EMPIRICAL ESSAYS ON ENTREPRENEURIAL FINANCE

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ABSTRACT

This dissertation contains three chapters, covering analyses on crowdfunding, mutual fund, and entrepreneurial ecosystem. The chapters are connected at a theoretical level by the study of information asymmetries among financial intermediaries and the value added (or lack thereof) that intermediaries provide in different contexts.

The first essay on crowdfunding focuses on platform due diligence. Crowdfunding platform due diligence comprises background checks, site visits, credit checks, cross-checks, account monitoring, and third party proof on funding projects. I conjecture that due diligence is associated with the busyness of platform employees and sophistication of platform service indicated by fee structure. Due diligence screens lower quality projects and mitigates information asymmetries between project issuers and funders; it is associated with higher percentage of successful campaigns and larger amount of capital raised on platforms. I test these propositions with platform-level data and find strong supportive evidence.

The second essay on mutual fund studies agency problems associated with fund fee structure. Distinguishing between switches, pre-authorized contributions, systematic withdrawal plans, reinvestments, and distributions, I find that different types of flow exhibit distinct characteristics to retail fund flow with respect to fund fees and past performance. I argue that the positive correlation between retail fund inflow and switch-out reflects information asymmetry between incoming investors and current unitholders. I further show that this information asymmetry, attributed to biased purchase advice, is negatively associated with fund performance. A large sample of proprietary Canadian data from 2003– 2014 support the findings.

The third essay on entrepreneurial ecosystem studies the joint impact of venture capitalist and technology parks on small business development. I argue two alternative routes that lead entrepreneurial start-ups to acquisition outcomes instead of liquidation. On one hand, acquisitions can come about through the control route with external financers such as venture capitalists (VCs). On the other hand, acquisitions can come about through more advice and support provided to the start-up, such as that provided by a technology park. Empirical analyses on a sample of 251 Crunchbase companies in the U.S. strongly support these propositions.

To my lovely wife, Yanan and my parents

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Chapter 1

1.1 Introduction

It is widely recognized in oft-repeated media releases that crowdfunding has drastically changed the entrepreneurship and entrepreneurial finance ecosystem. Relative to the better-studied traditional forms of finance involving banks (Robb and Robinson, 2012; Ryan et al., 2014; Tykvová, 2016), venture capital (Giot and Schwienbacher, 2007; Nahata, 2008; Nahata et al., 2014; Espenlaub et al., 2015) and private equity (Nielsen, 2008), and initial public offerings (IPOs) (Vismara et al., 2012), crowdfunding potentially involves a more pronounced democratization of capital, with the frequency and success of capital campaigns more equitably distributed across gender and project types. This spurs the creative process, enabling innovation and entrepreneurship at new levels of vigor not previously possible through traditional forms of entrepreneurial finance (Schwienbacher et al., 2013; Belleflamme et al., 2014; Dorfleitnera et al., 2016; Vismara, 2016). In recent years, the volume of crowdfunding has at least doubled annually around the world; in 2014, the crowdfunding market was $US17.25 billion in North America, $US85.74 million in South America, $US6.84 billion in Europe, $US24.16 million in Africa, $US10.54 billion in Asia, and $US68.60 million in Oceania (Massolution, 2015).

With the growth in crowdfunding markets around the world, several questions arise for which answers are not easily transferrable from other types of entrepreneurial finance. One question hitherto unexplored is very basic: whether all types of platforms are the same, merely providing ease of connection between individual funders and those that need capital, or whether they, in fact, differ in the sense that, for example, one venture capital fund may differ from another, implying massive differences for the venture's success and the investor's returns

(Nahata, 2008). Given the massive information asymmetries between investors with capital and entrepreneurs that need capital, attributable to the scant or non-existent disclosure requirements when an entrepreneurial firm is not publicly listed on a stock exchange, it becomes important to understand what crowdfunding platforms actually do and whether it influences entrepreneurial outcomes and funder returns. Similarly, as many global regions wrestle with legislation pertaining to crowdfunding, it is important to know what role platforms can, should, and/or might play in the governance of crowdfunding marketplaces.

In this paper, we address two questions. First, what drives the application of crowdfunding platform due diligence? Second, is there a benefit associated with due diligence in terms of more successful crowdfunding campaigns? We address these questions with a unique dataset gathered from 51 Canadian crowdfunding platforms over the years 2013-2017. The data comprise a majority of the crowdfunding marketplace, representing 71% of the total number of crowdfunding platforms in Canada in 2015, and were collected by a reputable third party (the National Crowdfunding Association of Canada, or NCFA Canada[1]). The data enable direct investigation of what crowdfunding platforms do. In particular, we examine crowdfunding due diligence, meaning the screening of projects that seek listing on crowdfunding platforms. We also examine other value-added services provided by platforms that go beyond due diligence. Finally, we assess the factors that influence the application of due diligence and other services, as well as whether due diligence and other services provided by platforms are associated with the success of project campaigns.

[1] http://ncfacanada.org/. Equity crowdfunding in Canada in the years covered by our data was restricted to accredited investors. The institutional setting is explained in full in section 2.

The data examined reveal that crowdfunding platform due diligence comprises background checks, site visits, credit checks, cross-checks, account monitoring, and third party proof. The data indicate that due diligence is less prominent for crowdfunding platforms with busy employees that list too many projects, with a less-sophisticated management system, as indicated by an inflexible service-fee structure, and with less complex campaigns that do not involve security investment. We further find that due diligence application not only facilitates fundraising campaign success but also helps to increase the total amount of capital raised on a platform. We argue that due diligence application benefits the crowdfunding process by screening lower quality or fraudulent projects and mitigating information asymmetries between project issuers and funders.

Our paper is related to a growing number of studies on reward-based crowdfunding (Agrawal et al., 2015; Belleflamme et al., 2013; 2014; Berea et al., 2016; Colombo et al., 2016) equity crowdfunding (Ahlers et al., 2015; Vismara, 2016), and crowdfunding regulation (Griffin, 2012; Hornuf and Schwienbacher, 2016a; 2016b). A common feature of these papers, however, is that the differences across platforms are not empirically studied, as the data typically come from just one platform. Our paper is distinct in exploring differences across platforms on due diligence application using unique proprietary data on platform operations. Our paper is, likewise, related to other forms of entrepreneurial finance, such as work on investor effort; most directly, our paper relates to work on the importance of due diligence (Yung, 2009), investor value added (Kanniainen and Keuschnigg, 2003; 2004; Keuschnigg, 2004; Andrieu and Groh, 2012), and venture capital and private equity reputation (Nahata, 2008). There is evidence of massive heterogeneity across private equity funds in the extent of due diligence carried out prior to investment, and a positive correlation and even a causal connection between the extent of due

diligence and the investee firm's subsequent performance (Cumming and Zambelli, 2016), consistent with theory (Yung, 2009). Inspired by these related studies, our analysis examines the presence and impact of due diligence on fundraising campaigns in the relatively new field of crowdfunding.

1.2 Institutional Settings and Legal Environment

Crowdfunding involves sourcing capital from many (typically) retail funders through an internet webpage known as a "platform." Entrepreneurs post projects for which they need capital. Anyone in "the crowd" (the pool of possible funders) can see the projects on the platform, and decide whether to invest. Some platforms facilitate donation- and reward-based crowdfunding without projects offering equity shares, while others list projects offering equity shares in entrepreneurial firms. Reward-based crowdfunding is the most common worldwide (Massolution, 2015), and involves offering small rewards, such as early product access, to the crowd in exchange for capital contributions. Peer-to-peer (P2P) lending is another form of crowdfunding, allowing interest to be paid on investment (Bradford, 2012).

Crowdfunding regulations are extremely detailed in the Canadian provinces. Here, we briefly summarize the general framework of Canadian security crowdfunding regulations as it pertains to due diligence.

Security crowdfunding regulations are imposed on all parties involved in the security offering process: funders, issuers, and crowdfunding platforms. For funders, a limit is imposed on the amount an ordinary funder can contribute per issuer distribution in a 12-month period. To remove this limit, a funder needs to be accredited by either possessing a high level of net assets or meeting an annual income requirement. Investment funds are not generally permitted to

participate in security crowdfunding. For issuers, their financial statements are required for fundraising; depending on project size, financial statements must be prepared by management in the least-regulated case and officially audited in the most-regulated case. In addition, biographic files for all directors and control persons related to the issuer are required. Although these documents are not vetted by security regulators prior to fundraising campaigns, issuers must file an official security distribution report and submit copies of financial statements and the directors' and/or control persons' biographies to the regulators after successful crowdfunding. For platforms, they must be registered as security dealers in the province in which they are headquartered and review the documents from issuers prior to posting projects on their portal. Platforms are not allowed to solicit funders.

Under this regulatory framework, it may seem reasonable to assume that all security crowdfunding platforms apply due diligence on project selection. Nevertheless, two questions must be posed before rushing to a conclusion. First, are there specific requirements for the procedures that platforms should follow to ensure they meet due diligence expectations? Second, are platforms liable for low-quality projects? Unfortunately, no clear answers are given under current regulations. As the actual due diligence application is resource-demanding to platforms and cannot be fully overseen by regulators, we expect significant variations in due diligence application, measured by the specific approaches platforms undertake, across all types of crowdfunding platforms, including security crowdfunding. However, due to the demands of security regulators, we expect due diligence to be more extensively performed among security crowdfunding than among other types of crowdfunding.

Although not central to regulatory concerns, donation- and reward-based crowdfunding platforms have reputational incentives to assure the quality and genuineness of listed projects, as

fraud cases can lead to project issuers and funders avoiding the platform in the future.[2] In addition, traditional consumer protection, contract, tort, and business laws apply to reward- and donation-based crowdfunding. Potential lawsuits on restitution for fraud claims provides a further layer of monetary incentive for due diligence. We, therefore, expect that due diligence is also conducted among non-security crowdfunding platforms, but that its use is less prevalent and rigorous than in security crowdfunding.

We do not exclude rewards–based platforms from the data for a variety of reasons. First, for many firms, rewards based crowdfunding is part of their financing cycle. Consider for example Pebble Watch, which raised $10 million in a week through Kickstarter's rewards based crowdfunding platform; and, Oculus One which raised $2.4 million on Kickstarter, and was subsequently purchased by Facebook for $2 billion, causing outrage amongst their *investors* (the way in which contributors to rewards based crowdfunding campaigns are referred to in the news) and leading to the legal change allowing equity crowdfunding in the U.S.[3] Second, the difference between an investor in a rewards based campaign and an investor in an equity campaign is merely in the nature of the reward and timing of the potential payoff. For example, in the campaign for Bolt Drones,[4] the reward is the early access to the product at a discounted price. In an equity crowdfunding campaign, the reward is the share which may potentially be sold at a subsequently higher price. Both are investments, and the only difference is in the nature

[2] Reputation concerns with crowdfunding and misconduct have been discussed repeatedly in mainstream media such as the New York Times. See for example, https://www.nytimes.com/2017/01/24/business/dealbook/crowdfunding-fraud-investing-startups.html

[3] The Guardian reported: "Early backers of the Oculus Rift project are questioning the value of their investment after the virtual reality firm was acquired by Facebook" https://www.theguardian.com/technology/2014/mar/26/facebook-oculus-deal-kickstarter-first-billion-dollar-exit. See also https://www.forbes.com/forbes/welcome/?toURL=https://www.forbes.com/sites/chancebarnett/2014/05/01/2-billion-facebook-acquisition-raises-question-is-equity-crowdfunding-better/&refURL=https://www.google.ca/&referrer=https://www.google.ca/ where Forbes reports "$2B Facebook Acquisition Raises Question: Is Equity Crowdfunding Better?"

[4] https://www.kickstarter.com/projects/1394449697/bolt-drones-introducing-a-whole-new-flight-experie

of the payoff. Reward investors face the risk that the product will never be developed and delivered, making their investment worthless. Equity investors face the risk that the company fails and the share is worthless. Third, rewards based crowdfunding investors are consuming a product, but at a substantial discount and at a substantial risk. There is no guarantee that the product will be delivered. Over half of rewards based crowdfunding projects are in fact not delivered. So we believe it the literature is consistent with the view that rewards based crowdfunding is an investment and not consumption, and the economics underlying the interplay between due diligence and platform success apply in a similar way to different types of platforms. In our empirical analyses below, we consider all platform types together and use platform fixed effects in our regressions. We exclude different platform types and provide other robustness checks in the Online Appendix that accompanies this paper.

1.3 Hypotheses

Our analyses of due diligence focus on two questions. First, what leads to the application of platform due diligence? Broadly, we focus on agency costs (Hypotheses 1 and 2). Second, what benefits do platforms receive through due diligence application? To this end, we examine the impact of mitigating agency problems and information asymmetries (Hypothesis 3).

1.3.1. Agency Costs: Multitask Moral Hazard

A crowdfunding platform's objective is of course to maximize the amount of capital that it makes. A platform has three primary choices: (1) fee structures, (2) due diligence, and (3) platform differentiation in respect of industry focus. A platform that is more differentiated in regards to its focus competes for business with other platforms less intensively on fees and on due diligence because the platform captures a niche area. For example, there are platforms

specific to arts, local regional businesses, women, music, real estate, fashion, farming, poverty, high tech firms such as blockchain related, among others. For each of these types of features, there is a level of product differentiation offered by the platform that encourages fundraisers to list with the platform to reach their target audience. Very few platforms, such as Kickstarter and Indiegogo, are generalist platforms that list everything. Therefore, fee structures and due diligence play a role in platforms competing with each other, but not a dominate role as would be the case if all platforms were perfectly homogenous. Fundraisers and their investors chose which platform to participate. Platforms select their extent of due diligence and their fee structures, which they may modify over time depending on the flow of new projects that seek listing on the platform, and the extent of investor interest in the platform. Platforms are much less likely to change their brand or product differentiation from one year to the next due to the long-term investment that is required to build up the brand. Selecting a high level of due diligence mitigates potential reputation costs and litigation risks associated with projects that should not have been listed. High levels of due diligence screens lower quality entrepreneurs from entering the platform. Platform fee structures further influence which entrepreneurs use the platform, and potentially provides incentives for platform employees to be more proactive in their application of due diligence. To hypothesize on a platform level, we consider the competition and choice of fundraisers, but also recognize that comparative statics are made tractable by virtue of platform product differentiation that is rather time invariant, and fee structures and due diligence that is time variant. The nascent nature of the crowdfunding industry predictions and enables assessment of these comparative statics as platforms sort themselves out over time. In view of platform differentiation, the platform decision rules regarding fee structures and due diligence

are not necessarily competing with other platforms as much as they are learning about their business model over time.

Our first hypothesis pertains to the simple notion of agents' time constraints, and draws from the venture capital literature on portfolio size per manager. Value-added active investors face a tradeoff in adding more investees to their portfolio, balancing the benefit of network externalities across portfolio firms against the cost of having less time to conduct proper due diligence and to add value to each investee company, by providing financial, administrative, human resource, network, and other forms of advice (Kanniainen and Keuschnigg, 2003; 2004; Keuschnigg, 2004; Cumming. 2006; Bernile et al., 2007; Fulghieri and Sevilir, 2009). The same notion applies to the time spent by crowdfunding platforms conducting due diligence on entrepreneurs seeking to list a campaign.

Platforms do not have unlimited resources, and it takes time to administer background checks, site visits, credit checks, cross-checks, account monitoring, and sourcing third party proof. Background checks involve checking the personal history of the entrepreneurial team, including whether or not they have crowdfunded in the past on the current platform or other platforms and if so how the campaign fared, whether they have a criminal record, and whether they have valid identification. Site visits involve physically going to the office, factory, or other space where the entrepreneur does their business. Credit checks, account monitoring and sourcing third party proof involves assessing the payment and credit card history of the entrepreneurial team, as well as payment of leases and other rentals for office space and equipment. Cross-checks involve talking with customers and suppliers that have interacted with the entrepreneurial team, as well as checking social media for improper language or other offensive material. Likewise, services provided to project initiators, such as strategic fundraising

guidance, marketing or promotion assistance, contractual help, and financial planning, are all time-consuming. The greater the number of listed projects per employee, the lower the likelihood of having sufficient time to conduct all these activities due to multitask moral hazard. In this regard, slack of human resources should have a positive impact on platform due diligence application.

Hypothesis 1: *Ceteris paribus, platforms that have more employees and fewer listed projects are more likely to conduct due diligence due to slack of human resources.*

Hypothesis 1 is not obvious and is worth subjecting to empirical testing. First, there could exist a moderating effect on the human resource impact: not all employees are equally productive, and platforms that adopt advanced technology skills may carry out due diligence more efficiently with fewer employees. If there is wide variation in technology levels among platforms, we should observe weak or no correlation between due diligence and employee number, but a strong correlation between due diligence and technology.

There is a second potentially confounding effect pertinent to Hypothesis 1. Crowdfunding platforms are for-profit business entities. A platform's employment demand depends on its business strategy and operational needs. Platforms do not over-employ and then assign idle workforce members to perform due diligence tasks. If a platform is not required to do due diligence, it may not hire designated due diligence staff. Instead, workforce can be used for tasks associated with marketing, customer service, website design and maintenance, etc. As such, more abundant human resources does not necessarily translate into the application of due diligence.

Note that while we have one theory as to why an increase in the number of campaigns per platform employee is associated with less due diligence due to busyness, and multiple alternative theories as to why there is no such association, it is nevertheless worth assessing whether or not the busyness theory is valid with empirical testing. We test this theory in section 4 and thereafter below, among other theories and predictions explained here in section 3.

1.3.2. Agency Costs: Compensation Structures

Crowdfunding platforms have different fee structures. Different types of fee structures may align the interests of the platform with those of the crowd that invests in projects listed on the platform. If platforms receive a fee regardless of whether a project campaign is successful, then the platform has a greater incentive to list a project regardless of its quality. Conversely, if the platform only receives a fee from successfully funded projects, then the platform has more incentive to conduct extensive due diligence and only list projects likely to come to fruition. In addition, fee structure design reflects the professionalism of platform management: sophisticated platforms adopt more flexible fee structures, provide services at different levels, carry higher reputation, and are more selective on campaign projects.

> **Hypothesis 2:** *Ceteris paribus, platforms that receive fees regardless of the success of fundraising campaigns are less likely to conduct extensive due diligence; platforms that adopt advanced fee structures and charge fees based on successful fundraising campaigns are more likely to apply due diligence.*

It is not obvious that we should expect to observe Hypothesis 2 in practice. An alternative hypothesis is that the main purpose of platform fee structure design is to maximize the number of entrepreneurs that use a platform. If a platform charges a low listing commission and obtains

revenue mainly from successful fundraising of projects, it may attract more entrepreneurs to list on the platform than a competing platform that charges listing commissions regardless of fundraising success, since project initiators thus pay less in the event of an unsuccessful campaign. In this case, the fee structure design would be uncorrelated with due diligence. So, as with Hypothesis 1, we have one theory that predicts a relationship and potentially more than one theory as to why that relationship might not exist.

1.3.3. Benefits Associated with Mitigating Agency Costs and Information Asymmetries

It is costly to apply due diligence; therefore, platforms need to obtain sufficient benefit from due diligence to justify the according expenses. To evaluate the benefit that platforms obtain from due diligence application, we introduce our measurements of platform performance.

We use three proxies to measure a platform's operational performance: (1) the percentage of projects fully funded on a platform (higher is better); (2) the total amount of capital raised through a platform (higher is better); and (3) the average fundraising duration on a platform (shorter is better).

In general, we expect due diligence to be positively associated with crowdfunding platforms' improved performance. Effective due diligence removes the left tail of the quality distribution, preventing such low-quality entrepreneurial projects from appearing on the platform. Without the left tail, the average project quality is higher. Prior research reinforces the view that the left tail is large in crowdfunding markets (Eraker and Ready, 2015). Furthermore, platform due diligence processes encourage entrepreneurs to present a more transparent campaign to clear the due diligence hurdle, which, in turn, mitigates information asymmetries between the entrepreneur and the crowd. Entrepreneurs faced with extensive due diligence

checks are more likely to take costly steps to signal their quality, such as preparing quality project descriptions, which, in turn, lowers information asymmetries faced by funders and signals quality to the crowd (Spence, 2002).

As the average quality of fundraising campaigns improves and campaign projects become more transparent to funders, we should observe a higher rate of successful fundraising[5] on a platform. This higher rate of successful fundraising directly attracts more entrepreneurs to list future projects. Moreover, competent due diligence builds a strong reputation for the platform among funders; in turn, this reputational effect makes a platform more appealing among potential project issuers. Therefore, ceteris paribus, we expect a platform to attract more projects and channel more money flow if it conducts due diligence on listed projects. Finally, as platform due diligence raises the quality of listed projects, investment decision-making will become easier for funders; consequently, we should observe more time-efficient fundraising associated with due diligence application.

> **Hypothesis 3:** *Crowdfunding platform due diligence is associated with better platform performance, in terms of: higher percentage of fully funded projects, larger total amount of capital raised through a platform, and quicker fundraising process.*

Several considerations point to alternative predictions counter to Hypothesis 3. Crowdfunding platforms scantly advertise their due diligence activities for at least three reasons.[6] First, once publicly announced, project selection criteria imply a guarantee of the minimum quality of listed projects to funders. However, the quality of listed projects is not fully observable to a platform even after conducting due diligence; and a large proportion of projects will fail to

[5] Fundraising is considered successful when a project is fully funded within the issuer's expected time horizon.
[6] We are not aware of any advertisements or promotions of what crowdfunding platforms do in respect of their due diligence for any of the platforms in our sample.

either meet funders' expectations or reach their campaign goals. As such, publicly announcing project selection criteria increases platforms' litigation risk.[7] Second, empirically, it is difficult for a platform to adopt standard and static project selection criteria beyond rudimentary listing requirements. Platforms implement flexible selection criteria to accommodate changes in the number and quality of projects. In addition, project quality can be evaluated in different dimensions: for example, some evaluation criteria, such as site-visit expectations and account-monitoring requirements, are either subjective by nature or confidential to prevent exploitation of loopholes. Since due diligence application is flexible, platforms do not have standard guidelines. Third, it is in platforms' interest to encourage more projects to apply, enabling them to obtain more comprehensive market information, on which an appropriate level of due diligence is applied. Furthermore, detailed and rigid listing requirements could even deter some good projects from listing on the platform, due to concerns over fundraising speed and efficiency.

The possible assortative matching of project to platform is possibly a function of due diligence and platform fees,[8] as we have noted above at the start of subsection 3.1. Entrepreneurs could figure out the extent of due diligence being applied and stop the application phase, or the platform could deny entry to the platform through the application of due diligence. However, another more critical component of that matching of projects to platforms is through the project type. Projects with a specific niche are more likely to select a platform with the same niche (e.g., music, fashion, real estate, etc.), regardless of the extent of due diligence application.

On the one hand, crowdfunding platforms' silence on due diligence application produces insufficient funder awareness on platform due diligence. On the other hand, even if platforms

[7] See for example https://canadianfraudnews.com/crowdfunding-fraud-litigation-litigation-funding-scams/ and https://www.crowdfundinsider.com/2015/08/73378-recent-lawsuit-may-show-big-liability-risk-for-crowdfunding-platforms/

[8] We thank an anonymous reviewer for this helpful comment.

claim due diligence application, their due diligence actions are not directly verifiable by project funders. It takes time for funders to realize the quality of listed projects and the level of platform due diligence. As the extent of due diligence application could vary between periods, funders cannot fully infer the level of platform due diligence application in the concurrent fundraising period: essentially, platform due diligence cannot directly facilitate funders' decision-making, which brings uncertainty to the benefit of due diligence application on crowdfunding outcomes. Taken together, due diligence may be completely unrelated to crowdfunding platform performance. It is, therefore, worth examining the data.

1.4 Data

This study's data were provided by NCFA Canada. The data contain information on 51 crowdfunding platforms, representing 71% of the total Canadian crowdfunding market.[9] Among the 51 platforms, 21 are donation-based, 9 reward-based, 4 lending-based, 9 security-based, and 8 platforms contain more than one type of crowdfunding. The data cover the time period for each of the five years from 2013 to 2017. The data are yearly based and were submitted by the platforms: each row in the data shows the operating condition of a platform in a given year. There are items of heterogeneity within the platform projects that we do not observe; it is not possible for us to observe all of the underlying data within each platform. The unit of observation is a platform-year, for a total of 255 observations for 2013-2017.

Table 1 summarizes different categories of platform information reported in the data. The data indicate the general status of a platform, such as the registration date and status, crowdfunding type, number of employees, website address, and related details. The data indicate

[9] As of December 2015, there were 72 crowdfunding platforms in Canada. There were fewer platforms in earlier years, implying we have coverage of more than 72% of the market for earlier years.

the type of due diligence checks conducted by a platform, such as background checks (i.e., verification of government-issued ID), personal meeting or site visit, financial or credit checks, cross-checks with customers, suppliers and social media (such as Facebook or LinkedIn), monitoring account activities, and requests for third party certificates or proof. Only 49% platforms acknowledged that they regularly conducted any form of due diligence. Of the six different types of due diligence checks (background checks, site visits, credit checks, cross-checks, account monitoring, and third party proof), the average number employed was 1.2, with a median of 0 and a maximum of 6.

The data indicate the services available to subscribers, such as pre-evaluation before listing on the platform, strategic fundraising guidance, business or financial planning, facilitation in crowdfunding contract design, and marketing or promotional services. In total, 34.5% of the platforms provided regular updates to users (funders and entrepreneurs), while 28.6% offered pre-evaluation to start-ups before listing, 26.3% offered fundraising guidance to entrepreneurs, 16.9% offered marketing and promotional services, 15.3% offered business and financial planning services, and 9.8% offered contractual help to start-ups.

The data comprise information on each platform's operating conditions in each year from 2013 to 2017: number of projects launched, average successful fundraising rate, average fundraising duration, and total amount of capital raised on a platform. The median platform has projects that take 7-9 weeks to achieve full-funding, and the median platform has 21-30% entrepreneurs achieving their funding goal. The median platform spends between $2,500 and $10,000 CAD on compliance annually,[10] has 10 employees, 501-1,000 funders per year, 101-250 entrepreneurial projects listed per year, and total capital raised between $1,000,000 and

[10] Employee salary is excluded from the compliance expenditure.

$1,500,000 per year. The crowdfunding projects cover the following industries: non-profit, business and professional services, education and research, art, life science, cleantech and energy, hardware and software, manufacturing, media, real estate, and social enterprise.

Fee structure/revenue models of the platform are included in the data, including whether the platform: charges a one-time platform listing fee (17.7%), periodical subscription at different levels/tiers (20.0%), fixed percentage of the total amount raised (whether funding is successful or not) (15.3%), fixed percentage of the total amount raised (only if funding is successful) (23.9%), and management fees and carry percentages (23.1%). These and other variables and detailed summary statistics (means, medians, standard deviations, minimum, and maximums) are shown in Table 1.

Table 1 (Page 36)

The comparison tests in Table 2 provide a first impression of some distinct patterns in the dataset. Although comparison tests do not show the precise relationships among variables because variables are analyzed separately and in isolation, these tests nevertheless present a general picture of relationships for some key variables of interest. The joint effect of the same variables is discussed in the next section's consideration of regression analysis.

Table 2 (Page 38)

Table 2 Panel A shows there is a higher probability of due diligence application among platforms with a smaller number of projects: when the number of campaign projects is greater than the median across platforms, only 34.7% of platforms conduct due diligence, and when the number of campaign projects is below the median then 51.3% of platforms conduct due diligence. This is consistent with Hypothesis 1. Similarly, there is a higher probability of due

diligence among platforms with a great number of employees: when the number of employees is greater than the median across platforms, 64.4% of platforms conduct due diligence, and when the number of employees is below the median then 19.1% of platforms conduct due diligence. Again, this is consistent with Hypothesis 1. There is a higher probability of due diligence among platforms that spend more on compliance: when compliance expenditures are greater than the median across platforms, 62.8% of platforms conduct due diligence, and when the compliance expenditures are below the median then 32.3% of platforms conduct due diligence. Due diligence is also more likely among platforms that have fee models with periodical subscription at different levels (72.6% for those with these fees, versus 43.6% for platforms without this fee structure), consistent with Hypothesis 2. However, the likelihood of due diligence is indistinguishable between platforms that charge a fixed percentage service fee only if fundraising is successful and platforms without the fee structure. Each of the reported differences is statistically significant at least at the 5% level.

Table 2 Panel B presents the possible advantages of due diligence application, partially consistent with Hypothesis 3. There is a higher level of fully funded projects and a larger amount of capital raised through platforms that conduct due diligence, and these differences are significant at the 1% level. However, due diligence does not have a significant effect on fundraising duration.

Table 3 presents the correlations among variables of interest. Table 3 Panel A shows that due diligence application is positively correlated with resources devoted to compliance, employee numbers, all or nothing fundraising policy, and user subscription at different levels. Due diligence application is negatively correlated with the number of campaign projects on a platform. Table 3 Panel B shows the correlation among due diligence application, platform

performance, and different types of platform services. Consistent with the comparison test results in Table 2 Panel B, due diligence application is positively associated with a higher percentage of fully funded projects and a larger amount of capital raised through a platform, and does not exhibit a strong correlation with fundraising duration. The number of due diligence types employed is positively correlated with the percentage of fully funded projects, the total amount of capital raised through the platform, and several platform services. The number of projects per employee ratio is negatively correlated with the total amount of capital raised through the platform, periodical updates, and contract help. Further detailed correlations among platform services are also presented in Table 3.

Table 3 (Page 39)

1.5 Multivariate Analyses

In this section, we use detailed analysis to reveal the factors influencing platform due diligence and demonstrate how due diligence application benefits crowdfunding platforms.

1.5.1. Due Diligence Application

We use logit regressions to examine the factors influencing platform due diligence. Crowdfunding platform fixed effect models are applied in analyses; standard errors are clustered by year. For reasons of conciseness, we do not show the regressions for all types of due diligence individually: instead, we first report regressions for overall due diligence (all types of due diligence combined), and then report regressions for the three most common due diligence subcategories: background check, site visit, and cross check. In a prior version of the paper, we reported year-by-year regressions, and the statistical and economic significance of the results are

very consistent (available on request).

Tables 4 (Page 40)

Figure 1 (Page 34)

Figure 2 (Page 34)

Table 4 shows the factors influencing due diligence application in general. Due diligence is applied when at least one of the following actions is taken: background check, site visit, credit check, cross-check with customers, suppliers and social media, monitoring account activities, and requesting third party certificates or proof. The data indicate that the number of projects in each year is negatively correlated with due diligence application, and this effect is statistically significant at the 5% level in each of the models. The economic significance is such that, on average, an increase by one categorical unit in the number of projects[11] is associated with an 24.5% (Model 5) to 30.2% (Model 1) reduction in the probability of due diligence, consistent with Hypothesis 1. Figure 1 presents a graphic illustration of these findings. Similarly, the number of employees is positively and significantly (at the 5% level) correlated with due diligence: a one standard deviation increase in the number of employees results in a 7.8% (Model 4) to 10.7% (Model 5) increase in the probability of due diligence, again consistent with Hypothesis 1. These results remain even when controlling for resources spent on compliance, which is positively and significantly (at the 5% level) correlated with due diligence: an increase by one unit in resources spent on compliance[12] leads to an 20.0% (Model 6) to 23.7% (Model 2) increase in the probability of due diligence (presented graphically in Figure 2).

[11] The number of projects is an ordinal variable; see Table 1.
[12] Resource is an ordinal variable; see Table 1.

Platforms with periodical subscription at different levels are more likely to conduct due diligence by 9.4% (Model 6), compared with platforms with plain one-time listing fee. This effect is consistent with Hypothesis 2, and significant at the 5% level. Furthermore, platforms that adopt all-or-nothing fundraising policy are more likely to conduct due diligence. On average, a platform with all-or-nothing fundraising policy is 6.8% (Model 4) to 8.2% (Model 5) more likely to carry out due diligence than a platform without all-or-nothing policy; this effect is statistically significant at the 5% level in Models 4 and 6 and at the 10% level in Model 5.

Table 5 (Page 41)

Table 5 further analyzes three main types of due diligence application: background checks (Panel A), site visits (Panel B), and cross-check with customers, suppliers and social media (Panel C). The data in Table 5 Panel A indicate the following (each of these effects is significant at the 5% level, except where otherwise stated). First, a one-unit increase in the number of campaign projects reduces the probability of background checks by 25.3% (Model 2) to 28.3% (Model 6). Second, a one-unit increase in the amount of resources spent on compliance annually increases the probability of background checks by 6.5% (Model 2) to 7.7% (Model 4). Third, a one standard deviation increase in the number of employees increases the probability of background checks by 5.9% (Model 3) to 7.4% (Model 5).[13] Fourth, all-or-nothing fundraising policy increases the probability of background checks by 4.7% (Model 6) to 5.1% (Model 4). Fifth, advanced fee structures increase the probability of background checks by 5.4% (Model 6).

Table 5 Panel B indicates that a one-unit increase in the number of projects reduces the probability of site visits by 26.5% (Model 6) to 32.8% (Model 4). A one-unit increase in the

[13] A one standard deviation increase in the number of employees is 10.58; see Table 1. We did not round up this figure to a whole number to maintain consistency across each of the variables in reporting the economic significance.

amount of resources spent on compliance annually increases the probability of site visits by 18.1% (Model 4) to 22.0% (Model 3); these effects are significant at the 10% level in Models 2-6, and at 5% level in Model 1. A one standard deviation increase in the number of platform employees increases the probability of a site visit by 8.2% (Model 5) to 9.1% (Model 3). The advanced fee structure has a statistically significant (at the 5% level) impact on probability of site visits where the economic significance is an increase of 8.8% (Model 6) compared with platforms adopting plain one-time listing fee.

Table 5 Panel C indicates that a one-unit increase in resources spent on compliance increases the probability of cross-checks by 27.6% (Model 4) to 33.8% (Model 5); these effects are significant at the 5% level. A one standard deviation increase in the number of employees increases the probability of cross-checks by 11.1% (Model 3) to 12.2% (Model 4); these effects are significant at the 5% level in Model 3, Model 4 and Model 6 and at the 10% level in Model 5. All-or-nothing fundraising policy is associated with an increase in the probability of cross-checks by 8.5% (Model 4) to 9.7% (Model 5); these effects are significant at the 10% level. Advanced fee structures increase the probability of cross-checks by 11.6% (Model 6), significant at the 5% level. Neither the number of campaign projects nor the number of funders has a consistently noticeable impact on cross-check with customers, suppliers and social media.

1.5.2. Due Diligence Benefit

We use ordered probit regressions to examine whether due diligence, among other factors, influences crowdfunding platform performance. Fix effect models controlling for crowdfunding platforms are applied; standard errors are clustered by year.

Table 6 presents the results for the impact of due diligence application on platform

performance, measured by the percentage of fully funded projects,[14] total amount of capital raised annually, and average fundraising duration.

Table 6 (Page 44)

Table 6 Panel A shows that due diligence application is associated with a higher percentage of fully funded projects, controlling for all types of services offered by the platform. Specifically, the application of due diligence increases the scale on percentage of fully funded projects by 1.07 (Model 4) to 1.33 (Model 1). This effect is statistically significant at the 5% level. Based on the average scale on the percentage of fully funded projects in the matched sample (2.73; see Table 1), platform due diligence application leads to a significant 39.3% to 48.7% increase in fully funded projects on a platform, controlling for different types of platform services.

It should also be noted that the project/employee ratio has a negative impact on the percentage of fully funded projects in Table 6: on average, the higher the ratio, the lower the resources devoted to each project, the greater the competition across projects and the lower the success of projects. On average, an increase in one magnitude of the project/employee ratio on a platform reduces the scale on the percentage of fully funded projects on a platform by 0.44 (Model 3) to 0.52 (Model 6); this effect is significant at the 5% level. Based on the average scale on the percentage of fully funded projects in the matched sample (2.73), a one magnitude increase in the project/employee ratio reduces the percentage of fully funded projects by 16.1% to 19.1%.

Table 6 Panel B shows that due diligence application is associated with a larger amount of capital raised through a platform. Specifically, the application of due diligence increases the

[14] We considered the commonly used transformation for dependent variables that are in percentages (e.g., see Kieschnick and McCullough, 2003) but not find material differences in the results.

scale of total amount of capital raised by 1.14 (Model 6) to 1.26 (Model 1), each significant at the 5% level in Models 1-6, controlling for the number of projects listed on and services provided by the platform. Based on the average scale on the total amount of capital raised (4.17), platform due diligence application leads to a significant 27.3% to 30.1% increase in the total amount of capital raised on a platform, controlling for different types of platform services.

The effect of the project/employee ratio is significant at the 10% level in Models 1-6. On average, an increase in one magnitude of project/employee ratio on a platform reduces the scale on the total amount of capital raised on a platform by 0.88 (Model 1) to 1.08 (Model 4). Based on the average scale on the total amount of capital raised (4.17), an increase in the project/employee ratio by one point on the ordinal scale reduces the total amount of capital raised by 21.0% to 26.0%.

The effect of strategic fundraising guidance is significant at the 10% level in Models 1, 2, 3, 5, and 6, and at the 5% level in Model 4. On average, strategic fundraising guidance increases the scale on the total amount of capital raised on a platform by 0.59 (Model 6) to 0.76 (Model 2). Based on the average scale on the total amount of capital raised (4.17), strategic fundraising guidance increases the total amount of capital raised on a platform by 14.2% to 18.1%.

Table 6 Panel C does not present a significant negative relationship between due diligence application and fundraising duration, where fundraising duration refers to the time span between the first official listing day and the fully funded day, excluding the project listing application waiting time before the launch of the official campaign.[15] Nevertheless, the negative coefficient for due diligence application shows that where due diligence was applied, fundraising became quicker, which is consistent with our expectation. The effect of the project/employee ratio is positive and significant at the 5% level in Models 1-6. On average, an increase in one

[15] Only fully funded campaigns are considered.

magnitude of the project/employee ratio on a platform increases the scale on the average fundraising duration on a platform by 0.97 (Model 5) to 1.12 (Model 3). Based on the average scale on the average fundraising duration in the matched sample (2.53), a one magnitude increase in the project/employee ratio increases the average fundraising duration by 38.3% to 44.4%.

Promotion and marketing services also has a positive impact on the efficiency of fundraising, significant at the 10% level in Model 6. On average, marketing or promotion services reduce the scale on the average fundraising duration on a platform by 0.31 (Model 6). Based on the average scale on the average fundraising duration in the matched sample (2.53), marketing or promotion services reduce the average fundraising duration by 12.2%.

Figure 3 (Page 35)

Figure 3 shows the performance of 12 crowdfunding platforms that switched from non-due diligence to due diligence in year 2014, 2015 and 2016. The average values of total amount of capital raised annually and percentage of fully funded projects in each year for the 12 platforms are 5.42 and 2.67 in scale before the switch and 6.25 and 3.42 after the switch. The differences in values prior versus post the switch are statistically significant at 5% level.

Figure 4 (Page 35)

Figure 4 shows the performance of 11 crowdfunding platforms that switched from due diligence to non-due diligence in year 2014, 2015 and 2016. The average values of total amount of capital raised annually and percentage of fully funded projects in each year for the 11 platforms are 4.18 and 2.45 in scale before the switch and 3.91 and 2.27 after the switch. The differences in values prior versus post the switch are however, not statistically significant.

Figure 3 and figure 4 show that, due diligence is in general associated with better crowdfunding platform performance, measured by total amount of capital raised and percentage of fully funded projects. However, the impact of due diligence on platform performance is asymmetric across different levels of platform operating conditions: On the one hand, platforms that switched from non-due diligence to due diligence are on average have operating conditions around or above sample median levels; adopting due diligence enables them to further improve platform performance. On the other hand, platforms that switched from due diligence to non-due diligence are on average have operating conditions below sample median levels; dropping due diligence in the hope of allowing more projects to be listed on a platform is not a solution to boost performance for struggling crowdfunding platforms, whose performances are not noticeably influenced by due diligence application. We do not observe platforms switch back and forth in due diligence application in the sample period.

1.6 Robustness Checks

In the multivariate analyses, we applied the same set of tests on all crowdfunding platforms. However, security crowdfunding operates under more rigid regulations and faces more complex contractual arrangements than other types of crowdfunding. In addition, security crowdfunding funders expect monetary returns from crowdfunding projects; this monetary incentive differentiates them from funders involved in other types of crowdfunding. In this sense, security crowdfunding funders could be more sensitive to platform due diligence application; security crowdfunding platforms could drive our regression results.

To disentangle our findings from the influence of security crowdfunding, we conduct robustness checks on due diligence application among platforms without security fundraising. The results show that due diligence application is still positively related with the resources spent

on compliance annually, number of platform employees, and a more sophisticated fee structure, while negatively related with the number of projects listed on a platform, although the according marginal effects vary. Further details of the robustness checks are available upon request.

Another concern in the multivariate analyses is whether due diligence application is associated with economies of scale: large crowdfunding platforms can invest more resources on technology to improve the efficiency and effectiveness of due diligence application; they are also more likely to gain standardized experience through overseeing a larger number of listed projects. To test the robustness of our analysis, we applied the same tests on the sample excluding the largest four platforms, each of which listed more than 500 projects. The analysis results are not materially different. For conciseness, the according test results are not presented.

We have conducted analyses using separate regressions by year instead of panel regressions; again, the results are not materially different and, hence, they are not reported for conciseness.

Another concern with our tests of Hypothesis 3 is that due diligence is endogenous. In prior versions of the paper, and in the Online Appendix accompanying this paper, we provide two-stage estimates with fitted values of due diligence. Those estimates are consistent with the estimates here in respect of the inferences drawn about the benefits of due diligence. We recognize there may be the usual concerns regarding the quality of the instruments and the assumptions underlying the methods for non-continuous variables, and hence prefer to report the base case results without those instruments here in the main paper.[16]

We report these and other checks in the accompanying Online Appendix.

[16] For a further discussion on how instruments and two step methods are not necessarily better and may even be worse, see http://www.mostlyharmlesseconometrics.com/

1.7 Discussion

We argue that due diligence application improves platform performance by rejecting low-quality projects and reducing information asymmetry between entrepreneurs and funders, based on the regression results in Table 6. However, we do not propose direct causal relationships for variables pertaining to due diligence application in Tables 4 and 5. For instance, neither an upgrade in fee structure nor an increase in employee number guarantees a higher likelihood or better quality of due diligence. As platforms become more sophisticated and accumulate more resources, they could invest in many areas other than due diligence: platform advertising, services to entrepreneurs, funder education, strategic partnerships with business incubators, Angels and VCs, and even lobbying for a more supportive legislative environment. What platforms do depend on what is most valuable to entrepreneurs and funders: platforms may rank their investment agendas by priorities. As due diligence protects funders and signals the quality of crowdfunding projects, it deserves high priority on the platform investment agenda. This inference is supported by our findings in Tables 4 and 5: in general, factors relating to the slack of recourses and management sophistication are reflective of platform due diligence application.

If we treat crowdfunding due diligence as a selective process for projects seeking to be listed on a platform, then the supply and demand of crowdfunding projects will directly affect due diligence application. At first glance, more projects on the waiting list and weaker funder demand for crowdfunding projects ("Projects beg for investments") lead to more due diligence or rigid project selection processes, and the funders' rights will be given higher priority; conversely, fewer projects on the waiting list and stronger funder demand ("Funders beg for projects.") lead to less due diligence or loose project selection processes, and the entrepreneurs' fundraising needs will be given higher priority. Nevertheless, due diligence can also influence the supply and

demand of crowdfunding projects through its impact on platform reputation: platforms that apply proper due diligence receive trust and popularity among funders, which, in turn, attracts more entrepreneurs for project listing, resulting in improved due diligence application. In this regard, due diligence application leads to a virtuous cycle of more funders and better crowdfunding projects; therefore, it plays an important role in assuring the healthy development of the crowdfunding industry.

An important factor we cannot omit is technology improvement. Although we do not observe significant differences in platform technology levels during the sample horizon[17], we do expect that as the crowdfunding industry develops, the heterogeneity of platform technologies will have a significant impact on due diligence application: computer programs may provide automatic due diligence recommendations based on account activities, documentations from entrepreneurs, publicly available information and credit history, etc. We expect that technology development will greatly improve the efficiency of crowdfunding due diligence and, longer-term, both influence the competitiveness of crowdfunding platforms and shape the growth pattern of the crowdfunding industry.

One interesting phenomenon we observe is that platforms are quite silent on their due diligence activities: few platforms publicly advertise how selective they are regarding listed projects or what approaches they take to assure the quality of listed projects. For security crowdfunding, this phenomenon could be related to legal risk concerns, as platforms may wish to avoid motivating regulatory investigation of whether due diligence is appropriately applied. More generally, this phenomenon could be related to platform marketing strategy: platforms may want to emphasize the innovativeness of this fundraising channel and the attractiveness of

[17] If technology levels are significantly different among platforms, then project number and employee number should have no explanatory power on due diligence application.

crowdfunding investment, rather than tedious details of the quality-checking on crowdfunding projects. However, it is only when funders know whether a platform conducts due diligence that they could react by funding a campaign faster. In this regard, silent due diligence application is consistent with our findings in Table 6 Panel C: fundraising duration is not noticeably affected by platform due diligence.

We could imagine many explanations as to why platforms do not advertise their due diligence activities. For example, we are aware that venture capital funds do not advertise their due diligence on their webpages. Similarly, investment banks do not seem to advertise their due diligence teams as well. Crowdfunding is a new industry. We have recently shown our evidence to platforms in Canada, as well as regulators in Canada, the U.S., and other countries around the world. It appears that platforms may now appreciate better the benefits of due diligence. But to date, it appears that most platforms do due diligence in order to avoid being sued later on, or risk regulators taking away their right to operate a platform. That is, due diligence is viewed as a cost center, similar to the way that compliance is viewed as a cost center in banks and investment banks. We have added a discussion of these points after the presentation of our empirical results.

1.8 Limitations and Directions for Future Research

Our analysis is based on data collected by NCFA Canada from crowdfunding platforms. As platforms report their data to NCFA Canada, they could overstate their actions on due diligence application to exaggerate the quality of listed projects and their prudence on funder protection. If the extent of due diligence application is overstated, then the impact of real due diligence application on platform performance is underestimated, while the explanatory power of the factors associated with due diligence application is overestimated. In addition, platforms

could have different reporting standards, creating measurement errors on variables of interest. We expect that a more detailed dataset based on direct evaluations of crowdfunding platforms will better reflect the importance of due diligence on platform performance.

Our study broaches the subject of due diligence application in the fast-growing crowdfunding industry. Future studies on the subject could focus on the following areas:

The efficiency of due diligence application:

What are the direct and indirect costs associated with due diligence application? When does due diligence bring the highest marginal benefit to a platform? What is the optimal level of due diligence? Given different levels of platform resource constraint, what are the best ways to apply due diligence? Which project characteristics call for more/less due diligence application?

The platform listing barrier set up by due diligence:

How selective is the due diligence, measured by project admission rate? Does the scale of individual projects listed on a platform become larger because of due diligence? For security crowdfunding platforms, to what extent does the due diligence barrier help to signal project quality? What are the responses of entrepreneurs to their individual projects being subject to due diligence application?

The long-term effect of due diligence application:

Do projects become more successful after fundraising when due diligence is applied? Does a platform have a higher proportion of funders that invest more than once on the same platform? Do entrepreneurs return to the platform to launch other projects after their first fundraising campaigns? Does more due diligence from platforms reduce funder incentives to apply due diligence before making investments?

The above list of potential future studies on crowdfunding due diligence is not exhaustive.

As the crowdfunding industry becomes increasingly popular among entrepreneurs and funders, we expect that platform due diligence will attract more attention from academics, practitioners, and policy-makers.

1.9 Conclusion

The decade leading up to 2017 witnessed massive growth in the popularity of crowdfunding as a viable form of entrepreneurial finance. In Canada, thousands of new projects are launched on different fundraising websites every year. Connecting donors and funders with beneficiaries, borrowers, and entrepreneurs, crowdfunding platforms help idle money realize its value. However, exactly what do crowdfunding platforms do? Do they simply provide a cheap online forum for business soliciting? Alternatively, do they apply due diligence on listed projects and help to reduce information asymmetry between projects' issuers and subscribers? What advantages can platforms obtain through carrying out due diligence?

In this paper, we have assessed the factors influencing the application of due diligence, as well as whether due diligence by platforms is associated with project success. The scope of crowdfunding due diligence comprises background checks, site visits, credit checks, cross-checks, monitoring accounts, and third party proof. Our paper provides the first-ever examination of empirical data on this topic, made possible by the innovative data collection efforts of NCFA Canada.

The summary statistics and comparison tests present a transparent picture in the data, as do the regression results controlling for other things being equal. The application of due diligence is associated with more affluent platform resources, either in compliance expenditure or in employee number, and a more sophisticated management structure, indicated by different

levels of subscription service. Due diligence is less likely to be applied when platform employees' expected workload is heavy, as shown by a large number of campaign projects launched on a given platform.

The data further indicate that the application of due diligence in general has a very strong positive influence on the fundraising success rate and amount raised on the platform, controlling for all the services it offers. Among all these services, only strategic fundraising guidance is significantly positively related with the fundraising success rate and the total amount raised through platforms. The strong positive association between due diligence and fundraising success shows the important value for crowdfunding platforms in limiting the number of lower quality projects they list through active due diligence.

The evidence herein strongly suggests that policymakers should require, whether through imposition of standards or otherwise, greater stringency of crowdfunding platforms in conducting due diligence. The evidence also suggests that further research on crowdfunding should pay careful attention to differences across platforms, as there appears to be massive heterogeneity in respect of what platforms actually do.

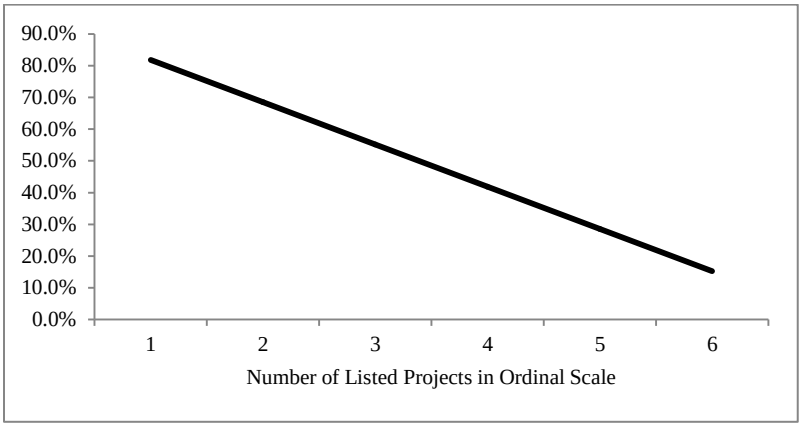

Fig.1.1 Probability of Due Diligence and Number of Listed Projects

This figure shows the predicted probability of due diligence application as the number of listed projects changes from scale 1 to scale 6. The figure is based on Model 6 in Table 4. Other explanatory variables are held constant at their respective means. The total numbers of projects/financings/loans launched in each year from 2013 to 2017 are measured in ordinal scales: level 1 is less than 20, level 2 is 21-50, level 3 is 51-100, level 4 is 101-250, level 5 is 251-500, and level 6 is more than 500.

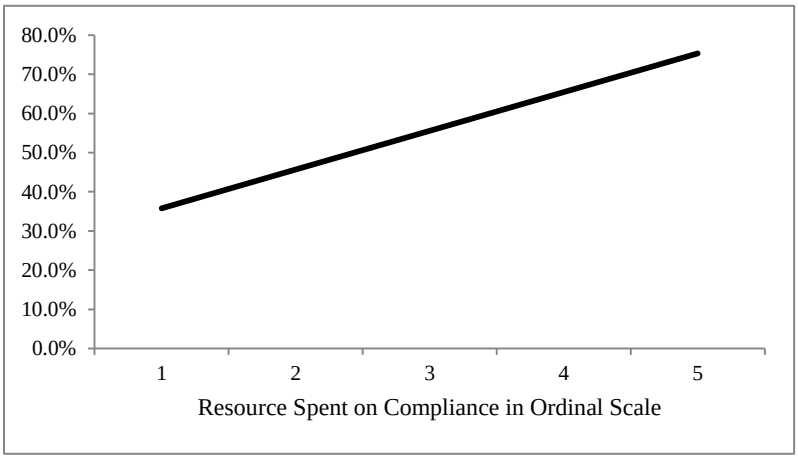

Fig. 1.2 Probability of Due Diligence and Resources Spent on Compliance

This figure shows the predicted probability of due diligence application as the resources spent on compliance changes from scale 1 to scale 5. The figure is based on Model 6 in Table 4. Other explanatory variables are held constant at their respective means. The total numbers of projects/financings/loans launched in each year from 2013 to 2017 are measured in ordinal scales: level 1 is less than 20, level 2 is 21-50, level 3 is 51-100, level 4 is 101-250, level 5 is 251-500, and level 6 is more than 500.

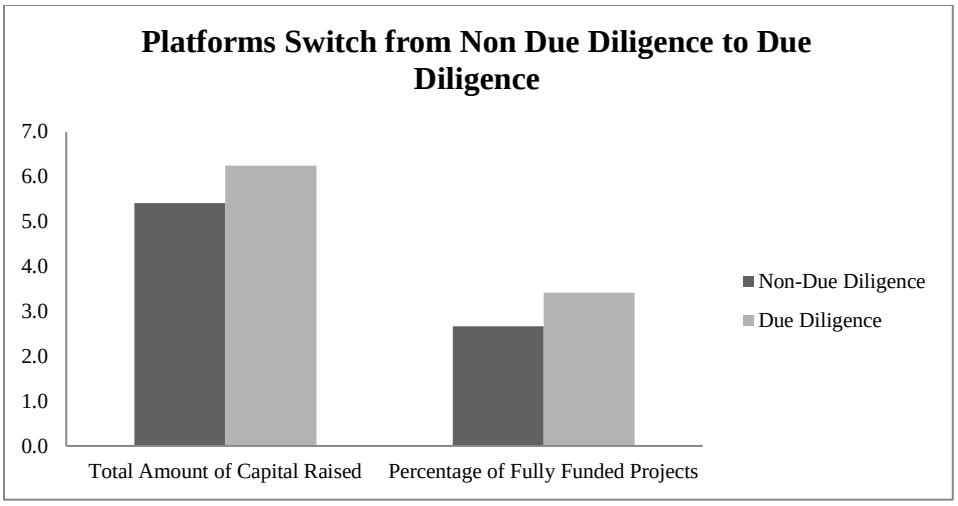

Fig. 1.3 Performance of Crowdfunding Platforms Switching from Non-Due Diligence to Due Diligence

This figure shows the performance of 12 crowdfunding platforms that switched from non-due diligence to due diligence over the sample period. The average values of total amount of capital raised and percentage of fully funded projects prior to the switches are compared with according values post the switch.

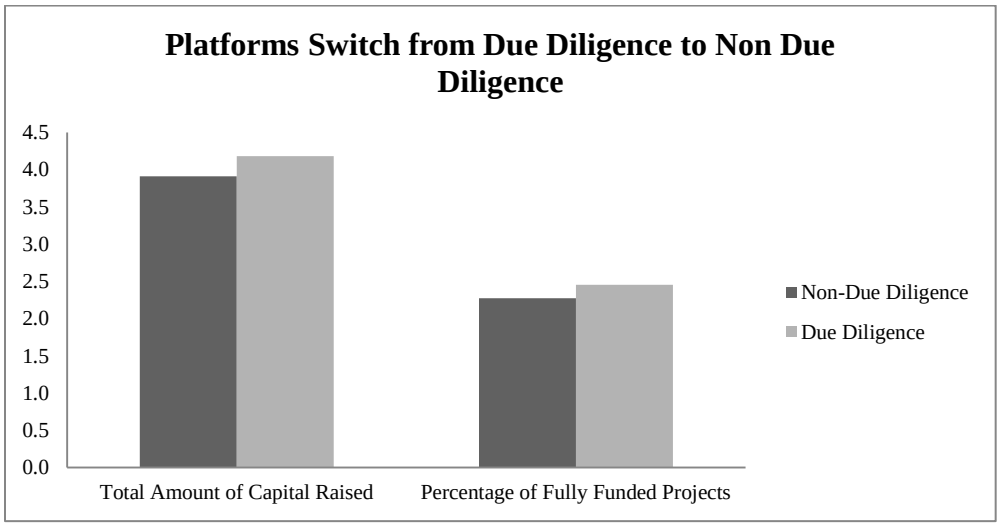

Fig. 1.4 Performance of Crowdfunding Platforms Switching from Due Diligence to Non-Due Diligence

This figure shows the performance of 11 crowdfunding platforms that switched from due diligence to non-due diligence over the sample period. The average values of total amount of capital raised and percentage of fully funded projects prior to the switches are compared with according values post the switch.

Table 1.1. Definitions and Summary Statistics.

This table provides definitions of the main variables, as well as summary statistics.

Variable	Definition	Obs	Mean	Median	Std. Dev	Min	Max
Any Due Diligence is applied? (Yes=1; No=0)	Dummy Variable: Is Any of the Following Due Diligence Regularly Applied: Background Check, Site Visit, Credit Check, Cross-check through Social Media Connections, Monitoring Account Activities, and Requesting Third Party Certificates or Proof? (Yes=1, No=0)	255	0.4941	0	0.5009	0	1
Total Number of types of Due Diligence applied	Total Number of Types of Due Diligence Applied by a Platform. Types of Due Diligence refer to: Background Check, Site Visit, Credit Check, Cross-check through Social Media Connections, Monitoring Account Activities, and Requesting Third Party Certificates or Proof	255	1.2196	0	1.4249	0	6
Number of Employees	Number of Employees Working for a Crowdfunding Platform	255	14.7490	10	10.5815	2	50
All or Nothing Fundraising Policy? (Yes=1; No=0)	Dummy Variable: Does the platform adopt “All-Or-Nothing” (AON) policy in fundraisng? (Yes=1; No=0)	255	0.2902	0	0.4547	0	1
Fee Structure: One-time Platform Listing Fee	Dummy Variable: Is the Main Service Charge a One-time Listing Fee? (Yes=1, No=0)	255	0.1765	0	0.3917	0	1
Fee Structure: Periodical Subscription at Different Levels/Tiers	Dummy Variable: Is the Main Service Charge based on Periodical Subscription at Different Levels/Tiers? (Yes=1, No=0)	255	0.2000	0	0.4121	0	1
Fee Structure: Fixed percentage of total amount raised, whether funding is successful or not	Dummy Variable: Is the Main Service Charge based on a Fixed Percentage of Total Amount Raised, regardless of whether Funding is Successful? (Yes=1, No=0)	255	0.1529	0	0.3752	0	1
Fee Structure: Fixed percentage of total amount raised, only if funding is successful	Dummy Variable: Is the Main Service Charge based on a Fixed Percentage of Total Amount Raised, only if Funding is Successful? (Yes=1, No=0)	255	0.2392	0	0.4471	0	1
Fee Structure: Management fee and carry percentage	Dummy Variable: Is the Main Service Charge based on a Management Fee and Carry Percentage? (Yes=1, No=0)	255	0.2314	0	0.4451	0	1
Average Fundraising Duration	Ordinal Variable: Average Fundraising Duration—Level 1: 1-3 Weeks; Level 2: 4-6 Weeks; Level 3: 7-9 Weeks; Level 4: 10-12 Weeks; Level 5: More than 12 Weeks	255	2.5255	3	0.8909	1	5
Resources Spent on Compliance Annually	Ordinal Variable: Total Resources Spent on Compliance Annually—Level 1: less than $2500; Level 2: $2501-10000; Level 3: $10001-30000; Level 4: $30001-50000; Level 5: more than $50000	255	2.2784	2	0.8447	1	5

Percentage of Fully Funded Projects	Ordinal Variable: fully funded projects as a percentage of all projects launched on the platform—Level 1: 0-10%; Level 2: 11-20%; Level 3: 21-30%; Level 4: 31-40%; Level 5: 41-50%; Level 6: more than 50%	255	2.7255	3	0.9729	1	6
Platform Provides Periodical Updated Information to Users	Dummy Variable: Does a Platform Provide Periodical (weekly, bi-weekly, monthly) Platform Updates and Activities to Users (Funders and Startups)? (Yes=1, No=0)	255	0.3451	0	0.4763	0	1
Platform offers pre-evaluation before listing Startups	Dummy Variable: Does a Platform Offer Pre-evaluation to Startups before their Listing? (Yes=1, No=0)	255	0.2863	0	0.4529	0	1
Platform offers strategic fundraising guidance	Dummy Variable: Does a Platform Offer Strategic Fundraising Guidance to Startups? (Yes=1, No=0)	255	0.2627	0	0.4410	0	1
Platform helps with business and financial planning	Dummy Variable: Does Platform Help Startups with Business and Financial Planning? (Yes=1, No=0)	255	0.1529	0	0.3606	0	1
Platform offers contractual help to Startups	Dummy Variable: Does a Platform Offer Contractual Help to Startups? (Yes=1, No=0)	255	0.0980	0	0.2980	0	1
Platform offers marketing or promotion service	Dummy Variable: Does a Platform Offer Marketing or Promotion Service to Startups? (Yes=1, No=0)	255	0.1686	0	0.3752	0	1
Number of Funders	Ordinal Variable: Total Number of Funders in Each Year from 2013 to 2016 (estimated)—Level 1: fewer than 100; Level 2: 101-500; Level 3: 501-1000; Level 4: 1001-2500; Level 5: 2501-5000; Level 6: 5001-10000; Level 7: 10001-20000; Level 8: 20001-50000; Level 9: more than 50000	255	3.3176	3	1.4048	1	8
Number of Projects	Ordinal Variable: Total Number of Projects/Financings/Loans Launched in Each Year from 2013 to 2016 (estimated)—Level 1: fewer than 20; Level 2: 21-50; Level 3: 51-100; Level 4: 101-250; Level 5: 251-500; Level 6: more than 500	255	3.5098	4	1.1633	1	6
Project/Employee Ratio	Ordinal Variable: Total Number of Projects Launched in Each Year from 2013 to 2016 (estimated) divided by Number of Employees for Each Platform—Level 1: fewer than 10 projects per employee; Level 2: 11-20 projects per employee; Level 3: 21-50 projects per employee; Level 4: 51-100 projects per employee; Level 5: more than 100 projects per employee.	255	2.9255	3	1.0454	1	5
Total Amount of Capital Raised (CAD)	Ordinal Variable: Total Amount of Money Raised in Each Year from 2013 to 2016 (estimated)—Level 1: Less than 300 K; Level 2: 300 K-500 K; Level 3: 500 K-1 M; Level 4: 1M-1.5 M; Level 5: 1.5M-3 M; Level 6: 3 M-5 M; Level 7: 5 M-10 M; Level 8: more than 10 M	255	4.1725	4	1.7004	1	8

Table 1.2. Comparison Tests

This table shows the impact of different platform characteristics on due diligence application (Panel A) and the impact of due diligence application on platform performance (Panel B) using comparison tests. The table is based on platform activities in 2013--2017. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Factors Affecting Due Diligence Application

	Project Number (Below Median)	Project Number (Above Median)	Z Value	Compliance Expenditure (Below Median)	Compliance Expenditure (Above Median)	Z Value
Probability of Due Diligence Application	0.5133	0.3469	2.43**	0.3229	0.6283	-5.16***
	Employee Number (Below Median)	Employee Number (Above Median)	Z Value	All or Nothing Policy (No)	All or Nothing Policy (Yes)	Z Value
Probability of Due Diligence Application	0.1905	0.6439	-4.57***	0.2597	0.4595	-2.46**
	Fee Structure: Periodical Subscription at Different Levels/Tiers (No)	Fee Structure: Periodical Subscription at Different Levels/Tiers (Yes)	Z Value	Fee Structure: Fixed percentage of total amount raised, only if funding is successful (No)	Fee Structure: Fixed percentage of total amount raised, only if funding is successful (Yes)	Z Value
Probability of Due Diligence Application	0.4363	0.7255	-3.62***	0.4742	0.5574	-0.91

Panel B: Impact of Due Diligence Application on Platform Performance

	Due Diligence (Not Applied)	Due Diligence (Applied)	T Value
Average Percentage of Fully Funded Projects (in Levels/Ordinal Scale)	2.3648	3.0778	-4.19***
Average Amount of Capital Raised (in Levels/Ordinal Scale)	3.6118	4.7202	-3.76***
Average Fund-raising Duration (in Levels/Ordinal Scale)	2.4217	2.6269	-0.92

Table 1. 3. Correlation Matrix for Key Variables.

This table shows the correlations among variables of interest. The correlation matrix shown below is based on platform activities in 2013--2017. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Factors Affecting Due Diligence Application

	Due Diligence Dummy	Project Number	Resources on Compliance	Employee Number	All or Nothing Fundraising Policy Dummy
Project Number	-0.352***				
Resources on Compliance	0.573***	0.363			
Employee Number	0.386***	0.267	0.422***		
All or Nothing Fundraising Policy Dummy	0.310***	-0.241*	0.283*	0.0809	
Subscription at Different Levels	0.159**	0.0624	0.187	0.126	-0.103

Panel B: The Influence of Due Diligence Application on Platform Performance

	Percentage of Fully Funded Projects	Total Amount of Capital Raised	Average Fundraising Duration	Due Diligence Dummy	Periodical Update	Pre-listing Evaluation	Strategic Guidance	Business Planning	Contract Help	Promotion Service	Number of Types of Applied Due Diligence
Total Amount of Capital Raised	0.646***										
Average Fundraising Duration	-0.191	0.328									
Due Diligence Dummy	0.365***	0.283***	0.172								
Periodical Update	0.204**	0.460**	-0.305**	0.484***							
Pre-listing Evaluation	0.165	0.0859	0.297*	0.322***	0.287*						
Strategic Guidance	0.327***	0.487***	0.262	0.193**	0.512**	0.359***					
Business Planning	-0.0594	-0.0673	0.241	0.315**	0.246	0.0875	0.0759				
Contract Help	-0.0172	-0.0812	-0.254	0.155	0.263	0.207*	0.254*	0.308*			
Promotion Service	0.318***	0.364***	-0.359**	0.103	0.309*	0.228*	0.516***	-0.0764	0.175		
Number of Types of Applied Due Diligence	0.233*	0.216*	-0.183	0.630***	0.325**	0.311**	0.285*	0.267	0.186	0.243	
Number of Projects/ Number of Employees	0.205	-0.351**	0.280	0.143	-0.244*	-0.0748	-0.262	0.156	-0.129*	0.135	-0.0921

Table 1.4 Factors Affecting Platform's Due Diligence Application.

This table shows the factors affecting a crowd-funding platform's due diligence application. Fixed effect logit regression models controlling for crowdfunding platforms are applied to evaluate the influence of different platform characters and activities. Standard errors are clustered by year. Due diligence is applied when at least one of the following actions is taken: background check, site visit, credit check, cross-check with customers, suppliers and social media, monitoring account activities, and requesting third party certificates or proof. Dependent variables equal 1 if due diligence is applied; 0 otherwise. Model specification and goodness of fit tests are applied. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Number of Funders per Year	-0.0714	-0.0648	-0.0703	-0.0665	-0.0822	-0.0769
	(-0.72)	(-0.69)	(-0.61)	(-0.84)	(-0.96)	(-1.05)
Number of Projects per Year	-0.149***	-0.145**	-0.139**	-0.137**	-0.121**	-0.133**
	(-2.66)	(-2.51)	(-2.32)	(-2.40)	(-2.29)	(-2.18)
Resources Spent on Compliance Annually		0.117**	0.104**	0.113**	0.101**	0.0988**
		(2.29)	(2.14)	(2.37)	(2.11)	(2.33)
Number of Employees			0.0451**	0.0385**	0.0527**	0.0468**
			(2.41)	(2.35)	(2.43)	(2.37)
All or Nothing Fundraising Policy? (Yes=1; No=0)				0.0338**	0.0405*	0.0376**
				(2.18)	(1.89)	(1.99)
Fee Structure: One-time platform listing fee					-0.0672**	
					(-2.35)	
Fee Structure: Periodical Subscription at Different Levels/Tiers						0.0465**
						(2.46)
Fee Structure: Fixed Percentage of Total Amount Raised, whether Funding is Successful or Not						0.0304
						(0.21)
Fee Structure: Fixed Percentage of Total Amount Raised, only if Funding is Successful						0.0123
						(1.64)
Fee Structure: Management Fee and Carry Percentage						0.0562
						(0.83)
Crowdfunding Platform Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors Clustered by Year?	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	255	255	255	255	255	255
R^2	0.2853	0.2947	0.3205	0.3248	0.3352	0.3471
F	4.46	4.84	5.23	5.31	6.03	6.58
Prob > F	0.0058	0.0027	0.0005	0.0001	0.0000	0.0000

Table 1.5 Application of Main Types of Due Diligence.

This table shows the application of three main types of due diligence: background check, site visit, and cross check with customers, suppliers and social media. Fixed effect logit regression models controlling for crowdfunding platforms are applied to evaluate the influence of different platform characteristics and activities. Standard errors are clustered by year. Panel A shows the application of a background check; Panel B, a site visit; and Panel C, a cross check. The models are based on platform characteristics and activities in 2013--2017. Dependent variables equal 1 if the type of due diligence is applied; 0 otherwise. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Dependent Variable: Background Check

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Number of Funders per Year	0.0303	-0.0185	-0.0137	0.0259	-0.0324	0.0362
	(0.83)	(-0.29)	(-0.58)	(0.61)	(-0.48)	(0.74)
Number of Projects per Year	-0.120**	-0.109**	-0.115**	-0.117**	-0.113**	-0.122**
	(-2.53)	(-2.48)	(-2.29)	(-2.33)	(-2.16)	(-2.25)
Resources Spent on Compliance Annually		0.0281**	0.0315**	0.0332**	0.0294**	0.0308**
		(2.18)	(2.13)	(2.04)	(2.21)	(2.07)
Number of Employees			0.0254**	0.0283**	0.0317**	0.0268**
			(2.28)	(2.31)	(2.19)	(2.16)
All or Nothing Fundraising Policy? (Yes=1; No=0)				0.0218**	0.0212*	0.0203*
				(2.07)	(1.79)	(1.88)
Fee Structure: One-time platform listing fee					-0.0565**	
					(-1.98)	
Fee Structure: Periodical Subscription at Different Levels/Tiers						0.0233**
						(2.24)
Fee Structure: Fixed Percentage of Total Amount Raised, whether Funding is Successful or Not						0.0185
						(1.27)
Fee Structure: Fixed Percentage of Total Amount Raised, only if Funding is Successful						0.00859
						(0.93)
Fee Structure: Management Fee and Carry Percentage						0.00313
						(1.24)
Crowdfunding Platform Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors Clustered by Year?	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	255	255	255	255	255	255
R^2	0.2368	0.2435	0.2605	0.2648	0.2759	0.3032
F	4.32	4.57	4.85	5.14	5.38	5.72
Prob > F	0.0143	0.0039	0.0009	0.0002	0.0000	0.0000

Panel B. Dependent Variable: Site Visit

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Number of Funders per Year	-0.113	-0.0822	-0.0843	-0.0785	-0.0801	-0.0986
	(-0.54)	(-0.49)	(-0.73)	(-1.02)	(-0.81)	(-0.95)
Number of Projects per Year	-0.130**	-0.126**	-0.133**	-0.135**	-0.128**	-0.109**
	(-2.23)	(-2.44)	(-2.36)	(-2.55)	(-2.29)	(-2.26)
Resources Spent on Compliance Annually		0.0865**	0.0904*	0.0746*	0.0841*	0.0811*
		(2.11)	(1.79)	(1.87)	(1.73)	(1.90)
Number of Employees			0.0376**	0.0354**	0.0339**	0.0368**
			(2.31)	(2.24)	(2.18)	(2.29)
All or Nothing Fundraising Policy? (Yes=1; No=0)				0.0164*	0.0182*	0.0156
				(1.86)	(1.75)	(1.64)
Fee Structure: One-time platform listing fee					-0.0489**	
					(-2.57)	
Fee Structure: Periodical Subscription at Different Levels/Tiers						0.0362**
						(1.98)
Fee Structure: Fixed Percentage of Total Amount Raised, whether Funding is Successful or Not						0.0285
						(1.03)
Fee Structure: Fixed Percentage of Total Amount Raised, only if Funding is Successful						0.0149
						(0.74)
Fee Structure: Management Fee and Carry Percentage						0.00428
						(0.79)
Crowdfunding Platform Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors Clustered by Year?	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	255	255	255	255	255	255
R2	0.2431	0.2569	0.2684	0.2711	0.2948	0.3154
F	4.17	4.39	4.81	4.93	5.26	5.68
Prob > F	0.0165	0.0050	0.0009	0.0003	0.0000	0.0000

Panel C. Dependent Variable: Cross Check with customers, suppliers and social media

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Number of Funders per Year	-0.249	-0.325	-0.357	-0.404	-0.296	-0.268
	(-0.88)	(-0.79)	(-0.91)	(-0.85)	(-0.76)	(-0.52)
Number of Projects per Year	-0.186*	-0.163*	-0.172*	-0.159	-0.160	-0.144
	(-1.70)	(-1.68)	(-1.92)	(-1.47)	(-1.59)	(-0.84)
Resources Spent on Compliance Annually		0.103**	0.0986**	0.0964**	0.118**	0.110**
		(2.57)	(2.46)	(2.29)	(2.30)	(2.42)
Number of Employees			0.0388**	0.0425**	0.0413*	0.0397**
			(2.05)	(1.99)	(1.87)	(2.18)
All or Nothing Fundraising Policy? (Yes=1; No=0)				0.0296*	0.0338*	0.0315*
				(1.90)	(1.86)	(1.70)
Fee Structure: One-time platform listing fee					-0.0391**	
					(-2.53)	
Fee Structure: Periodical Subscription at Different Levels/Tiers						0.0404**
						(2.41)
Fee Structure: Fixed Percentage of Total Amount Raised, whether Funding is Successful or Not						0.00753
						(0.85)
Fee Structure: Fixed Percentage of Total Amount Raised, only if Funding is Successful						0.0130
						(1.17)
Fee Structure: Management Fee and Carry Percentage						0.0216
						(1.43)
Crowdfunding Platform Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors Clustered by Year?	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	255	255	255	255	255	255
R^2	0.1815	0.2146	0.2430	0.2509	0.2657	0.3168
F	2.75	3.92	4.36	4.54	5.28	5.57
Prob > F	0.0659	0.0093	0.0020	0.0006	0.0000	0.0000

Table 1.6 Impact of Due Diligence Application on Platform Performance.

This table shows the impact of due diligence application on the percentage composition of fully funded projects, total amount of capital raised through a platform, and average crowdfunding duration on a platform. Due diligence is applied when at least one of the following actions is taken: background check, site visit, credit check, cross-check with customers, suppliers and social media, monitoring account activities, and requesting third party certificates or proof. Fixed effect ordered probit regressions controlling for crowdfunding platforms are used to evaluate the influence of due diligence application on platform performance in 2013--2017. Standard errors are clustered by year. Different services offered by crowd-funding platforms are used as controls. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Dependent Variable: Percentage of Fully Funded Projects

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Due Diligence Application? (Yes=1; No=0)	1.327***	1.117**	1.235**	1.072**	1.184**	1.128**
	(2.65)	(2.42)	(2.31)	(2.27)	(2.35)	(2.44)
Total Number of types of Due Diligence applied	0.169*	0.140*	0.158*	0.146*	0.135*	0.147
	(1.89)	(1.77)	(1.68)	(1.71)	(1.84)	(1.63)
Project/Employee Ratio	-0.521**	-0.503**	-0.439**	-0.465**	-0.474**	-0.518**
	(-2.44)	(-2.37)	(-2.18)	(-2.20)	(-2.03)	(-1.98)
Platform offers strategic fundraising guidance	0.627*	0.563	0.649	0.714*	0.598*	0.605*
	(1.88)	(1.59)	(1.61)	(1.77)	(1.85)	(1.90)
Platform Provides Periodical Updated Platform Information to Startups		-0.0318	-0.0445	0.0169	-0.0347	0.0426
		(-0.49)	(-0.53)	(0.68)	(-0.62)	(1.12)
Platform offers pre-evaluation before listing Startups			0.152	-0.0895	-0.108	0.133
			(0.38)	(-0.80)	(-0.75)	(1.03)
Platform helps with business and financial planning				-0.0653	-0.0724	-0.0595
				(-0.56)	(-0.47)	(-0.54)
Platform offers contractual help to Startups					0.286	0.317
					(1.52)	(0.97)
Platform offers marketing or promotion services						0.298
						(1.29)
"All or Nothing" Fundraising Policy Control?	Yes	Yes	Yes	Yes	Yes	Yes
Crowdfunding Platform Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors Clustered by Year?	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	255	255	255	255	255	255
R^2	0.2645	0.2846	0.2953	0.3147	0.3208	0.3274
F	3.96	4.05	4.11	4.64	4.72	4.81
Prob > F	0.0018	0.0007	0.0003	0.0000	0.0000	0.0000

Panel B. Dependent Variable: Total Amount of Capital Raised

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Due Diligence Application? (Yes=1; No=0)	1.255**	1.146**	1.210**	1.204**	1.172**	1.139**
	(2.40)	(2.53)	(2.34)	(2.28)	(2.16)	(2.09)
Total Number of types of Due Diligence applied	0.0947*	0.0873*	0.110*	0.108	0.0975*	0.0864
	(1.90)	(1.78)	(1.81)	(1.55)	(1.74)	(1.58)
Project/Employee Ratio	-0.877*	-0.945*	-0.932*	-1.084*	-0.977*	-0.963*
	(-1.86)	(-1.91)	(-1.83)	(-1.75)	(-1.69)	(-1.72)
Platform offers strategic fundraising guidance	0.633*	0.756*	0.734*	0.682**	0.701*	0.592*
	(1.80)	(1.69)	(1.95)	(1.98)	(1.71)	(1.73)
Platform Provides Periodical Updated Platform Information to Startups		0.0821	0.0866	0.0736	0.0925	0.0963
		(0.75)	(0.93)	(0.67)	(0.84)	(0.66)
Platform offers pre-evaluation before listing Startups			0.135	0.127	0.119	0.123
			(1.13)	(1.09)	(1.47)	(0.98)
Platform helps with business and financial planning				0.149	0.167	-0.132
				(1.08)	(1.25)	(-1.14)
Platform offers contractual help to Startups					0.238*	0.205
					(1.83)	(1.60)
Platform offers marketing or promotion services						0.384
						(1.05)
"All or Nothing" Fundraising Policy Control?	Yes	Yes	Yes	Yes	Yes	Yes
Number of Listed Projects Control?	Yes	Yes	Yes	Yes	Yes	Yes
Crowdfunding Platform Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors Clustered by Year?	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	255	255	255	255	255	255
R^2	0.2433	0.2517	0.2635	0.2714	0.2852	0.2916
F	3.85	3.96	4.07	4.21	4.33	4.59
Prob > F	0.0011	0.0004	0.0001	0.0000	0.0000	0.0000

Panel C. Dependent Variable: Average Fundraising Duration

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Due Diligence Application? (Yes=1; No=0)	-1.122	-1.105	-1.127	-1.124	-1.139	-1.084
	(-1.38)	(-1.24)	(-0.95)	(-1.07)	(-1.33)	(-0.86)
Total Number of types of Due Diligence applied	-0.0988*	-0.0916	-0.104	-0.115	-0.109	-0.112
	(-1.75)	(-1.53)	(-1.36)	(-1.20)	(-1.58)	(-1.32)
Project/Employee Ratio	1.023**	1.106**	1.121**	1.113**	0.967**	1.085**
	(2.55)	(2.34)	(2.28)	(2.46)	(2.38)	(2.19)
Platform offers strategic fundraising guidance	0.741*	0.685	0.836	0.953	0.708	0.652*
	(1.89)	(1.63)	(1.48)	(1.50)	(1.45)	(1.67)
Platform Provides Periodical Updated Platform Information to Startups		-0.496*	-0.530*	-0.615	-0.638	-0.584
		(-1.71)	(-1.68)	(-1.64)	(-1.63)	(-1.58)
Platform offers pre-evaluation before listing Startups			-1.133	-0.952	-0.926	-1.059
			(-1.05)	(-1.22)	(-0.86)	(-0.71)
Platform helps with business and financial planning				0.413	0.367	0.384
				(0.14)	(0.23)	(0.37)
Platform offers contractual help to Startups					-0.258	-0.242
					(-1.32)	(-1.22)
Platform offers marketing or promotion services						-0.308*
						(-1.79)
"All or Nothing" Fundraising Policy Control?	Yes	Yes	Yes	Yes	Yes	Yes
Crowdfunding Platform Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
Standard Errors Clustered by Year?	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.234***	1.093***	1.137**	1.115***	1.158***	1.209***
	(2.77)	(3.05)	(2.47)	(2.83)	(2.75)	(2.64)
Number of Observations	255	255	255	255	255	255
R^2	0.2367	0.2453	0.2509	0.2558	0.2640	0.2785
F	3.28	3.69	3.95	4.21	4.38	4.82
Prob > F	0.0069	0.0016	0.0004	0.0001	0.0000	0.0000

Chapter 2

2.1 Introduction

Not all mutual fund flows are created equal. Beneath the veil of changes in total assets under management (AUM) over time, there are appreciations or depreciations in fund assets and different types of money flow. Specifically, total fund inflow is composed of new purchases, pre-authorized contribution (PAC) plan purchases, switch-in, and reinvested distributions; total fund outflow is composed of one-time redemptions, systematic withdrawal plan (SWP) redemptions, switch-out, and distributions to unitholders. Among these flows, new purchases and one-time redemptions, hereinafter referred to as "retail fund flow," are, respectively capital flows' first entry into or final exit out of a mutual fund. The rest are transitional or operational capital flows generated in mutual fund operating processes.

Different mutual fund flows are not weighted equally. Overall, retail fund flows dominate the capital movement in a fund. Inevitably, mutual fund managers strive to attract and retain capital from retail investors. To raise a fund's appeal, they produce higher returns, demand lower service fees, and advertise through the radio, television, newspapers, magazines, and posters on buses and trains. Retail fund flow is so important and popular that the existing literature treats it as the same as the overall capital flow of a mutual fund.

Nevertheless, the overall capital flow, or changes in AUM net of asset appreciation, does not fully or completely depict the investment behavior of mutual fund unitholders. Some fund flows, such as switches, are transitional money flows directed by current unitholders with ongoing financial interest in a mutual fund company. Other fund flows, such as PACs and SWPs, consist of regular deposits from and withdrawals by current unitholders. In addition, distribution

flows are designed for tax purposes. These fund flows are, by nature, different from both retail fund inflows, in which new money enters a fund for the first time, and retail fund outflows, in which investments leave a fund permanently. As mutual fund flows vary by type and function, overall capital flow alone is too ambiguous to explain the diverse preferences of mutual fund investors.

Some mutual fund flows, such as switches, are overlooked in the extant literature, yet actively affect AUM. In addition, PAC flows, SWP flows, distributions to unitholders, and reinvested distribution flows all impact the AUM of a mutual fund. To what extent these fund flows contribute to the aggregate capital movement of a mutual fund has not been examined in the extant literature.

Mutual fund flows are sensitive to fund performance and service charges. In general, better performance and lower fund fees attract retail fund flow from investors. Extant literature has studied the relationship between overall capital flow and fund performance (Warther (1995), Carhart (1997), Sirri and Tufano (1998), Edelen (1999), Jain and Wu (2000), Chen, Hong, Huang, and Kubik (2004), Bollen and Busse (2005), Cooper, Gulen, and Rau (2005), Frazzinia and Lamont (2008), Ivković and Weisbenner (2009), Gil-bazo and Ruiz-verdu (2009), Barras, Scaillet, and Wermers (2010)), but does not distinguish among the various types of flows that compose overall capital movement. In addition, the marginal impacts of various mutual fund service charges on fund flows remain unclear. The characteristics of each specific type of fund flow, with respect to changes in past fund performance and fund fees, have not previously been investigated.

Although different types of mutual fund flows are distinct in volume, flow–performance/fee sensitivity, and function, they are not isolated from one another. Different mutual fund flows are directed by the same group of investors, whose risk preferences and investment behaviors do not change across fund flow structures. However, the relationships among different types of fund flows have not yet been extensively studied. As retail fund flow sways the overall capital movement, whether or how other types of flows correlate with retail fund flow, and the implications of fund flow correlations, are important questions that remain unanswered.

The relationships between retail fund flow and other fund flows draw attention to the integrity of information possessed by investors. Specifically, retail fund inflows are contributed by incoming investors with little experience of the funds they are entering; they choose to invest in a mutual fund following advice received from dealers or brokers.[18] Retail fund outflows are directed by outgoing unitholders wishing to either cash out profits or cut their losses. Fund switches occur among different FundSERV[19] units within the same mutual fund company. Mutual fund unitholders who make these switches are acquainted with the performance of a FundSERV unit in which they have previously invested; they choose to switch out to a new FundSERV unit due to changed risk preference or anticipated better fund performance. While it is difficult to disentangle outgoing investors' motivation for leaving, as different investors evaluate the return of a fund over different time horizons—not just fund return in the investor's exit month—it is easy to assume that most investors have stable risk preferences under normal

[18] In the Canadian mutual fund market, more than 80% of funds (excluding fund of funds) are sold through dealers and brokers; the remaining funds can be purchased directly from fund managers.

[19] FundSERV is an online hub that electronically connects fund companies, distributors, and intermediaries, enabling them to buy, sell and transfer investment funds amongst one other. A unique FundSERV code is provided for each fund series/purchase option combination.

economic conditions. In this respect, switching out of a FundSERV unit reveals an insider's discontent regarding fund performance. Although one investor's switch-out does not indicate lower performance of a fund, the switch-out from a herd of investors, i.e., the aggregate switch-out fund flow, does.

All mutual funds, including those that underperform, want to attract investments from clients. An agency problem is then created when an investor is enticed to an underperforming mutual fund by an advisor who receives sales commissions from the fund company. Here, there exists information asymmetry between the new investor and the fund's insiders, namely the managers and existing unitholders. The leaving of existing unitholders and entry of new investors, reflected by the positive correlation between switch-out fund flow and retail fund inflow, demonstrates the information asymmetry between current unitholders and incoming investors. The impact of this information asymmetry on mutual fund performance has not yet been analyzed.

In this paper, we reveal the percent compositions of each type of fund flow in total capital movement, analyze the sensitivity of each type of flow with respect to changes in past fund performance and in service fees, investigate the correlations between retail flow and other fund flows, uncover the information asymmetry between current mutual fund unitholders and incoming investors, and examine the impact of this information asymmetry on fund performance. Our study is based on proprietary data obtained directly from mutual funds in Canada, relating detailed mutual fund fee structures to specific types of fund flows and to performance.

This paper is related to many others on mutual fund flows, both in general (Del Guercio and Tkac (2002), Christofferson et al. (2013), (2014)) and in particular respect to the fact that

fees affect flows (Chalmers and Reuter (2012)). Prior works have shown that option-like incentive contracts can exacerbate risk-taking by fund managers (Starks (1987)). By contrast, fulcrum fees, or fees that encourage managers to just beat a benchmark, lead managers to just buy the benchmark (Admati and Pfleiderer (1997)) and reduce the reward for good performance or 'flow–performance sensitivity' (Heinkel and Stoughton (1994)). Hence, fulcrum fees are rare (Golec (1992), Elton et al. (2003)). More generally, prior work is consistent with the view that fixed fees and incentive fees significantly vary with fund flows and performance (Warner and Wu (2011), Deli (2002), Kuhnen (2004)). The present paper adds to an important stream of literature by providing specific information on the different components of fee structures that were not available in prior data sets, relating fee structure details to specific types of fund flows that cannot be estimated from publicly available sources, revealing the relationships among different types of fund flows, and disclosing the agency problems associated with flow correlation. To this end, we provide an empirical assessment of the possible and often-debated conflicts of interest between agent and principal in the mutual fund industry.

2.2 Institutional Background[20]

There are four primary purchase options for mutual funds in Canada. The no-load (NL) purchase option does not include a front-end commission, nor can it result in deferred sales charges, but a trailer fee is paid to the fund dealer. The deferred sales charge (DSC) purchase option (which includes low-load purchase options) requires the investor to pay a redemption fee to the fund company if the units are sold before the elapse of a predetermined period. The fund dealer receives an upfront commission directly from the fund company under this option, as well as a trailer fee. The front-end (FE), or initial sales charge, purchase option allows the fund dealer

[20] This section is based on an earlier version of this paper (Cumming, Johan, and Zhang (2015)).

to charge a negotiable front-end commission directly upon the initial sale, in addition to receiving a trailer fee. In the fee-based (FB) purchase option, no FE commission may be charged, no trailer fees are paid to the dealer, and no DSCs may be levied. Instead, the dealer charges fees directly to the investor's account. High net worth or institutional series/purchase options, where no FE commission, DSC, or trailer fees are paid, are also reported as FB.

Mutual fund fees in Canada encompass more than just the publicly available management expense ratios (MERs): they also comprise trading expenses, trailer fees, DSCs, FE commissions, switch fees, performance fees, and negotiated management fees. Some of these items change over the life of a fund. The stated purpose of trailer fees is to compensate the advisor's dealer firm for the ongoing investment services and advice they provide to investors.[21] In some funds, trailer fees are paid at the same rate in perpetuity, while in other funds they may fluctuate over time. Differed sales charge (DSC) is a back-end charge to mutual fund unitholders who redeem investments early. The DSC decreases over time and usually disappears when investments are redeemed after five to eight years. FE commissions are paid when investors choose the "front-end" purchase option. Switch fees apply to investors when they switch from one fund to another within the same mutual fund company. Performance fees are incentive fees paid to fund managers. Finally, negotiated management fees are paid when the management fees of a particular fund series/purchase option are negotiable.

[21] In practice, trailer fees pay for many aspects not associated with advice. There is currently no legal requirement to provide advice in order to receive a trailer fee. For example, discount brokerages receive trailer fees without providing any advice. Trailer fees are often paid quarterly, as long as clients hold investments in the fund manager's mutual funds. Each dealer then pays out a portion of those trailer fees to its advisors, according to the firm's own compensation grid. Generally, under this compensation grid, the more commission or fee revenue the advisor generates for the firm, the greater the portion of that revenue the advisor retains.

Some mutual funds in Canada must be purchased through an advisor or intermediary, while others may be purchased directly from the fund company, although when buying directly, the person with whom the investor deals would still be considered an advisor. The advice provided may significantly influence flows.

2.3 Hypotheses

Our analyses focus on four questions. First, do different types of fund flows exhibit materially different characteristics or are they essentially alike? Second, can the mutual fund fee structure impact on fund flow and fund performance; if so, what is the rationale? Third, do different types of fund flows correlate with each other; if so, what can we learn from the correlations? Fourth, can fund flows predict future fund performance; if so, what is the mechanism?

2.3.1 Fund Flow Characteristics: Alike or Different?

The return of mutual fund investors is affected by fund performance and fund charges. In general, better past performance and lower fund fees attract investors, while poorer past performance and higher fund fees dissuade them. Consequently, mutual fund flows are sensitive to fund past performance and fees. As mutual fund flows vary by type, it is natural to conjecture that different types of flows exhibit distinct characteristics with respect to past fund performance and fees. The important question is whether the characteristic distinctions are significant such that the aggregate fund flow, measured by changes in AUM net of asset appreciation, is misleading in evaluating dynamic investor behavior, despite its extensive adoption in the literature.

On the one hand, on average, switch-in flow, reinvested distribution flow, and PAC flow jointly account for approximately 20% of total inflow; switch-out flow, distribution to unitholders flow, and SWP flow jointly account for approximately 20% of total outflow. The relative weights of fund flows other than new purchases and one-time redemptions are nontrivial. If these fund flows exhibit characteristics with respect to prior fund performance and fees that are distinct from retail fund flow, then aggregate fund flow alone cannot accurately reflect investor behavior. Compared with other types of fund flows, net retail flow—measured by new purchases net of one-time redemptions—is more influenced by recommendations from fund advisors due to the incentive effect of trailer fees. In particular, switches occur within the same fund company and do not generally affect trailer fee payments to fund advisors; PACs and SWPs are preset fund flows determined by investors' embedded contribution preference and consumption needs, not by advisors' promoting effort; distribution to unitholders is designed for tax avoidance; and reinvested distributions are flows mainly based on investors' previous experiences with the fund. Only net retail flow is directly associated with trailer fee payments to fund advisors, and critically depends on fund advisors' promoting effort. In this regard, we should expect material differences in flow sensitivities between retail flow and other types of flows with respect to prior fund performance and the fee structure.

On the other hand, as retail fund flow dominates aggregate fund flow, variations in retail fund flow significantly drive aggregate flow movement. In addition, new purchases can be significantly correlated with switches in, as both are primarily based on prior fund performance, as are one-time redemptions and switch out. Fund performance also has a long-term impact on PACs and SWPs, due to its influence on investor expectation. In this regard, the differences in flow–performance and flow–fee sensitivities among distinct types of flows can be trivial. The

positive correlations among distinct types of fund flows can make retail fund flow representative of aggregate flow, enabling aggregate flow alone to reflect general investor preference.

The impact of factors that affect mutual fund flow, such as fee structures, may differ depending on the type of flow. For example, trailer fees paid to fund advisors for promoting the fund to retail investors may enable fund managers to attract and retain AUM without demonstrating strong fund performance. Furthermore, higher trailer fees may cause fund advisors to deviate from recommendations based on prior fund performance and investors' risk-tolerance level; an underperforming fund may, thus, be favored by an advisor simply due to a high trailer fee payment. In addition to incentivizing fund advisors, the trailer fee also provides a comfort zone for fund managers: without delivering effort and skill, they can still attract and retain assets from retail investors. Another example is DSCs, which penalize early investment withdrawal and restrict AUM outflow when a mutual fund underperforms. Hence, trailer fees and DSCs would be expected to mitigate net retail flow performance sensitivity and enable funds to attract more flow regardless of past performance; however, these fees may differently impact other components of aggregate fund flow, such as switches, reinvested distributions, preauthorized plan purchases, or systematic plan redemptions, for the possibly different economic reasons considered below.

Hypothesis 1： *Aggregate fund flow exhibits different properties and determinants than net retail flow (inflows comprising new purchases net of pre-authorized contribution plan purchases, switches-in, and reinvested distributions; outflows comprising one-time redemptions net of systematic withdrawal plan redemptions, switches -out, and distributions made to unitholders).*

2.3.2 Fund Flow Correlations: Reflection of Information Asymmetry?

Different types of mutual fund flows reveal different investment decisions. Existing unitholders' investment decisions are mainly based on their prior experiences with the fund, whereas future unitholders' investment decisions are generally influenced by purchase recommendations from fund advisors, who tempted by higher trailer fees, may recommend underperforming funds to their clients.

An important question regarding underperforming funds is whether there is information asymmetry between existing and future unitholders. If so, then they may react differently to the same fund status: existing unitholders escape while future unitholders are guided in; if not, then existing and future unitholders' actions should be synchronized: existing unitholders cash out and potential future unitholders refrain from investment.

On the one hand, neither existing nor future mutual fund unitholders have access to private asset information. In addition, funds' portfolio composition, prior performance, and service charges information are all publicly available. Existing unitholders should, thus, have no information advantage over incoming unitholders.

On the other hand, under the classical search theory, transactions do not occur until buyers and sellers find each other. The searching process can be inefficient and costly; agents must choose between continuing to search for a better deal and accepting a current offer. In the mutual fund context, thousands of fund series are available to investors, each containing miscellaneous details in its fund prospectus. An average mutual fund investor has neither the time nor expertise to select the fund that best matches their investment expectation and risk-tolerance level. In this circumstance, even if detailed fund information is publicly available,

whether an average investor can utilize it is another matter. In this regard, search cost creates market frictions (Sirri and Tufano (1998)) that lead to information asymmetry between existing and future mutual fund unitholders: existing unitholders are aware of a fund's suitability, whereas future unitholders face uncertainties in both deciding whether a fund is an appropriate choice and evaluating alternative investment opportunities. Fund advisors mitigate information asymmetry and reduce the search cost for investors when recommending based on clients' best interest. However, where advisors breach their fiduciary duty by making inappropriate recommendations, they amplify the information asymmetry between existing and future fund investors.

The level of correlations among different types of fund flows, such as investor switch-out flow and new purchases flow, reveal the extent of information asymmetry between existing and future fund unitholders, as well as the classical principal-agent problem between mutual fund investors and advisors. Furthermore, if fund managers can induce fund advisors to entice investors even when funds underperform, they have less incentive to create value for existing fund unitholders. Consequently, the correlations among different types of mutual fund flows should impact significantly on fund performance.

Hypothesis 2: *A positive correlation between retail fund inflow and switches out reflects information asymmetry between incoming investors and current unitholders. This information asymmetry, which is more common when fund series are sold through dealers or brokers and is attributed to biased purchase advice, is negatively associated with fund performance.*

2.4 Data

The data were collected on behalf of the Canadian Securities Administrators (CSA) with the assistance of the Ontario Securities Commission (OSC) in 2015.[22] The sample covers the period 2003–2014 and includes 43 fund families of the 113 total in Canada, or 38.1% of the market, and covering $746 billion of AUM, or 66.7% of the market[23]. More specifically, the sample comprises 18,102 FundSERV codes. In total, the sample comprises more than 1 million monthly FundSERV code observations on fees, flows, and performance. We conducted comparison tests for the representativeness of the respondent fund families by examining publicly available data, such as location and ratings; we did not find any statistically significant differences. For reasons of confidentiality and to ensure no fund identity can be reverse engineered, we do not present specific information on fund families. Fund of funds are not included in this analysis.

Table 1 (Page 85)

Table 1 defines the main variables from the data. The first key variable is NET_RETAIL_FLOW, calculated as the fund flows net of PACs, SWPs, switches, reinvestments, and distributions. NET_RETAIL_FLOW is measured over each FundSERV code—a monthly observation in the data given as a percentage of the prior month's FundSERV AUM—to make comparative assessments of flow across funds and over time. Table 1 indicates that the FundSERV code monthly observation shows an average NET_RETAIL_FLOW of

[22]The mutual fund data for this research were obtained further to a data request sent to all Canadian fund managers offering conventional mutual funds to the public under prospectus. Canadian fund managers' participation in the research was voluntary. The data request questionnaire may be accessed here: https://www.securities-administrators.ca/uploadedFiles/General/pdfs/Mutual%20Fund%20Fees%20Research%20Data%20Request.pdf.

[23] According to Investment Funds Institute of Canada, the estimated market size of Canadian stand-alone mutual funds in 2015 was $1.1 trillion.

0.49%, with a median of 0.00% and a standard deviation of 3.28%. Including all types of inflows and outflows, the average monthly flow was 0.49%, with a median of 0.00% and a standard deviation of 3.28%. The average flows attributable to PACs and SWPs, switches, and reinvestments and distributions were 0.03%, 0.09%, and –0.02%, respectively.

It is worth noting that as different mutual funds vary in size, the basic arithmetic average of flows across different funds does not accurately reflect the overall trend of capital movement. The trend of aggregate capital movement for mutual funds in the sample follows:[24]

Figure 1 (Page 105)

Figure 1 shows that the sample mutual fund companies' AUM experienced strong growth, from CAD 286 billion in January 2003 to CAD 667 billion in December 2014, or an average 7.31% annual growth over 12 years, compared to an average 1.99% growth in Canadian GDP over the same period.[25]

Table 1 further indicates that the sample's average 12-month Fama-French 4-factor gross return annualized alpha is 0.25%, with a median of 0.25% and a standard deviation of 0.74%.[26]

[24] Mutual funds established after January 2003 or liquidated before December 2014 are excluded from Figure 1.

[25] According to the World Bank, Canada's GDP in 2003 and 2014 was CAD 1.433 trillion and CAD 1.780 trillion, respectively; based on constant 2010 USD. http://data.worldbank.org/indicator/NY.GDP.MKTP.KD?end=2014&locations=CA&start=2003

[26] Fama and French (2014) point out that, for calculating alpha, their new 4-factor model is the appropriate model, improving on earlier models such as that of Carhart (1997). They have, thereby, updated the Kenneth R. French Data library. Our factors are taken directly from the Kenneth French Library: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_developed.html. We checked robustness by considering separately funds that are and are not North American-focused, as well as other fund categories. The flow-performance results are quite stable. We use a homogenous set of factors to calculate alpha, as we do not have the requisite information to pick different factors for different funds. Our findings are also robust to other specifications, such as a single-factor model based on market conditions, for example. The positive alpha we have found is consistent with the existing literature. For example, Fama and French (2010) report positive alpha, based on a sample period from January 1984 to September 2006. Bauer, Koedijk, and Otten (2005) document both positive alpha and negative alpha in different sample periods using data

To the best of our ability and the fund companies' ability to provide the data, we have created a survivorship bias-free data set by including live and defunct FundSERV codes.[27]

Figure 2 reveals the sizes of different types of mutual fund inflows and outflows relative to total inflow and outflow directed by investors. The relative sizes are calculated by aggregating each type of fund flow across all FundSERV units in each observation month, then dividing the aggregate value of each type of fund flow by the aggregate value of total investor flow in each month.

Figure 2 (Page 106)

Figure 2 shows that, when measured in aggregate flow volume, new purchases, on average, account for around 79% of total investor inflow over time; switch-in, 16%; reinvested distribution, 4%; and PAC, 1%. One-time redemption, on average, accounts for around 76% of total investor outflow over time; switch-out, 19%; distribution to unitholder, 4%; and SWP, 1%. Contrary to the growth pattern of aggregate AUM in Figure 1, in which financial crisis shifts the value line downward, the compositions of mutual fund flows are resistant to economic downturn.

Figure 2 further reveals seasonality in mutual fund flow compositions: December is a period in which distribution to unitholders and reinvested distribution increase, whereas investors switching in and out decreases. This seasonality could be attributed to different practices between fund managers, who want to demonstrate their performance to investors before New

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from Germany, the United Kingdom, and the United States. Kosowski et al. (2006) report positive and negative alpha, based on different sample periods. Our results are likewise robust to other approaches, such as those explored by Barber et al. (2016) and Berk and van Binsbergen (2016).

[27] It is possible that some fund managers had difficulty gathering the data for all funds closed and merged over the sample period; in some cases, it was not possible to gather data on fund companies that had ceased operations over the period, but based on what we could ascertain from publicly available information, we did not identify any gaps in the data.

Year's Eve, and fund investors, who usually spend more time with their families during Christmas, thus postponing investment decisions until January.

More details on fund flow compositions are illustrated in Figure 3, in which distributions on the weight of each type of flow within total fund flow are presented.

Figure 3 (Page 108)

Figure 3A shows that new purchases equals total inflow for less than 25% of all monthly observations in the sample; investor switch-in is absent for around 35% of all observations; PAC is absent for around 50% of observations; and around 75% of monthly flows do not contain reinvested distribution. Figure 3B shows that retail outflow equals total outflow for around 25% of all monthly observations; investor switch-out flow is absent for around 35% of observations; SWP flow is absent for around 70% of observations; and around 75% of monthly flows do not contain distribution to unitholders.

Some fund inflows are positively correlated with fund outflows within the same FundSERV unit, indicating discrepancy in investors' judgment on future fund performance. Specifically, 13.43% of FundSERV units exhibit a positive correlation between retail fund inflow and investor switch-out; this correlation is more common when fund series are sold through dealers or brokers.[28] In addition, 2.43% of FundSERV units exhibit a positive correlation between retail fund outflow and investor switch-in; 21.25% of FundSERV units exhibit a positive correlation between retail fund inflow and distribution to unitholders; and 3.46% of

[28] Of the fund series sold through dealers and brokers, 14.81% exhibit a statistically significant positive correlation between retail fund inflow and investor switch-out. The ratio is 4.52% when fund series can be purchased directly through fund managers.

FundSERV units exhibit a positive correlation between retail fund outflow and reinvested distribution.

In total, 45.79% of the monthly observations in the sample comprise funds purchased as DSC options, while 39.56% were purchased as FE options, 8.35% as FB options, and 6.29% as NL options.

The summary statistics for fee variables in Table 1 are indicated for the full sample of monthly fund observations across all purchase options. The average maximum posted initial trailer fee for the entire sample of month-year observations is 0.58%, with a median of 0.50% and a standard deviation of 0.36%. Table 1 shows that the average initial DSC for the entire sample of month-year observations is 4.79%, with a median of 5.50% and a standard deviation of 1.52%. The data suggest that DSCs in subsequent years are lower, as indicated by the DSC slope variable. The average MER in the sample is 2.07%, with a median of 2.16% and a standard deviation of 0.66%.[29] Further details on the data distribution for other variables are also recorded in Table 1.

In the data set, 87% of mutual fund series are sold through dealers and brokers; the other 13% can be purchased directly from fund managers. Dealers and brokers are compensated by trailer fees from mutual fund companies, to reward their efforts in recommending funds to investors. When fund series are purchased directly, managers act as fund advisors and receive trailer fees. The difference is that trailer fees constitute the main income for dealers and brokers but only a small proportion of income for mutual fund managers, whose compensation is mostly based on the AUM amount and fund performance.

[29] In the summary statistics, we report the full MER to show the totals. In the regression analyses, we exclude trailer fees and sales charges from the MER to avoid double counting and correlation across variables.

Table 2 presents comparison test results for the effect of trailer fees on different types of fund flows. The comparison analyses results are indicative of sample distribution by trailer fee levels, and provide us with the first insights into the data regarding the impact of trailer fees on fund flows. Specifically, the comparison tests are constructed by first calculating the means and medians of different types of fund flows for each FundSERV code over the sample horizon; then, for all FundSERV codes, we apply two-sample t-tests on the calculated means and medians based on whether the corresponding trailer fee level of a FundSERV code is above or below the group median. Each FundSERV code has one related observation in the two-sample t-tests.

Table 2 (Page 87)

Panel A of Table 2 shows that for fund series sold through dealers and brokers, trailer fees are positively associated with NET_RETAIL_FLOW, NET_AGGREGATE_FLOW, and PAC inflow net of SWP outflow, and negatively associated with net investor switch-in and the reinvested distribution net of paid distributions. The results are at least statistically significant at the 5% level, except for the differences between the median value of the PAC inflow net of SWP outflow, which is only weakly significant at the 10% level.

Panel B of Table 2 shows similar results to those in Panel A for NET_RETAIL_FLOW, NET_AGGREGATE_FLOW, and net investor switch-in. However, when fund series can be directly purchased from fund managers, the trailer fee does not exhibit significant impact on the PAC inflow net of SWP outflow; its impact on the reinvested distribution net of paid distribution is not stable.

Overall, Table 2 indicates there are substantial differences in flow levels depending on what type of flow is measured. It should be noted, though, that the comparison test results are not

conclusive, as they do not control for the impacts of other influential factors. Further detailed analyses on the effects of mutual fund fee structures on fund flow are supported by multivariate regressions, presented below.

2.5. Fund Flow Characteristics

In this section, we analyze whether retail fund flow exhibits materially different characteristics to aggregate fund flow and investigate the rationale behind the differences.

2.5.1 Analyses of Specific Types of Mutual Fund Flows

We examine the marginal impacts of past fund performance and fund fees on mutual fund flows. Specific types of fund flows are analyzed first, followed by further analyses comparing retail flow with total flow. More detailed analyses of fund inflows and outflows are presented in the Appendix.

The basic model specification is as follows:

$$(1) \quad FLOW_{t+1} = CONSTANT + \beta_1 * ALPHA_t + \beta_2 * ALPHA^2_t + \beta_3 * FUND\_FEE_t + \beta_4 * FUND\_FEE_t * ALPHA_t + \beta_5 * CONTROLS^{30} + RESIDUALS$$

The regression is estimated as a panel model clustering on each fund series/purchase option and observation month. Observations are clustered into fund series/purchase options based on FundSERV codes to account for potential time-series correlation for flow variables within each fund. Standard errors are also clustered by time, based on observation month,

30 We use dummies to control for Canadian Investment Funds Standards Committee (CIFSC) Fund Category, Fund Risk Classification, and Discount Brokerage Series. For definitions of the control variables, please refer to https://www.securities-administrators.ca/uploadedFiles/General/pdfs/Mutual%20Fund%20Fees%20Research%20Data%20Request.pdf.

because macroeconomic factors and systematic risk could lead to cross-sectional correlations among fund flows.

We also test two-way fixed effect models controlling for FundSERV code and month, to address the unobserved heterogeneity across different FundSERV codes and months, and to focus exclusively on variations within FundSERV codes in a given month. The marginal impacts and statistical significance of explanatory variables in the two-way fixed effect models are not materially different from the results reported in the two-dimensional cluster regressions. However, it is noteworthy that for fund series purchasable directly from managers, some fee variables do not exhibit sufficient within-group variations and are, thus, dropped from the two-way fixed effect models, resulting in fewer explanatory variables in the fixed effect model setup. For conciseness, the two-way fixed effect regression results are not reported. Note that some papers estimating flow include on the right-hand-side a variable for assets under management. We have excluded such a variable because our dependent variable divides by assets under management, and hence by construction there is a negative relation. Regardless, including or excluding such a variable has no material effect on the other variables in the regression. These and other specifications are available on request.

Table 3 presents regression analyses of fund flows relative to past performance for the subset of funds that do not permit FB purchase options (i.e., only including funds that allow for DSCs, commissions, and trailer fees). The dependent variable in Table 3 is the monthly net retail flow, the total monthly inflows minus outflows, the net investor switches in, the total monthly PAC inflows net of SWP outflows, and the reinvested distributions net of distributions to unit holders, all divided by AUM at the start of month. Models 1–5 in Table 3 are presented for the subset of funds that sold through dealers or brokers, and models 6–10 are presented for the

subset of funds that can be purchased directly from the fund company. Each of the models includes a squared alpha term to account for possible non-linearity in flow. Prior work on mutual fund flows (Del Guerci and Tkac (2002)) shows that flow–performance relationship is convex: retail investors are quick to rush to invest into funds that have had recent success but slow to withdraw capital from funds that have had poor recent performance. The regressions in Table 3 examine in detail the convexity between different types of fund flows and fund performance.

The data in Panel A of Table 3 indicate the following for fund series sold through dealers or brokers:

Table 3 (Page 88)

Panel A of Table 3 shows that net aggregate flow exhibits a convex relationship with respect to prior alpha, such that a 1-standard-deviation increase in prior alpha on average increases NET_AGGREGATE_FLOW by 33% and increases NET_AGGREGATE_FLOW–performance sensitivity by 4%. This convex flow–performance relationship is consistent with the findings of Del Guercio and Tkac (2002). However, alpha does not have a significant second-order impact on NET_RETAIL_FLOW, indicating that new purchases net of one-time redemptions do not become more sensitive to fund performance as performance improves, due to the influence of the MER, trailer fees, DSCs, sales commissions for DSC, switch fees, and negotiated management fees, whose interactions with prior alpha are statistically significant in Panel A of Table 3. In addition, the marginal impacts of different service fees on different fund flows and related flow–performance sensitivities vary. For example, a 1-standard-deviation rise in MER, on average, increases NET_RETAIL_FLOW by 9% (4% for NET_AGGREGATE_FLOW) and reduces flow–performance sensitivity by 4% (insignificant

for NET_AGGREGATE_FLOW); a 1-standard-deviation rise in trailer fees, on average, increases NET_RETAIL_FLOW by 23% (14% for NET_AGGREGATE_FLOW) and reduces flow–performance sensitivity by 8% (4% for NET_AGGREGATE_FLOW); a 1-standard-deviation rise in trailer slope, or rate of changes in trailer fees, increases NET_RETAIL_FLOW by 19% (insignificant for NET_AGGREGATE_FLOW); the rate of change in trailer fees does not have a statistically significant impact on the NET_RETAIL_FLOW–performance sensitivity, but does increase NET AGGREGATE FLOW-performance sensitivity by 5%. A 1-standard-deviation rise in DSC, on average, reduces NET_RETAIL_FLOW by 26% (insignificant for NET_AGGREGATE_FLOW) and reduces flow–performance sensitivity by 7% (9% for NET_AGGREGATE_FLOW); a 1-standard-deviation rise in sales commission for DSC reduces NET_RETAIL_FLOW by 26% (22% for NET_AGGREGATE_FLOW); a 1-standard-deviation rise in switch fees increases NET_RETAIL_FLOW–performance sensitivity by 1% (1% for NET_AGGREGATE_FLOW); a 1-standard-deviation rise in FE commission, on average, increases NET_RETAIL_FLOW by 9% (12% for NET_AGGREGATE_FLOW); a 1-standard-deviation rise in performance fees, on average, increases NET_RETAIL_FLOW by 6% (4% for NET_AGGREGATE_FLOW).

Given the magnitude of different fund flows shown in Figures 2 and 3, special attention is paid to investor switch-in and -out. Net investor switch flow is positively correlated with prior fund performance, such that a 1-standard-deviation increase in prior alpha increases net switch flow by 18%, compared to a 26% increase in net aggregate flow and a 37% increase in net retail flow. Switch flow is less reactive to prior fund performance than net aggregate flow and net retail flow due to frictions caused by switch charges. However, a 1-standard-deviation rise in prior alpha increases the net switch flow–performance sensitivity by 9%, compared to a 4%

increase in aggregate net flow–performance sensitivity and an insignificant impact on retail flow–performance sensitivity, showing that investors are more likely to switch to a high-performance fund that realized strong growth in the prior period than to a low performance fund that just started to catch up. In addition, higher FE commissions, performance fees, and negotiated management fees encourage net switch flow, while higher TER, trailer fees, and DSCs deter net switch flow. This shows that mutual fund unitholders who make switches prefer upfront service charges, a clear incentive fee structure that aligns the interests of fund managers with those of investors, and higher investor discretion; they are averse to inefficient trading costs, sales commissions paid to dealers and brokers, and fees that restrict their redemption flexibility. Furthermore, the sensitivity of net switches to prior fund performance is moderated by the fee structures specified in Panel A of Table 3.

PACs net of SWPs is positively correlated with prior fund performance, MER, sales commission for DSCs, FE commission paid, and negotiated management fee, and negatively correlated with TER and DSCs, showing that investors who set up a PAC and SWP are averse to direct high trading expenses and fees discouraging early redemptions, but not averse to less straightforward management expenses. Surprisingly, trailer fee does have a significant positive impact on PACs net of SWPs flow, revealing the impact of mutual fund dealers and brokers on investors' long-term contribution and withdrawal preference.

Distributions paid out and reinvested are individually positively correlated with prior fund performance, as shown in the Appendix. However, reinvestment net of paid distributions does not exhibit a strong correlation with prior fund performance; instead, it is positively correlated with DSCs and negatively correlated with trailer fees, sales commissions for DSC, and

FE commissions paid, showing that mutual funds that pay high commissions to dealers and brokers are less likely to receive reinvestment after a distribution is paid out.

Panel B of Table 3 presents the analyses results for fund series purchasable directly from mutual fund managers.

Panel B of Table 3 shares a few similarities with Panel A of Table 3. NET_RETAIL_FLOW, NET_AGGREGATE_FLOW, net switches, and PACs net of SWPs are positively correlated with prior fund performance when the fund series can be purchased directly from fund managers. Reinvested distributions net of paid distributions do not exhibit significant correlations with prior fund performance. In addition, as prior fund performance rises, NET_AGGREGATE_FLOW increases at an accelerating rate. The MER has a positive impact on the flow–performance sensitivity of the PACs net of SWPs flow. Trailer fees have a negative impact on the flow–performance sensitivity for NET_RETAIL_FLOW, NET_AGGREGATE_FLOW, and reinvested distribution net of paid distribution, and a positive impact on the flow–performance sensitivity for net switch-in. The rate of change in trailer fees over time (the trailer slope) is positively correlated with NET_RETAIL_FLOW. TER is negatively correlated with NET_AGGREGATE_FLOW. DSCs have a negative impact on NET_RETAIL_FLOW and net switch-in, and reduce the flow–performance sensitivity for NET_AGGREGATE_FLOW. The rate of change in DSCs over time (the DSC slope) is negatively correlated with NET_RETAIL_FLOW, net switch-in, and PACs net of SWPs flow, and has a negative impact on the flow–performance sensitivity for net switch-in and reinvested distribution net of paid distribution. The sales commission for DSC is negatively correlated with the reinvested distribution net of paid distribution, and reduces the flow–performance sensitivity for NET_AGGREGATE_FLOW and PACs net of SWPs flow. Maximum posted switch fee has

a positive impact on the flow–performance sensitivity for NET_RETAIL_FLOW and NET_AGGREGATE_FLOW, and a negative impact on the flow–performance sensitivity for net switch-in. FE commission paid is positively correlated with NET_RETAIL_FLOW, NET_AGGREGATE_FLOW, and net switches. Negotiated management fees are positively correlated with net switches and the PACs net of SWPs flow.

Panel B of Table 3 is, however, distinct from Panel A of Table 3 in many aspects, among which the following differences are especially noteworthy: The marginal effects of prior alpha on NET_RETAIL_FLOW, NET_AGGREGATE_FLOW, and net switches notably dropped from respective increases of 42%, 33%, and 25% per 1-standard-deviation rise in prior alpha (Panel A) to respective increases of 28%, 20%, and 16% (Panel B). This shows that investors are less reactive and more cautious to changes in prior fund performance when the fund series is directly purchasable. The MER is no longer positively correlated with NET_RETAIL_FLOW and NET_AGGREGATE_FLOW, showing that, in the absence of dealers and brokers, high MER funds do not exhibit additional attraction to investors, who evidently do not associate high MER with better future fund performance. In addition, MER is positively associated with the flow–performance sensitivity for NET_RETAIL_FLOW and NET_AGGREGATE_FLOW, showing that management expenses stimulate investors' reaction to prior fund performance when fund series are directly purchased. Trailer fees no longer exhibit significant impact on the NET_RETAIL_FLOW and NET_AGGREGATE_FLOW in Panel B of Table 3, suggesting that the sales incentives to dealers and brokers do not influence investor decision making when fund series are directly purchasable. In addition, trailer fees are no longer negatively associated with reinvested distribution net of paid distribution, showing that, in the absence of dealers and brokers, investors are more likely to reinvest in a fund after a distribution is paid out. TER

negatively influences NET_RETAIL_FLOW and NET_AGGREGATE_FLOW, such that a 1-standard-deviation rise in TER reduces NET_RETAIL_FLOW and NET_AGGREGATE_FLOW by 11% and 10%, respectively, compared to insignificant impacts in Panel A of Table 3, suggesting that investors are averse to high TER when fund series are directly purchasable. The marginal impact of DSCs on NET_RETAIL_FLOW is –15%, compared to –26% in Panel A of Table 3, suggesting that investors who choose to purchase funds directly from fund managers are less averse to DSCs. This weakened aversion to DSCs can be explained by stronger investor confidence, as investors who do not rely on dealers' advice to make decisions also foresee less probability of withdrawing their investments in the short run. Similarly, investors are not noticeably averse to sales commissions for DSC when fund series are purchasable directly from managers. The negotiated management fee is positively correlated with NET_RETAIL_FLOW and NET_AGGREGATE_FLOW, compared to insignificant impacts when fund series are sold through dealers and brokers, suggesting that negotiation flexibility attracts investors when fund series are directly purchasable.

2.5.2 Analyses of New Purchases and One-time Redemptions

Table 4 presents analyses results comparing new purchases with total inflows and one-time redemptions with total outflows. Panel A of Table 4 reveals the regression results when fund series are sold through dealers and brokers; Panel B of Table 4 reveals the regression results when fund series can be directly purchased from fund managers.

Table 4 (Page 92)

Panel A of Table 4 shows that new purchases and one-time redemptions share strong similarities with all inflows and all outflows, respectively, with respect to changes in prior fund

performance and mutual fund fees. Both new purchases and all inflows are positively correlated with prior fund performance, MER, trailer fees, and FE commissions paid, and are negatively correlated with TER and DSCs. In addition, the flow–performance sensitivity for both new purchases and all inflows are positively affected by MER, switch fees, TER, and negotiated management fees, and are negatively affected by trailer fees, DSCs, and sales commissions for DSC. Both one-time redemptions and all outflows are positively correlated with MER and are negatively correlated with prior fund performance, trailer fees, and DSCs. In addition, the flow–performance sensitivity for one-time redemptions and all outflows is both positively affected by MER and the DSC slope, and negatively affected by trailer fees, the trailer slope, and negotiated management fees. The flow–performance relationships for one-time redemptions and all outflows are concave, but they are convex for all inflows and insignificant for new purchases, indicating asymmetric investor behavior with respect to changes in prior fund performance: good mutual fund performance quickly attracts investment, whereas inferior mutual fund performance slowly deter potential investment.

Panel A of Table 4 further shows that retail flows, namely new purchases and one-time redemptions, are generally more sensitive to prior fund performance and fund fees than total flows. For instance, a 1-standard-deviation rise in prior alpha increases new purchases by 28% and all inflows by 19%, and reduces one-time redemptions by 21% and all outflows by 13%. A 1-standard-deviation rise in MER increases new purchases by 10% and all inflows by 8%. A 1-standard-deviation rise in trailer fees increases new purchases by 12% and all inflows by 7%, and reduces one-time redemptions and all outflows by 8%. A 1-standard-deviation rise in TER reduces new purchases by 10% and all inflows by 9%. A 1-standard-deviation rise in DSC reduces new purchases by 21%, all inflows by 16%, one-time redemptions by 19%, and all

outflows by 14%. The exception is that a 1-standard-deviation rise in MER increases one-time redemptions by 13% and total outflows by 14%.

Panel B of Table 4 shares a few similarities with Panel A of Table 3. A 1-standard-deviation rise in prior alpha increases new purchases by 26% and all inflows by 18%, while reducing one-time redemptions by 23%, and all outflows by 15%. In addition, all inflows exhibit a convex relationship with prior fund performance, whereas one-time redemptions and all outflows exhibit a concave relationship therewith. Trailer fee is positively correlated with new purchases and all inflows; DSC is negatively correlated with new purchases, all inflows, one-time redemptions, and all outflows; TER is negatively correlated with new purchases and all inflows; and FE commission paid is positively correlated with new purchases and all inflows.

Panel B of Table 4 differs from Panel A of Table 4 in the following aspects. MER does not exhibit a significant correlation with new purchases and all inflows when the fund series is directly purchasable, whereas, when fund series are sold through dealers and brokers, MER is positively correlated with new purchases and all inflows. The marginal impact of trailer fees on new purchases and all inflows drops in the absence of dealers and brokers: from 12% to 9% for new purchases and from 7% to 5% for all inflows; TER is positively correlated with one-time redemptions and all outflows, such that a 1-standard-deviation rise in TER increases one-time redemptions by 6% and all outflows by 7%; switch fee is positively correlated with one-time redemptions and all outflows, such that a 1-standard-deviation rise in the switch fee increases one-time redemptions by 3% and increases all outflows by 2%; FE commission paid is positively correlated with one-time redemptions and all outflows, such that a 1-standard-deviation rise in FE commission paid increases one-time redemptions by 14% and all outflows by 8%; negotiated

management fee is positively correlated with new purchases, one-time redemptions, and all outflows, compared with the insignificant effects in Panel A of Table 4.

The analyses results indicate that when mutual funds are purchased directly, rather than through dealers and brokers, investors exhibit different attitudes and reactions to changes in fund performance and fees. This difference can be attributed to two possible reasons. Investors who choose to purchase mutual funds directly are more sophisticated than those who make decisions based on recommendations from dealers and brokers. Alternatively, if two groups of investors are of similar sophistication, then recommendations from mutual fund dealers and brokers are pivotal in shaping investor behavior.

2.5.3 Comparing Net Retail Flow with Net Aggregate Flow

We evaluate whether the NET_AGGREGATE_FLOW, measured by changes in AUM net of asset appreciation, is fully representative of NET_RETAIL_FLOW, measured by new purchases net of one-time redemptions. Conceptually, NET_AGGREGATE_FLOW indicates overall fund movement, which is not directly related to investor actions. NET_RETAIL_FLOW, however, is directly determined by investment decisions and accurately reflects investor preferences. Tables 3 and 4 reveal that NET_RETAIL_FLOW exhibits different sensitivities with respect to prior fund performance and fund fees compared to NET_AGGREGATE_FLOW. Whether this difference is of statistical and economic significance warrants examination.

In Table 5, we regress NET_RETAIL_FLOW on predicted NET_AGGREGATE_FLOW, prior fund performance, and fund fee variables, where predicted NET_AGGREGATE_FLOW is based on model 2 (Panel A) or model 7 (Panel B) in Table 3. If NET_AGGREGATE_FLOW is fully representative of NET_RETAIL_FLOW, we should observe that neither prior fund

performance nor fund fee variables exhibit statistical significance in Table 5, as their impact on NET_RETAIL_FLOW has been absorbed by the predicted aggregate flow variable. Alternatively, statistically significant prior fund performance or fee variables would reveal material differences between NET_RETAIL_FLOW and NET_AGGREGATE_FLOW.

Table 5 (Page 96)

Panel A of Table 5 shows that, for fund series sold through dealers and brokers, NET_RETAIL_FLOW is more sensitive to prior fund performance than NET_AGGREGATE_FLOW: NET_RETAIL_FLOW increases by an additional 22%–34% compared to NET_AGGREGATE_FLOW when alpha increases by 1-standard-deviation. In addition, compared to NET_AGGREGATE_FLOW, NET_RETAIL_FLOW increases by an additional 8%–12%, 34%–42%, and 6%–13% when the MER, trailer fee, and trailer slope, respectively, increases by 1-standard-deviation. NET_RETAIL_FLOW reduces by an additional 15%–25%, 34%–44%, and 3% when DSCs in Year 1, the DSC slope, and front-end commission paid, respectively, increase by 1-standard-deviation.

Panel B of Table 5 shows that, for fund series purchasable directly from fund managers, a 1-standard-deviation increase in the trailer slope and switch fee increases NET_RETAIL_FLOW by an additional 5%–12% and 15%–24%, respectively, compared to net aggregated flow. A 1-standard-deviation increase in DSCs in Year 1 and front-end commission paid reduces NET_RETAIL_FLOW by an additional 36%–47% and 3%–4%, respectively, compared to NET_AGGREGATE_FLOW.

In general, the empirical data analyses results are consistent with Hypothesis 1: different types of fund flow exhibit significantly different sensitivities with respect to prior fund performance and fund fees.

2.6. Fund Fees and Fund Performance

In this section, we analyze the relationship between mutual fund fees and performance and investigate whether agency problems are embedded in inappropriate fee structure.

Table 6 presents the analyses results on the factors influencing management skill transitions from one period to the next. The basic model specification is as follows:

(2) $$FUND\_PERFORMANCE_{t+12} = CONSTANT + \beta_1 * ALPHA_t + \beta_2 * FUND\_FEE_t + \beta_3 * CONTROLS + RESIDUALS$$

Panel regression models with standard errors clustered on FundSERV codes and observation month are applied in the analyses. We choose 12-month lead alpha as the dependent variable to avoid overlap between estimation windows in future and current fund performance. Explanatory variables include lagged alpha and mutual fund fees. Fund characteristic variables are used as controls. Panel A of Table 6 reveals regression results for fund series sold through dealers and brokers; Panel B of Table 6 reveals regression results for fund series purchasable directly from fund managers.

Table 6 (Page 98)

Panel A of Table 6 shows that prior fund performance is positively correlated with fund performance in the 12 months ahead, statistically significant at the 5% level. Specifically, a 1-standard-deviation improvement in prior fund performance increases fund performance in the 12

months ahead by 5% (model 3) to 7% (model 1), showing that management skills are transferrable from one period to the next.

Panel A of Table 6 further shows that a mutual fund fee structure has a significant impact on management skill delivery. A 1-standard-deviation rise in the performance fee increases future alpha by 5% (model 3) to 9% (model 6); a 1-standard-deviation rise in DSCs in Year 1 reduces future alpha by 12% (model 6) to 16% (model 1). An increase in DSCs in the following years further reduces future fund alpha. A 1-standard-deviation rise in negotiated management fee increases future alpha by 5% (model 1) to 6% (model 3); a 1-standard-deviation rise in trailer fees reduces future alpha by 7% (model 1) to 10% (model 4); a 1-standard-deviation rise in sales commissions for DSC reduces future alpha by 4% (model 5) to 5% (model 4). These results are at least statistically significant at the 5% level.

Panel B of Table 6 shows that lagged fund alpha is positively correlated with future alpha, such that a 1-standard-deviation improvement in prior alpha increases future alpha by 6% (model 12) to 8% (model 9). DSCs in Year 1 is negatively correlated with future alpha, such that a 1-standard-deviation rise in DSCs reduces future alpha by 7% (model 7) to 9% (model 10), compared to 12%–16% reduction in future alpha in Panel A of Table 6. FE commission paid is negatively correlated with future alpha, but the economic significance is limited: a 1-standard-deviation rise in FE commission paid reduces future alpha by 1% (model 11) to 2% (model 10). MER and TER do not exhibit a significant impact on future alpha. The trailer fee is negatively correlated with future alpha: a 1-standard-deviation increase in trailer fees reduces future alpha by 4%–7%, compared to 7%–10% in Panel A of Table 6.

In general, Table 6 shows that the mutual fund fee structure has a significant impact on fund managers' skill delivery from one period to the next. Performance fees encourage management effort and lead to better fund performance in the following period; as the negotiated management fee needs to be justified by fund performance, management effort is thus incentivized, leading to better fund performance. However, trailer fee reduces management incentives and leads to worse fund performance in the future. This effect is more obvious when fund series are sold through dealers and brokers.

2.7. Fund Flow and Fund Performance

In this section, we investigate the correlations among different types of fund flows and examine whether certain fund flow correlations have significant impact on future fund performance.

Table 7 presents comparison tests on the effects of fund flow correlations on mutual fund performance. The comparison test results are not conclusive as these tests do not control for impacts from other influential factors. However, they exhibit general correlations for variables in the data set.

Table 7 (Page 100)

Panel A of Table 7 shows that for fund series sold through dealers and brokers, 33% of monthly observations exhibit a statistically significant positive correlation between new purchases and switches in; 15% of monthly observations exhibit a statistically significant positive correlation between new purchases and switches out; 3% of monthly observations exhibit a statistically significant positive correlation between one-time redemptions and switches in; and 29% of monthly observations exhibit a statistically significant positive correlation

between one-time redemptions and switches out. Panel A of Table 7 further shows that average fund performance is higher when new purchases are positively correlated with switches in and when one-time redemptions are positively correlated with switches out. Average fund performance is lower when new purchases are positively correlated with switches out and when one-time redemptions are positively correlated with switches in; the results are at least significant at the 5% level.

Panel B of Table 7 shows that, for fund series purchasable directly from fund managers, 27% of monthly observations exhibit a statistically significant positive correlation between new purchases and switches in; 5% of monthly observations exhibit a significant positive correlation between new purchases and switches out; 1% of monthly observations exhibit a significant positive correlation between one-time redemptions and switches in; and 23% of monthly observations exhibit a significant positive correlation between one-time redemptions and switches out. Similar to Panel A of Table 7, average fund alpha is higher when retail flows and switch flows move in the same direction, and lower when they move the opposite directions; these results are significant at the 1% level.

Table 8 presents cross-sectional regressions on the effect of flow correlations on fund performance. The basic model specification is as follows:

(3) FUND_PERFORMANCE= CONSTANT + β1 * FUND_FEE + β2 * FLOW CORRELATION DUMMIES + β3 * CONTROLS + RESIDUALS

Each FundSERV code has one corresponding observation in the model; the dependent variable is the average alpha for each FundSERV code; explanatory variables include dummy variables indicating whether a FundSERV code exhibits statistically significant correlations for

specified fund flows, and control variables for the most common mutual fund fee types, where the average value for each fee is taken.

Table 8 (Page 101)

Panel A of Table 8 shows that for fund series sold through dealers and brokers, the MER does not exhibit a statistically significant correlation with fund performance; TER does exhibit a positive correlation with fund performance, but the correlation is weak and unstable; trailer fees are negatively correlated with fund performance, statistically significant at the 1% level; and a performance fee is positively correlated with fund performance, statistically significant at the 1% level.

Panel A of Table 8 further shows that the average fund performance is 8% (model 5) to 14% (model 1) lower when new purchases are positively correlated with investor switches out; and 1% lower when one-time redemptions are positively correlated with distribution to unitholders. Average fund performance is 5% (model 2) to 6% (model 5) higher when one-time redemptions are positively correlated with switches out.

Panel B of Table 8 shows that for fund series purchasable directly from fund managers, the MER and TER do not exhibit significant correlations with fund performance; trailer fee is negatively correlated with fund performance, statistically significant at the 1% level.

Panel B of Table 8 further shows that average fund performance is 5% (model 5) to 6% (model 6) lower when new purchases are positively correlated with switches out; 2% lower when one-time redemptions are positively correlated with switches in; and 1% (model 4) to 2% (model 5) lower when one-time redemptions are positively correlated with reinvested distributions. Average fund performance is 3% higher when one-time redemptions are positively correlated

with switches out, and 2% higher when new purchases are positively correlated with reinvested distributions.

In general, Table 8 provides empirical support for Hypothesis 2: a positive correlation between new purchases and switches out is negatively correlated with average fund performance, and the marginal impact of this effect is especially obvious when fund series are sold through dealers and brokers.

2.8 The Trend of Fund Performance: Catch it or Miss it?

In this section, we study the correlation between fund flow and future fund performance and investigate whether certain types of fund flow are predictive of future fund performance.

Table 9 presents panel regression results with standard errors clustered by two dimensions: FundSERV code and observation month. The basic model specification is as follows:

$$(4) \quad FUND\_PERFORMANCE_{t+12} = CONSTANT + \beta_1 * ALPHA_t + \beta_2 * FUND\_FEE_t + \beta_3 * FUND\_FLOW_t + \beta_3 * CONTROLS + RESIDUALS$$

The dependent variable is the lead 12-month fund alpha[31]. Explanatory variables include lagged fund performance, fund flow variables, and variables controlling for mutual fund fees exhibiting statistical significance in Table 6. Panel A of Table 9 presents the results when fund series are sold through dealers and brokers; Panel B of Table 9 presents the results when fund series are purchasable directly from fund managers.

Table 9 (Page 103)

[31] As alpha is estimated based on 12 month rolling window, a lead 12 month future alpha does not have any overlap in estimation window with prior alpha used as explanatory variable.

Panel A of Table 9 shows that lagged new purchases and one-time redemptions are not associated with changes in future fund performance, suggesting that an average investor is not able to catch the trend of fund performance. Lagged switch-in is positively associated with future alpha, but the economic significance of the association is small: a 1-standard-deviation rise in switch-in is associated with a 1% improvement in future alpha, showing that investors who switch in usually receive improved fund performance in the new fund, but the economic benefit of the switch is small and can be offset by switch fees. Lagged switch-out is negatively associated with future fund performance, such that a 1-standard-deviation rise in switch-out is associated with a 6% (model 5) to 7% (model 2) reduction in future alpha, showing that investors who switch out of a fund successfully avoid future losses. PACs, SWPs, distribution to unitholders, and reinvested distributions do not exhibit a statistically significant correlation with future fund performance.

Panel B of Table 9 shows that lagged new purchases and one-time redemptions do not exhibit strong correlations with changes in future alpha; switches in and out exhibit statistically significant positive and negative correlations, respectively, with future alpha, but the economic impact is small: a 1-standard-deviation increase in switch-in (-out) is associated with a 1%–2% increase (decrease) in future fund performance. Other types of fund flows do not exhibit a statistically significant relationship with future fund performance.

The associations between fund switching and future fund performance can be attributed to the barriers to fund switches, namely switch fees and discouragement from dealers and brokers. Due to these barriers, investors do not make switches among different fund series without strong preference or discontent. The convex relationship between net switch flow and prior fund performance further indicates that without substantial fund underperformance,

investors are reluctant to switch out. The compelling attitude towards a fund, especially for switches out, is based on investors' prior experiences with fund management and performance, which are strongly correlated with fund performance in the following period, as demonstrated by the positive correlation between lagged and future alpha. The economic impact of the correlation between switches and fund alpha is higher when fund series are sold through dealers and brokers, whose advice increases the barrier to investor switches, consistent with Hypothesis 2.

2.9 Conclusion

Mutual fund flows are more than just changes in AUM net of asset appreciation. Different types of fund flows reflect distinct investor incentives and dynamic skill and effort delivery from fund managers. In this paper, we study the characteristics of each type of fund flow—new purchases, one-time redemptions, switches in and out, PACs, SWPs, distribution to unitholders, and reinvested distributions—with respect to changes in prior fund performance and mutual fund fees. We find that the mutual fund fee structure directly influences fund flows and changes the flow-performance sensitivity.

We further compare characteristics between new purchases and total inflow, and between one-time redemptions and total outflow, and discuss the similarities and differences among the assessed flows. We propose that total inflows and outflows are barely sufficient and not accurate in reflecting the diverse investment behaviors of mutual fund unitholders. In addition, we test the correlations among new purchases, one-time redemptions, and investor switches, and relate these correlations with fund performance in the 12 months ahead. We find that a positive correlation between new purchases and investor switch-out is negatively correlated with future fund performance, and that this correlation is both statistically and economically significant. We

further propose that this correlation is indicative of the information asymmetry between incoming unitholders and existing unitholders. We attribute this information asymmetry to search cost initiated in investors' fund selection process and argue that the biased advice from mutual fund dealers and brokers, who recommend funds that pay them the highest trailer fees rather than those that best match investors' financial interests, amplifies the information asymmetry problem. Empirical evidence further shows that this information asymmetry is negatively correlated with future fund performance. Finally, we examine whether fund flows can catch the trend of fund performance and find that, among different types of fund flows related to investor behavior, only switch flows have a strong association with future fund performance. We attribute this strong association to barriers to investor switches, and find higher switching barriers and stronger economic significance in the positive association between new purchases and investor switch-out when fund series are sold through dealers and brokers.

TABLE 2.1 Variable Definitions and Summary Statistics

This table defines the variables in the data set and provides summary statistics for the number of fund-month observations (Obs.) between January 2003 and December 2014.

	Definition	Obs.	Mean	Median	Std. Dev.
Fund Flow and Performance Variables					
NET_AGGREGATE_FLOW	(Total monthly inflows - total monthly outflows) / assets under management (AUM) at start of month. All flow data are winsorized at the 1% level.	1102377	0.49%	0.00%	0.0328
NET_RETAIL_FLOW	(New Purchases - One-time Redemptions) / AUM at start of month, where New Purchases is the total monthly inflow net of switches in, pre-authorized contribution (PAC), and reinvested distribution; One-time Redemptions is the total monthly outflow net of switches out, systematic withdrawal plan (SWP), and distribution to unitholders.	1102377	0.39%	0.00%	0.0297
SWITCHES_IN-SWITCHES_OUT	(Total monthly switches in - total monthly switches out) / AUM at start of the month.	1102377	0.09%	0.00%	0.0075
PAC_INFLOWS-SWP_OUTFLOWS	(Total monthly PAC inflows - total monthly SWP outflows) / AUM at start of month.	1102377	0.03%	0.00%	0.0010
REINVESTED_DISTRIBUTIONS-PAID_DISTRIBUTIONS	(Total reinvested distributions - distributions to unit holders) / AUM at start of month.	1102377	-0.02%	0.00%	0.0013
Alpha	The annualized abnormal return in percent, calculated by 12-month rolling windows, based on monthly gross return and Fama-French North America 4 factors. Monthly gross returns are winsorized at the 1% level; Fama-French 4 factors (market, SMB, HML and WML) and the risk-free rate are sourced from the Kenneth R. French Data Library.	1010575	0.2502	0.2492	0.7433
Flow Composition and Correlation Data					
Total Inflow (%)	Total inflow as a percentage of AUM in a month.	1102377	2.37%	0.94%	0.0310
Total Outflow (%)	Total outflow as a percentage of AUM in a month.	1102377	1.88%	0.55%	0.0188
New Purchases (%)	New retail purchases fund inflow as a percentage of AUM in a month.	1102377	1.87%	0.75%	0.0284
One-time Redemptions (%)	One-time redemption fund outflow as a percentage of AUM in a month.	1102377	1.48%	0.36%	0.0157
Switch-In (%)	Investor switches in fund flow as a percentage of AUM in a month.	1102377	0.36%	0.15%	0.0078
Switch-Out (%)	Investor switches out in fund flow as a percentage of AUM in a month.	1102377	0.27%	0.15%	0.0070
Pre-authorized Contribution (%)	PAC fund inflow as a percentage of AUM in a month.	1102377	0.05%	0.01%	0.0014
Systematic Withdrawal Plan (%)	SWP fund inflow as a percentage of AUM in a month.	1102377	0.02%	0.00%	0.0004
Reinvested Distribution (%)	Reinvested distribution fund inflow as a percentage of AUM in a month.	1102377	0.09%	0.00%	0.0024
Distribution to Unitholders (%)	Distribution to unitholders fund outflow as a percentage of AUM in a month.	1102377	0.11%	0.00%	0.0031
Positive Correlated: Retail Inflow and Switch-In (Yes=1; No=0)	The correlation between Retail Inflow volume and Investor Switch-In volume is positive and significant at the 5% level (Yes=1; No=0).	18102	0.3194	0.00%	0.4667
Positive Correlated: Retail Inflow and Switch-Out (Yes=1; No=0)	The correlation between Retail Inflow volume and Investor Switch-Out volume is positive and significant at the 5% level (Yes=1; No=0).	18102	0.1333	0.00%	0.3638
Positive Correlated: Retail Outflow and Switch-In (Yes=1; No=0)	The correlation between Retail Outflow volume and Investor Switch-In volume is positive and significant at the 5% level (Yes=1; No=0).	18102	0.0243	0.00%	0.1529
Positive Correlated: Retail Outflow and Switch-Out (Yes=1; No=0)	The correlation between Retail Outflow volume and Investor Switch-Out volume is positive and significant at the 5% level (Yes=1; No=0).	18102	0.2822	0.00%	0.4438

TABLE 2.1 (Continued)

	Definition	Obs.	Mean	Median	Std. Dev.
Positive Correlated: Retail Inflow and Distribution to Unitholders (Yes=1; No=0)	The correlation between Retail Inflow volume and Distribution to Unitholders volume is positive and significant at the 5% level (Yes=1; No=0).	18102	0.2125	0.00%	0.4129
Positive Correlated: Retail Inflow and Reinvested Distribution (Yes=1; No=0)	The correlation between Retail Inflow volume and Reinvested Distribution volume is positive and significant at the 5% level (Yes=1; No=0).	18102	0.2427	0.00%	0.4305
Positive Correlated: Retail Outflow and Distribution to Unitholders (Yes=1; No=0)	The correlation between Retail Outflow volume and Distribution to Unitholders volume is positive and significant at the 5% level (Yes=1; No=0).	18102	0.0133	0.00%	0.1146
Positive Correlated: Retail Outflow and Reinvested Distribution (Yes=1; No=0)	The correlation between Retail Outflow volume and Reinvested Distribution volume is positive and significant at the 5% level (Yes=1; No=0).	18102	0.0348	0.00%	0.1782
Service Fee Data					
Deferred Sales Charge Year 1	The deferred sales charges (DSCs) as a percentage of AUM in Year 1.	1209285	4.7928	5.5	1.5236
DSC Slope	The average of the percentage change in DSCs from one period to the next.	868685	-0.186	-0.1831	0.0486
Sales Commission for DSC	The sales commission rate paid by the fund company to the fund dealer, as reported in the simplified prospectus at the time of purchase.	1209285	1.6704	0	2.1481
Front-End Commissions Paid	The total amount of front-end (FE) commissions paid each month, divided by AUM at the start of the month.	1102377	0.0196	0	0.0871
Maximum Posted Switch Fee	The maximum switch fee rate as reported in the simplified prospectus at the time of purchase.	1209285	1.9964	2	0.083
Performance Fee	The percentage incentive fee charged by the fund manager to the fund.	1209285	0.0845	0	0.561
Negotiated Management Fees Paid	Where the management fees of a particular fund series/purchase option are typically negotiated: the total amount of management fees received each month, divided by AUM at the start of the month. This amount includes any payments made to the fund and any payments made directly to the fund company for fund management.	1102377	0.0244	0	0.0909
Management Expense Ratio (MER)	The management expense ratio (MER) after waivers and absorptions, as reported in the management report of fund performance (or the financial statements before 2006) at the time of purchase. Please refer to National Instrument 81-106 part 15 for the calculation.	1110152	2.0736	2.1604	0.6552
Trading Expense Ratio (TER)	The trading expense ratio (TER) (%) for the fund series/purchase option, as reported in the management report of fund performance at the time of purchase. For periods before 2006, TER calculated (estimates are acceptable) and reported as outlined in National Instrument 81-106F1.	1209285	1.3137	0.2467	2.3835
Maximum Posted Initial Trailer	For purchase option type "FE," "DSC," or "NL," the maximum trailer fee annualized rate that applied to assets held during the period reported.	1110152	0.5823	0.5	0.3628
Trailer Slope	The average of the percentage change in the trailer fee from one period to the next.	1074741	0.0664	0	0.1644

TABLE 2.2 Comparison Test on the Effect of Trailer Fee on Fund Flows

This table presents comparisons of the means and medians of different types of fund flows based on the corresponding level of trailer fee. Panel A shows the results for fund series sold through dealers and brokers; Panel B shows the results for fund series purchasable directly from the fund manager. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Fund Series Sold through Dealers or Brokers

	Average Flow for Maximum Posted Initial Trailer Fee above Median	Average Flow for Maximum Posted Initial Trailer Fee below Median	T-Value for Comparison of Means	Median Flow for Maximum Posted Initial Trailer Fee above Median	Median Flow for Maximum Posted Initial Trailer Fee below Median	T-Value for Comparison of Medians
NET_RETAIL_FLOW	0.52%	0.43%	4.52***	0.51%	0.40%	4.93***
NET_AGGREGATE_FLOW	0.42%	0.34%	4.17***	0.41%	0.36%	2.86***
SWITCHES_IN-SWITCHES_OUT	0.07%	0.12%	-4.25***	0.08%	0.13%	-4.13***
PAC_INFLOWS-SWP_OUTFLOWS	0.04%	0.03%	3.15***	0.03%	0.03%	1.90*
REINVESTED_DISTRIBUTIONS-PAID_DISTRIBUTIONS	-0.03%	-0.01%	-3.76***	-0.03%	-0.02%	-2.23**

Panel B. Fund Series Purchasable Directly from Fund Manager

	Average Flow for Maximum Posted Initial Trailer Fee above Median	Average Flow for Maximum Posted Initial Trailer Fee below Median	T-Value for Comparison of Means	Median Flow for Maximum Posted Initial Trailer Fee above Median	Median Flow for Maximum Posted Initial Trailer Fee below Median	T-Value for Comparison of Medians
NET_RETAIL_FLOW	0.59%	0.50%	4.43***	0.57%	0.48%	5.12***
NET_AGGREGATE_FLOW	0.49%	0.41%	3.73***	0.46%	0.39%	3.59***
SWITCHES_IN-SWITCHES_OUT	0.11%	0.13%	-2.13**	0.10%	0.13%	-2.50**
PAC_INFLOWS-SWP_OUTFLOWS	0.03%	0.02%	1.94**	0.02%	0.02%	0.97
REINVESTED_DISTRIBUTIONS-PAID_DISTRIBUTIONS	-0.02%	-0.03%	2.04**	-0.03%	-0.03%	1.48

TABLE 2.3 The Effect of Mutual Fund Fees on Fund Flow

This table presents unbalanced panel regressions on the determinants of different types of fund flow (1 month ahead), excluding fund of funds and the subsample of fee-based purchase option types. Standard errors are clustered by FundSERV Code and month. Explanatory variables include lagged alpha, mutual fund fees and the interaction terms with lagged alpha and fund fees. T-statistics are in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Fund Series Sold through Dealers or Brokers

	Model 1	Model 2	Model 3	Model 4	Model 5
	NET_RETAIL_ FLOW	NET_AGGREGATE _FLOW	SWITCHES_IN-SWITCHES_OUT	PAC_INFLOWS-SWP_OUTFLOWS	REINVESTED_ DISTRIBUTIONS-PAID_ DISTRIBUTIONS
Alpha Lagged	0.00265***	0.00189***	0.000732***	0.0000195**	0.0000436
	(3.57)	(4.98)	(3.36)	(1.97)	(1.34)
Alpha Lagged^2	0.000336	0.000295**	0.000258***	0.00000699	0.00000301
	(1.28)	(2.19)	(3.19)	(0.83)	(1.62)
Management Expense Ratio (MER) (%)	0.000638***	0.000278***	-0.000602*	0.000117***	-0.000105
	(5.19)	(3.58)	(-1.68)	(5.40)	(-1.24)
Alpha Lagged * MER	-0.000281**	-0.000267	-0.000108***	0.00000373**	0.0000145
	(-2.37)	(-0.67)	(-2.74)	(2.37)	(1.55)
Trading Expense Ratio (TER) (%)	0.000259	-0.000162	-0.000119***	-0.00000189***	-0.0000407*
	(1.16)	(-0.96)	(-4.10)	(-2.59)	(-1.67)
Alpha Lagged * TER	0.0000303	0.000124	-0.0000157*	-0.00000155	-0.00000104
	(0.22)	(1.46)	(-1.74)	(-0.80)	(-0.47)
Maximum Posted Initial Trailer Fee (%)	0.0118***	0.00657***	-0.00263***	0.000208***	-0.0000295**
	(5.31)	(3.54)	(-4.31)	(5.90)	(-1.97)
Alpha Lagged * Maximum Posted Initial Trailer Fee	-0.00381***	-0.00171***	0.000984***	0.000035	-0.0000316**
	(-3.30)	(-3.25)	(3.56)	(1.13)	(-2.49)
Trailer Slope	0.00512***	0.00547	0.00113	-0.000291***	0.000223**
	(3.14)	(1.57)	(1.58)	(-9.34)	(2.02)
Alpha Lagged * Trailer Slope	0.00552*	0.00115***	0.000624***	0.0000501***	-0.000111*
	(1.71)	(4.76)	(3.47)	(2.80)	(-1.66)
Deferred Sales Charge (DSC) Year 1	-0.000734***	-0.000850	-0.0000522***	-0.0000245***	0.0000285***
	(-3.65)	(-1.21)	(-3.19)	(-6.37)	(5.66)
Alpha Lagged * DSC Amount Year 1 (%)	-0.000192**	-0.000235***	0.0000700	0.0000136***	-0.0000146
	(-2.55)	(-5.77)	(0.74)	(5.68)	(-1.45)
DSC Slope	-0.0284***	-0.0256*	-0.00785***	-0.00278	-0.00136***
	(-2.62)	(-1.75)	(-3.50)	(-1.47)	(-3.05)
Alpha Lagged * DSC Slope	-0.00865***	-0.00245***	-0.00633***	0.000231**	-0.000281**
	(-3.80)	(-3.81)	(-2.61)	(2.04)	(-2.07)
Sales Commission paid on DSC purchase (%)	-0.000542***	-0.000419***	-0.000355***	0.00000915***	-0.0000224***
	(-4.03)	(-7.98)	(-6.05)	(4.27)	(-3.24)
Alpha Lagged * Sales Commission paid on DSC purchase	-0.0000826***	-0.0000433***	0.000125***	-0.00000236***	-0.0000107
	(-3.94)	(-3.83)	(3.12)	(-2.63)	(-1.46)

TABLE 3 *Panel A* **(Continued)**

	Model 1 NET_RETAIL_ FLOW	Model 2 NET_AGGREGATE_ FLOW	Model 3 SWITCHES_IN-SWITCHES_OUT	Model 4 PAC_INFLOWS-SWP_OUTFLOWS	Model 5 REINVESTED_ DISTRIBUTIONS-PAID_ DISTRIBUTIONS
Maximum Posted Switch Fee (%)	0.0104	-0.00652	-0.00178	0.000321	-0.000692*
	(0.87)	(-1.14)	(-0.76)	(1.48)	(-1.72)
Alpha Lagged * Maximum Posted Switch Fee (%)	0.000646**	0.000549**	-0.000183***	0.000105	0.000255*
	(2.01)	(2.11)	(-3.27)	(1.53)	(1.91)
Front-End (FE) Commission paid (%)	0.00434***	0.00556***	0.000898***	0.00021***	-0.000273***
	(10.65)	(7.81)	(3.62)	(2.59)	(-3.21)
Alpha Lagged * FE Commission paid	-0.00711	0.00184***	0.00144*	-0.000142	0.0000620
	(-1.54)	(4.08)	(1.70)	(-1.12)	(1.20)
Performance Fee (%)	0.000458***	0.000277***	0.000456**	-0.0000889	0.0000232
	(3.17)	(5.10)	(2.53)	(-0.11)	(1.14)
Alpha Lagged * Performance Fee	0.000175	0.000176	0.000183**	-0.0000178*	0.0000113**
	(0.23)	(0.31)	(2.01)	(-1.68)	(2.34)
Negotiated Management Fee (%)	0.00501	0.00421	0.00379***	0.000267**	-0.000643
	(1.56)	(1.24)	(6.59)	(2.27)	(-0.11)
Alpha Lagged * Negotiated Management Fee	0.00259	0.00149	-0.000761***	0.0000616	-0.000119
	(0.39)	(1.54)	(-3.01)	(1.04)	(-1.52)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes	Yes
Constant	0.0295	0.0137***	0.00202	0.0000801	0.000148
	(1.15)	(2.65)	(0.42)	(0.49)	(0.18)
Number of Observations	508121	508121	508121	508121	508121
Number of Clusters (FundSERV Code)	9595	9595	9595	9595	9595
Number of Clusters (Month)	131	131	131	131	131
R^2	0.068	0.055	0.047	0.059	0.061
F	611.7	416.2	251.8	969.7	543.0

Panel B. Fund Series Purchasable Directly from Fund Manager

	Model 6	Model 7	Model 8	Model 9	Model 10
	NET_RETAIL_ FLOW	NET_AGGREGATE _ FLOW	SWITCHES_IN-SWITCHES_OUT	PAC_INFLOWS-SWP_OUTFLOWS	REINVESTED_DISTRIBUTIONS-PAID_DISTRIBUTIONS
Alpha Lagged	0.0131***	0.0223***	0.00378***	0.000362***	-0.000213
	(8.06)	(5.68)	(3.50)	(2.61)	(-0.32)
Alpha Lagged^2	0.00122*	0.00355***	0.0000850*	0.0000229	0.0000970
	(1.69)	(3.11)	(1.73)	(0.43)	(0.65)
Management Expense Ratio (MER) (%)	-0.00686	-0.00525	-0.00278***	-0.0000250***	0.000280**
	(-1.26)	(-0.31)	(-5.84)	(-3.85)	(2.21)
Alpha Lagged * MER	0.00388***	0.00320***	0.000678	0.0000685***	0.000252***
	(5.52)	(4.49)	(1.53)	(2.65)	(3.22)
Maximum Posted Initial Trailer Fee (%)	0.00326	0.00375*	0.00119	-0.000164***	0.0000299
	(0.85)	(1.70)	(1.19)	(-3.33)	(0.16)
Alpha Lagged * Maximum Posted Initial Trailer Fee	-0.00264***	-0.00393***	0.000114***	0.000153	-0.000487**
	(-3.05)	(-2.59)	(5.01)	(0.94)	(-1.98)
Trailer Slope	0.0145***	0.00564***	0.00187**	-0.000142	-0.00104***
	(3.07)	(3.27)	(2.05)	(-1.52)	(-4.21)
Alpha Lagged * Trailer Slope	0.00514	-0.00133	-0.000279	0.0000788***	0.000250*
	(1.35)	(-0.63)	(-0.48)	(2.69)	(1.78)
Trading Expense Ratio (TER) (%)	-0.000340***	-0.000367***	-0.0000794*	0.0000113	0.000149
	(-4.65)	(-3.83)	(-1.90)	(1.60)	(1.10)
Alpha Lagged * TER	-0.000177	0.000420*	0.000173*	-0.00000492	-0.0000376
	(-0.44)	(1.91)	(1.73)	(-0.12)	(-1.34)
Deferred Sales Charge (DSC) Year 1	-0.00311***	-0.00569**	-0.000453**	-0.0000535*	0.0000596
	(-3.02)	(-2.17)	(-2.19)	(-1.87)	(1.25)
Alpha Lagged * DSC Amount Year 1 (%)	0.000862	-0.000856***	0.000146	0.0000237	-0.0000268***
	(1.43)	(-2.61)	(1.17)	(1.55)	(-5.76)
DSC Slope	-0.0371**	-0.0336***	-0.0171***	-0.00174***	-0.00112
	(-2.02)	(-2.98)	(-3.65)	(-2.77)	(-1.45)
Alpha Lagged * DSC Slope	0.0117	0.0181	-0.0161**	0.0019*	-0.00132***
	(1.46)	(1.11)	(-2.40)	(1.65)	(-6.35)

Table 3 *Panel B* **(Continued)**

	Model 6	Model 7	Model 8	Model 9	Model 10
	NET_RETAIL_ FLOW	NET_AGGREGATE_ FLOW	SWITCHES_IN-SWITCHES_OUT	PAC_INFLOWS-SWP_OUTFLOWS	REINVESTED_ DISTRIBUTIONS-PAID_ DISTRIBUTIONS
Sales Commission paid on DSC purchase (%)	0.00272	0.00177	0.000169	-0.0000214	-0.000176**
	(1.52)	(0.30)	(0.56)	(-0.87)	(-2.25)
Alpha Lagged * Sales Commission on DSC purchase	-0.00148	-0.00132***	-0.000371**	-0.0000437***	0.0000245***
	(-1.26)	(-2.60)	(-2.21)	(-3.98)	(2.83)
Maximum Posted Switch Fee (%)	-0.0243***	-0.0338***	-0.0219***	0.0000792***	-0.000341
	(-5.41)	(-4.80)	(-3.43)	(2.73)	(-0.33)
Alpha Lagged * Maximum Posted Switch Fee (%)	0.00610***	0.00962***	-0.00497***	0.000120	0.000189
	(7.73)	(3.36)	(-4.27)	(0.17)	(0.64)
Front-End (FE) Commission paid (%)	0.0270***	0.0302***	0.0211***	0.000314	0.00212***
	(7.19)	(9.23)	(8.23)	(1.35)	(4.28)
Alpha Lagged * FE Commission paid	-0.00945***	-0.00545*	0.00390***	-0.0000578***	-0.000481***
	(-6.83)	(-1.74)	(2.84)	(-2.70)	(-4.48)
Negotiated Management Fee (%)	0.0338***	0.0749***	0.00725***	0.000362***	0.00174*
	(7.42)	(5.16)	(5.01)	(3.63)	(1.82)
Alpha Lagged * Negotiated Management Fee	0.00588***	0.0118***	0.00248**	0.000223**	0.000524
	(2.81)	(3.18)	(2.22)	(2.54)	(1.07)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes	Yes
Constant	-0.00119***	0.00951***	0.00314***	-0.0000784	-0.0000688
	(-9.74)	(5.88)	(4.36)	(-1.55)	(-0.29)
Number of Observations	134505	134505	134505	134505	134505
Number of Clusters (FundSERV Code)	2010	2010	2010	2010	2010
Number of Clusters (Month)	131	131	131	131	131
R^2	0.510	0.047	0.061	0.026	0.111
F	275.6	280.6	260.1	262.9	374.9

TABLE 2.4 Retail Flow and Total Flow

This table presents unbalanced panel regressions on the factors influencing new purchases, one-time redemptions, total inflow, and total outflow in the next period. Fund of funds are excluded from the analysis. Explanatory variables include lagged alphas, fee types, and interaction terms. Standard errors are clustered by FundSERV Code and month. T-statistics are in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Fund Series Sold through Dealers or Brokers

	Model 1 New Purchases	Model 2 All Inflows	Model 3 One-time Redemptions	Model 4 All Outflows
Alpha Lagged	0.00752***	0.00629***	-0.00414**	-0.00350***
	(3.66)	(3.01)	(-2.43)	(-2.72)
Alpha Lagged^2	-0.000336*	-0.000491**	0.000738***	0.000405**
	(1.85)	(2.43)	(2.68)	(2.36)
Management Expense Ratio (MER) (%)	0.00292***	0.00310***	0.00305***	0.00421***
	(3.55)	(4.57)	(2.61)	(7.20)
Alpha Lagged * MER	0.000858**	0.000746***	0.000202***	0.000631***
	(2.29)	(2.69)	(2.75)	(3.70)
Maximum Posted Initial Trailer Fee (%)	0.00647***	0.00473***	-0.00331***	-0.00422***
	(5.97)	(3.60)	(-5.20)	(-4.59)
Alpha Lagged * Maximum Posted Initial Trailer Fee	-0.000913***	-0.00126**	-0.000428***	-0.000866***
	(-3.28)	(-2.34)	(-4.79)	(-4.55)
Maximum Posted Switch Fee (%)	-0.00808	-0.00896	-0.00185	-0.00409
	(-1.50)	(-1.10)	(-0.97)	(-0.02)
Alpha Lagged * Maximum Posted Switch Fee (%)	0.00821***	0.00942***	-0.00204	-0.00189
	(5.17)	(5.22)	(-1.35)	(-0.99)
Trading Expense Ratio (TER) (%)	-0.000751***	-0.000823***	-0.000422	-0.000474
	(-2.61)	(-8.74)	(-1.04)	(-1.03)
Alpha Lagged * TER	0.000194***	0.000212***	0.0000639	0.0000541
	(2.91)	(2.64)	(1.55)	(0.95)
Performance Fee (%)	0.00263	0.00489	0.00182	0.00220
	(1.25)	(1.01)	(1.20)	(0.65)
Alpha Lagged * Performance Fee	-0.000566***	-0.000592	-0.000240	-0.000885
	(-3.34)	(-1.13)	(-1.20)	(-1.07)

TABLE 4 *Panel A* **(Continued)**

	Model 1 New Purchases	Model 2 All Inflows	Model 3 One-time Redemptions	Model 4 All Outflows
Deferred Sales Charge (DSC) Year 1	-0.00251***	-0.00226***	-0.00175***	-0.00167**
	(-4.98)	(-2.73)	(-3.39)	(-2.09)
Alpha Lagged * DSC Amount Year 1 (%)	-0.000350***	-0.000388***	-0.000643	-0.000691
	(-6.55)	(-6.55)	(-1.63)	(-1.40)
Trailer Slope	-0.00398**	-0.00710***	-0.00261**	-0.00121
	(-2.08)	(-4.58)	(-2.53)	(-0.79)
Alpha Lagged * Trailer Slope	0.00527***	0.00555***	-0.00108**	-0.00129**
	(3.01)	(2.67)	(-2.55)	(-2.31)
DSC Slope	-0.0116***	-0.0201	-0.0143***	-0.00292**
	(-3.67)	(-1.45)	(-3.93)	(-2.52)
Alpha Lagged * DSC Slope	-0.0134	-0.0194	0.00955***	0.00481***
	(-0.35)	(-0.65)	(4.31)	(3.11)
Sales Commission paid on DSC purchase (%)	-0.00155	-0.00118	-0.000473	0.000462
	(-1.01)	(-0.95)	(-1.62)	(1.32)
Alpha Lagged * Sales Commission paid on DSC purchase	-0.000466***	-0.000449***	0.000175*	0.000115
	(-3.99)	(-3.42)	(1.77)	(1.39)
Front-End (FE) Commission paid (%)	0.0136***	0.0175***	-0.0134	-0.0181
	(5.06)	(4.56)	(-0.65)	(-0.86)
Alpha Lagged * FE Commission paid	0.00128	0.00335**	0.00149	0.00154
	(0.74)	(1.98)	(1.45)	(1.60)
Negotiated Management Fee (%)	0.0121	0.0197	0.00579	0.00129
	(1.60)	(1.41)	(1.37)	(0.39)
Alpha Lagged * Negotiated Management Fee	0.00738**	0.00791**	-0.00167**	-0.00305***
	(2.27)	(2.03)	(-2.07)	(-3.02)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes
Constant	0.0354***	0.0407***	0.0170***	0.0303***
	(6.87)	(6.67)	(3.90)	(6.69)
Number of Observations	508121	508121	508121	508121
Number of Clusters (FundSERV Code)	9595	9595	9595	9595
Number of Clusters (Month)	131	131	131	131
R^2	0.047	0.054	0.045	0.058
F	362.0	425.7	352.9	244.6

Panel B. Fund Series Purchasable Directly from Fund Manager

	Model 5 New Purchases	Model 6 All Inflows	Model 7 One-time Redemptions	Model 8 All Outflows
Alpha Lagged	0.00723***	0.00526**	-0.00461***	-0.00382***
	(2.89)	(2.28)	(-4.00)	(-3.48)
Alpha Lagged^2	0.000581*	0.000762**	0.000173**	0.000707***
	(1.87)	(2.22)	(2.23)	(3.28)
Management Expense Ratio (MER) (%)	-0.0112	-0.0136*	0.00556	-0.0046
	(-1.57)	(-1.87)	(1.58)	(-1.49)
Alpha Lagged * MER	0.00249***	0.00305***	0.00193***	0.00265***
	(3.56)	(5.06)	(4.69)	(4.23)
Maximum Posted Initial Trailer Fee (%)	0.00451***	0.00276***	-0.00588*	-0.00974*
	(3.38)	(4.17)	(-1.67)	(-1.86)
Alpha Lagged * Maximum Posted Initial Trailer Fee	0.000265	0.0000347	0.00241	0.00222
	(0.13)	(0.01)	(1.27)	(1.62)
Trailer Slope	0.00131***	0.00224***	0.000618***	0.00247***
	(6.64)	(3.96)	(2.68)	(4.75)
Alpha Lagged * Trailer Slope	-0.000772	-0.00262	0.000663	0.00181**
	(-0.58)	(-1.56)	(1.16)	(2.10)
Deferred Sales Charge (DSC) Year 1	-0.00332***	-0.00273***	-0.00116***	-0.000934***
	(-3.78)	(-4.41)	(-3.89)	(-6.42)
Alpha Lagged * DSC Amount Year 1 (%)	-0.000751**	-0.00105***	0.000104	0.000291
	(-2.52)	(-2.90)	(0.67)	(1.40)
DSC Slope	-0.0219**	-0.0289*	-0.0234***	-0.0203***
	(-2.20)	(-1.79)	(-3.29)	(-4.50)
Alpha Lagged * DSC Slope	0.0335	0.0436	0.00523	0.0115
	(1.43)	(1.46)	(0.74)	(1.20)
Sales Commission paid on DSC purchase (%)	0.00028	0.00145*	-0.000744**	-0.000732*
	(1.49)	(1.65)	(-2.39)	(-1.69)
Alpha Lagged * Sales Commission paid on DSC purchase	-0.000323**	-0.000502*	0.0000861	0.000478*
	(-1.97)	(-1.78)	(0.49)	(1.88)

TABLE 2.4.*Panel B* **(Continued)**

	Model 5 New Purchases	Model 6 All Inflows	Model 7 One-time Redemptions	Model 8 All Outflows
Trading Expense Ratio (TER) (%)	-0.000806**	-0.000728***	0.000386***	0.000524***
	(-2.44)	(-2.61)	(2.94)	(2.60)
Alpha Lagged * TER	0.000235***	0.0000666	-0.00017	-0.000343*
	(3.48)	(0.34)	(-1.45)	(-1.76)
Maximum Posted Switch Fee (%)	-0.00264	0.000164	0.00433***	0.00354***
	(-1.56)	(0.21)	(2.78)	(7.62)
Alpha Lagged * Maximum Posted Switch Fee (%)	0.00213	0.00612**	-0.000238	-0.000956
	(1.01)	(2.10)	(-0.21)	(-0.62)
Front-End (FE) Commission paid (%)	0.0461***	0.0393***	0.0211***	0.0159***
	(8.72)	(8.19)	(9.31)	(4.99)
Alpha Lagged *FE Commission paid	-0.00839***	-0.0113***	-0.00133***	-0.00350***
	(-3.01)	(-3.48)	(-4.98)	(-3.23)
Negotiated Management Fee (%)	0.0117**	0.0107*	0.00444**	0.00258***
	(2.53)	(1.84)	(2.11)	(3.57)
Alpha Lagged * Negotiated Management Fee	0.00329***	0.0043***	-0.00253	0.00467
	(5.61)	(5.67)	(-1.27)	(0.17)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes
Constant	0.0362***	0.0459***	0.0254***	0.0334**
	(6.06)	(3.43)	(2.96)	(2.17)
Number of Observations	134505	134505	134505	134505
Number of Clusters (FundSERV Code)	2010	2010	2010	2010
Number of Clusters (Month)	131	131	131	131
R^2	0.087	0.079	0.078	0.044
F	507.3	495.4	506.1	289.5

TABLE 2.5 Difference between Net Retail Flow and Net Aggregate Flow

This table presents unbalanced panel regressions on NET_RETAIL_FLOW, excluding fund of funds and the subsample of fee-based purchase option types. Standard errors are clustered by FundSERV Code and month. Explanatory variables include predicted value of NET_AGGREGATE_FLOW and mutual fund fees. Predicted net aggregate flow is based on Model 2 (Panel A) or Model 7 (Panel B) in Table 3. T-statistics are in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Fund Series Sold through Dealers or Brokers

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Predicted Net Aggregate Flow	0.536***	0.524***	0.531***	0.540***	0.527***	0.538***
	(8.48)	(8.65)	(8.57)	(8.72)	(8.29)	(8.40)
Alpha Lagged	0.00184***	0.00165**	0.00176***	0.00130***	0.00158***	0.00116***
	(2.67)	(2.55)	(2.62)	(2.76)	(3.04)	(2.88)
Alpha Lagged^2				-0.000539*	-0.000481*	-0.000507
				(-1.83)	(-1.67)	(-1.62)
Management Expense Ratio (MER) (%)	0.000497***	0.000674***	0.000740***	0.000519***	0.000508***	0.000613***
	(5.29)	(5.83)	(6.39)	(4.57)	(4.49)	(5.19)
Trading Expense Ratio (TER) (%)	0.00182	0.000924	0.000903	0.000873	0.000812	0.000839
	(0.49)	(1.03)	(1.04)	(0.38)	(0.71)	(0.72)
Maximum Posted Initial Trailer Fee (%)	0.00468***	0.00425***	0.00375***	0.00370***	0.00392***	0.00407***
	(7.07)	(6.19)	(6.40)	(7.93)	(8.06)	(5.02)
Trailer Slope		0.00289**	0.00292**	0.00174**	0.00137***	0.00223**
		(2.24)	(2.33)	(2.23)	(2.62)	(2.11)
Deferred Sales Charge (DSC) Year 1		-0.000354**	-0.000371**	-0.000353**	-0.000592***	-0.000603***
		(-2.37)	(-2.24)	(-2.06)	(-3.20)	(-3.78)
DSC Slope		-0.0381***	-0.0335***	-0.0376***	-0.0315***	-0.0298***
		(-3.39)	(-3.51)	(-4.12)	(-4.06)	(-2.98)
Sales Commission paid on DSC purchase (%)			0.000550	-0.000219	-0.000394	-0.000908
			(1.59)	(-0.65)	(-1.17)	(-0.65)
Maximum Posted Switch Fee (%)			0.0112	0.0138	0.0156	0.0140
			(1.01)	(1.24)	(1.40)	(1.24)
Front-End Commission paid (%)				-0.00132***	-0.00124***	-0.00136***
				(-6.31)	(-6.33)	(-6.27)
Performance Fee (%)					-0.000592	-0.000606*
					(-1.60)	(-1.73)
Negotiated Management Fee (%)						-0.00111
						(-1.41)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.0118***	0.0283***	0.00739	0.00357	0.0129	0.0240
	(-5.74)	(2.75)	(0.31)	(0.15)	(0.55)	(1.00)
Number of Observations	508121	508121	508121	508121	508121	508121
Number of Clusters (FundSERV Code)	9595	9595	9595	9595	9595	9595
Number of Clusters (Month)	131	131	131	131	131	131
R^2	0.103	0.117	0.118	0.155	0.157	0.170
F	1792.45	2006.38	1805.24	1763.09	1843.60	1952.75

Panel B. Fund Series Purchasable Directly from Fund Manager

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Predicted Net Aggregate Flow	0.389***	0.365***	0.371***	0.406***	0.424***	0.412***
	(6.85)	(6.59)	(6.93)	(6.22)	(6.71)	(6.44)
Alpha Lagged	0.0163	0.0179	-0.0171	-0.00525	0.00855	0.0145
	(0.89)	(1.34)	(-0.21)	(-0.61)	(0.99)	(1.54)
Alpha Lagged^2	-0.00434*	-0.00394*	-0.00203**	-0.00212**	-0.00175*	-0.00254**
	(-1.72)	(-1.84)	(-2.17)	(-2.39)	(-1.92)	(-1.96)
Management Expense Ratio (MER) (%)	0.00633	0.00959	0.00110	0.00113	-0.00106	-0.00309
	(0.88)	(1.64)	(1.22)	(1.29)	(-0.20)	(-0.58)
Trading Expense Ratio (TER) (%)	-0.000206	-0.000662	-0.000682	-0.000697	0.000342	0.000338
	(-0.93)	(-0.88)	(-0.97)	(-0.99)	(0.56)	(0.59)
Maximum Posted Initial Trailer Fee (%)		-0.00139*	0.000864	0.000880	-0.000992	-0.00138
		(-1.74)	(1.05)	(1.10)	(-1.20)	(-1.02)
Trailer Slope		0.00225***	0.00130**	0.00152***	0.00262**	0.00310***
		(3.15)	(2.39)	(2.64)	(2.38)	(3.05)
Deferred Sales Charge (DSC) Year 1		-0.00107**	-0.00116***	-0.00139***	-0.00122***	-0.00123**
		(-2.28)	(-2.90)	(-2.78)	(-3.86)	(-2.18)
DSC Slope			-0.00145	-0.00146	0.00205	0.00261
			(-1.06)	(-1.07)	(1.21)	(1.54)
Sales Commission paid on DSC purchase (%)			0.000758	0.000756	0.000660	0.000644
			(0.58)	(1.50)	(1.76)	(1.25)
Maximum Posted Switch Fee (%)				0.00815***	0.0135***	0.0115***
				(2.79)	(3.35)	(2.94)
Front-End Commission paid (%)					-0.00186***	-0.00169***
					(-3.32)	(-3.28)
Negotiated Management Fee (%)						-0.00724
						(-1.60)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.0968***	-0.0218**	-0.0122***	-0.121***	-0.114***	-0.122***
	(-4.37)	(-2.31)	(-3.50)	(-3.26)	(-4.05)	(-6.13)
Number of Observations	134505	134505	134505	134505	134505	134505
Number of Clusters (FundSERV Code)	2010	2010	2010	2010	2010	2010
Number of Clusters (Month)	131	131	131	131	131	131
R^2	0.0976	0.112	0.116	0.124	0.136	0.138
F	670.70	611.20	691.86	638.34	657.38	667.49

TABLE 2. 6 The Effect of Fund Fees on Fund Performance

This table presents unbalanced panel regressions on the factors influencing fund performance in the 12 months ahead, measured by abnormal return (alpha). Fund of Funds are excluded from the analysis. Explanatory variables include lagged alpha and mutual fund fees. Standard errors are clustered by FundSERV Code and month. T-statistics are in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Fund Series Sold through Dealers or Brokers

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Prior Performance						
Alpha Lagged	0.0228***	0.0197***	0.0165***	0.0186***	0.0181***	0.0167**
	(3.76)	(3.41)	(3.39)	(2.68)	(2.59)	(2.43)
Incentive Fees						
Performance Fee (%)	0.0295***	0.0221***	0.0216***	0.0285***	0.0341**	0.0389**
	(3.72)	(3.54)	(3.38)	(2.95)	(2.57)	(2.34)
Sales Charges						
Deferred Sales Charge (DSC) Year 1	-0.0244***	-0.0236***	-0.0227***	-0.0209***	-0.0206**	-0.0191**
	(-4.48)	(-3.53)	(-3.57)	(-3.14)	(-2.49)	(-2.46)
DSC Slope		-0.322***	-0.329***	-0.283***	-0.295***	-0.327***
		(-4.29)	(-4.30)	(-3.76)	(-3.22)	(-2.77)
Front-End Commission paid (%)				-0.00603	-0.00442	0.00665
				(-0.14)	(-0.10)	(0.16)
Management Fees and Operating Expenses						
Management Expense Ratio (MER) (%)	-0.0171	-0.0302	-0.0223*	-0.0224*	-0.0197*	-0.0275
	(-1.35)	(-1.58)	(-1.89)	(-1.93)	(-1.67)	(-1.04)
Negotiated Management Fee (%)	0.00476***	0.00583***	0.00595***	0.00593***	0.00586***	0.00497**
	(3.46)	(4.52)	(2.83)	(3.55)	(3.54)	(2.66)
Trading Expense Ratio (TER) (%)					0.187	0.160
					(1.58)	(0.27)
Trailing Commissions						
Maximum Posted Initial Trailer Fee (%)	-0.0477***	-0.0575***	-0.0713***	-0.0714***	-0.0615***	-0.0592***
	(-3.53)	(-3.48)	(-3.72)	(-3.82)	(-3.11)	(-2.88)
Sales Commission paid on DSC purchase (%)			-0.00547**	-0.00552**	-0.00482**	-0.00539**
			(-2.22)	(-2.11)	(-2.24)	(-2.26)
Trailer Slope						0.0490
						(0.96)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.0907***	-0.148***	-0.0538***	-0.0393***	-0.0390***	-0.0532***
	(-2.98)	(-3.57)	(-3.68)	(-3.01)	(-3.00)	(-3.30)
Number of Observations	406775	406775	406775	406775	406775	406775
Number of Clusters (FundSERV Code)	9595	9595	9595	9595	9595	9595
Number of Clusters (Month)	131	131	131	131	131	131
R^2	0.042	0.056	0.061	0.068	0.075	0.085
F	112.2	55.74	56.87	50.65	50.30	43.09

Panel B: Fund Series Purchasable Directly from Fund Manager

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Prior Performance						
Alpha Lagged	0.0256***	0.0231***	0.0291***	0.0280***	0.0265***	0.0229***
	(3.45)	(3.37)	(3.41)	(3.29)	(2.85)	(2.70)
Sales Charges						
Deferred Sales Charge (DSC) Year 1	-0.0119***	-0.0128***	-0.0136***	-0.0150***	-0.0129***	-0.0131***
	(-7.09)	(-10.36)	(-10.31)	(-10.10)	(-10.29)	(-9.98)
DSC Slope		-0.0218***	-0.0167***	-0.0261***	-0.0240***	-0.0258***
		(-8.92)	(-8.93)	(-8.83)	(-8.63)	(-8.31)
Front-End Commission paid (%)				-0.0512***	-0.0405***	-0.0425***
				(-3.11)	(-2.93)	(-2.82)
Management Fees and Operating Expenses						
Management Expense Ratio (MER) (%)	0.0936	0.0825*	0.0748**	0.0743*	0.0820**	0.0664*
	(1.51)	(1.90)	(1.96)	(1.94)	(1.97)	(1.84)
Negotiated Management Fee (%)		0.171***	0.182***	0.176***	0.160***	0.144***
		(4.90)	(5.04)	(5.10)	(4.19)	(4.68)
Trading Expense Ratio (TER) (%)					0.0281	0.0284
					(1.34)	(1.40)
Trailing Commissions						
Maximum Posted Initial Trailer Fee (%)	-0.0364***	-0.0458***	-0.0395**	-0.0441***	-0.0415**	-0.0256**
	(-3.10)	(-2.76)	(-2.36)	(-2.67)	(-2.51)	(-2.48)
Trailer Slope			-0.124***	-0.115***	-0.104***	-0.0954**
			(-3.45)	(-3.24)	(-2.99)	(-2.24)
Sales Commission paid on DSC purchase (%)						0.0344
						(0.94)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.0284*	-0.0279*	-0.0302**	-0.035**	-0.0381**	-0.0392***
	(-1.91)	(-1.89)	(-2.06)	(-2.33)	(-2.51)	(-2.59)
Number of Observations	97820	97820	97820	97820	97820	97820
Number of Clusters (FundSERV Code)	2010	2010	2010	2010	2010	2010
Number of Clusters (Month)	131	131	131	131	131	131
R^2	0.025	0.033	0.038	0.039	0.040	0.043
F	668.8	584.3	473.7	402.2	348.1	307.8

TABLE 2.7 Comparison Tests on Fund Performance

This table shows the comparison test results on abnormal returns (alpha) between the group of funds in which retail flow is positively correlated with other flows and the group of funds that do not exhibit this positive correlation. Two sample t-tests (results in T-Value) with equal variance are used to evaluate the impact of correlation between new purchases (outflow) and other outflow (inflow) on average fund performance. Two-sample Wilcoxon rank-sum (Mann-Whitney) test (results in Z-Value) is also used to evaluate the same impact on the distribution of fund performance. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Fund Series Not Purchasable Directly from Fund Manager

For each FundSERV Code, Positive Correlation Between:	Yes=1/No=0	Total Obs	Average Alpha	T-Value	Z-Value
New Purchases / Switches In	0	540,605	0.2445	-6.46***	-8.79***
New Purchases / Switches In	1	262,103	0.2522		
New Purchases / Switches Out	0	683,772	0.2504	15.33***	17.14***
New Purchases / Switches Out	1	118,306	0.2273		
One-time Redemptions / Switches In	0	780,903	0.2471	2.11**	10.83***
One-time Redemptions / Switches In	1	21,175	0.2440		
One-time Redemptions / Switches Out	0	568,928	0.2439	-7.54***	-14.68***
One-time Redemptions / Switches Out	1	233,150	0.2545		

Panel B: Fund Series Purchasable Directly from Fund Manager

For each FundSERV Code, Positive Correlation Between:	Yes=1/No=0	Total Obs	Average Alpha	T-Value	Z-Value
New Purchases / Switches In	0	119,153	0.2677	-4.89***	-11.38***
New Purchases / Switches In	1	44,925	0.2791		
New Purchases / Switches Out	0	155,989	0.2717	11.15***	13.54***
New Purchases / Switches Out	1	8,089	0.2531		
One-time Redemptions / Switches In	0	162,372	0.2710	9.87***	16.42***
One-time Redemptions / Switches In	1	1,706	0.2526		
One-time Redemptions / Switches Out	0	126,742	0.2692	-3.56***	-17.59***
One-time Redemptions / Switches Out	1	37,336	0.2761		

TABLE 2.8 Cross-sectional Regression on Fund Performance

This table presents cross sectional regressions evaluating the impact of flow correlations on average fund performance. The dependent variable is the average abnormal return (alpha) for a FundSERV code over the whole sample period. Funds that experienced changes in service fees (around 3% of the sample FundSERV codes) over the sample period are excluded from the analyses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Fund Series Sold through Dealers or Brokers

	Model 1	Model 2	Model 3	Model 4	Model 5
Management Expense Ratio (MER) (%)	-0.0412*	-0.0307*	-0.0289	-0.0368*	-0.0353*
	(-1.79)	(-1.69)	(-0.98)	(-1.92)	(-1.83)
Trading Expense Ratio (TER) (%)	0.00679**	0.0068*	0.00678*	0.00678**	0.00677**
	(2.04)	(1.86)	(1.72)	(2.15)	(1.99)
Maximum Posted Initial Trailer Fee (%)	-0.0564***	-0.0569***	-0.0563***	-0.0562***	-0.0567***
	(-8.06)	(-7.93)	(-8.42)	(-8.03)	(-8.17)
Performance Fee (%)	0.00847***	0.00859***	0.00833***	0.00853***	0.00853***
	(3.89)	(3.95)	(3.83)	(3.93)	(3.92)
Positively Correlated: New Purchases and Switch-In (Yes=1; No=0)	0.0131				0.0107
	(0.39)				(0.31)
Positively Correlated: New Purchases and Switch-Out (Yes=1; No=0)	-0.0341***				-0.0207***
	(-3.46)				(-3.81)
Positively Correlated: One-time Redemptions and Switch-In (Yes=1; No=0)		-0.0111**			-0.00891*
		(-2.08)			(-1.87)
Positively Correlated: One-time Redemptions and Switch-Out (Yes=1; No=0)		0.013***			0.0154***
		(4.04)			(4.67)
Positively Correlated: New Purchases and Distribution to Unitholders (Yes=1; No=0)			0.00498		0.00904
			(0.11)		(1.02)
Positively Correlated: New Purchases and Reinvested Distribution (Yes=1; No=0)			0.00982		0.00369
			(0.22)		(0.81)
Positively Correlated: One-time Redemptions and Distribution to Unitholders (Yes=1; No=0)				-0.00278***	-0.00312***
				(-4.37)	(-4.81)
Positive Correlated: One-time Redemptions and Reinvested Distribution (Yes=1; No=0)				0.00895	0.00746
				(1.42)	(1.16)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes	Yes
Constant	0.33***	0.33***	0.329***	0.332***	0.332***
	(3.14)	(3.68)	(3.98)	(4.79)	(3.05)
Number of Observations	15667	15667	15667	15667	15667
R^2	0.040	0.036	0.038	0.043	0.054
F	43.22	48.13	42.93	51.56	79.52

Panel B. Fund Series Purchasable Directly from Fund Manager

	Model 6	Model 7	Model 8	Model 9	Model 10
Management Expense Ratio (MER) (%)	0.0351*	0.0354*	0.0368	0.0355*	0.0352*
	(1.65)	(1.82)	(1.23)	(1.79)	(1.77)
Trading Expense Ratio (TER) (%)	0.0036	0.00347	0.00352*	0.00362*	0.00339*
	(1.61)	(1.55)	(1.88)	(1.83)	(1.72)
Maximum Posted Initial Trailer Fee (%)	-0.0293***	-0.0294***	-0.0286***	-0.0279***	-0.028***
	(-4.94)	(-5.01)	(-4.86)	(-4.71)	(-4.78)
Positively Correlated: New Purchases and Switch-In (Yes=1; No=0)	0.00875				0.00628
	(1.34)				(0.95)
Positively Correlated: New Purchases and Switch-Out (Yes=1; No=0)	-0.0138***				-0.0108**
	(-2.92)				(-2.10)
Positively Correlated: One-time Redemptions and Switch-In (Yes=1; No=0)		-0.00567***			-0.00504**
		(-2.74)			(-2.07)
Positively Correlated: One-time Redemptions and Switch-Out (Yes=1; No=0)		0.00603***			0.00629***
		(4.35)			(3.93)
Positively Correlated: New Purchases and Distribution to Unitholders (Yes=1; No=0)			0.00265*		0.00335*
			(1.95)		(1.80)
Positively Correlated: New Purchases and Reinvested Distribution (Yes=1; No=0)			0.00425***		0.0047***
			(5.60)		(6.16)
Positively Correlated: One-time Redemptions and Distribution to Unitholders (Yes=1; No=0)				0.0115	-0.00733
				(1.62)	(-1.02)
Positively Correlated: One-time Redemptions and Reinvested Distribution (Yes=1; No=0)				-0.00316***	-0.00409***
				(-4.60)	(-5.96)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes	Yes
Constant	-0.00159	-0.000366	-0.00793	0.00632	-0.00351
	(-0.27)	(-0.06)	(-1.34)	(1.07)	(-0.59)
Number of Observations	2435	2435	2435	2435	2435
R^2	0.091	0.104	0.097	0.092	0.114
F	76.8	68.41	86.35	79.52	79.27

TABLE 2.9 The Association between Fund Flow and Fund Performance

This table presents unbalanced panel regressions on the factors influencing fund performance in the 12 months ahead, measured by abnormal return (alpha). Fund of Funds are excluded from the analysis. Explanatory variables include lagged alpha, fee variables, and different fund flows. Standard errors are clustered by FundSERV Code and month. T-statistics are in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Fund Series Sold through Dealers or Brokers

	Model 1	Model 2	Model 3	Model 4	Model 5
Alpha Lagged	0.0223***	0.0194***	0.0264***	0.0248**	0.0204**
	(3.36)	(3.37)	(3.12)	(2.39)	(2.38)
Performance Fee (%)	0.0226***	0.0330***	0.0302**	0.0193***	0.0176**
	(3.52)	(3.34)	(2.34)	(3.09)	(2.18)
Deferred Sales Charge (DSC) Year 1	-0.0106***	-0.0104***	-0.0114***	-0.0127***	-0.0133***
	(-2.74)	(-2.73)	(-2.80)	(-2.89)	(-2.45)
DSC Slope	-0.0580***	-0.0455***	-0.0569***	-0.0131***	-0.0104***
	(-3.40)	(-3.31)	(-4.38)	(-3.59)	(-2.61)
Negotiated Management Fee (%)	0.215***	0.212***	0.215***	0.218***	0.222***
	(2.99)	(2.94)	(2.98)	(3.03)	(3.12)
Maximum Posted Initial Trailer Fee (%)	-0.0735***	-0.0704***	-0.0693***	-0.0643***	-0.0675***
	(-3.29)	(-3.03)	(-3.25)	(-3.17)	(-2.70)
Sales Commission paid on DSC purchase (%)	-0.00875**	-0.00771**	-0.00734**	-0.00705**	-0.00804**
	(-2.05)	(-2.09)	(-2.18)	(-2.20)	(-1.97)
New Purchases Lagged (%)	-1.163				-1.021
	(-1.03)				(-1.39)
One-time Redemptions Lagged (%)	-0.780				-0.614*
	(-1.53)				(-1.76)
Switch-In Lagged (%)		0.387***			0.452***
		(3.39)			(3.28)
Switch-Out Lagged (%)		-2.481***			-2.203***
		(-4.21)			(-3.75)
Pre-authorized Contribution Lagged (%)			-4.765*		-2.708
			(-1.69)		(-1.25)
Systematic Withdrawal Plan Lagged (%)			3.086		-2.695
			(0.24)		(-0.47)
Distribution to Unitholders Lagged (%)				2.264	1.736
				(0.69)	(0.52)
Reinvested Distribution Lagged (%)				5.709	7.146
				(1.25)	(1.61)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes	Yes
Constant	0.386***	0.370***	0.375***	0.377***	0.398***
	(4.21)	(4.11)	(4.23)	(4.24)	(4.42)
Number of Observations	406775	406775	406775	406775	406775
Number of Clusters (FundSERV Code)	9595	9595	9595	9595	9595
Number of Clusters (Month)	131	131	131	131	131
R^2	0.001	0.001	0.001	0.001	0.002
F	51.68	36.72	37.74	55.83	44.32

Panel B: Fund Series Purchasable Directly from Fund Manager

	Model 1	Model 2	Model 3	Model 4	Model 5
Alpha Lagged	0.0304***	0.0284***	0.0264***	0.0223***	0.0242***
	(3.41)	(3.37)	(3.11)	(3.16)	(2.89)
Deferred Sales Charge (DSC) Year 1	-0.0122***	-0.0119***	-0.0120***	-0.0123***	-0.0126***
	(-9.37)	(-9.48)	(-9.22)	(-9.31)	(-9.18)
DSC Slope	-0.0248***	-0.0313***	-0.0425***	-0.0331***	-0.0214***
	(-8.81)	(-8.84)	(-8.75)	(-8.77)	(-8.08)
Front-End Commission paid (%)	-0.0407***	-0.0693***	-0.0732***	-0.0713***	-0.0650***
	(-2.89)	(-2.78)	(-2.69)	(-3.05)	(-2.66)
Negotiated Management Fee (%)	0.228***	0.233***	0.284***	0.232***	0.261***
	(4.05)	(4.24)	(4.10)	(4.59)	(4.18)
Maximum Posted Initial Trailer Fee (%)	-0.0286***	-0.0319**	-0.0328**	-0.0365**	-0.0281***
	(-2.62)	(-2.25)	(-2.31)	(-2.50)	(-2.60)
Trailer Slope	-0.0328***	-0.0331***	-0.0310***	-0.0265***	-0.0227***
	(-3.39)	(-3.44)	(-3.15)	(-3.27)	(-2.84)
New Purchases Lagged (%)	-0.308				-0.279
	(-1.20)				(-1.07)
One-time Redemptions Lagged (%)	-0.459				-0.597*
	(-1.15)				(-1.75)
Switch-In Lagged (%)		0.482***			0.546***
		(3.42)			(3.27)
Switch-Out Lagged (%)		-0.613***			-0.470***
		(-4.31)			(-3.58)
Pre-authorized Contribution Lagged (%)			-1.462		-1.290
			(-0.09)		(-0.54)
Systematic Withdrawal Plan Lagged (%)			2.313		2.234
			(1.55)		(1.49)
Distribution to Unitholders Lagged (%)				-1.763	-1.589
				(-1.08)	(-0.97)
Reinvested Distribution Lagged (%)				-3.597	-2.297
				(-0.32)	(-0.15)
CIFSC Fund Category Control?	Yes	Yes	Yes	Yes	Yes
Fund Risk Classification Control?	Yes	Yes	Yes	Yes	Yes
Discount Brokerage Series Control?	Yes	Yes	Yes	Yes	Yes
Constant	0.0710***	0.0454***	0.0504***	0.0684***	0.0719***
	(4.42)	(3.02)	(3.35)	(4.37)	(4.13)
Number of Observations	97820	97820	97820	97820	97820
Number of Clusters (FundSERV Code)	2010	2010	2010	2010	2010
Number of Clusters (Month)	131	131	131	131	131
R^2	0.021	0.020	0.020	0.021	0.023
F	144.0	139.2	138.6	157.9	105.4

FIGURE 2.1 Growth of Mutual Fund Assets

Figure 2.1 shows the growth of total assets under management (AUM) for all mutual funds in the sample data set over time. Mutual funds established after January 2003 or liquidated before December 2014 are included in other analyses in the paper but excluded from Figure 1.

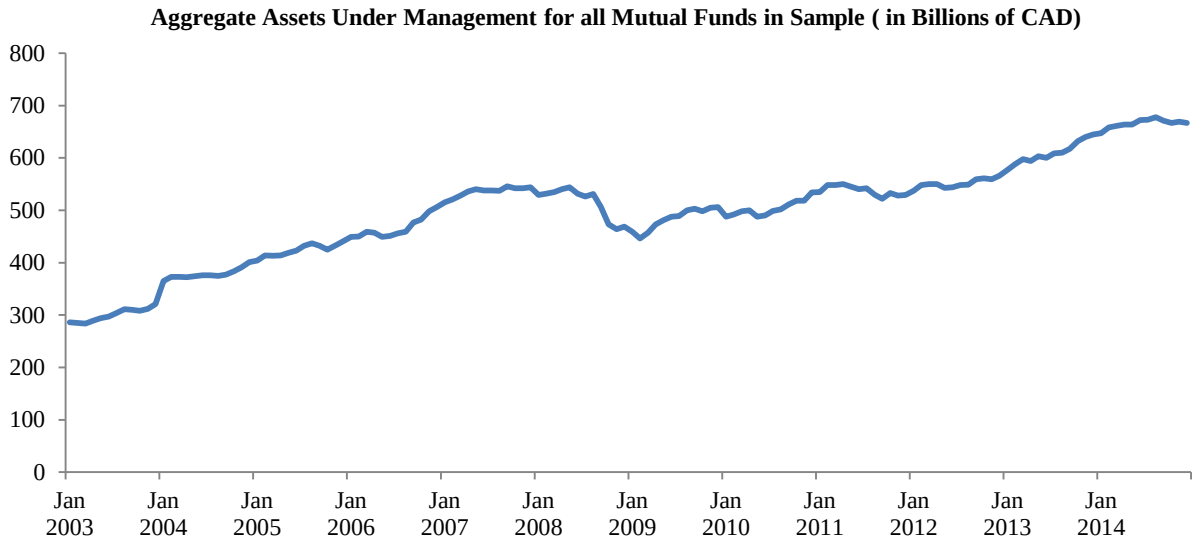
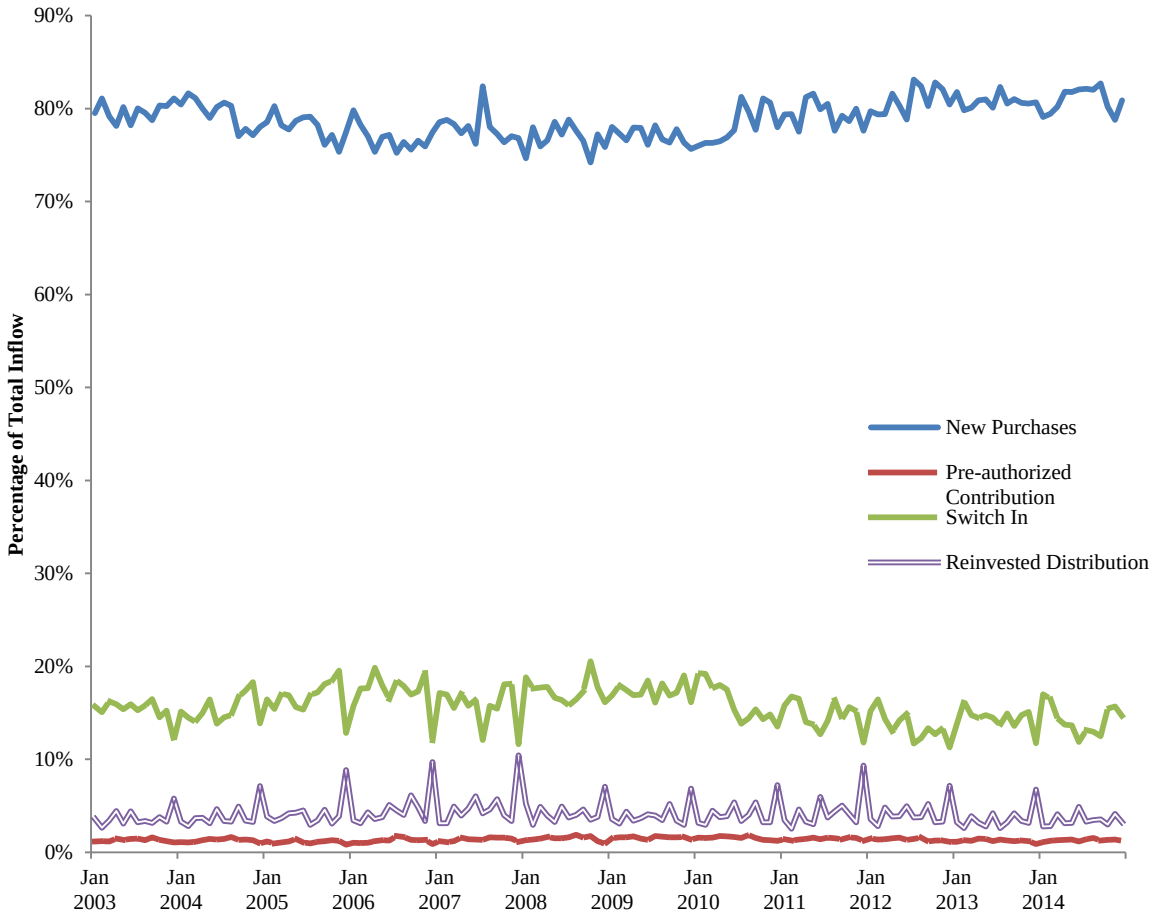


FIGURE 2.2 Relative Weight of Different Types of Mutual Fund Flows over Time

Figure 2.2 illustrates the relative weight of each type of flow to total flow over the period of January 2003 to December 2014. The percentage weights in each graph are the ratios of the aggregate volume of a specific type of flow across all FundSERV codes to the aggregate volume of total flow for all FundSERV codes in a given month. Graph A of Figure 2 exhibits the relative weight of each type of inflow to total inflow; Graph B of Figure 2 exhibits the relative weight of each type of outflow to total outflow.

Graph A



Graph B

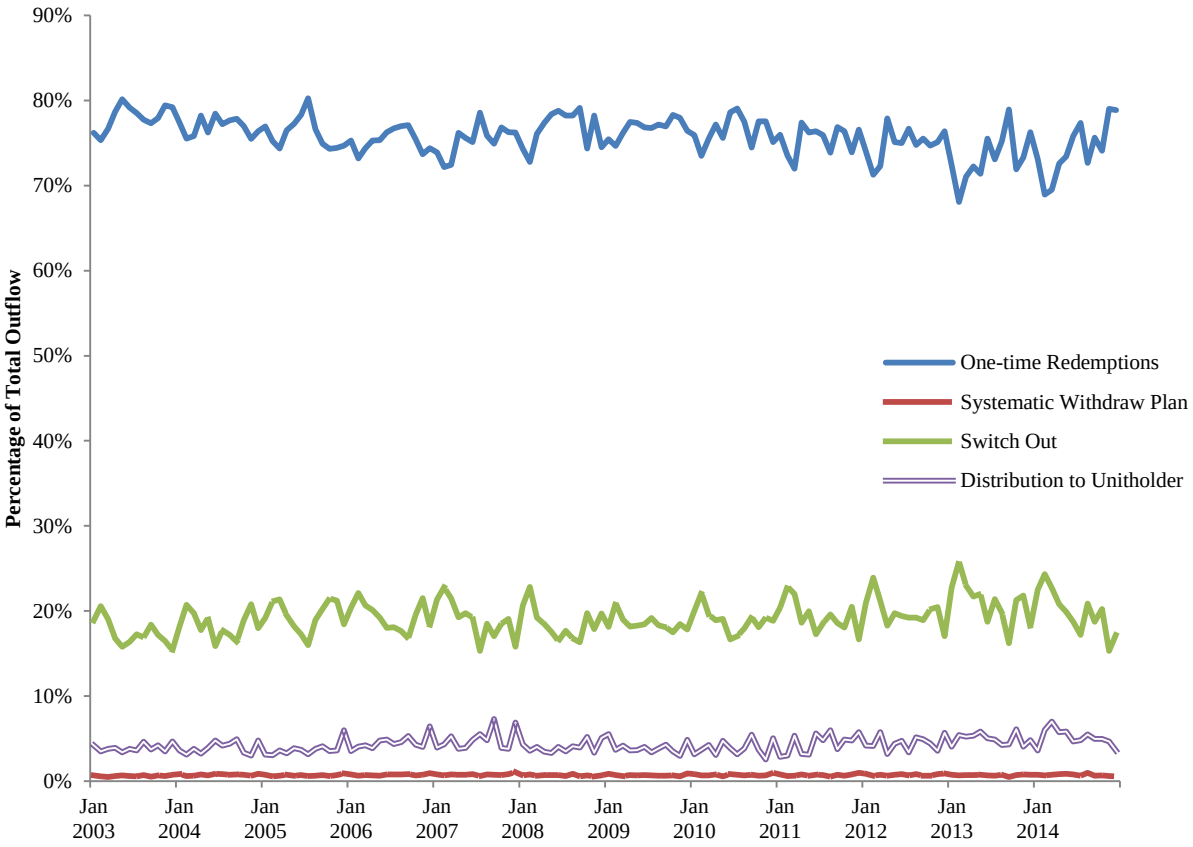

90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentage of Total Outflow
Jan 2003
Jan 2004
Jan 2005
Jan 2006
Jan 2007
Jan 2008
Jan 2009
Jan 2010
Jan 2011
Jan 2012
Jan 2013
Jan 2014
One-time Redemptions
Systematic Withdraw Plan
Switch Out
Distribution to Unitholder

FIGURE 2. 3A Percent Compositions in Total Monthly Inflow

Figure 2.3A shows the weight distribution of four types of flows included in total monthly inflow: investor controlled new purchases, pre-authorized contribution, switch-in, and reinvested distribution.

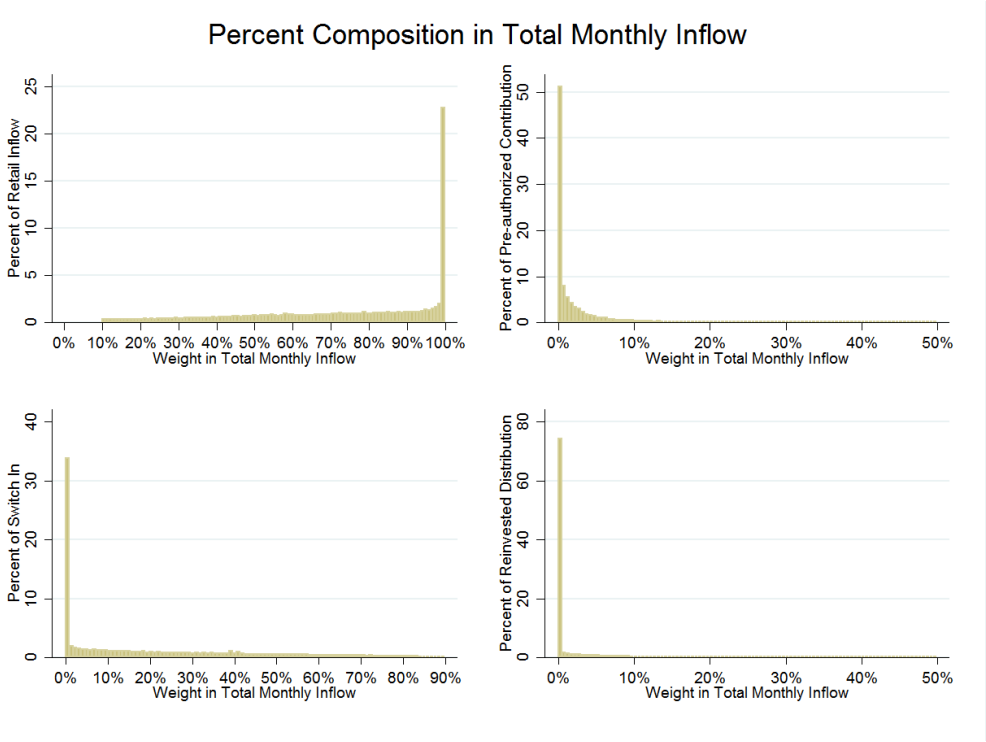
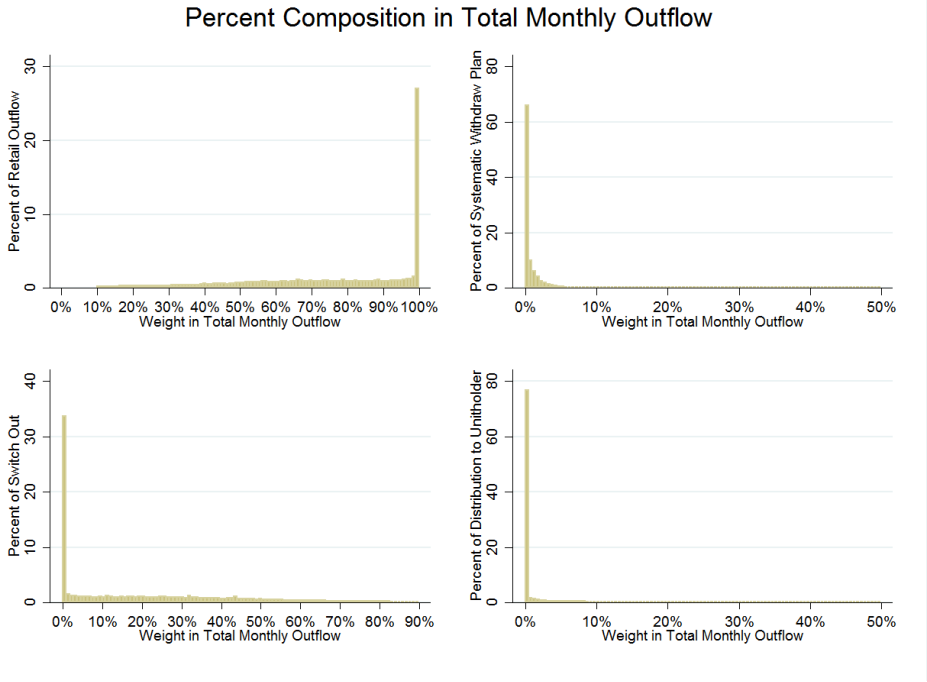


FIGURE 2.3B Percent Compositions in Total Monthly Outflow

Figure 2.3B shows the weight distribution of four types of flows included in total monthly outflow: investor-controlled retail outflow, systematic withdrawal plan flow, switch-out, and distribution to unitholders.



Chapter 3

3.1 Introduction

Since the financial crisis, there has been a growth in acquisition exits for start-ups, including VC-backed start-ups. The relatively higher costs associated with going public, attributable in part to regulatory changes around the IPO process (Ferran, Moloney, Hill, and Coffee, 2012), have made IPOs less common (Ritter, 2016) and acquisition exits much more common for entrepreneurial start-ups, particularly in the United States (Cumming and Johan, 2013a). And in Europe, firms are frequently acquired within 3 years of an IPO (Signori and Vismara, 2017). Given this new environment where investors in start-ups more often successfully exit via acquisitions, in this paper we explore the avenues on which start-ups achieve such an acquisition outcome. We focus our comparison on two different types of important resources for start-ups: venture capital (VC) finance, and technology parks. We show that these two routes have substantially different governance paths: technology parks are characterized by advice and networks, while VCs are characterized by control.

There has been extensive work on entrepreneurial ecosystems (Acs et al., 2013; 2014a,b; 2016; Adner and Kapoor, 2010; Audretsch, 2015; Audretsch, Keilbach, and Lehmann, 2006; Audretsch and Thurik, 2004; Hwang and Horowitt, 2012; Holling, 2001; Lee et al., 2004; Mason and Brown, 2014; Stam, 2014). The comparative dearth of IPOs relative to acquisitions post financial crisis in the U.S. has given rise to a marked shift in the entrepreneurial ecosystem, and the effect of this institutional shift away from IPOs on entrepreneurial ecosystems in the U.S. has been underexplored in prior studies. In particular, the shift away from IPOs has the potential to affect the type of support, governance, and financing in the early stages of the entrepreneurial

firm. If a start-up achieves an IPO then the founding entrepreneur typically becomes the CEO of the publicly traded company. By contrast, acquisition exits are peculiar in the sense that the founding entrepreneur of the start-up must either become an employee in the merged entity, or leave to work for another start-up or become an angel investor (Cumming, Werth and Walz, 2016). Often, entrepreneurs are very reluctant to sell a firm that they had created, and it is an emotional event to give up the entity by merging it with another one and thereby lose control (Petty, Martin, and Kensinger, 1999). Venture capitalists (VCs), by contrast typically only care about the financial return to an investment and do not have non-pecuniary incentives that entrepreneurs may have. For this reason, it is possible that there are conflicts of interest between outside investors and entrepreneurs when investors want to maximize the return on investment through an acquisition and entrepreneurs do not wish to exit via an acquisition.

Prior to the financial crisis when IPOs were more feasible, the tension between the choice of IPOs versus acquisitions was more pronounced in the U.S. Post-financial crisis, the tension is not so much whether the founding entrepreneur will give up control in an acquisition exit, but instead when the entrepreneur will give up control. If the entrepreneur obtains VC finance, the entrepreneur gives up board seats and other contractual rights through which VCs can exercise control and even replace the founding entrepreneur as CEO prior to an exit event. If the entrepreneur does not obtain VC finance, there is a smaller chance that the entrepreneur will achieve a successful acquisition exit and greater likelihood of liquidation unless the entrepreneur has access to other forms of support in the entrepreneurial ecosystem.

Apart from VC finance, incubators and technology parks are a widely recognized form of support for entrepreneurs (Hansen, Chesbrough, Nohria, and Sull, 2000; Hülsbeck, Lehmann, Starnecker, 2013; Audretsch, Lehmann, Paleari, Vismara, 2016). Technology parks, unlike VCs,

do not take equity cash flow rights and various control rights over the companies that they help. Instead, technology parks offer a physical space and a support network (from technology park staff or other tenant companies) to enable a start-up to successfully grow. As well, an affiliation with a technology park can enable visibility to potential new investors and/or strategic acquirers (Löfsten and Lindelöf, 2002; Squicciarini, 2009; Cumming and Johan, 2013b). Hence, we expect that firms making use of technology parks are more likely to successful grow through the support and advice, leading to acquisitions. The critical governance difference with between technology parks and VC finance is that with VC finance the founding entrepreneur is typically replaced as the CEO years prior to the acquisition, unlike that with technology parks, unless a VC is involved in the firm together with the technology park.

In this paper we introduce a new hand-collected dataset of 251 software/Internet start-up firms from Crunchbase, an extremely detailed tech entrepreneur webpage resource. A total of 181 of these firms received either angel or VC finance, 99 were affiliated with a technology park, and 78 had angel or VC finance and were affiliated with a technology park. We know whether or not and when firms were acquired, liquidated, or remained private, whether or not and when the founding entrepreneur was replaced as CEO, the timing of board changes and other details on the structure and changes in the board over time. We followed in detail all of these firms from January 2007 to May 2014. The data indicate that entrepreneurs financed by VCs typically lead to CEO replacement (normally after 1.5 years) and then acquisition exits (normally after 6.5 years). Further, the data indicate that start-ups that make use of technology parks, not VCs, are less likely to experience CEO replacement and yet still achieve an acquisition exit. But when VCs are on the board of a start-up that is resident at a technology park, exit via acquisition is

delayed and CEO replacement is much more likely and faster. These details are described herein.

This paper is related to a long literature on VCs (Mason and Harrison, 1995, 2002a,b; Cumming, 2008; Jolink and Niesten, 2016; Colombo, Cumming, and Vismara, 2016), PEs (Rigamonti, Cefis, Meoli, and Vismara, 2016) and angels (Goldfarb et al., 2007, 2012; DeGennaro, 2013; DeGennaro and Dwyer, 2014), and a separate stream of literature on incubators and technology parks (Hansen, Chesbrough, Nohria, Sull, 2000; Lofsten and Lindelof, 2002; Squicciarini, 2009; Cumming and Fischer, 2012; Cumming and Johan, 2013b; Gykpali, Kokkinos, and Bouras, 2016). Few papers study VCs, angels, and technology parks at the same time. Perhaps the paper closest to ours is a study by Chen (2009) on 122 start-ups with VC or incubator support, who finds both VCs and incubators moderate the role of technology commercialization on new venture performance. Cosh, Cumming, and Hughes (2009) note that the literature on entrepreneurial finance is highly segmented by virtue of the data coming from the source of capital, and not from the entrepreneurial firm, and hence papers on VC for example typically only know about VC and no other forms of finance. In this paper, we use data from entrepreneurial firms and use a recent sample of firms that do and do not have a wide range of sources of finance, and that are and are not in incubators/technology parks, etc. We document changes over time among these firms to understand the governance implications of different sources of finance, boards, and support mechanisms such as incubators, among other things as documented herein.

This paper is organized as follows. Section 2 develops the hypotheses. Section 3 introduces and describes the data. Section 4 presents the multivariate tests. Limitations and

extensions are discussed in section 5. The last section provides a brief summary and concluding remarks.

3.2 Hypotheses

Since the introduction of Sarbanes Oxley legislation in the U.S. in June 2002, and further regulatory changes since the aftermath of the financial crisis which started in the first week of August 2007, IPOs have become a relatively less common form of exit for investors in start-ups backed by VCs in the U.S. (Cumming and Johan, 2013a; Ritter, 2016) due to the very large regulatory costs and changes in rules for taking companies public (Ferran, Moloney, Hill, and Coffee, 2012). The economics of investment banks in the aftermath of the financial crisis is such that firms need larger valuations to be taken public, and have substantially larger sales at the time of IPO and are older (Ritter, 2016). For example, from 1980-2002, firms were on average 8 years old at the time of IPO, while from 2002-2015, firms were on average 12 years old at the time of IPO (Ritter, 2016). VC investments are normally from 2-7 years from time of investment to exit, as VC limited partnership agreements are normally 10 years with an option wind-up investments for a final 1-3 years (Cumming and Johan, 2013a). Because it is tough to take a start-up with a couple of entrepreneurs at a valuation of a few million dollars at the time of investment to a billion dollar plus valuation in 2-7 years, it is now relatively much more common for U.S. VCs to successfully exit their investments in start-ups as acquisitions.

VC governance is characterized by very strong contractual rights and representation on boards of directors that typically enable the investor to replace the founding entrepreneur as the CEO, the right to force an acquisition through drag along and other rights, or some other type sale such as a buyback through redemption rights, or an IPO through demand registration rights

(Cumming, 2008). VCs bargain hard at the time of initial investment to acquire these rights, and they are often used to direct governance and exit outcomes, particularly among the more reputable VC funds (Bengtsson and Sensoy, 2011; Cumming and Johan, 2013a).

Entrepreneurs may have non-pecuniary preferences to wait until they can achieve an IPO if they prefer to be the CEO of a publicly traded company. VCs, by contrast, prefer only to maximize their return on investment. And since the aftermath of the financial crisis, this return is most likely achieved by selling the company in an acquisition exit. VC control through board seat representation and other contractual rights will therefore mean that acquisitions are more likely with VC investors than without VC investors.

H1. (VC Control): VCs on boards increase the probability of and reduce the time to acquisitions through VCs' exercise of control.

A technology park (is a collection of buildings or a single building in the case of an incubator) that hosts chosen entrepreneurial firms who share resources or services provided by the technology park. Technology parks facilitate technology licensing, establishing trade shows, providing funds for commercialization, and/or distributing and disseminating information about the R&D activities of its tenants. Technology parks add value to their tenants in many ways: (1) they offer an environment in which there is support provided; (2) they foster complementarities across different firms in the technology park that can facilitate the growth and financing of an entrepreneurial firm, thereby achieving agglomeration benefits (Shaver, 1998); (3) they attract outside investors, such banks, angel investors, and VCs. Firms exit technology parks after they are sufficiently independent and post-revenue and post-financing such that there are expansion (in terms of both space and geography) and other business reasons to relocate. Prior work is

consistent with the view that technology parks significantly facilitate the growth and success of start-ups (Löfsten and Lindelöf, 2002; Squicciarini, 2009; Bonardo, Paleari, Vismara, 2010, 2011; Cumming and Fischer, 2012; Cumming and Johan, 2013a; Cumming et al., 2015).

H2. (Incubator/Technology Park Advice and Support): Technology parks increase the probability of and reduce the time to acquisition through the park's advice and support.

A natural question arises as to whether or not VCs are complements or substitutes? That is, for firms with VC investment and based in a technology park, is the advice and support provided by a technology park additive or in conflict with the control exercised by the VC? On one hand, more sources of advice and help can benefit the firm if that support is provided in a consistent way. On the other hand, differing sources of advice may come in conflict when the advice provided is in opposite directions or has conflicting interests. For example, a technology park may prefer a different acquirer than the VC for strategic reasons (such as a local presence for a local firm that helps the technology park in other ways and other firms in the technology park), or could prefer an IPO to an acquisition to build the profile of the technology park. In view of the potential scope of conflicts of interest is much wider than the narrow possibility that the VCs' capitalists' and technology parks' incentives are directly aligned, we expect that conflicts are more likely than not.

H3. (Moderating Impact of VCs on Start-ups at Technology Parks): VCs on boards of entrepreneurial firms resident in technology parks increase the time and reduce the probability to acquisition, due to conflict of interests between VC and technology parks

3.3 Data

Our analysis is based on firms listed in the CrunchBase online database (see www.CrunchBase.com). CrunchBase was developed and is maintained by TechCrunch, the most influential technology blog in the United States, and has been used in recent academic studies; e.g., Cumming, Walz, and Werth, 2016). Professionals in the technology community can add information to the database, which then goes through an approval process before being made available online. Our data covers a period from January 2007 to May 2014. Based on CrunchBase records, 680 startups were founded in 2007, and we only consider firms founded in 2007 to enable a sufficient period of time to study these firms. In order to disentangle the influence of industry specific factors on startup activities, we included only two most represented and related sectors, web (174 firms) and software (102 firms), in our dataset. We further excluded the firms that were resulted from spin-offs and mergers. As such, we have the population of 251 firms in the CrunchBase data. The data comprise comprehensive details over time on their board characteristics, their financing, whether or not they were part of a technology park, whether or not they received angel or VC finance and if so whether or not those investors also held board seats, whether or not the founding entrepreneur was replaced, among other things. We hand-collected information on the founder of each of these startups from LinkedIn pages, personal websites, as well as from other sources such as Bloomberg Businessweek. The details of the variables used are outlined in Table 1. Our data allows us to describe the characteristics of all founder teams.

Table 1 (Page 126)

Table 2 summarizes the cases in which the start-up either joined a technology park and/or a VC or angel investor, and the data are broadly consistent with Hypotheses 1-3. For 49 of the 251 firms there was neither an angel/VC nor a technology park involved with the start-up, and of these firms, 3 were acquired, 15written off, and 31 were still private as at May 2014, and 2 experienced the replacement of the founding entrepreneur as CEO. For 103 of the 251 firms there was an angel/VC but not a technology park involved with the start-up, and of these firms, 37 were acquired, 9 written off, and 57 were still private as at May 2014, and 33 experienced the replacement of the founding entrepreneur as CEO. For 21 of the 251 firms there was not an angel/VC but there was a technology park involved with the start-up, and of these firms, 14 were acquired, 4 written off, and 3 were still private as at May 2014, and 2 experienced the replacement of the founding entrepreneur as CEO. For 78 of the 251 firms there was both an angel/VC and a technology park involved with the start-up, and of these firms, 23 were acquired, 6 written off, and 49 were still private as at May 2014, and 14 experienced the replacement of the founding entrepreneur as CEO.

Table 2 (Page 128)

The average time to CEO replacement when a VC was involved was 1.58 years (18.9 months), and 47 of the 181 firms with a VC experienced CEO replacement. The average time to CEO replacement without a VC was 23 months, and 4 of these 70 firms experienced CEO replacement. The average time to CEO replacement with a technology park involved was 1.48 years (17.8 months), and 16 of these 99 firms experienced CEO replacement. The average time to CEO replacement without a technology park was 19.9 months, and 35 of these 152 firms experienced CEO replacement. The average time to acquisition when a VC was involved was 6.33 years (75.9 months), and 60 of the 181 firms with a VC were acquired. The average time to

acquisition without a VC was 77.3 months, and 17 of these 70 firms were acquired. The average time to acquisition with a technology park involved was 6.28 years (75.4 months), and 37 of these 99 firms were acquired. The average time to acquisition without a technology park was 76.5 months, and 40 of these 152 firms were acquired. The average time to liquidation when a VC was involved was 6.36 years (76.4 months), and 15 of the 181 firms with a VC were liquidated. The average time to liquidation without a VC was 74.25 months, and 19 of these 70 firms were liquidated. The average time to liquidation with a technology park involved was 6.22 years (74.6 months), and 10 of these 99 firms were liquidated. The average time to liquidation without a technology park was 75.0 months, and 24 of these 152 firms were liquidated.

Table 3 presents comparison of proportions tests for acquisitions, liquidations and staying private for the firms with and without an outside board member, for having a seed/angel round of external finance, for hiring new employees before or without appointing a new external CEO, for appointing a new CEO after angel or VC investment, for joining a technology park, and for different market conditions (MSCI index in the last exit month above or below the median over the sample years). The data in Table 3 further indicate write-offs are significantly more likely without an outside board member (6.7% with an outside board member and 17.4% without), and this difference is significant at the 5% level of significance. Write-offs are also more likely if the firm has not hired new employees before or without replacing the founding entrepreneur as CEO (7.9% with new employees and 17.3% without new employees) and this difference is significant at the 10% level.

Table 3 (Page 129)

The data indicate acquisitions are significantly more likely if the firm has a seed/angel round of finance (36.4% with and 22.0% without), and this difference is significant at the 5% level, consistent with Hypothesis 1. Write-offs are significantly less likely when the firm has passed the seed/angel round (6.6% with and 24.0% without) and this difference is significant at the 1% level.

Acquisitions are significantly more likely if the firm had replaced CEO (34.8% with and 19.4% without) and this difference is significant at the 5% level, consistent with Hypothesis 1. Write-offs are more likely if the firm has not replaced the CEO after angel/VC investment (8.7% with and 26.9% without) and this difference is significant at the 1% level.

Acquisitions are significantly more likely if the firm has joined a technology park (37.4% with and 26.3% without) and this difference is significant at the 10% level, consistent with Hypothesis 2. Joining a technology park shows no significant difference for write-offs and staying private in the comparison tests in Table 3.

Surprisingly, acquisitions are less likely when market conditions are above the median (22.7% when above and 60.2% when below) and this difference is significant at the 1% level. Write-offs are also more likely in down market conditions (21.2% when less than the median MSCI and 9.7% when greater than the median MSC) and this difference is significant at the 5% level. Staying private is more likely when MSCI returns are above the median (67.6% when above versus 18.6% when below), and this difference is significant at the 1% level.

3.4 Regression Analyses

Table 4 presents competing risks exits outcome regressions for acquisitions (Models 1-3) and write-offs (Models 4-6). Different sets of right-hand variables are included to show

robustness to different specifications. The hazard rates are shown in Panel A and the coefficient estimates are shown in Panel B. The Appendix presents analogous logit regressions to show the probability of different exit outcomes with matching sets of right-hand-side variables in the model specifications as those in Table 4.

Table 4 (Page 130)

Figure 1 (Page 139)

Figure 2 (Page 140)

Table 4 shows that having a VC on the board has a competing risk hazard ratio of 1.98 in Model 1 (2.31 in Model 2 and 2.06 in Model 3), which reflects the faster time to acquisition and greater probability of acquisition, consistent with Hypothesis 1. The significance of VC influence is shown graphically in Figure 1. Similarly, Table A.I in the Appendix shows that the probability of an acquisition is 12.1% higher (Model 1, and 12.3% in Model 2 and 11.8% in Model 3) if there is a VC on the board. By contrast, having an angel investor on the board does not materially affect the hazard ratio or the probability of an acquisition.

The likelihood of an acquisition is heightened when the start-up replaces the founding entrepreneur as CEO, and this effect is significant at the 10% level in each of Models 1-3 in Table 4 with hazard ratios at 1.15 (Models 1 and 2) and 1.28 (Model 3). This effect is graphically shown in Figure 2. Similarly, Table A.I in the Appendix shows that the probability of an acquisition is 10.8% (Model 1) to 13.9% (Model 3) higher when the founding entrepreneur is replaced as the CEO. Furthermore, the hazard ratio for liquidations (Table 4 Models 4-6) and probability of liquidation (Table A-1 Models 4-6) is significantly lower when the founding entrepreneur is replaced as the CEO.

Table 4 further shows that the competing risk hazard ratio for joining a technology park is 1.73 in Model 1 (4.14 in Model 2 and 4.40 in Model 3), which reflects the faster time to acquisition and greater probability of acquisition, consistent with Hypothesis 2. However, there is no material change in the time to or likelihood of liquidation when the firm is affiliated with a technology park in Models 4-6 in Table 4. These effects are graphically illustrated in Figure 3. Similarly, Table A.I in the Appendix shows that the probability of an acquisition is 21.0% higher (Model 2, and 22.5% higher Model 3) if the start-up joins a technology park.

Table 4 Models 2 and 3 show the interaction between VCs and technology parks has a dampening effect on the competing risks hazard ratio. It is 0.58 in Model 2 and 0.59 in Model 3, implying a longer time and lower probability of an acquisition with VCs are mixed with technology parks, consistent with Hypothesis 3. Similarly, Appendix Table A.I shows a reduction in the probability of an acquisition by 4.5% in Model 2 and 5.1% in Model 3 when VCs and technology parks are mixed together.

Some of the control variables are significant in Table 4 in ways that we would expect as well. For example, bringing in new employees and obtaining angel finance increases the hazard ratio for acquisitions (Models 1-3) and lowers the hazard ratio for write-offs (Models 4-6). Stronger market conditions at the time of exit lower the hazard ratios for acquisitions (not expected) and write-offs (expected). Stronger market conditions are associated with a greater likelihood of the start-up remaining private, possibly with the entrepreneur waiting for better terms in an acquisition or aiming towards an IPO.

3.5 Robustness Check

In Table 4, we use CEO replacement as an independent variable to explain the variation in startup acquisition and written-off probabilities. However, it is not impossible that CEO replacement is affected by VC presence: when venture capitalists' planned exit blocked by entrepreneurs, they make use of contractual power to replace existing CEO. In this case, the correlation between CEO replacement and VC board presence could bias our estimates.

In this section, we first test whether VC or technology park have impact on CEO replacement. Once the correlation between VC or technology park and CEO replacement is detected, we use instrument variable in competing risk models to address the endogeneity concern.

Table 5 (Page 133)

Table 5 complements the analysis of acquisition and write-off exits in Table 4 by studying when and why firms replace the founding entrepreneur as the CEO. CEO replacement is significantly faster and more likely among firms with a board of directors, particularly with VCs on the board, and when there are other executive managers and fewer other key employees; the significance of these effects is shown graphically in Figures 4. The hazard ratio ranges from 1.78 (Model 4) to 3.83 (Model 8) for having a VC on the board, and the probability of CEO replacement increases by approximately 2% on average with a VC on the board (see Table A.II in the Appendix). This evidence supports our earlier findings and is consistent with Hypothesis 1 regarding the role of control for VC. Note that by contrast, joining a technology park has no significant effect on CEO replacement.

Table 6 (Page 136)

Figure 3 (Page 141)

Figure 4 (Page 142)

Table 6 checks the robustness of Table 4 by replacing the actual CEO replacement variable with predicted CEO replacement, where predicted CEO replacement is estimated by model 8 in Table 5 Panel B. Table 6 shows that the correlation between CEO replacement and VC presence does not materially change our regression results: VC presence significantly increases the probability of startup acquisition and reduces the probability of startup liquidation; joining a technology park increases the probability of startup acquisition; VC and technology park have offset impact on startup outcome.

Additional robustness checks are presented in appendix Table A.III, where predicted CEO replacement is used to test potential endogeneity problem under logit regression settings. Our results are robust under logit models.

3.6 Limitations and Extensions

In this paper we focused our comparisons on VCs, angels and technology parks in respect of acquisitions and liquidations. Our detailed data enabled these tests as the data were derived from the entrepreneurial firm, and not from a particular dataset on the source of capital such as a VC dataset as is often the case in VC studies. There are of course limitations to our dataset and ways that this type of analysis can be extended in future studies.

The cutoff point of May 2014 for our sample can lead to potential censorship bias; that is, some firms can be acquired or written off right after May 2014, and other firms may stay private for 20 more years, yet we cannot control for startup activities beyond sample horizon (although our econometric tests carried out above with competing risks hazard models account for such censorship). In addition, we do not have information on startups' operating activities, although

angel and VC involvement can signal operating condition in general. As well, we did not present a preliminary analysis of why some firms end up in incubators/technology parks and others obtain VC/angel finance. Our outcomes of interest come many years after the initial assignment, and hence we do not believe selection versus treatment is a major concern with our sample. We do not have ideal instruments to deal with these selection issues, but our investigations with various specifications such as market conditions at the time of entry into VC or incubators suggested our analysis is not distorted by selection effects. Likewise, the selection of particular VC terms and control rights is beyond the scope of our dataset and relevant to the issue of selection versus treatment (see also Cumming, 2008).

To extend our study, with other types of data it would be possible to compare innovation rates associated with VCs and technology parks, in the spirit of work such as Battisti, Colombo and Rabbiosi (2015). It would be useful to know precisely what the VCs and the technology parks or incubators do for their investee firms, and when these value added activities come into conflict with each other and why. As well, it would be possible to compare the role of higher education with VCs versus technology parks as done in work such as Bonaccorsi, Colombo Guerini, Lamastra (2015) and Meoli and Vismara (2016). Furhter work could also examine other sources of finance such as crowdfunding (Colombo, Franzoni, Rossi Lamasstra, 2015; Vismara, 2015; Vismara, 2016) and debt finance (Cosh, Cumming and Hughes, 2009). Finally, this type of comparative analysis of entrepreneurial finance could be applied in different institutional settings and different counties (in the spirit of work such as Acs, Audretsch, Lehmann, and Licht, 2016, Audretsch, 2007a, 2007b, Audretsch and Keilbach, 2007; Coad et al., 2016; Engel and Keilbach, 2006; Schillo, Persaud, and Jin (2016),) to better understand the role of institutional constraints and public policy (McCann and Ortega-Argiles, 2016).

3.7 Conclusion

In this paper we argued that VCs and technology parks play very different but important roles in the entrepreneurial finance ecosystem. We examined the post-financial crisis environment over the years 2007-2014 in the U.S. for 251 software/Internet start-up firms that can be tracked on Crunchbase. We argued that entrepreneurial firms that obtain VC finance are more likely to experience replacement of the founding entrepreneur as CEO, and subsequently exit by acquisition. VCs take control positions through their role on boards and with other contractual rights that can bring about changes in a start-up necessary to effect a successful acquisition. By contrast, entrepreneurs that affiliate themselves with technology parks are more likely to achieve an acquisition exit without experiencing CEO replacement. The probability of and time to acquisition, however, are significantly mitigated with VCs and technology parks come together, which is most likely due to differing objectives and conflicts of interest. Overall, both VCs and technology parks have significant governance roles in the entrepreneurial ecosystem, and further research could examine a number of extensions on how and where to optimize their respective roles in entrepreneurial development and innovation.

Table 3.1. Summary Statistics of Key Variables

This table shows the summary statistics of the key variables we used in Competing Risk analysis. The dataset covers a period from January 2007 to May 2014.

Variable Name by Categories	Definition	Mean	Minimum	25th percentile	Median	75 percentile	Maximum	Standard Deviation
Start-Up Outcome								
Startup is acquired	Dummy Variable: whether a startup is acquired in the sample horizon? Yes=1, No=0	0.31	0	0	0	1	1	0.46
Startup is written-off	Dummy Variable: whether a startup is written-off in the sample horizon? Yes=1, No=1	0.14	0	0	0	0	1	0.34
Start-Up Characteristics								
Startup size	The size of a startup (in US dollar) before its first round of external financing	20789892.43	0	712000	3000000	13000000	1.10E+09	90672060.96
New employees were hired before bringing in new CEO	Dummy Variable: whether new employees are hired before the hire of new CEO? Yes=1, No=0	0.40	0	0	0	1	1	0.49
Number of all current key employees	Total number of current key employees(i.e. developers, IT experts, technicians)	3.03	0	0	2	5	19	3.69
Number of executive managers	Total number of executive managers in a Startup	3.95	0	1	3	6	31	4.33
Startup had joined incubator/technology park	Dummy Variable: whether a startup has joined an incubator or technology park in the past? Yes=1, No=0	0.31	0	0	0	1	1	0.46
Startup passed seed/angel stage	Dummy Variable: whether a startup has passed seed/angel stage? Yes=1, No=0	0.60	0	0	1	1	1	0.49
Startup had a board of directors	Dummy Variable: whether a startup has a board of directors? Yes=1, No=0	0.57	0	0	1	1	1	0.50
Startup had replaced CEO	Dummy Variable: whether startup had replaced CEO in the sample period? Yes=1, No=0	0.20	0	0	0	0	1	0.40

Table 3.1. (Continued)

Variable Name by Categories	Definition	Mean	Minimum	25th percentile	Median	75 percentile	Maximum	Standard Deviation
Board Characteristics								
Number of outside board members	Total number of outside board members	1.14	0	0	0	2	9	1.76
Number of founding team members on board	Total number of founding team members on board	2.3	0	1	2	3	5	1.08
Average board serving time	Average board serving time in months	51.51	9	51.75	51.75	51.75	86	12.97
Startup had Angel on board	Dummy Variable: whether a startup had Angel on board? Yes=1,No=0	0.37	0	0	0	1	1	0.49
Startup had VC on board	Dummy Variable: whether a startup had VC on board? Yes=1, No=0	0.65	0	0	1	1	1	0.48
Startup had inside chairman	Dummy Variable: whether a startup had inside chairman? Yes=1, No=0	0.17	0	0	0	0	1	0.37
Startup had founder chairman	Dummy Variable: whether a startup had founder chairman? Yes=1, No=0	0.18	0	0	0	0	1	0.38
Number of Financial Vehicle Corporations (FVC) on board	Total number of FVC on startup board	0.75	0	0	0	1	8	1.32
Number of Corporate Venture Capital (CVC) on board	Total number of CVC on startup board	0.02	0	0	0	0	1	0.14
Financing Characteristics								
Total number of financing rounds	Total number of financing rounds a startup had over the sample period	2.18	0	1	2	3	8	1.42
Average growth rate of external financing amount	Average growth rate of the amount of money raised by startup in all rounds of external financing	2.61	-0.67	0	0	1.04	232.4	15.55
Time span between the first round financing and exist month	Time span (in month) between the first round financing and startup exit month	40	6	27	39.5	53	81	17.95
Market Conditions								
Local MSCI Index Return on Exit Month	Local MSCI Index Return when Startup exited	0.018	-0.1725	0.019	0.0251	0.0251	0.0943	0.0278
Local MSCI Index Return on CEO Replacement Month	Local MSCI Index Return when Startup replaced CEO	0.0175	-0.1725	0.0251	0.0234	0.0242	0.0917	0.0258

Table 3.2. Summary of Startup Outcome

This table summarizes the operational outcome of 251 startups in our dataset. The startups we analyze have 3 different outcomes: acquired by another firm, written-off or stayed private. We categorize the outcomes into 4 groups based on 2 conditions: whether a VC firm or Angel Investor invested in the startup, and whether a startup joined an incubator or technology park. The categories Angel/VC and Incubator/Technology Park are not mutually exclusive and hence do not sum to 251. Our dataset covers the period from January 2007 to May 2014.

		Startup Activities		Frequency of Startup Outcome			CEO Replacement
	Count	Angel/VC joined?	Joined Incubator/ Technology Park?	Acquired	Written-off	Stay Private	
	49	No	No	3	15	31	2
	103	Yes	No	37	9	57	33
	21	No	Yes	14	4	3	2
	78	Yes	Yes	23	6	49	14
Count	251	181	99	77	34	140	51

Table 3.3. Probability Allocation on Startup Outcome

This table presents the probability allocation of startup outcome by 5 types of firm-specific conditions and 1 type of market condition: whether a startup has outside board member, whether a startup has passed seed/angel stage, whether a startup hires new employees before/without appointing new CEO, whether a startup appoints new CEO after Angel/VC investment, whether a startup has joined an incubator/technology park and whether the local MSCI index return on the exit/last month is above median. For each type of condition, the sum of the probabilities of 3possible outcomes equals 1. Comparison tests are applied on each firm-specific condition to evaluate its influence on the firm's operational outcome. Standard errors are in brackets. *, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

	Startup has Outside Board Member			Startup Passed Seed/Angel Stage		
	Yes	No	Z value	Yes	No	Z value
Acquired	0.3667	0.2733	-1.54	0.3642	0.2200	-2.43**
	(0.0508)	(0.0351)		(0.0392)	(0.0414)	
Written-off	0.0667	0.1739	2.38**	0.0662	0.2400	3.94***
	(0.0263)	(0.0299)		(0.0202)	(0.0427)	
Stay Private	0.5667	0.5528	-0.21	0.5695	0.5400	-0.46
	(0.0522)	(0.0392)		(0.0403)	(0.0498)	
Number of observations	90	161		151	100	

	Startup Hired New Employees before/without Appointing New CEO			Startup had Replaced CEO		
	Yes	No	Z value	Yes	No	Z value
Acquired	0.3168	0.3000	-0.26	0.3478	0.1940	-2.35**
	(0.0463)	(0.0374)		(0.0351)	(0.0483)	
Written-off	0.0792	0.1733	1.94*	0.0870	0.2687	2.74***
	(0.0269)	(0.0309)		(0.0208)	(0.0542)	
Stay Private	0.6040	0.5267	-1.13	0.5652	0.5373	-0.36
	(0.0487)	(0.0408)		(0.0365)	(0.0609)	
Number of observations	75	176		51	200	

	Startup has joined incubator/technology park			Local MSCI index in exit/last year is above median		
	Yes	No	Z value	Yes	No	Z value
Acquired	0.3737	0.2632	-1.86*	0.2271	0.6018	6.02***
	(0.0968)	(0.0304)		(0.0291)	(0.0702)	
Written-off	0.1010	0.1579	1.29	0.0966	0.2123	2.53**
	(0.0523)	(0.0233)		(0.0205)	(0.0657)	
Stay Private	0.5253	0.5789	0.84	0.6763	0.1859	-7.85***
	(0.0981)	(0.0331)		(0.0325)	(0.0428)	
Number of observations	99	152		125	126	

Table 3.4. Competing Risks Analysis on Startup Outcome

This table shows the influence of different firm activities on startups' operational outcome using competing risks regressions. Panel A. presents the estimated subhazard ratio (SHR) of different firm activities for startup acquisition and written-off. Subhazard ratio greater than 1stands for positive influence of the activity on the operational outcome of interest; smaller than 1, negative influence. Panel B. presents the coefficients of the same set of competing risks regressions. T values are shown in brackets. *, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

Panel A. Competing Risks Model--Subhazard Ratio Estimation

Event of interest: Startup was acquired (Model 1-3)

	Model 1			Model 2			Model 3		
	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z
Start-Up Characteristics									
Startup size	1.000	0.0000	0.29	1.000	0.0000	0.78	1.000	0.0000	1.32
New employees were hired before bringing in new CEO	1.175*	0.2065	1.87	1.183**	0.1925	2.25	1.203**	0.1705	2.45
Startup had joined incubator/technology park	1.731*	1.6403	1.89	4.141**	2.3998	2.45	4.402**	2.5652	2.54
Startup passed seed/angel stage	1.091*	0.3585	1.66	1.358*	0.4705	1.93	1.409**	0.4777	2.01
Startup had replaced CEO	1.145*	0.5352	1.92	1.150*	0.4841	1.71	1.282*	0.5216	1.84
Board Characteristics									
Number of outside board members				1.160*	0.0885	1.95	1.174**	0.0914	2.06
Number of founding team members on board				1.239*	0.1537	1.73	1.241*	0.1492	1.81
Average board serving time							0.978***	0.0081	-2.64
Startup had Angel on board	0.811	0.2255	-0.75	0.957	0.3176	-0.13	0.959	0.3225	-0.12
Startup had VC on board	1.977*	0.9641	1.76	2.309*	1.1217	1.72	2.061**	0.9743	2.13
Financing Characteristics									
Total number of financing rounds				0.629***	0.0841	-3.47	0.624***	0.0812	-3.62
Average growth rate of external financing amount							0.989	0.0110	-0.99
Market Conditions									
Local MSCI Index Return on Exit Month	0.0004**	0.0013	-2.07	0.0004**	0.0016	-2.01	0.0005**	0.0019	-1.99
Interaction Variable									
Startup had VC on board* Startup had joined incubator/technology park				0.579***	0.2064	-3.78	0.588***	0.2343	-4.13
Observations		251			251			251	
No. failed		77			77			77	
No. competing		174			174			174	
Wald chi^2		18.13			28.84			37.72	

Panel A. (Continued)

Event of interest: Startup was written off (Model 4-6)

	Model 4			Model 5			Model 6		
	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z
Start-Up Characteristics									
Startup size	1.000	0.0000	-0.77	1.000	0.0000	-0.38	1.000	0.0000	-0.36
New employees are hired before bringing in new CEO	0.663*	0.2683	-1.92	0.753*	0.3166	-1.76	0.665**	0.1558	-2.08
Startup had joined incubator/technology park	0.676	0.5533	-0.14	0.833	0.7270	-1.01	0.785	0.6262	1.23
Startup passed seed/angel stage	0.743*	0.4435	-1.84	0.839*	0.3483	-1.92	0.777*	0.3247	-1.72
Startup had replaced CEO	0.560*	0.2278	-1.72	0.690*	0.1571	-1.69	0.686*	0.1521	-1.70
Board Characteristics									
Number of outside board members				0.726	0.1416	-1.64	0.736	0.1511	-1.49
Number of founding team members on board				0.723	0.1562	-1.50	0.717	0.1535	-1.55
Average board serving time							0.981	0.0168	-1.10
Startup had Angel on board	0.776	0.4534	-0.43	0.917	0.5817	-0.14	0.969	0.6312	-0.05
Startup had VC on board	0.324**	0.2437	-2.51	0.438*	0.3624	-1.69	0.445**	0.3495	-1.98
Financing Characteristics									
Total number of financing rounds				0.757	0.3512	-0.60	0.751	0.3080	-0.70
Average growth rate of external financing amount							0.851*	0.0715	-1.92
Market Conditions									
Local MSCI Index Return on Exit Month	0.00004*	0.0002	-1.81	0.0006*	0.0029	-1.69	0.0004*	0.0019	-1.74
Interaction Variable									
Startup had VC on board* Startup had joined incubator/technology park				0.914***	0.2567	-3.14	0.661**	0.2912	-2.24
Observations		251			251			251	
No. failed		34			34			34	
No. competing		217			217			217	
Wald chi^2		26.95			37.52			41.11	

Panel B. Competing Risks Model—Coefficients Estimation

	Startup was acquired (Model 1-3)			Startup was written off (Model 4-6)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Start-Up Characteristics						
Startup size	5.30E-10	3.74E-09	4.43E-09	-3.10E-08	-1.08E-08	-1.21E-08
	(0.29)	(0.78)	(1.32)	(-0.77)	(-0.38)	(-0.36)
New employees are hired before bringing in new CEO	0.185*	0.194**	0.236**	-0.423*	-0.278*	-0.417**
	(1.87)	(2.25)	(2.45)	(-1.92)	(-1.76)	(-2.08)
Startup had joined incubator/technology park	0.313*	0.965**	1.056**	-0.391	-0.178	-0.258
	(1.89)	(2.45)	(2.54)	(-0.14)	(-1.01)	(1.23)
Startup passed seed/angel stage	0.124*	0.292*	0.346**	-0.296*	-0.173*	-0.279*
	(1.66)	(1.93)	(2.01)	(-1.84)	(-1.92)	(-1.72)
Startup had replaced CEO	0.173*	0.179*	0.278*	-0.644*	-0.527*	-0.534*
	(1.92)	(1.71)	(1.84)	(-1.72)	(-1.69)	(-1.70)
Board Characteristics						
Number of outside board members		0.185*	0.196**		-0.296	-0.284
		(1.95)	(2.06)		(-1.64)	(-1.49)
Number of founding team members on board		0.224*	0.229*		-0.305	-0.342
		(1.73)	(1.81)		(-1.50)	(-1.55)
Average board serving time			-0.0233***			-0.0169
			(-2.64)			(-1.10)
Startup had Angel on board	-0.210	-0.0436	-0.0410	-0.253	-0.0856	-0.0308
	(-0.75)	(-0.13)	(-0.12)	(-0.43)	(-0.14)	(-0.05)
Startup had VC on board	0.682*	0.837*	0.723**	-1.126**	-0.823*	-0.810**
	(1.76)	(1.72)	(2.13)	(-2.51)	(-1.69)	(-1.98)
Financing Characteristics						
Total number of financing rounds		-0.467***	-0.478***		-0.271	-0.278
		(-3.47)	(-3.62)		(-0.60)	(-0.70)
Average growth rate of external financing amount			-0.0126			-0.152*
			(-0.99)			(-1.92)
Market Conditions						
Local MSCI Index Return on Exit Month	-7.955**	-7.807**	-7.627**	-8.167*	-6.847*	-7.460*
	(-2.07)	(-2.01)	(-1.99)	(-1.81)	(-1.69)	(-1.74)
Interaction Variable						
Number of Angel/VC on board* Startup had joined incubator/technology park		-0.548***	-0.531***		-0.0897****	-0.420**
		(-3.78)	(-4.13)		(-3.14)	(-2.24)
Observations	251	251	251	251	251	251
No. failed	77	77	77	34	34	34
No. competing	174	174	174	217	217	217
Wald chi^2	18.13	28.84	37.72	26.95	37.52	41.11

Table3. 5. Competing Risks Analysis on CEO Replacement

This table shows the influence of different firm characters on CEO replacement using competing risks regressions. Panel A. presents the estimated subhazard ratio (SHR) of different firm characters for startup CEO replacement during the sample period from January 2007 to May 2014. Subhazard ratio greater than 1stands for positive influence on CEO replacement; smaller than 1, negative influence. Panel B. presents the coefficients of the same set of competing risks regressions. T values are shown in brackets. *, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

Panel A. Competing Risks Model--Subhazard Ratio Estimation

	Model 1			Model 2			Model 3			Model 4		
	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z
Start-Up Characteristics												
Number of all current key employees				0.857***	0.0355	-3.70	0.865***	0.0378	-3.31	0.837***	0.0482	-3.09
Number of executive managers				1.208***	0.0511	4.46	1.233***	0.0553	4.67	1.254***	0.0674	4.21
Startup had joined incubator/technology park				0.551	0.4448	-0.74	0.928	0.8563	-1.25	0.772	0.8311	-1.09
Startup had a board of directors	7.809***	4.9634	3.23	7.524***	4.9400	3.07	10.576***	7.3833	3.38	10.731***	8.3178	3.06
Board Characteristics												
Number of outside board members							0.843**	0.0663	-2.17	0.878*	0.0681	-1.68
Startup had Angel on board	0.838	0.2501	-0.59	0.939	0.2892	-0.21	0.904	0.3022	-0.31	0.720	0.2852	-0.83
Startup had VC on board	2.374*	1.3144	1.92	1.931*	1.0729	1.84	2.525*	1.3775	1.70	1.783*	0.9769	1.85
Startup had inside chairman							1.255	0.3937	0.73			
Startup had founder chairman										0.648	0.2497	-1.13
Financing Characteristics												
Average growth rate of external financing amount							0.749**	0.0866	-2.50	0.788**	0.1024	-2.26
Market Conditions												
Local MSCI Index Return on CEO Replacement Month	2.08e^-6***	7.97e^-6	-3.41	5.96e-6***	2.14e^-6	-3.35	1.62e^-7***	6.63e^-7	-3.82	3.98e^-7***	1.69e^-6	-3.47
Interaction Variable												
Startup had VC on board * Startup had joined incubator/technology park							1.163***	1.4403	9.42	1.767***	1.3888	8.94
Observations		251			251			251			251	
No. failed		51			51			51			51	
No. competing		200			200			200			200	
Wald chi^2		24.32			48.57			60.55			41.47	

Panel A. (Continued)

	Model 5			Model 6			Model 7			Model 8		
	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z
Start-Up Characteristics												
Number of all current key employees	0.872***	0.0368	-3.25	0.872***	0.0400	-2.99	0.856***	0.0346	-3.86	0.855***	0.0393	-3.41
Number of executive managers	1.243***	0.0547	4.94	1.228***	0.0605	4.17	1.231***	0.0543	4.71	1.245***	0.0555	4.91
Startup had joined incubator/technology park	0.622	0.5973	-1.25	0.784	0.6753	-0.29	0.590	0.5541	-1.28	0.151	0.1685	-1.02
Startup passed seed/angel stage				1.283	0.6785	0.47						
Board Characteristics												
Startup had a board of directors	12.204***	8.6384	3.59	11.685***	8.8162	3.37	11.273***	7.7796	3.51	10.201***	7.3396	3.23
Number of outside board members	0.843**	0.0654	-2.20	0.833**	0.066	-2.30	0.828**	0.0605	-2.58	0.939*	0.1988	-1.72
Average board serving time	0.991	0.0083	-1.12									
Startup had Angel on board	0.885	0.2838	-0.38	0.868	0.2848	-0.43	0.737	0.2653	-0.85	0.869	0.2828	-0.43
Startup had VC on board	2.469**	1.3666	2.13	2.361*	1.2778	1.79	2.294**	1.3021	1.99	3.829**	2.4551	2.09
Number of Financial Vehicle Corporations (FVC) on board										0.841	0.2248	-0.65
Number of Corporate Venture Capital (CVC) on board										4.048	3.8453	1.47
Financing Characteristics												
Total number of financing rounds							1.196	0.1143	1.47			
Average growth rate of external financing amount	0.725***	0.089	-2.62	0.726**	0.0915	-2.54	0.675***	0.1014	-2.62	0.749**	0.0864	-2.50
Market Conditions												
Local MSCI Index Return on CEO Replacement Month	1.74e^-7***	6.95e^-7	-3.89	2.27e^-7***	9.12e^-7	-3.80	3.92e^-7***	1.63e^-6	-3.55	1.33e^-7***	5.27e^-7	-3.99
Interaction Variable												
Startup had VC on board * Startup had joined incubator/technology park	1.640***	2.0840	9.45	1.648***	2.0236	9.78	1.506***	1.847	9.72	1.760***	1.0280	8.31
Observations		251			251			251			251	
No. failed		51			51			51			51	
No. competing		200			200			200			200	
Wald chi^2		56.39			62.12			63.09			54.39	

Panel B. Competing Risks Model—Coefficients Estimation

Event of interest: Startup had CEO replacement

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Start-Up Characteristics								
Number of all current key employees		-0.157***	-0.145***	-0.178***	-0.137***	-0.137***	-0.156***	-0.157***
		(-3.70)	(-3.31)	(-3.09)	(-3.25)	(-2.99)	(-3.86)	(-3.41)
Number of executive managers		0.205***	0.213***	0.226***	0.217***	0.209***	0.211***	0.219***
		(4.46)	(4.67)	(4.21)	(4.94)	(4.17)	(4.71)	(4.91)
Startup had joined incubator/technology park		-0.596	-0.136	-0.315	-0.412	-0.248	-0.523	-1.036
		(-0.74)	(-1.25)	(-1.09)	(-1.25)	(-0.29)	(-1.28)	(-1.02)
Startup passed seed/angel stage						0.249		
						(0.47)		
Startup had a board of directors	2.174***	2.169***	2.728***	2.735***	2.870***	2.769***	2.711***	2.654***
	(3.23)	(3.07)	(3.38)	(3.06)	(3.59)	(3.37)	(3.51)	(3.23)
Board Characteristics								
Number of outside board members			-0.171**	-0.130*	-0.171**	-0.182**	-0.188***	-0.0633*
			(-2.17)	(-1.68)	(-2.20)	(-2.30)	(-2.58)	(-1.72)
Average board serving time					-0.0094			
					(-1.12)			
Startup had Angel on board	-0.332	-0.291	-0.101	-0.328	-0.122	-0.142	-0.305	-0.140
	(-0.59)	(-0.21)	(-0.31)	(-0.83)	(-0.38)	(-0.43)	(-0.85)	(-0.43)
Startup had VC on board	0.926*	0.770*	1.061*	0.578*	0.954**	0.859*	0.830**	1.342**
	(1.92)	(1.84)	(1.70)	(1.85)	(2.13)	(1.79)	(1.99)	(2.09)
Startup had inside chairman			0.227					
			(0.73)					
Startup had founder chairman				-0.434				
				(-1.13)				
Number of Financial Vehicle Corporations (FVC) on board								-0.173
								(-0.65)
Number of Corporate Venture Capital (CVC) on board								1.398
								(1.47)
Financing Characteristics								
Total number of financing rounds							0.179	
							(1.47)	
Average growth rate of external financing amount			-0.311**	-0.289**	-0.322***	-0.320**	-0.393***	-0.311**
			(-2.50)	(-2.26)	(-2.62)	(-2.54)	(-2.62)	(-2.50)
Market Conditions								
Local MSCI Index Return on CEO Replacement Month	-13.08***	-12.24***	-15.64***	-14.74***	-15.57***	-15.30***	-14.75***	-15.84***
	(-3.41)	(-3.35)	(-3.82)	(-3.47)	(-3.89)	(-3.80)	(-3.55)	(-3.99)
Interaction Variable								
Startup had VC on board * Startup had joined incubator/technology park			0.179***	0.564***	0.465***	0.473***	0.396***	0.558***
			(9.42)	(8.94)	(9.45)	(9.78)	(9.72)	(8.31)
Observations	251	251	251	251	251	251	251	251
No. failed	51	51	51	51	51	51	51	51
No. competing	200	200	200	200	200	200	200	200
Wald chi^2	24.32	48.57	60.55	41.47	56.39	62.12	65.29	54.39

Table 3.6. Robustness Check on Startup Outcome

This table shows the influence of different firm activities on startups' operational outcome using competing risks regressions. Predicted CEO replacement is estimated based on model 8 in Table 5 Panel B, in which only statistically significant variables are included in estimation. Panel A. presents the estimated subhazard ratio (SHR) of different firm activities for startup acquisition and written-off. Subhazard ratio greater than 1stands for positive influence of the activity on the operational outcome of interest; smaller than 1, negative influence. Panel B. presents the coefficients of the same set of competing risks regressions. T values are shown in brackets. *, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

Panel A. Competing Risks Model--Subhazard Ratio Estimation

Event of interest: Startup was acquired (Model 1-3)

	Model 1			Model 2			Model 3		
	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z
Start-Up Characteristics									
Startup size	1.000	0.0000	0.61	1.000	0.0000	0.54	1.000	0.0000	1.12
New employees were hired before bringing in new CEO	1.052**	0.3268	1.98	1.082*	0.3183	1.77	1.051**	0.3247	2.16
Startup had joined incubator/technology park	1.819*	0.7629	1.83	3.249**	2.3273	2.15	3.018**	2.3143	2.44
Startup passed seed/angel stage	1.071*	0.4227	1.87	1.591**	0.5971	2.24	1.714**	0.6034	2.53
Predicted CEO replacement	1.010*	0.0308	1.74	1.011*	0.0289	1.73	1.019*	0.0301	1.84
Board Characteristics									
Number of outside board members				1.175*	0.1164	1.69	1.232**	0.1281	2.01
Number of founding team members on board				1.144*	0.1798	1.85	1.176*	0.1789	1.88
Average board serving time							0.974***	0.0089	-2.92
Startup had Angel on board	0.803	0.2442	-0.72	1.111	0.3798	0.31	1.129	0.3928	0.35
Startup had VC on board	1.851*	0.7962	1.93	2.052*	0.8484	1.74	1.858**	0.7580	2.52
Financing Characteristics									
Total number of financing rounds				0.536***	0.0924	-3.62	0.501***	0.0904	-3.83
Average growth rate of external financing amount							1.040	0.0289	1.41
Market Conditions									
Local MSCI Index Return on Exit Month	0.0002**	0.0014	-2.18	0.0001**	0.0007	-2.48	0.001**	0.0048	-2.11
Interaction Variable									
Startup had VC on board* Startup had joined incubator/technology park				0.746***	0.8906	-2.97	0.654***	0.8215	-3.05
Observations		251			251			251	
No. failed		77			77			77	
No. competing		174			174			174	
Wald chi^2		17.27			34.76			44.15	

Panel A. (Continued)

Event of interest: Startup was written off (Model 4-6)

	Model 4			Model 5			Model 6		
	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z	SHR	Robust Standard Error	Z
Start-Up Characteristics									
Startup size	1.000	0.0000	-0.20	1.000	0.0000	-0.19	1.000	0.0000	-0.16
New employees are hired before bringing in new CEO	0.513*	0.2697	-1.77	0.581*	0.3109	-1.81	0.558**	0.2981	-2.09
Startup had joined incubator/technology park	0.641	0.7804	-0.37	1.638	2.3476	0.34	2.172	2.9839	0.56
Startup passed seed/angel stage	0.913**	0.5475	-2.15	0.986**	0.6371	-2.02	0.914**	0.6413	-2.13
Predicted CEO replacement	0.833*	0.0784	-1.81	0.752**	0.1044	-2.31	0.873*	0.0940	-1.71
Board Characteristics									
Number of outside board members				0.865	0.1929	-0.65	0.865	0.2163	-0.58
Number of founding team members on board				0.807	0.1630	-1.06	0.814	0.1599	-1.05
Average board serving time							0.988	0.0229	-0.52
Startup had Angel on board	0.640	0.3602	-0.79	0.619	0.3576	-0.83	0.633	0.3561	-0.81
Startup had VC on board	0.176**	0.1243	-2.46	0.211**	0.1424	-2.30	0.225**	0.1511	-2.22
Financing Characteristics									
Total number of financing rounds				1.029	0.5882	0.05	1.115	0.6208	0.19
Average growth rate of external financing amount							0.848*	0.1575	-1.89
Market Conditions									
Local MSCI Index Return on Exit Month	0.0004**	0.0033	-1.98	0.003*	0.0223	-1.71	0.003*	0.0213	-1.72
Interaction Variable									
Startup had VC on board* Startup had joined incubator/technology park				0.856***	0.0000	-11.63	0.365***	0.0000	-11.49
Observations		251			251			251	
No. failed		34			34			34	
No. competing		217			217			217	
Wald chi^2		21.53			45.27			47.32	

Panel B. Competing Risks Model—Coefficients Estimation

	Startup was acquired (Model 1-3)			Startup was written off (Model 4-6)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Start-Up Characteristics						
Startup size	4.25E-09	7.63E-09	8.31E-09	-4.22e-09	-3.80e-09	-3.13e-09
	(0.61)	(0.54)	(1.12)	(-0.20)	(-0.19)	(-0.16)
New employees are hired before bringing in new CEO	0.0505**	0.0788*	0.0494**	-0.668*	-0.543*	-0.583**
	(1.98)	(1.77)	(2.16)	(-1.77)	(-1.81)	(-2.09)
Startup had joined incubator/technology park	0.598*	1.178**	1.104**	-0.445	0.494	0.776
	(1.83)	(2.15)	(2.44)	(-0.37)	(0.34)	(0.56)
Startup passed seed/angel stage	0.0689*	0.464**	0.539**	-0.0915**	-0.0744**	-0.0895**
	(1.87)	(2.24)	(2.53)	(-2.15)	(-2.02)	(-2.13)
Predicted CEO replacement	0.0103*	0.0109*	0.0188*	-0.138*	-0.161**	-0.127*
	(1.74)	(1.73)	(1.84)	(-1.81)	(-2.31)	(-1.71)
Board Characteristics						
Number of outside board members		0.161*	0.209**		-0.145	-0.145
		(1.69)	(2.01)		(-0.65)	(-0.58)
Number of founding team members on board		0.134*	0.162*		-0.215	-0.206
		(1.85)	(1.88)		(-1.06)	(-1.05)
Average board serving time			-0.0266***			-0.0120
			(-2.92)			(-0.52)
Startup had Angel on board	-0.219	0.106	0.121	-0.446	-0.479	-0.457
	(-0.72)	(0.31)	(0.35)	(-0.79)	(-0.83)	(-0.81)
Startup had VC on board	0.616*	0.719*	0.620**	-1.736**	-1.556**	-1.491**
	(1.93)	(1.74)	(2.52)	(-2.46)	(-2.30)	(-2.22)
Financing Characteristics						
Total number of financing rounds		-0.624***	-0.691***		0.0281	0.109
		(-3.62)	(-3.83)		(0.05)	(0.19)
Average growth rate of external financing amount			0.0393			-0.164*
			(1.41)			(-1.89)
Market Conditions						
Local MSCI Index Return on Exit Month	-8.549**	-9.066**	-7.216**	-7.830**	-5.921*	-5.973*
	(-2.18)	(-2.48)	(-2.11)	(-1.98)	(-1.71)	(-1.72)
Interaction Variable						
Number of Angel/VC on board* Startup had joined incubator/technology park		-0.354***	-0.478***		-0.131***	-0.782***
		(-2.97)	(-3.05)		(-11.63)	(-11.49)
Observations	251	251	251	251	251	251
No. failed	77	77	77	34	34	34
No. competing	174	174	174	217	217	217
Wald chi^2	17.27	34.76	44.15	21.53	45.27	47.32

Figure 3.1. The Influence of Venture Capital on Startup Exit

This figure shows the influence of VC on startups' operational outcome using cumulative incidence function (CIF). Cumulative incidence depicts the probability of an event occurs before given time. The figure is based on competing risks analysis using Model 3(exit through acquisition) and Model 6(exit through write-off) in Table 4 Panel A.

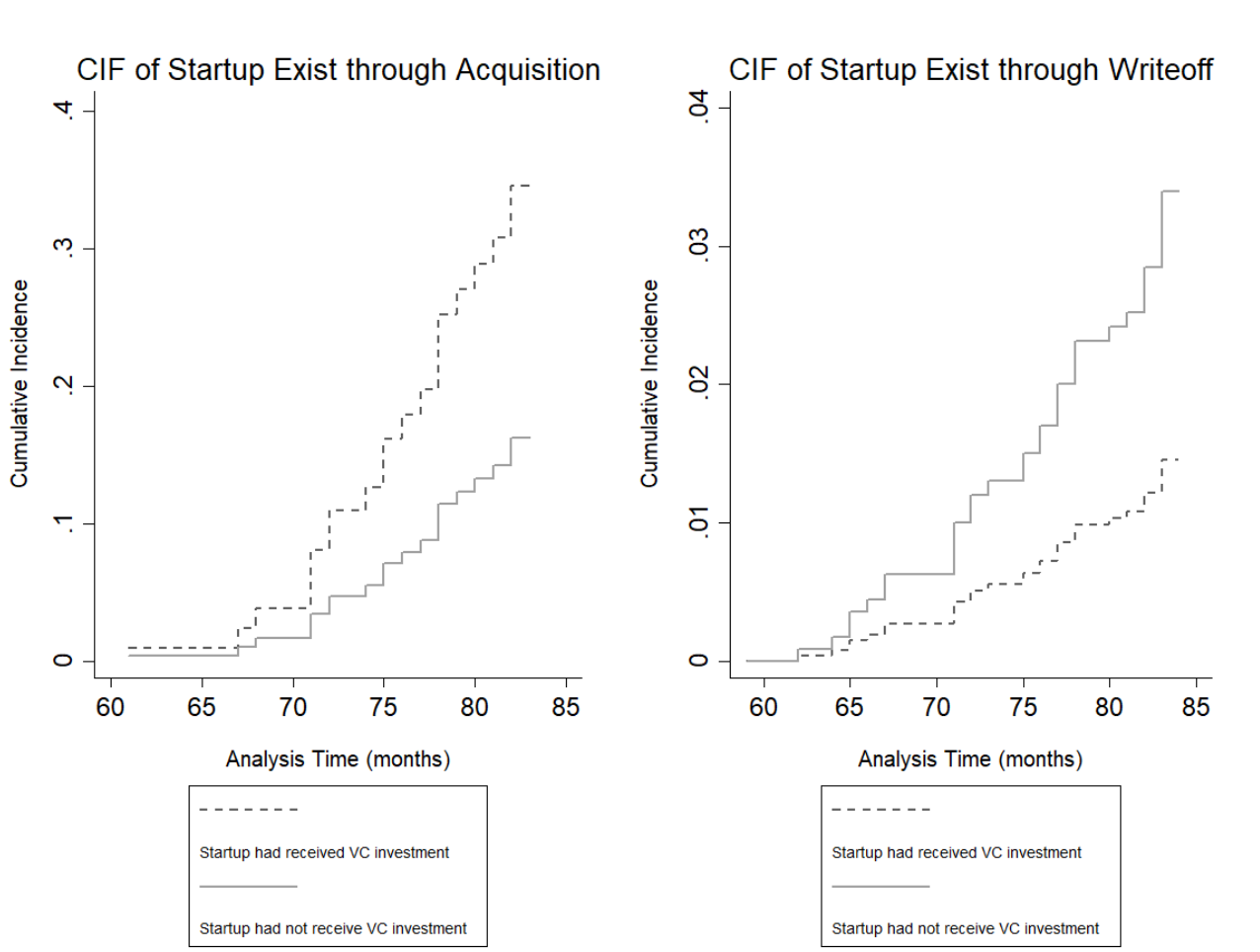


Figure3. 2. The Influence of CEO replacement on Startup Exit

This figure shows the influence of CEO replacement on startups' operational outcome using cumulative incidence function (CIF). Cumulative incidence depicts the probability of an event occurs before given time. The figure is based on competing risks analysis using Model 3(exit through acquisition) and Model 6(exit through write-off) in Table 4 Panel A.

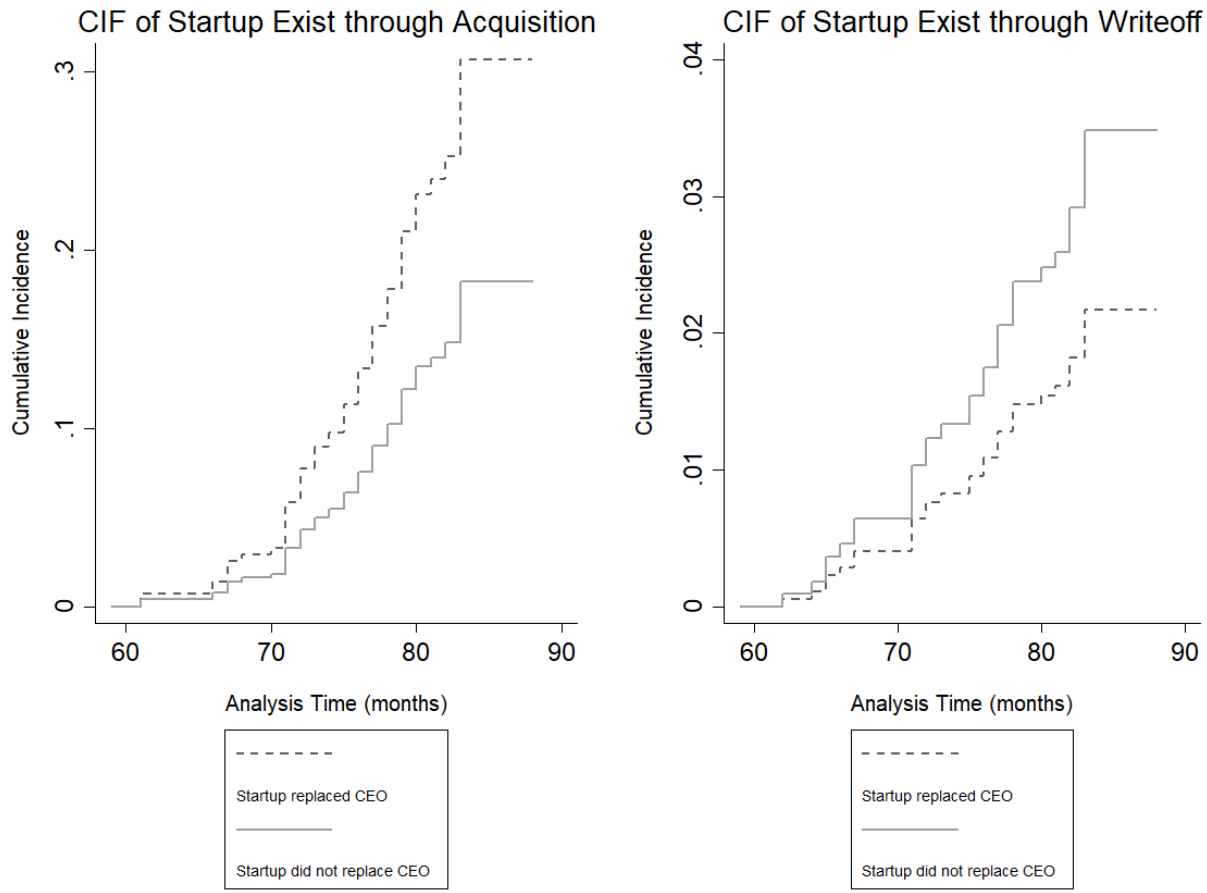


Figure 3.3. The Influence of Incubator/Technology Park Experience on Startup Exit

This figure shows the influence of incubator/technology park experience on startups' operational outcome using cumulative incidence function (CIF). Cumulative incidence depicts the probability of an event occurs before given time. The figure is based on competing risks analysis using Model 3(exit through acquisition) and Model 6(exit through write-off) in Table 4 Panel A.

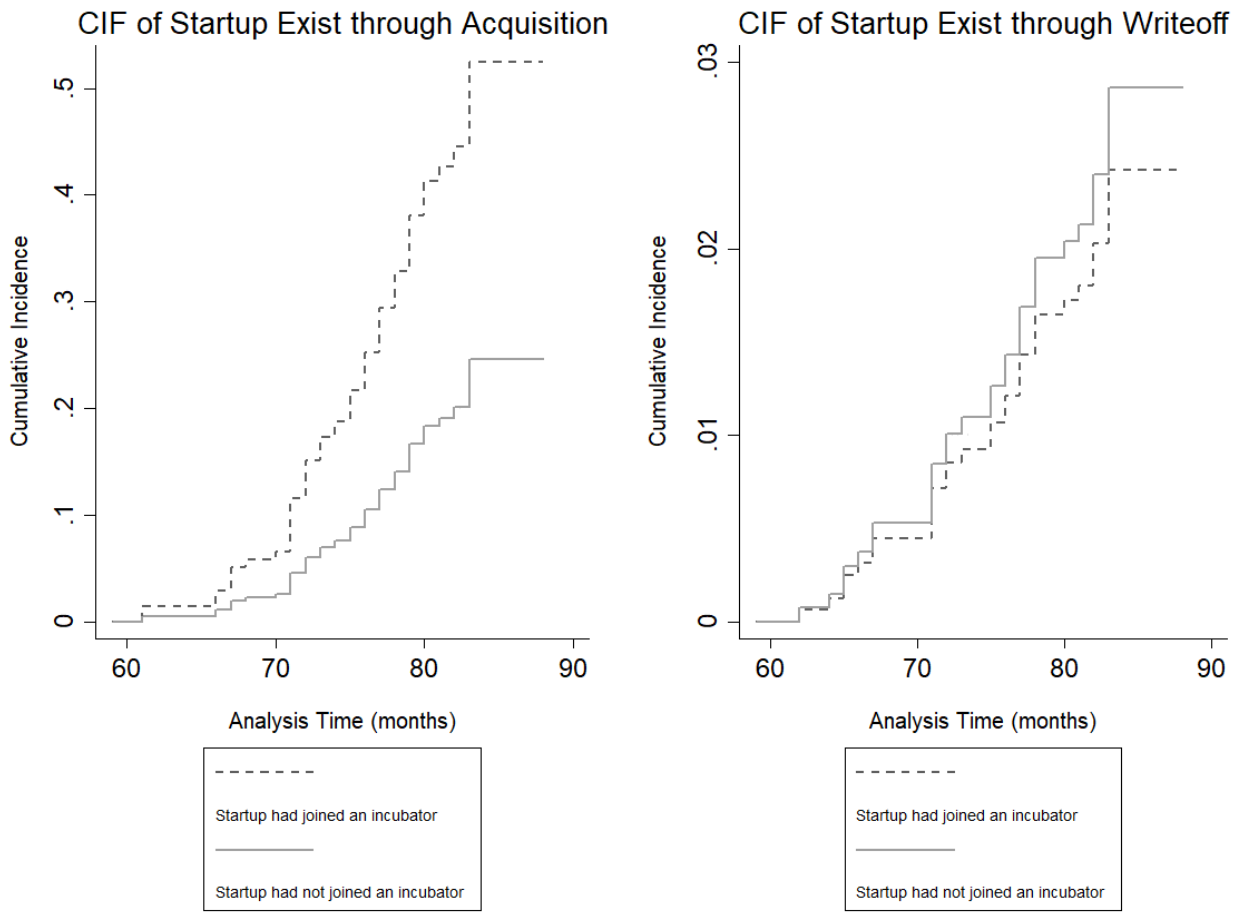


Figure 3.4. Influences on CEO Replacement

This figure shows the influence of VC, management, employee and board on CEO replacement using cumulative incidence function (CIF). Cumulative incidence depicts the probability of an event occurs before given time. The figure is based on competing risks analysis using Model 3 in Table 5 Panel A.

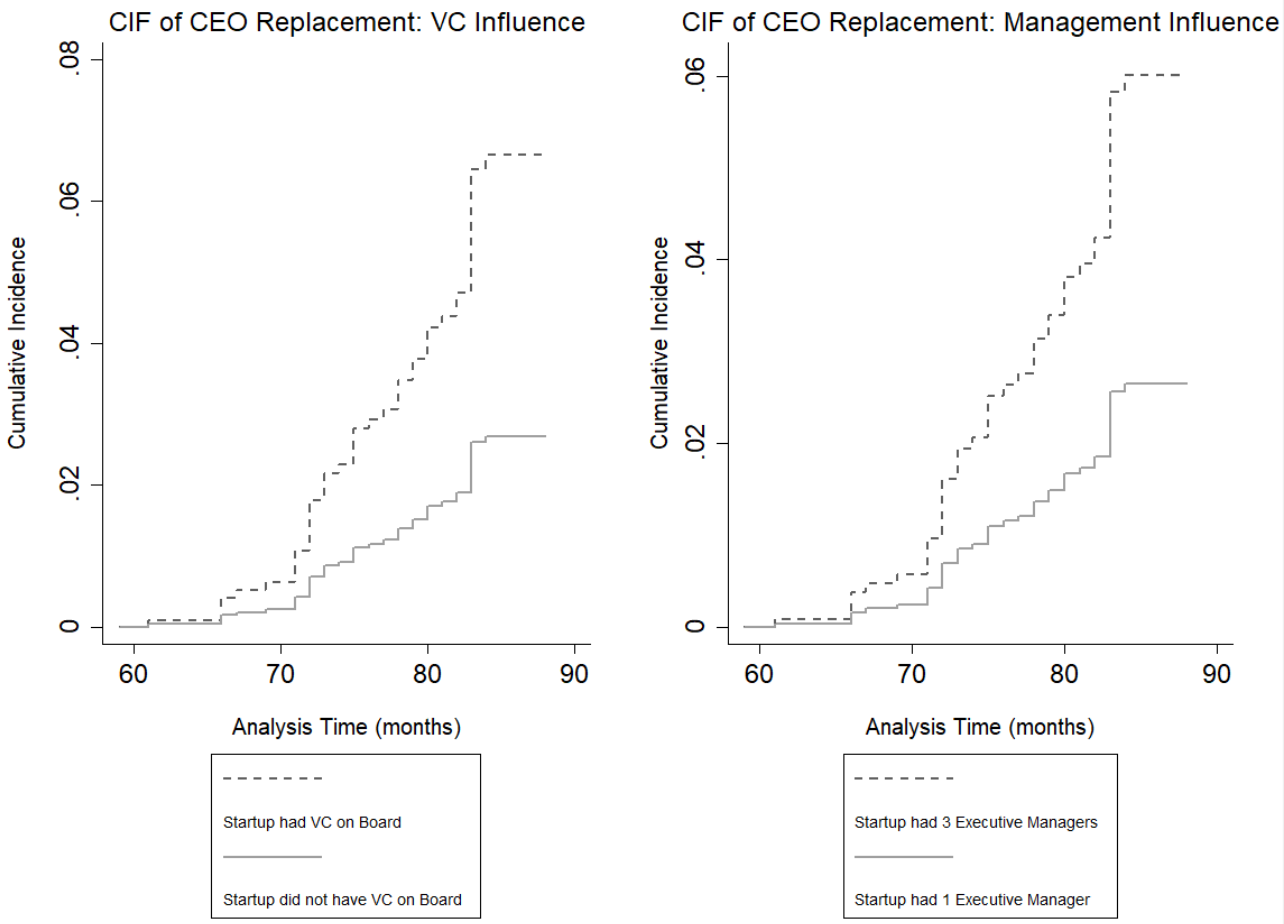
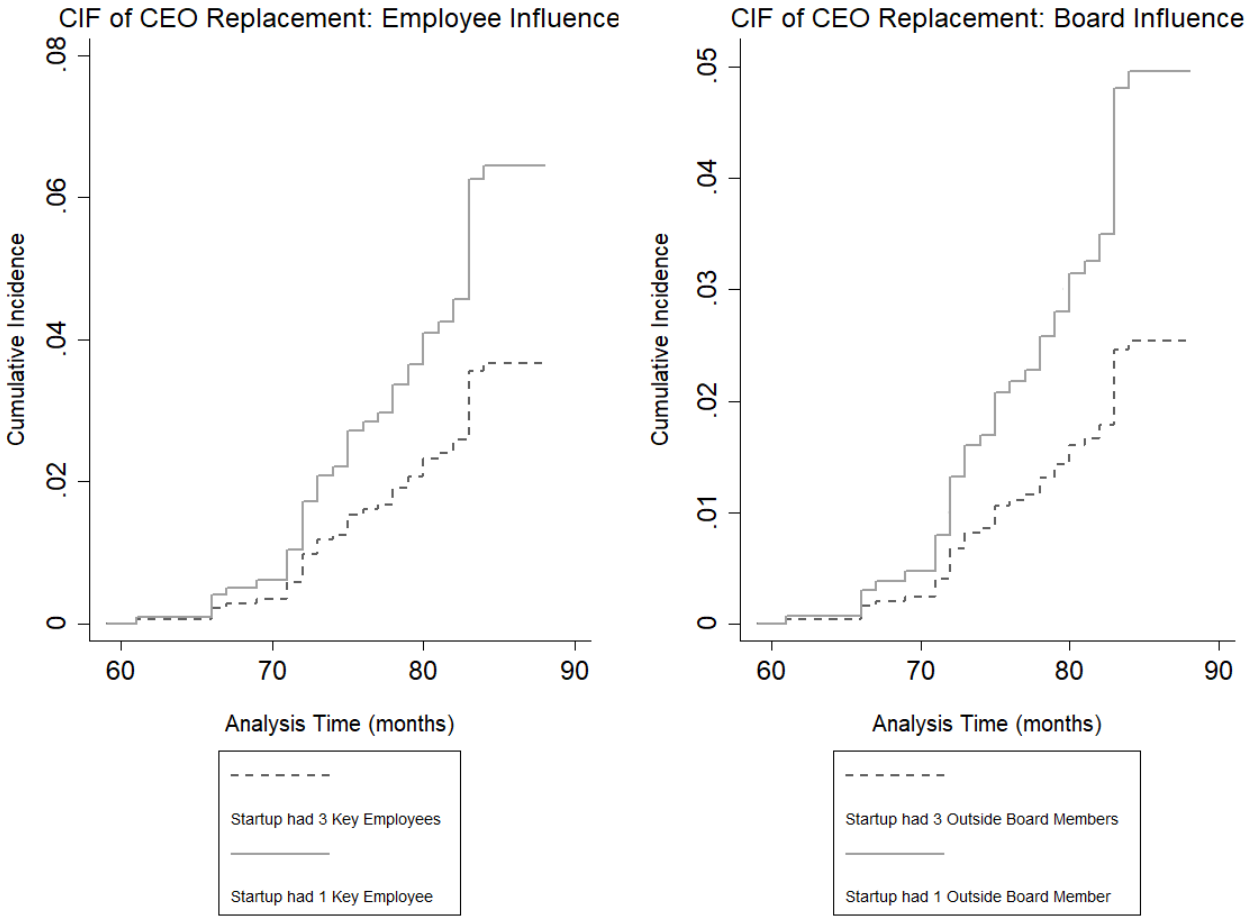


Figure 3.4 (Continued)



Appendix

In this appendix, we present the results of robustness checks for Table 4, Table 5 and Table 6 using logit regressions. For startup outcome analysis, exist year fixed effect is included in the analysis; for CEO replacement analysis, replacement year fixed effect is included in the analysis.

Table 3. A.I. Logit Analysis on Startup Outcome

This table presents the logit regression results of startup outcome analysis. The dependent variable equals 1 if the outcome of interest occurs and 0 otherwise. T values are shown in brackets. *, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

	Startup was acquired (Model 1-3)			**Startup was written off (Model 4-6)**		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Start-Up Characteristics						
Startup size	-3.18E-11	5.55E-10	6.20e-10*	-1.05E-10	-4.39E-12	9.02E-13
	(-0.10)	(1.56)	(1.75)	(-0.45)	(-0.02)	(0.03)
New employees are hired before bringing in new CEO	-0.03	-0.0365	-0.0391	-0.0296*	-0.0149**	-0.0160**
	(-0.49)	(-0.59)	(-0.64)	(-1.66)	(-2.32)	(-2.35)
Startup had joined incubator/technology park		0.210**	0.225**		-0.0366	-0.0254
		(2.12)	(2.17)		(-0.50)	(-0.33)
Startup passed seed/angel stage	0.109*	0.156**	0.150**	-0.0918*	-0.0632**	-0.0618**
	(1.69)	(2.08)	(2.02)	(-1.79)	(-2.14)	(-2.11)
Startup had replaced CEO	0.108*	0.129*	0.139*	-0.115**	-0.101*	-0.100*
	(1.83)	(1.76)	(1.91)	(-2.15)	(-1.87)	(-1.84)
Board Characteristics						
Number of outside board members		0.0433**	0.0458**		-0.0184	-0.0183
		(2.25)	(2.40)		(-1.29)	(-1.28)
Number of founding team members on board		0.0529*	0.0491*		-0.0375*	-0.0379*
		(1.94)	(1.81)		(-1.86)	(-1.87)
Average board serving time			-0.00545**			-0.000356
			(-2.49)			(-0.22)
Startup had Angel on board	-0.0308	-0.0238	-0.0222	-0.0285	-0.0161	-0.0189
	(-0.52)	(-0.38)	(-0.35)	(-0.61)	(-0.33)	(-0.38)
Startup had VC on board	0.121**	0.123**	0.118**	-0.149**	-0.165**	-0.163**
	(2.27)	(2.23)	(1.98)	(-2.00)	(-2.13)	(-2.10)
Financing Characteristics						
Total number of financing rounds		-0.105***	-0.103***		-0.0125	-0.0124
		(-3.69)	(-3.65)		(-0.59)	(-0.59)
Average growth rate of external financing amount			-0.00195			-0.000739
			(-1.01)			(-0.51)
Market Conditions						
Local MSCI Index Return on Exit Month	-0.617	-0.908	-0.88*	-0.276	-0.542*	-0.501
	(-0.65)	(-0.95)	(-1.92)	(-0.37)	(-1.73)	(-1.60)
Interaction Variable						
Startup had VC on board * Startup had joined incubator		-0.0448**	-0.0507**		-0.0727**	-0.0812*
		(-2.25)	(-2.18)		(-2.32)	(-1.78)
Exit Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.175***	0.161**	0.442***	0.310***	0.396***	0.414***
	(2.95)	(1.99)	(3.19)	(7.25)	(6.62)	(3.99)
Observations	251	251	251	251	251	251
R-squared	0.032	0.106	0.131	0.093	0.112	0.113
F	4.049***	5.177***	5.263***	5.013***	6.380***	9.772***

Table 3.A.II. Logit Analysis on CEO Replacement

This table presents the logit regression results of startup CEO replacement. The dependent variable equals 1 if a CEO is replaced and 0 otherwise. T values are shown in brackets. *, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Start-Up Characteristics								
Number of all current key employees		-0.0047	-0.00490*	-0.000712*	-0.0051	-0.00502*	-0.00358**	-0.00450*
		(-1.51)	(-1.69)	(-2.20)	(-1.61)	(-1.72)	(-2.12)	(-1.85)
Number of executive managers		0.0000734**	0.000276***	0.00108**	0.0000741***	0.000435***	0.0000551***	0.000406***
		(2.03)	(3.10)	(2.34)	(3.09)	(3.15)	(3.02)	(3.14)
Startup has joined incubator/technology park		-0.0196	-0.00381	-0.00302	-0.00385	-0.00535	-0.0126	-0.00138
		(-0.83)	(-0.08)	(-0.06)	(-0.08)	(-0.11)	(-0.26)	(-0.03)
Startup passed seed/angel stage						0.0177		
						(0.82)		
Board Characteristics								
Startup had a board of directors	0.00169**	0.00904***	0.00263**	0.00344**	0.00151**	0.00427**	0.00444**	0.00448**
	(2.10)	(3.49)	(2.13)	(2.15)	(2.07)	(2.20)	(2.22)	(2.31)
Number of outside board members			-0.00392*	-0.00389*	-0.00406*	-0.00500**	-0.00543*	-0.00798*
			(-1.78)	(-1.70)	(-1.80)	(-1.98)	(-1.67)	(-1.73)
Average board serving time					-0.000256			
					(-0.44)			
Startup had Angel on board	0.0118	0.00867	0.00644	-0.00289	0.00764	0.00869	0.000298	0.00614
	(0.79)	(0.58)	(0.42)	(-0.17)	(0.50)	(0.57)	(0.02)	(0.40)
Startup had VC on board	0.0223*	0.0170*	0.0163*	0.0298*	0.0167*	0.00967**	0.0122*	0.0223**
	(1.73)	(1.94)	(1.89)	(1.90)	(1.91)	(2.45)	(1.66)	(1.99)
Startup had inside chairman			-0.0196					
			(-0.93)					
Startup had founder chairman				-0.0101				
				(-0.44)				
Number of Financial Vehicle Corporations (FVC) on board								-0.0178
								(-1.26)
Number of Corporate Venture Capital (CVC) on board								-0.018
								(-0.33)
Financing Characteristics								
Total number of financing rounds							0.0101	
							(1.48)	
Average growth rate of external financing amount			-0.000236	-0.000204*	-0.000241	-0.000109**	-0.00028	-0.000205
			(-0.52)	(-1.86)	(-0.52)	(-2.23)	(-0.62)	(-0.45)
Market Conditions								
Local MSCI Index Return on CEO Replacement Month	-0.0000227	-0.0345	-0.000773*	-0.0306**	-0.0235**	-0.00732**	-0.0191**	-0.0196**
	(-1.57)	(-1.59)	(-1.68)	(-2.09)	(-2.36)	(-2.02)	(-2.35)	(-2.25)
Interaction Variable								
Startup had VC on board * Startup had joined incubator			0.0239*	0.0241*	0.0239**	0.0215**	0.0263**	0.0251**
			(1.74)	(1.81)	(2.19)	(2.40)	(2.49)	(2.46)
CEO Replacement Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.183***	0.181***	0.181***	0.212***	0.194***	0.180***	0.172***	0.179***
	(11.73)	(11.46)	(11.43)	(11.49)	(15.83)	(11.31)	(10.18)	(11.28)
Observations	251	251	251	251	251	251	251	251
R-squared	0.013	0.033	0.04	0.018	0.037	0.042	0.045	0.043
F	4.806***	6.344***	11.082***	7.336***	12.006***	16.023***	12.236***	9.046***

Table 3.A.III. Robustness Checks on Startup Outcome under Logit Analysis

This table presents the logit regression results of startup outcome analysis. The dependent variable equals 1 if the outcome of interest occurs and 0 otherwise. Predicted CEO replacement is estimated by model 8 in Table A.II. , in which only statistically significant variables are included in estimation. T values are shown in brackets. *, **, *** Significant at the 10%, 5%, and 1% levels, respectively.

	Startup was acquired (Model 1-3)			**Startup was written off (Model 4-6)**		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Start-Up Characteristics						
Startup size	1.00e-10	2.45e-10	2.77e-10	-9.67e-11	-3.26e-10	-3.60e-10
	(0.27)	(0.62)	(0.70)	(-0.34)	(-1.06)	(-1.17)
New employees are hired before bringing in new CEO	0.0194	0.00152	0.000751	-0.0505*	-0.0535**	-0.0530**
	(0.32)	(0.02)	(0.01)	(-1.86)	(-1.97)	(-2.05)
Startup had joined incubator/technology park		0.168*	0.168*		-0.189*	-0.186
		(1.90)	(1.88)		(-1.71)	(-1.27)
Startup passed seed/angel stage	0.0214**	0.0535*	0.0622*	-0.00455**	-0.0253**	-0.0336**
	(2.25)	(1.76)	(1.69)	(-2.07)	(-2.36)	(-2.48)
Predicted CEO replacement	0.00937*	0.00652*	0.00570*	-0.00318**	-0.00358***	-0.00265**
	(1.83)	(1.86)	(1.73)	(-2.57)	(-2.65)	(-2.44)
Board Characteristics						
Number of outside board members		0.0360	0.0389*		-0.00919	-0.0120
		(1.63)	(1.75)		(-0.54)	(-0.70)
Number of founding team members on board		0.0170*	0.0158		-0.0310	-0.0298
		(1.72)	(1.54)		(-1.37)	(-1.32)
Average board serving time			-0.00257**			0.00253
			(-2.11)			(1.42)
Startup had Angel on board	0.0112	0.0504	0.0587	-0.0159	-0.0297	-0.0376
	(0.18)	(0.76)	(0.88)	(-0.33)	(-0.58)	(-0.73)
Startup had VC on board	0.187**	0.188**	0.179*	-0.170**	-0.172**	-0.164**
	(2.13)	(2.06)	(1.96)	(-2.50)	(-2.44)	(-2.32)
Financing Characteristics						
Total number of financing rounds		-0.0671**	-0.0681**		0.0521	0.0532
		(-2.10)	(-2.13)		(1.11)	(1.15)
Average growth rate of external financing amount			0.00121			-0.00171
			(0.15)			(-0.27)
Market Conditions						
Local MSCI Index Return on Exit Month	-0.390	-0.467	-0.367**	-0.736*	-0.920*	-0.810*
	(-1.28)	(-1.34)	(-2.26)	(-1.69)	(-1.86)	(-1.75)
Interaction Variable						
Startup had VC on board * Startup had joined incubator		-0.0509**	-0.0613**		-0.0115**	-0.0228**
		(-2.24)	(-2.28)		(-2.07)	(-2.14)
Exit Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.153**	0.181**	0.309**	0.273***	0.277***	0.151
	(2.46)	(2.12)	(2.15)	(5.64)	(4.19)	(1.35)
Observations	251	251	251	251	251	251
R-squared	0.087	0.122	0.130	0.128	0.167	0.179
F	9.868	15.791	31.623	11.902	19.572	34.367

Bibliography

[1] Acs, Z. J., Szerb, L., & Autio, E., 2014b. National Systems of Entrepreneurship: Measurement and Policy. Research Policy Implications, 43, 476-494.

[2] Acs, Z., Estrin, S. Mickiewicz, T., & Szerb, L., 2014a. The Continued Search for the Solow Residual: The Role of National Entrepreneurial Ecosystem. Discussion Paper for IZA, DP No. 8652.

[3] Acs, Z.J., D.B. Audretsch, E.E. Lehmann, G. Licht, 2016. National systems of entrepreneurship, Small Business Economics, forthcoming

[4] Acs, Z.J., Sanders, M.W.J.L., 2013. Knowledge spillover entrepreneurship in an endogenous growth model, Small Business Economics 41(4), 775-795.

[5] Admati, A., and P. Pfleiderer. "Does it all add up? Benchmarks and the compensation of active portfolio managers." Journal of Business, 70 (1997), 323–350.

[6] Adner, R., & Kapoor, R., 2010. Value Creation in Innovation Ecosystems: How the Structure of Technological Interdependence Affects Firm Performance in New Technology Generations. Strategic Management Journal, 31, 306-333.

[7] Agrawal, A., Catalini, C., Goldfarb, A. 2015. Crowdfunding: Geography, Social Networks, and the Timing of Investment Decisions. Journal of Economics and Management Strategy 24 (2), 253–274.

[8] Ahlers, G.K.C., Cumming, D.J., Günther, C., Schweizer, D. 2015. Signaling in Equity Crowdfunding. Entrepreneurship Theory and Practice 29, 955–980.

[9] Andrieu, A., Groh, A. 2012. Entrepreneurs' Financing Choice between Independent and Bank-Affiliated Venture Capital Firms. Journal of Corporate Finance 18, 1143–1167.

[10] Audretsch, D., 2007a. Entrepreneurship Capital and Economic Growth. Oxford Review of Economic Policy, 23, 63-78.

[11] Audretsch, D., 2007b. The Entrepreneurial Society, Oxford: Oxford University Press.

[12] Audretsch, D., 2015. Everything in its Place: Entrepreneurship and the Strategic Management of Cities, Regions and States, Oxford University Press, New York, USA.

[13] Audretsch, D., Keilbach, M., 2007. The Localisation of Entrepreneurship Capital: Evidence from Germany. Regional Science, 86, 351-365.

[14] Audretsch, D., Keilbach, M., Lehmann, E., 2006. Entrepreneurship and economic growth, Oxford University Press.

[15] Audretsch, D., Lehmann, E., Paleari, S. Vismara, S., 2016. Entrepreneurial finance and technology transfer, The Journal of Technology Transfer 41(1), 1-9.

[16] Audretsch, D., Thurik, R., 2004. A model of the entrepreneurial economy. International Journal of Entrepreneurship Education 2(2): 143-166.

[17] Barber, B. M.; X. Huang; and T. Odean. "Which Factors Matter to Investors? Evidence from Mutual Fund Flows." Review of Financial Studies, (2016), forthcoming.

[18] Barras, L.; O. Scaillet; and R. Wermers. "False discoveries in mutual fund performance: measuring luck in estimated alphas." Journal of Finance, 65 (2010), 179–216.

[19] Battisti, G., Colombo, M.G., Rabbiosi, L., 2015. Simultaneous versus sequential complementarity in the adoption of technological and organizational innovations: the case of innovations in the design sphere, Industrial & Corporate Change, forthcoming.

[20] Bauer, R.; K. Koedijik; and R. Otten. "International evidence on ethical mutual fund performance and investment style." Journal of Banking and Finance, 29 (2005), 1751-1767

[21] Belleflamme, P., Lambert, T., Schwienbacher, A. 2013. Individual Crowdfunding Practices. Venture Capital: An International Journal of Entrepreneurial Finance 15 (4), 313–333.

[22] Belleflamme, P., Lambert, T., Schwienbacher, A. 2014. Crowdfunding: Tapping the Right Crowd. Journal of Business Venturing 29 (5), 585–609.

[23] Bengtsson, O., B.A. Sensoy, 2011. Investor abilities and financial contracting: Evidence from venture capital, Journal of Financial Intermediation 20, 477-502.

[24] Berea, A., Goldfarb, B., Kirsch, D., Rand, B. 2016. Crowdfunding Success and Social Media: A Data-Driven Analysis. Working Paper, University of Maryland.

[25] Berk, J. B., and J. H. van Binsbergen. "Measuring Skill in the Mutual Fund Industry." Journal of Financial Economics, (2016), forthcoming.

[26] Bernile, G., Cumming, D.J., Lyandres, E. 2007. The Size of Venture Capital and Private Equity Fund Portfolios. Journal of Corporate Finance 13, 564–590.

[27] Bernstein, Shai and Korteweg, Arthur G. and Laws, Kevin, Attracting Early Stage Investors: Evidence from a Randomized Field Experiment (August 27, 2015). Journal of Finance, Forthcoming; Rock Center for Corporate Governance at Stanford University Working Paper No. 185; Stanford University Graduate School of Business Research Paper No. 14-17. Available at SSRN: https://ssrn.com/abstract=2432044 or http://dx.doi.org/10.2139/ssrn.2432044

[28] Bollen N. P., and J. A. Busse. "Short-term persistence in mutual fund performance." Review of Financial Studies,.18 (2005), 569–597.

[29] Bonaccorsi, A., Colombo, M.G., Guerini, M., Rossi Lamastra, C., 2015. The effect of Higher Education Institutions on the creation of new firms: Offering comprehensive evidence on the Italian case, Small Business Economics, forthcoming

[30] Bonardo, D., Paleari, S., Vismara, S., 2010. The M&A dynamics of European science-based entrepreneurial firms, Journal of Technology Transfer 35 (1), 141-180.

[31] Bonardo, D., Paleari, S., Vismara, S., 2011. Valuing university-based firms: the effects of academic affiliation on IPO performance, Entrepreneurship Theory and Practice 35(4), 755-776.

[32] Boyle, J.C. The Battle for the Soul of Capitalism. New Haven: Yale University Press (2006).

[33] Bradford, C.S. 2012. Crowdfunding and the Federal Securities Laws. Columbia Business Law Review, Vol. 2012, No. 1.

[34] Canadian Securities Administrators (CSA). "Mutual Fund Fees." Discussion Paper and Request for Comment 81-407 (2012).

[35] Carhart, M. "On persistence in mutual fund performance." Journal of Finance, 52 (1997), 57–82.

[36] Cashman, G. D., and D. N. Deli. "Locating decision rights: evidence from the mutual fund industry." Journal of Financial Markets, 12 (2009), 645–671.

[37] Chalmers, J., and J. Reuter. "Is conflicted investment advice better than no advice?" NBER Working Paper No. 18158 (2012).

[38] Chen J.; H. Hong; M. Huang; and J. D. Kubik. "Does fund size erode mutual fund performance? The role of liquidity and organization." American Economic Review, 94 (2004), 1276–1302.

[39] Chen, C.-J., 2009. Technology commercialization, incubator and venture capital, and new venture performance, Journal of Business Research 62(1), 93-103.

[40] Chen, J.; H. Hong; W. Jiang; and J. D. Kubik. "Outsourcing mutual fund management: firm boundaries, incentives, and performance." Journal of Finance, 68 (2013), 523–558.

[41] Christoffersen, S. E. K.; D. K. Musto; and R. Wermers. "Investor flows to asset managers: causes and consequences." Annual Review of Financial Economics, 6 (2014), 289–310.

[42] Christoffersen, S. E. K.; R Evans; and D. K. Musto. "What do consumers' fund flows maximize? Evidence from their brokers' incentives." Journal of Finance, 68 (2013), 201–235.

[43] Chuprinn, O.; M. Massa; D. Schumacher. "Outsourcing in the international mutual fund industry: An equilibrium view." Journal of Finance, 70 (2014), 2275–2308.

[44] Coad A., Frankish S.J., Roberts G.R. and Storey J.D. ,2016. Predicting new venture survival and growth: Does the fog lift? Small Business Economics, forthcoming

[45] Colombo, M. G., Cumming, D. J, and Vismara S. 2016 Governmental venture capital for innovative young firms, The Journal of Technology Transfer, Volume 41, Issue 1, Pages 10-24

[46] Colombo, M.G., Franzoni, C., Rossi Lamastra, C., 2015. Internal social capital and the attraction of early contributions in crowdfunding, Entrepreneurship Theory & Practice, forthcoming.

[47] Colombo, M.G., Franzoni, C., Rossi-Lamastra, C. 2015. Internal Social Capital and the Attraction of Early Contributions in Crowdfunding Projects. Entrepreneurship Theory and Practice 39, 79–100.

[48] Cooper M. J.; H. Gulen; and P. R. Rau. "Changing names with style: mutual fund name changes and their effects on fund flows." Journal of Finance, 60 (2005), 2825–2858.

[49] Cosh, A., D.J. Cumming, and A. Hughes, 2009. Outside entrepreneurial capital, Economic Journal 119, 1494-1533.

[50] Cumming, D., U. Walz, and J. Werth, 2016. Entrepreneurial spawning: experience, education, and exit, The Financial Review, forthcoming

[51] Cumming, D.; S. Johan; and Y. Zhang. "A dissection of mutual fund fees, flows, and performance." Working Paper, York University (2015).

[52] Cumming, D.J. 2006. The Determinants of Venture Capital Portfolio Size: Empirical Evidence. Journal of Business 79, 1083–1126.

[53] Cumming, D.J., 2008. Contracts and exits in venture capital finance, Review of Financial Studies 21, 1947-1982.

[54] Cumming, D.J., and E. Fischer, 2012. Publicly funded business advisory services and entrepreneurial outcomes, Research Policy 41, 467-481.

[55] Cumming, D.J., and S. Johan, 2013b. Technology Parks and Entrepreneurial Outcomes around the World, International Journal of Managerial Finance 9, 279-293.

[56] Cumming, D.J., and S.A. Johan, 2013a. Venture Capital and Private Equity Contracting: An International Perspective, Elsevier Science Academic Press

[57] Cumming, D.J., Zambelli, S. 2016. Due Diligence and Investee Performance. European Financial Management, forthcoming.

[58] Debaere, P., and R. Evans. "Outsourcing vs. integration in the mutual fund industry: An incomplete contracting perspective." Working Paper, University of Virginia (2014).

[59] DeGennaro, R. and Dwyer, G., 2014. Expected Returns to Stock Investments by Angel Investors in Groups. European Financial Management. 20, 739–755.

[60] DeGennaro, R., 2013. Angel Investors and their Investments. The Oxford Handbook of Entrepreneurial Finance.

[61] Del Guercio, D., and J. Reuter. "Mutual fund performance and the incentive to generate alpha." Journal of Finance, 69 (2014), 1673–1704.

[62] Del Guercio, D., and P. A. Tkac. "The determinants of the flow of funds of managed portfolios: mutual funds versus pension funds." Journal of Financial and Quantitative Analysis, 37 (2002), 523–557.

[63] Del Guercio, D.; J. Reuter; P. A. Tkac. "Demand for Financial Advice, Broker Incentives, and Mutual Fund Market Segmentation." (2010). Available at SSRN: http://ssrn.com/abstract=1361710 or http://dx.doi.org/10.2139/ssrn.1361710.

[64] Deli, D. N. "Mutual fund advisory contracts: an empirical investigation." Journal of Finance, 57 (2002), 109–133.

[65] Dorfleitnera, G., Pribernya, C., Schustera, S., Stoiberc, J., Webera, M., de Castrod, I., Kammlera, J., 2016. Description-text related soft information in peer-to-peer lending – Evidence from two leading European platforms. Journal of Banking & Finance 64, 169–187.

[66] Edelen, R. M. "Investor flows and the assessed performance of open-end mutual funds." Journal of Financial Economics, 53 (1999), 439–466.

[67] Elton E. J.; M. J. Gruber; and C. R. Blake. "Incentive fees and mutual funds." Journal of Finance, 58 (2003), 779–804.

[68] Engel, D., and M. Keilbach, 2006. Firm-Level Implications of Early Stage Venture Capital Investment – An Empirical Investigation. Journal of Empirical Finance 14, 150-167.

[69] Espenlaub, S., Khurshed, A., Mohamed, A., 2015. Venture capital exits in domestic and cross-border investments. Journal of Banking & Finance 53, 215–232.

[70] Fama, E. F., and K. R. French. "A five-factor asset pricing model." Working Paper, University of Chicago (2014).

[71] Fama, E. F., and K. R. French. "Luck versus Skill in the Cross-Section of Mutual Fund Returns." Journal of Finance, 65 (2010), 1915–1947.

[72] Ferran, E., N. Moloney, J.G. Hill, J.C. Coffee, Jr., 2012. The Regulatory Aftermath of the Global Financial Crisis Cambridge University Press.

[73] Foerster, S.; J. T. Linnainmaa; B. T. Melzer; and A. Previtero. “Retail Financial Advice: Does One Size Fit All?” Journal of Finance, (2016), forthcoming.

[74] Frazzini, A., and O. A. Lamont. “Dumb money: mutual fund flows and the cross-section of stock returns.” Journal of Financial Economics, 88 (2008), 299–322.

[75] Fulghieri, P., Sevilir, M. 2009. Size and Focus of a Venture Capitalist’s Portfolio. Review of Financial Studies 22, 4643–4680.

[76] Gil-bazo, J., and P. Ruiz-verdu. “The relation between price and performance in the mutual fund industry.” Journal of Finance, 64 (2009), 2153–2183.

[77] Giot, P., Schwienbacher, A., 2007. IPOs, trade sales and liquidations: Modelling venture capital exits using survival analysis. Journal of Banking & Finance 31, 679–702.

[78] Gkypali, A., V. Kokkinos, C. Bouras 2016. Science parks and regional innovation performance in fiscal austerity era: Less is more? Small Business Economics, forthcoming.

[79] Goldfarb, B., Hoberg, G., Kirsch, D. and Triantis, A., 2007. Are Angels Preferred Series A Investors? Unpublished Working Paper, University of Maryland.

[80] Goldfarb, B., Hoberg, G., Kirsch, D. and Triantis, A., 2012. Does angel participation matter? An analysis of early venture financing. Unpublished working paper.

[81] Golec, J. H. “Empirical tests of a principal-agent model of the investor-investment advisor relationship.” Journal of Financial and Quantitative Analysis, 27 (1992), 81–95.

[82] Griffin, Z.J. 2012. Crowdfunding: Fleecing the American Masses. Working paper – Available from: http://ssrn.com/abstract=2030001.

[83] Hansen, M.T., Chesbrough, H.W., Nohria, N., & Sull, D.N., 2000. Networked incubators: hothouses of the new economy, Harvard Business Review (September-October), 74-84.

[84] Hausman, J. A. “Specification tests in econometrics.” Econometrica, 46 (1978), 1251–1271.

[85] Heinkel, R., and N. Stoughton. “The dynamics of portfolio management contracts.” Review of Financial Studies, 7 (1994), 351–387.

[86] Holling, C.S., 2001. Understanding the Complexity of Economic, Ecological and Social Systems’, Ecosystems, 4, 390-405.

[87] Hornuf, L., Schwienbacher, A. 2016a. Internet Based Entrepreneurial Finance: Lessons from Europe. California Management Review, forthcoming.

[88] Hornuf, L., Schwienbacher, A. 2016b. Which Securities Regulation Promotes Crowdinvesting? Small Business Economics, forthcoming.

[89] Hülsbeck, M, Lehmann, E.E., Starnecker, A., 2013. Performance of technology transfer offices in Germany, The Journal of Technology Transfer, 38(3), 199-215

[90] Hwang, VW & Horowitt, G 2012, The Rainforest – The Secret to Building the Next Silicon Valley, Regenwald, California, USA.

[91] Investor Economics. "Analysis of Factors Influencing Sales, Retention and Redemptions of Mutual Fund Units." September 2015 Study by Investor Economics for The Investment Funds Institute of Canada (2015).

[92] Ivkovića, Z., and S. Weisbenner. "Individual investor mutual fund flows." Journal of Financial Economics, 92 (2009), 223–237.

[93] Jain P. C., and J. S. Wu. "Truth in mutual fund advertising: evidence on future performance and fund flows." Journal of Finance, 55 (2000), 937–958.

[94] Jolink, A., E. Niesten, 2016. The impact of venture capital on governance decisions in collaborations with start-ups, Small Business Economics (2016)

[95] Kanniainen, V., Keuschnigg, C. 2003. The optimal portfolio of start-up firms in venture capital finance. Journal of Corporate Finance 9, 521–534.

[96] Kanniainen, V., Keuschnigg, C. 2004. Start-up investment with scarce venture capital support. Journal of Banking and Finance 28, 1935–1959.

[97] Keuschnigg, C. 2004. Taxation of a venture capitalist with a portfolio of firms. Oxford Economic Papers 56, 285–306.

[98] Khorna, A.; H. Servaes; and P. Tufano. "Mutual fund fees around the world." Review of Financial Studies, 22 (2008), 1279–1310.

[99] Kieschnick, R., B.D. McCullough, 2003. Regression analysis of variates observed on (0,1): Percentages, proportions and fractions. Statistical Modelling 3, 193-213.

[100] Kosowski, R.; A. Timmermann; R. Wermers; and H. White. "Can Mutual Fund 'Stars' Really ick Stocks? New Evidence from a Bootstrap Analysis." Journal of Finance, 61 (2006), 2551–2595.

[101] Kuhnen, C. "Dynamic contracting in the mutual fund industry." Working Paper, Northwestern University (2004).

[102] Lee, S.Y., Florida, R., & Acs, Z., 2004. Creativity and Entrepreneurship: A Regional Analysis of New Firm Formation. Regional Studies 38(8): 879-891.

[103] Löfsten, H., and Lindelöf. P. 2002. Science parks and the growth of new technology-based firms—academic-industry links, innovation and markets. Research Policy 31, 859-876.

[104] Mason, C. & Brown, 2014. Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship. Paper prepared for a workshop of the OECD LEED Programme and the Dutch Ministry of Economic Affairs, The Hague, Netherlands, 7th November 2013.

[105] Mason, C. and Harrison, R., 1995. Closing the regional equity capita gap: The role of informal venture capital. Small Business Economics. 7, 153–172

[106] Mason, C. and Harrison, R., 2002a. Is it worth it? The rates of return from informal venture capital investments. Journal of Business Venturing. 17, 211–236.

[107] Mason, C. and Harrison, R., 2002b. Barriers to investment in the informal VC sector. Entrepreneurship and Regional Development 14, 271-287.

[108] Massa, M. "How do family strategies affect fund performance? When performance maximization is not the only game in town." Journal of Financial Economics, 67 (2003), 249–305.

[109] Massolution. 2015. Crowdfunding Industry Report. Massolution/Crowdsourcing.org 2015CF – Available from: http://reports.crowdsourcing.org/index.php?route=product/product&product_id=54.

[110] McCann, P., R. Ortega-Argilés, 2016. Smart specialisation, entrepreneurship and SMEs: issues and challenges for a results-oriented EU regional policy, Small Business Economics, forthcoming

[111] Meoli, M., S. Vismara, 2016. University support and the creation of technology and non-technology academic spin-offs , in Small Business Economics

[112] Nahata, R. 2008. Venture Capital Reputation and Investment Performance. Journal of Financial Economics 90, 127−151.

[113] Nahata, R., Hazarika, S., Tandon, K. 2014. Success in Global Venture Capital Investing: Do Institutional and Cultural Differences Matter? Journal of Financial and Quantitative Analysis 49 (4), 1039–1070.

[114] Nielsen, K.M. 2008. Institutional Investors and Private Equity. Review of Finance 12, 185–219.

[115] Oh N.; J. T. Parwada; and K. M. E. Tan. "Should indirect brokerage fees be capped? Lessons from mutual fund marketing and distribution expenses." Journal of Financial and Quantitative Analysis, 52 (2017), 781–809.

[116] Petersen, M. "Estimating standard errors in finance panel data sets: comparing approaches." Review of Financial Studies, 22 (2009), 435–480.

[117] Petty, J.W., J.D. Martin, and J.W. Kensinger, 1999, Harvesting investments in private companies, Morristown, N.J.: Financial Services Research Foundation, Inc.

[118] Plumper, T., and V. E. Troeger. “Efficient estimation of time-invariant and rarely changing variables in finite sample panel analyses with unit fixed effects.” Political Analysis, 15 (2007), 124–139.

[119] Reuter, J. “Revisiting the Performance of Broker-Sold Mutual Funds.” (2015). Available at SSRN: http://ssrn.com/abstract=2685375

[120] Rigamonti D., Cefis E., Meoli M., Vismara S. 2016. The Effects of the Specialization of Private Equity Firms on their Exit Strategy, Journal of Business Finance & Accounting, DOI: 10.1111/jbfa.12221

[121] Ritter, J., 2016. Initial Public Offerings: VC-backed IPO Statistics Through 2015. https://site.warrington.ufl.edu/ritter/files/2016/02/IPOs2015VC-backed.pdf

[122] Robb, A.M., Robinson, D.T. 2014. The Capital Structure Decisions of New Firms. Review of Financial Studies 27 (1), 153–179.

[123] Ruckman, K. “Expense ratios in North American mutual funds.” Canadian Journal of Economics, 36 (2003), 192–223.

[124] Ryan, R.M., O’Toole, C.M., McCann, F. (2014. Does bank market power affect SME financing constraints? Journal of Banking & Finance 49, 495–505.

[125] Schillo, R.S., A. Persaud, M. Jin, 2016. Entrepreneurial readiness in the context of national systems of entrepreneurship, Small Business Economics

[126] Schwienbacher, A., Belleflamme, P., Lambert, T. 2013. Individual Crowdfunding Practices. Venture Capital: An International Journal of Entrepreneurial Finance 15 (4), 313–333.

[127] Shaver, J.M., 1998. Accounting for endogeneity when assessing strategy performance: Does entry mode choice affect FDI survival? Management Science 44(4), 571-585.

[128] Signori, A., Vismara, S., 2017. Stock-financed M&As of newly listed firms, Small Business Economics, 48(1), 115-134.

[129] Sirri, E. R., and P. Tufano. “Costly search and mutual fund flows.” Journal of Finance, 53 (1998), 1589–1622.

[130] Spence, M. 2002. Signaling in Retrospect and the Informational Structure of Markets. American Economic Review 92, 434–459.

[131] Squicciarini, M. 2009. Science parks: seedbeds of innovation? A duration analysis of firms’ patenting activity. Small Business Economics Vol. 32, pp. 169–190.

[132] Stam, E., 2014. The Dutch Entrepreneurial Ecosystem. (July 29, 2014). Available at SSRN: http://ssrn.com/abstract=2473475 or http://dx.doi.org/10.2139/ssrn.2473475

[133] Starks, L. T. “Performance incentive fees: an agency theoretic approach.” Journal of Financial and Quantitative Analysis, 22 (1987), 17–32.

[134] Tykvová, T. 2016. When and Why Do Venture Capital-Backed Companies Obtain Venture Lending? Journal of Financial and Quantitative Analysis, forthcoming

[135] Vismara, S. 2016. Information Cascades Among Investors in Equity Crowdfunding. Entrepreneurship Theory and Practice, forthcoming.

[136] Vismara, S., 2016. Equity retention and social network theory in equity crowdfunding, Small Business Economics, 46(4), 579–590.

[137] Vismara, S., 2016. Information cascades among investors in equity crowdfunding, Entrepreneurship Theory and Practice, forthcoming

[138] Vismara, S., Paleari, S., Ritter, J.R. 2012. Europe’s Second Markets for Small Companies. European Financial Management 18, 352–388.

[139] Warner J.B., and J. S. Wu. “Why do mutual fund advisory contracts change? Performance, growth and spillover effects.” Journal of Finance, 66 (2011), 271–306.

[140] Warther, V. A. “Aggregate mutual fund flows and security returns.” Journal of Financial Economics, 39 (1995), 209–235.

[141] Yung, C. 2009. Entrepreneurial Financing and Costly Due Diligence. Financial Review 44, 137–149.

[142] Zheng, L. “Is Money Smart? A Study of Mutual Fund Investors' Fund Selection Ability.” Journal of Finance, 54 (1999), 901–933.