The impact of intermediaries in activism and IPOs

Emmanuel Pezier
Cass Business School, City, University of London

A thesis submitted for the degree of
Doctor of Philosophy in Finance

December 2020

Abstract

This thesis explores the role and impact of financial intermediaries in shareholder activism and initial public offerings (IPOs).

The first chapter examines the risks and returns to shareholder activism in small-cap stocks. Activists appear to play an important governance role, but identifying it empirically remains challenging. We examine a private dataset of engagements in small UK companies in the 2008-15 period. Our activist receives a blind portfolio; has low incentives and financial resources; engages alone, behind-the-scenes; and deals in illiquid under-researched firms. These features help us to focus on the treatment (as compared to the selection) effect. Consistent with a positive governance effect of shareholder activism, we find that the engagements generate positive annual returns for the period (+1.4%), especially in confrontational situations (+4.9%), and have persistent impacts on firms' operating performance.

The second chapter examines whether advisory firms improve outcomes for issuers in IPOs. Issuers increasingly employ advisers in IPOs. We examine advisers' incentives and effects on first-day returns, withdrawals and underwriting spreads in Europe. We find advisers in aggregate have no impacts despite charging significant fees and claiming they add value. Decomposing the null result, we find differences between advisers consistent with their heterogeneous incentives: generalist firms (offering IPO and other services) are associated with a 91-percentage point increase in first-day returns amongst deals priced at the top of the filing range; specialist firms (primarily IPO services) have no such effect. Since advisers' incentives are not transparent, issuers may be making uninformed choices.

The third chapter examines whether early investors reduce risks and/or add value to issuers in IPOs. IPOs increasingly involve early investors who commit to buying shares before the offering is launched. Using a European sample, we examine whether banks underprice strongly-demanded IPOs to satisfy the limit prices of early investors, and whether such investors salvage weakly-demanded IPOs in equilibrium. We find early investors are associated with a 52-percentage point increase in underpricing in IPOs where their limit prices are likely to have been binding. However, we find no evidence that they salvage weakly-demanded IPOs, reduce gross spreads or IPO withdrawals, or provide value-added or informational services. Instead, we find support for agency-based explanations for the underpricing.

Supervisor Paolo Volpin from Cass Business School, London.

Total words This thesis contains approximately 60,000 words.

Authorship All parts of this thesis are single-authored and fully my own work.

Funding I gratefully acknowledge funding from the Robert Legget scholarship.

Declaration The work in this thesis is based on research I have carried out at Cass Business School between September 2017 and December 2020. No part of this thesis has been submitted for a degree at this, or any other, university.

Copies I grant powers of discretion to the university librarian to allow single copies of this thesis to be made available in whole or in part for study purposes without further reference to me subject to normal conditions with respect to acknowledgement.

Acknowledgements I have been lucky to be surrounded by wonderful family, friends, colleagues, ex-colleagues, mentors and supervisors who have provided guidance, support and encouragement throughout my studies. I am enormously indebted and sincerely grateful.

Emmanuel Pezier
London, December 2020

Contents

List of tables and figures

Chapter 1: Returns to small-cap activism

Chapter 2: The impact of advisory firms in IPOs

Chapter 3: The impact of early investors on IPO pricing

Chapter 1:
Returns to small-cap activism

1.1 Introduction

Shareholder activism is growing in popularity around the world and generally appears to deliver benign results for firms and stockholders. Studies using private data reveal that behind-the-scenes engagements are widespread and successful, and that exit (and its threat) is a complement rather than a substitute to voice (e.g. Smith (1996), Carleton, Nelson and Weisbach (1998), Becht et al. (2009), Dimson, Karakas and Li (2015), and McCahery, Sautner and Starks (2016)). Econometric analyses of public data report that activism is associated with positive stock returns and improved operating performance within target firms (e.g. Brav et al. (2008) and Bebchuk, Brav and Jiang (2015)). However, these empirical findings may be the result of a combination of factors such as the high incentives and resources of the funds examined, the latent characteristics of the firms targeted (e.g. large-cap value stocks with recent underperformance), and the stock picking skills and collusion amongst activists. Critics argue that activists hunt in 'wolf packs' that exploit regulatory loopholes (Goldman (2018)), focus on short-term financial metrics to the detriment of long-term value creation (George and Lorsch (2014)), and extract gains that represent wealth transfers from other stakeholders (Klein and Zur (2011)). In other words, the improvement an activist might deliver and the return he or she might extract, if acting alone, when assigned to a random portfolio of firms, has never been identified.

Our paper attempts to address these identification challenges by way of a quasi-natural experiment. We conduct a clinical study of a UK fund manager (Progressive Value Management Limited, hereafter "PVML") that is a leading activist in UK small companies via a number of closed-end funds, of which Brookwell (the "Fund") is the most recent. PVML contrasts to a typical activist in a number of important ways: (1) it does not pick stocks, but instead receives a

blind portfolio from investors, thereafter realizing value via a mixed strategy of exit and voice; (2) it has low incentives (1% management fee and 10% performance fee), no financial resources (e.g. for hostile campaigns or to build stakes), and operates on the London's Alternative Investment Market (or "AIM") where tools available to activists are limited; (3) it acts behind-the-scenes, without collaborating with other activists, and undertakes long-term engagements (longer than 2 years on average); and (4) its portfolio comprises illiquid, under-researched and narrowly owned firms (i.e. with significant founder/manager ownership, and few other stakeholders such as public bondholders or employee representation groups). By their own nature these features restrict the role played by other factors and allow us to focus on the treatment effect of shareholder activism more directly than in previous papers. As a non-management entity holding large blocks, PVML displays many of the textbook traits of outside monitors: it has fewer regulatory constraints than mutual or pension funds; it is not concerned with losing money management business; it has fewer agency problems of its own; and its interests are more aligned with outside shareholders than managerial blockholders.

With full access to the trading records of Brookwell and private data on all of PVML's activities including letters, meeting notes, email transcripts, internal memos and client reports, we study the nature and effects of activism in UK small-cap firms over the 2008-2015 period. Our research design must identify as far as possible the effects of PVML's engagements on stock prices and fund returns. We face the challenges of two-way causality and omitted variables (Edmans and Holderness (2017)) and alternative explanations as proposed by Brav, Jiang and Kim (2015), namely: (1) that management was enacting changes anyway; (2) that firms benefitted from an industry shock; and (3) that firms were poised for improvement. We believe our setting helps to control for many possible confounding effects described in the literature. Thereafter, we exploit our private data to measure the returns attributable to activism. First, we identify a sub-set of engagements that PVML considers to be highly confrontational. Second, we exclude events with confounding information when calculating cumulative abnormal returns in event

studies. Third, we compute returns directly attributable to activist outcomes (the "Activism Contribution Ratio"), not simply the total fund return reported to the fund's investors. Finally, we examine the extent to which PVML's activism returns are explained by private or inside information by comparing the returns available to investors from various replicating portfolios.

Following established methodologies, we adopt a 4% cut-off in block size, measured against the equity market value of firms or against the overall value of the Brookwell portfolio. Applying this cut-off, the total portfolio of 222 equity stakes is reduced to 49 'large' blocks. The median size of these blocks is 5.7% of market capitalization or 3.7% of fund size. As an alternative measure of importance, PVML's blocks represent on average 112 days of trading volume in the underlying firms. Assuming PVML could 'dribble-out' 10% of average daily trading volume, the blocks would take more than 3 years to liquidate without causing market disruption. In 27 of these blocks PVML chooses to engage with management; in the remaining ones, PVML chooses to exit via the market. We find the determinants of engagements are mostly consistent with prior studies: PVML intervenes in large blocks by value that are difficult to liquidate and where there is a high number of 'friendly' blockholders (institutions that are Brookwell fund participants). Contrary to earlier studies, weak prior stock momentum or operating performance does not appear to determine engagement. Interestingly, PVML engages principally with firms that have older Chairmen.

Depending on firms' responses to PVML's activism approach, we classify engagements as collaborative and non-collaborative, the latter comprising openly confrontational and mixed situations. We find 12 collaborative and 15 non-collaborative interventions. Non-collaborative firms are characterized by younger CEOs, or more precisely where the age gap between an older Chairman and a younger CEO is greatest. The duration of investments also increases with intervention and non-collaboration: exits take 344 days on average, reflecting the illiquidity of AIM firms; engagements take 546 days; non-collaborative engagements take 661 days; and confrontational ones 750 days on average.

When examining PVML's engagements, we find that most are conducted behind the scenes via private meetings and letters with very few instances of public criticism (e.g. at general meetings) and no openly hostile actions such as litigation or press campaigns. Contact is almost exclusively with Chairmen, CEOs and CFOs and is initiated soon after stakes are acquired (median 59 days for first meeting with the CEO). There is a surprisingly small amount of interaction with other shareholders or relevant parties. The stated objectives of PVML's activism are predominantly related to restructuring themes (46% of cases) and to a lesser extent Board changes (36%). Success rates are higher in restructuring (78%) than in Board changes (55%), and higher in collaborative engagements (91%) than in non-collaborative ones (61%). Non-collaborative engagements consume more PVML attention on a per firm basis: contact is made more quickly (median 54 days versus 85 days for first meeting), more time is spent with executives (median 8 versus 3.5 contacts per firm) and more activism actions are undertaken (median 2 versus 0.5 actions per firm). However, when regressing Brookwell fund returns on various independent variables, we find the strongest positive coefficient on the number of research analysts covering the stock, rather than on any engagement characteristic.

To assess whether PVML's engagements are value-enhancing, we conduct event studies on the share price impact of the disclosure of stakes and the announcement of engagement objectives being met, and examine the operating performance of firms one and two years after exit. In the event study, we find negative returns associated with the disclosure of PVML's stakes. This is significantly at odds with almost all prior studies of hedge fund activism and is likely to be a function of the stock-swap acquisition of the initial portfolio. However, in line with prior studies, upon governance objectives being met we find statistically significant and economically large positive abnormal returns of 4-6%. This rises to 8-10% when events with confounding information are excluded. Restructuring is associated with the largest returns (mean 16.4%, median 7.4%), followed by Board changes (mean 4.8%, median 2.9%).

Importantly, it is only in confrontational engagements that we find statistically significant event study returns (7-10%). Private discussions with PVML staff reveal that confrontational engagements are characterized by a difference in attitude (as proxied by age) between the Chairman and the CEO, with the (older) Chairman typically enthusiastic about the changes proposed by PVML, and the (younger) CEO typically opposed. This finding is new and important. It suggests that the strategic direction of a small-cap firm is imbued with the personality traits of its Chairman and CEO, and that shareholder value may be destroyed (and unlocked by a tenacious activist) where a difference in opinion exists between the two.

In general, our event study returns are higher than those reported in previous clinical studies or hedge fund reviews, likely due to the low trading volume, high volatility and sensitivity to news flow of our portfolio firms. Univariate tests indicate that PVML's interventions have some persistent effects on firms' operating metrics. Engaged firms appear leaner (reduced total assets and employees) but not weaker (improved return on assets and higher market-to-book ratios) one and two years after exit, irrespective of the hostility of the intervention.

When examining returns, we find that Brookwell generated an excess annual IRR net of fees for the period 2008-2015 of 3.09% after adjusting for the FTSE AIM All-Share Index. Of the £40.4 million cash returned, £21.7 million (54%) was from the 27 large investments in which engagements took place, of which £11.6m from 8 confrontational ones. We estimate 60% of the total return from engagements is due to activist outcomes. Brookwell's monthly Sharpe ratio is around 0.04 with idiosyncratic risk of 29% and a beta of 0.92. In performance attribution regressions, Brookwell's market return factor is positive in CAPM and Momentum regressions.

There are a number of qualifications to our results. First, they relate to a single UK manager and may not apply to the same extent to other activists. Second, high event study returns are a function of AIM's auction-based trading system for illiquid securities and the activism tools available for AIM investors: such returns may cease to exist if market microstructure or corporate governance rules change. Finally, PVML's activities result in a risk

profile that changes significantly over time, both in systematic and idiosyncratic measure. Notwithstanding these limitations, the unique setting represents a quasi-natural experiment to isolate the effects of shareholder activism from stock selection and other various confounding effects. It is also an opportunity to examine the impact of activism in small-cap firms in which entrenched managerial blockholders have large stakes.

The paper is closely related to Becht et al. (2009). We replicate the earlier study's methodology as far as possible in order for comparisons to be possible. In particular, we compute the returns attributable to activist outcomes, not simply the total fund return reported to the fund's investors. Our key finding, that underlying differences in opinion between a Chairman and a CEO may damage shareholder value in small firms, is consistent with theoretical models of entrenchment and private benefits. As a clinical study of a UK fund using private engagement data, our findings also relate to Dimson et al. (2015) and Becht et al. (2019), although these authors study large managers investing in large-cap stocks with blocks representing much smaller percentage stakes in firms (0.06% in the case of Dimson et al. (2015)).

Our study also complements the literature on shareholder activism (e.g. Brav et al. (2008), Klein and Zur (2009), Bebchuk, Brav and Jian (2015)), in particular by providing a comparison to the studies on hedge funds and entrepreneurial activists whose primary purpose is to pick conviction stocks, build stakes and agitate for quick change. Our paper therefore builds on earlier theoretical work examining the trade-offs between voice, exit and loyalty (e.g. Admati and Pfleiderer (2009)) and adds to recent survey evidence on the engagement activities of long-term investors (McCaherty, Sautner and Starks (2016)). Finally, our findings relate to recent literature on how traditional institutional investors engage behind the scenes with their portfolio companies, for example when trading around AGMs (Li, Maug and Schwartz-Ziv (2018)), obtaining information from analyst and corporate access meetings (Green et al. (2014)), and in other forms of information acquisition (Iliev, Kalodimos and Lowry (2020)).

1.2 Institutional setting, research design and data

In this section, we describe the institutional setting, our empirical approach and the private data that we have gained access to. As in Becht et al. (2009), we perform a clinical analysis of the investment and engagement activities of an individual UK fund. The choice of the UK as the setting was dictated by the opportunity to access the specific private dataset but also, as Becht et al. (2019) argue, the UK setting is "particularly suited for testing theories of monitoring, engagement and trading." Our focus is on firms listed on the Alternative Investment Market ("AIM"), one of the most lightly regulated markets in the developed world (Gerakos et al. (2012) and Nielsson (2012)).[1]

1.2.1 PVML and the Brookwell Fund

We study the Brookwell Fund, a Guernsey-registered, closed-end investment company listed on AIM in June 2008, established to acquire shares in UK smaller companies (mostly AIM firms) with the objective of realising value and returning cash to shareholders within a three year horizon. The fund is externally managed by PVML, an independent investment management firm set up in 2000 which, together with its former subsidiary Progressive AIM Realisation Limited ("PARL"), has managed five UK smaller funds with a total initial value of £267 million which returned cash totaling £237 million to shareholders.

PVML's methodology in raising and managing its funds is unique. PVML's website states: "PVML identified that institutional portfolios often contain smallholdings in illiquid stocks. Although these holdings might represent a small proportion of an institutional portfolio's value, they require a disproportionate amount of the manager's time and resources […]. The funds managed by PVML […] have taken on such holdings from institutions by way of a "stock swap", exchanging shares in the fund for the shares held by the investor institutions. PVML has then managed the portfolio of stocks acquired so as to achieve value and liquidity and to return funds to shareholders."

[1] We examine AIM's regulations and compare US vs. UK research coverage of small-cap stocks in the Appendix.

PVML does not select stocks for investment, but rather acts as a liquidity provider to institutional investors in UK smaller companies. It offers such institutions the opportunity to swap their illiquid non-core holdings at the bid price prevailing in the market, in exchange for shares in a PVML fund. The alternative for institutions would be to suffer the large discount associated with a prompt sale for cash (if such sale were possible), or the long time delay and risk exposure of dribbling-out shares. Institutions have further flexibility in whether to swap all or part of their non-core stakes, and in what to do with the shares they receive in the PVML fund. Depending on their choices, institutions can achieve full immediate exits or they can manage their exits gradually over time ("partial upside retention" or "free-riding").

Brookwell received 84 investments at its IPO in June 2008, followed by 62 further investments in February 2009 in a follow-on offering of B shares, and a further 76 in February 2011 in a follow-on offering of D shares. Of these 222 investments, 86% were AIM firms comprising 80% of the total value of the portfolio. For the purposes of our research, we focus only on investments that represent 4% or more of either the firm's market capitalization or of Brookwell's total assets. This 4% cut-off results in a portfolio of 49 'large blocks' totaling £36 million across the three Brookwell share classes. These large blocks represent 66% (22%) of the overall Brookwell fund by value (number of firms).

1.2.2 PVML's value-realization approach

There are two investment professionals at PVML dedicated to managing the overall Brookwell portfolio. Their incentives comprise a 1% management fee on assets, a 1% fee on capital returns made in any calendar month, and a 10% share of any value returned to shareholders in excess of 100p per share ("equity appreciation fee"). The approach is hence a mixed strategy of exit and voice, depending on the costs and benefits of monitoring versus the ability to "cut and run."

PVML suffers from a number of structural disadvantages when compared to a hedge fund or entrepreneurial activist. First, it has a negative selection portfolio in illiquid AIM stocks, as

would be the case for a market maker, but is not able to manage risk by posting a bid-ask spread, or by using long versus short positions, derivatives or leverage. Instead, the fund is 100% long its portfolio on the day of admission, with an entry price equivalent to the previous night's closing bid price in the market for each investment. Second, PVML has a high number of investment positions relative to its number of staff, restricting the number of engagements it can realistically undertake at any one time. Intervention activities are not scalable, in the sense that PVML does not hire more monitoring resources as the portfolio rises. Duties are essentially divided between the two investment managers: one more focused on exit, the other more on voice. Third, PVML lacks the cash or resources to make new investments or stake-build, to subscribe to rights issues or equity placements from its existing portfolio firms, or to finance hostile campaigns through the press or via litigation. Liquidity shocks cannot be financed through the sale of portfolio positions. Fourth, it lacks the scale to direct trading flows or threaten to withdraw such flows with investment banks and brokers in return for support and/or research and trading ideas. Finally, as a known seller, the disclosure of Brookwell's 3%+ blocks is perceived as an overhang on the stock price, making value realization more challenging.

Nevertheless, PVML also benefits from certain structural advantages. First, it is not subject to the quarterly investor redemption requests of a hedge fund. The managers have 'patient capital' with which to enter into long-term engagements, should they so wish. Second, it can exit outside the market's bid-ask spread if required to achieve a sale, as it is not subject to the same restrictions as institutional investors. Third, it is free of potential conflicts as it does not pay commissions to brokers for research ideas or in acquiring its stakes, and does not seek pension or other mandates from firms in its portfolio. To our knowledge, PVML has no business ties with any of its portfolio firms, and is motivated entirely by returns and the ability to raise future funds. Fourth, it has a stealth advantage when seeking the support of outside shareholders, for example in gathering the required votes to call an EGM or block a significant transaction. This is due to the existence of 'friendly stakes' (discussed in the next section) that are not known to a

firm's management or its corporate advisers. Finally, it can acquire large blocks by aggregating smaller holdings without paying a block premium.

PVML employs a variety of methods to realize assets or engage with firms. Sales may be to particular interest groups (such as private equity firms, trade buyers, or management teams and their backers) or by encouraging a firm to buy back its own shares, or by stimulating broker and market activity. In each case, the possibility of selling a block for a profit clearly reduces PVML's incentive to intervene. Engagements may be chosen where a firm's management is open to or already pursuing actions designed to achieve value and liquidity, or where Brookwell's investment represents a key interest derived from the consolidation of several smaller holdings that could alter the dynamics of a previously entrenched corporate situation. Initial approaches to firm management are always constructive, beginning by an exploration of the potential changes PVML seeks. The nature of engagements then evolves depending on the reaction of the management in question. Engagements are classified as collaborative or non-collaborative, with the latter category comprising mixed and openly confrontational attitudes (a definition of engagement attitudes in provided in the Appendix). In collaborative engagements, PVML monitors the implementation of the desired changes, awaits such changes to be announced to the market, and then attempts to sell its holdings in the post-announcement period. In non-collaborative engagements, particularly confrontational ones, PVML needs to consider a wider range of possible actions before realizing its investments, mostly behind closed doors, but in certain cases reaching the public domain. We report the nature and frequency of these actions in the next section.

1.2.3 Research design

Measuring the extent to which PVML's activism is associated with increased stock returns or improvements in firm performance presents a number of identification challenges. Edmans and Holderness (2017) describe such challenges, in particular two-way causality and omitted variables. The authors also find instruments and natural experiments to be problematic or

unavailable. In parallel, Brav et al. (2015) propose that empirical studies should control for three alternative explanations for returns: first, that firm management would have implemented the activist's desired changes absent intervention ("doing it anyway"); second, that activists pick stocks most likely to benefit from exogenous industry shocks ("rising tide"); and third, that activists pick firms poised for improvement ("momentum reversal").

Our research design attempts to address these identification challenges and alternative explanations by exploiting the key differences between PVML and other activists, and by taking advantage of our private data. Table 1.1 sets out the various features of activist funds, their target companies, the setting in which they operate and the manner in which they report returns. As described in the introduction, we believe the existence of such a fund represents a quasi-natural experiment in that PVML shares almost no features with typical hedge fund activists; instead, PVML represents the opposite of a typical activist in almost every measurable way.

We believe stock selection effects are significantly mitigated, both by the blind initial portfolio and the lack of in-house research and stock-picking expertise of PVML. The effect of other activists or institutional investors 'free riding' on PVML's engagements is limited due to the behind-the-scenes nature of PVML's activities and the fact that PVML acts alone. The argument that activists are incentivized to produce short-term gains, and achieve these with relative ease by jawboning or garnering announcement-related returns is directly addressed by the fee structure, long holding period, absence of quarterly redemption pressure, lack of financial resources, and especially by the size of PVML's blocks relative to the trading volume in the target's shares. We believe other potentially omitted variables described in the literature (e.g. market, regulatory, legal, idiosyncratic, momentum and stakeholder considerations) are similarly controlled for by PVML's features and setting.

We use our private data on PVML to address alternative explanations and to measure the returns attributable to activism. First, we identify a sub-set of engagements that PVML considers to be highly confrontational; by their very nature these engagements should provide a

control for a "doing it anyway" explanation. Next, we exclude events with confounding information when calculating the cumulative abnormal returns in our event studies. We then follow Becht et al. (2009) in computing returns directly attributable to activist outcomes (the "Activism Contribution Ratio"), not simply the total fund return reported to the fund's investors. Finally, we examine the extent to which PVML's activism returns are explained by private or inside information by measuring the returns available to investors from various replicating portfolios.

1.2.4 Data

PVML has given us access to all data relating to the Brookwell fund. Starting with details of the initial portfolios, IPO subscribers and admission costs, we have records of all trading activity in portfolio firms and in Brookwell shares, monthly management and administration fees, other expenses, net-asset values, and Brookwell's monthly balance sheet and profit and loss statements. With respect to engagements, we have access to all internal and external documents including letters, emails, presentations, meeting notes and minutes, investment committee reports and other client-related memos. PVML staff provided additional information from personal agendas, hand written notes, and memory. We collect external firm-level data on stock prices, trading volume, volatility, research coverage, ownership, management, and various operating characteristics from Bloomberg, Datastream and the Bureau van Dijk Fame database. We use the LSE Regulatory News Service ("RNS") and the Dow Jones Factiva database to collect data on firm announcements, news flow, restructuring outcomes, equity offerings, major transactions (takeovers, asset disposals and divestitures), board changes and payout decisions.

1.3 Main results

In this section, we present the main results of our analysis. We start by providing descriptive information on the Brookwell fund and the types of engagements used by PVML. We then analyze the success of different engagement tactics and their impact on returns.

1.3.1 The Brookwell portfolio

Which institutions subscribe for Brookwell shares? Do they tender only their weakest performing investments? How long do PVML's engagements take to realize value? To address the first question, we collect data on all shareholders exceeding a 3% ownership threshold at Brookwell's IPO, subsequent follow-on offerings, and otherwise during the fund's life. Panel A of Table 1.2 shows that several major UK institutional investors are frequent subscribers to Brookwell funds, and that these same institutions are frequent holders of outside stakes in Brookwell's portfolio firms. For example, the leading subscriber in value terms to the Brookwell funds (Cazenove) has an ownership stake greater than 3% in 5 of the 49 largest investments in the Brookwell fund. Gartmore, the smallest disclosed subscriber in Brookwell, has a similar stake in 10 cases. Such stakes are viewed by PVML as 'friendly' in the context of gathering sufficient votes to call an EGM, or otherwise exerting pressure on firm management.

To address the second question, we recall that investors have significant flexibility in managing their exit versus upside participation when choosing which investments and how many of each to swap for Brookwell shares at IPO. Institutions may swap shares with PVML that they believe are performing poorly with little prospect of change, or they may swap shares where they believe activism would be successful, but where their stakes are too small, where they do not have the expertise or resources to intervene, or where they have other reasons for not wanting to engage with management directly. Many institutions prefer to delegate activism to PVML, in order to safeguard their relationships with the firm's management or broker, or to protect their reputation from potentially damaging and/or lengthy disputes.[2] Panel B of Table 1.2 reports the performance relative to market of firms prior to being swapped to PVML. Although the majority of firms demonstrate weak prior performance (with approximately 60% of firms in the lowest two deciles for 6-month and 1-year prior periods), there is another

[2] Appel et al., (2016) find a similar pattern in the interaction between activists and index funds. Gantchev and Jotikasthira (2017) have similar findings when studying trading funds and activists.

grouping of 12-14% in the highest decile, suggesting institutions do not merely swap their worst performers but also take the opportunity to monetize some of their best performing stocks. This barbell pattern of both poor and strong performers differs from previous studies. Becht et al. (2009) report that the Hermes fund invested in only 1 firm in the top two deciles of 6-month prior performance (and none in the top two deciles for 1-year prior performance) from their sample of 39 firms. On the other hand, Klein and Zur (2009) report their hedge fund activists target well-performing firms, evidenced by 1-year prior mean abnormal returns of 12.3% compared to a control group sample return of 8.1% (a difference that is significant at the 1% level) in their sample of 134 firms.

To examine the third question, we present summary statistics in Panel C of Table 1.2 on the duration of investments by Brookwell by engagement and engagement attitude. We present means (medians) side-by-side for all large blocks in Column (1), non-engaged and engaged investments in Columns (2) and (3) respectively, and collaborative and non-collaborative engagements in Column (4) and (5) respectively. In Columns (6) and (7) we test for differences between these categories. Engaged firms have a mean (median) duration of 546 (473) days compared to 344 (348) days for non-engaged firms.[3] The difference yields significantly negative *t*- and *Z*-statistics suggesting that value realization via engagement is a longer process. Non-collaborative engagements take longer to be determined than collaborative ones, with a mean (median) duration of 661 (589) days. The difference in collaboration attitude also yields significantly negative *t*- and *Z*-statistics, suggesting confrontational responses require longer periods of resolution before investments can be realized. These results are consistent with Becht et al. (2009) who report that confrontational engagements have a mean (median) duration of 1,162 (1,284) days versus 527 (469) days for collaborative ones, although the mean and median in our study imply that the distribution of duration is generally left-skewed.

[3] Brav, Jiang and Kim (2015) report mean (median) duration of 581 (348) days for US activist hedge funds in the period 1994 to 2011 using data from 13D/A filings.

1.3.2 Characteristics of large blocks at time of acquisition

In this section, we examine the characteristics of firms in Brookwell's large block portfolio at the point in time they are received. As in the previous section, we compare engaged firms to non-engaged firms and collaborative to non-collaborative engagements. We present summary statistics and univariate tests in Table 1.3. As before, we show means (medians) side-by-side and report *t*- and *Z*-statistics for differences in means and medians between categories.

The first set of metrics relate to the size and market profile of firms. As conjectured in the previous section, Brookwell receives investments in small market capitalization firms (median £9.3 million) with significant insider ownership (median 32.1%), low daily trading volumes (median £5,293), thin research coverage (median 0 analysts) and high volatility (median 62.2% 180-day historic stock volatility). However, there are no statistically significant differences in means or medians between engaged and non-engaged firms, or between collaborative and non-collaborative engagements. This suggests PVML may not attach weight to any of these metrics in deciding on engagements, and that inferences on how a firm management will respond cannot be made based solely on such attributes. Our findings on market capitalization are at odds with many authors who find the probability of activism is inversely related to market value of equity (e.g. Klein and Zur (2009) and Mietzner and Schweizer (2014)). Our findings on free float, liquidity and analyst coverage are similarly at odds with recent studies (e.g. Brav, Jiang and Kim (2015), and Dimson, Karakas and Li (2015)) who find activists target large mature firms with high institutional ownership, liquid shares, and broad analyst coverage in univariate regressions. A simple explanation for our results is that PVML does not 'target' firms in the traditional sense. The selection of firms with which PVML can engage is already restricted to the firms that are in the Brookwell portfolio, all of which are small, illiquid, under researched and volatile when compared to samples of firms studied by previous authors.

Turning to the characteristics of PVML's blocks, we find that larger holdings by value are more likely to be engaged by PVML (*t*-statistic of -2.51 with significance at the 5% level)

although block value is not different when comparing collaborative versus non-collaborative engagements. This finding is consistent with recent literature on the impact of shareholders with above 5% ownership (e.g. Becker, Cronqvist and Fahlenbrach (2011); Clifford and Lindsey (2013)) and also with Becht et al. (2009) who find that Hermes' ownership as a percent of market capitalization increases as engagement attitudes worsen. In confrontational engagements, Hermes owns blocks of 6.9% of market capitalization on average (median of 7.5%).[4] We also examine a 'block score' variable based on discussions with PVML staff, calculated as follows:

$$Block\ Score = \frac{\frac{Block\ Value}{Daily\ volume} \times \sqrt{180d\ Volatility} \times Block\ Value \times Float\ Percent^{-1}}{\sqrt{Stock\ Price} \times 2(1 + No\ of\ Analysts) \times No\ of\ Stakes > 3\%}$$

The variable combines elements of size, liquidity, block size and ownership concentration, and attempts to measure the sale-ability of a block when weighing the potential for engagement versus the ease of exit. The higher the score, the more difficult the block is to liquidate. Unsurprisingly, we find firms with a higher block score are more likely to be engaged (*t*-statistic of -2.22 with significance at the 5% level) by PVML.

With respect to other blockholders, we find that holdings with a higher number of 'friendly' stakes are more likely to be engaged by PVML. Engaged firms have a mean (median) of 3.4 (3) such stakes compared to 1.8 (2) for non-engaged firms, yielding *t*- and *Z*-statistics with significance at the 1% level. However, there is no significant difference in the number of friendly stakes between collaborative and non-collaborative engagements. This suggests the presence of friendly stakes plays an important role in PVML's choice to engage, but does not indicate whether a firm will respond collaboratively, supporting the view that friendly stakes are either not known to management (stealth hypothesis) or not considered significant (stubbornness hypothesis). Our finding is consistent with previous authors (e.g. Dimson, Karakas and Li (2015)) who report that activists often rely on support from fellow shareholders

[4] Brav, Jiang and Kim (2015) report median initial (maximum) percent stakes of activist hedge funds in the period 1994 to 2011 of 6.4% (9.5%).

in order to apply pressure on firm management, and that their target firms have significantly higher institutional ownership as a result.

Finally, we examine other firm attributes. In general, previous studies find that activist hedge funds behave like deep value investors, targeting undervalued firms with high potential for improvement, as evidenced by inverse relationships with ROA, book multiples, and prior stock momentum. Our results cannot confirm these findings, except insofar as the summary statistics show weak stock performance and operating results across all firms in the portfolio. However, we include two further firm attributes: Chairman age and CEO age. Examining these two variables, we find differences at the 1% level of significance in both mean and median between engaged and non-engaged categories. Our findings suggest that PVML tends to engage with firms where the Chairman and CEO are significantly older than the average (median) in their overall portfolio. When comparing collaborative versus non-collaborative engagements, we find that CEO age is again a potentially significant factor, but this time with an inverted sign. Non-collaborative engagements are characterized by CEOs that are significantly younger than collaborative ones. Given that Chairman age does not vary significantly by collaboration attitude, this suggests the larger the difference in age between (an older) Chairman and (a younger) CEO, the larger the likelihood that an engagement is non-collaborative.

1.3.3 Engagement tactics

In Table 1.4 we report the types of activities undertaken by PVML with respect to the 27 firms in the Brookwell portfolio where engagements took place. Panel A shows that the majority of contact was with the CEO, Chairman and/or CFO of target firms either in person or by letter, with contact outside this core group of executives being somewhat limited. In all 27 cases, contact was with either the CEO or Chairman, and in 63% of cases, both. PVML also met with Non-Executive Directors ("NEDs") in almost a third of target firms, and attended firm-organized site visits with almost one quarter. In total, PVML had 173 contacts with executives, with a mean of 6.3, a median of 5 and a maximum of 15 contacts per firm in two instances.

PVML made first contact as soon as 11 days after acquiring investments, with a median first contact of 59 days for CEOs, followed by 86 days for CFOs and 90 days for Chairmen. Site visits and non-executive contacts were made as soon as 42 and 72 days after acquiring investments, but other contacts outside the core executive group were made much later in the investment holding period. Our findings are consistent with Becht et al. (2009) who report an average of 9.7 contacts per firm (a median of 7 and maximum of 48) for the 30 firms engaged by Hermes. However, PVML's contacts were far less frequent with middle management and NEDs, as might be expected given the significantly smaller size of the firms engaged.

In Panel B we examine contact and cooperation with other shareholders and entities such as banks, brokers, headhunters and other advisers. In only 5 cases (18.5% of the engaged sample) did PVML engage with other shareholders, soliciting support in only 3 cases, resulting in 1 joint meeting and 1 joint letter. Company brokers were contacted in 26% of cases, and headhunters and other advisers in 37% of cases. These findings are at odds with the view that activists solicit wide support from other parties. For example, Becht et al. (2009) report that Hermes contacted other shareholders and company brokers in 80% and 70% of their engagements respectively. McCahery, Sautner and Starks (2016) report that 59% of their survey respondents consider coordinating their activism actions. Dimson, Karakas and Li (2015) find higher success rates in coordinated ESG campaigns. One interpretation might be that, in many cases, PVML already has the 5% of votes required to call a general meeting. Added to this, PVML believes it can count on (and threaten management with) the votes of its friendly stakes without needing to make formal contact, thus protecting it and those investors from possible concerns over concert party regulations. UK shareholders are free and encouraged by policy such as the Stewardship Code (2012) to talk to one another, but must take account of the regulatory context of such discussions.[5]

[5] In particular, investors need to not unlawfully disclose any inside information (as defined in the EU Market Abuse Regulation (EU 596/2014) or MAR) in relation to their intentions, or (if they have such information) the firm, which could amount to market abuse under MAR.

Panel C reports PVML's actions with respect to shareholders' general meetings. PVML posed questions in 7 AGMs (26% of the sample), but was in general reluctant to make further public interventions, solicit hostile views, or otherwise use its voting power to requisition meetings. For example, in EGMs, shareholders had plans to requisition a meeting in two cases, three were threatened by PVML (going as far as preparing the necessary documents for the meeting), and the Chairman of the target firm planned one, but none were finally called. We observe the same reluctance to 'go hostile' when we consider cases of litigation, press campaigns, and other high intensity actions in Panel D. In only one case did PVML threaten to block a rights issue. In no cases did PVML induce or encourage litigation, hostile takeover attempts or press campaigns, nor seek board representation with or without public criticism of management or a proxy contest.

In summary, PVML's activism tactics are strongly weighted towards behind-the-scenes activities such as meetings and letters with firm management, with only very few instances of interventions at public meetings or hostile actions, typically as a last resort. These tactics are consistent with findings reported by Becht et al. (2009) and survey evidence collected by McCahery, Sautner and Starks (2016), but contrast strongly with many studies of US hedge fund activists. For example, Brav et al. (2008) find that 57% of events in their 1994-2011 sample have some degree of public criticism of target firms. Klein and Zur (2009) report that 40% of their hedge fund campaigns involved a proxy solicitation. Indeed, many previous researchers have suggested a proxy fight is a shareholder's only effective tool to exert pressure on management (e.g. Kahan and Rock (2007)).

1.3.4 Engagement objectives and success rates

We report the objectives and success rates of PVML's engagement activities by collaboration attitude in Table 1.5. Many categorizations of objectives are used in prior studies, in particular those articulated in the purpose statements of initial 13D filings of US hedge funds. In Panel A, we follow the terminology used by Becht et al. (2009) in reporting on the Hermes

fund. Most frequently (in 40 out of 87 stated objectives), PVML seeks to restructure firms in some way, in particular aiming to reduce the discount to fair value (24 cases). Selling non-core divisions or non-core assets, and stopping acquisitions in order to refocus firms is an objective in 11 cases, while disciplining capital expenditures is an objective in 5 cases. The overall success rate in restructuring is 77.5%, with higher rates in collaborative engagements, and no individual instances below 50%. This compares with a success rate in restructuring reported by Klein and Zur (2009) of 52% for hedge funds, and 68% for entrepreneurial activists, and a 69% success rate reported by Becht et al. (2009) for the Hermes fund.

The next most frequent objective is Board changes (31 out of 87 cases), in particular changing CEO, Chairman or NEDs (21 cases). As might be expected, there are no collaborative engagements in which CEO, Chairman or NED change is the stated objective. The overall success rate in this category is 54.8%. This compares to 64% for the Hermes fund, and 73% and 71% for hedge fund and entrepreneurial activists respectively. Finally, PVML also seeks to change certain financial and other policies (16 out of 87 cases), in particular improving investor relations (6 cases). The overall success rate in this segment is 75%, and might be higher but for a 0% success in improving operational management. By comparison, Hermes has a 61% success rate in this category, hedge funds 53% and entrepreneurial activists 47%.

To test for the association between objectives and success rates, we perform chi-squared tests where we group together Restructuring and Board Changes (and Other themes) and compare them to each other. A chi-squared test on the relation between Restructuring and Board themes with respect to success rates yields a statistic of 22.74 (*p*-value 0.004), indicating a significant association between the two. We find similar significant results when testing the relation between Restructuring and a combination of Board/Other themes (chi-squared 37.88; *p*-value 0.002) and success. This suggests restructuring objectives are positively related to whether PVML is successful. We interpret this result as being consistent with PVML's choice of tactics (mainly behind-the-scenes contact with CEOs and Chairmen) and the probability of success

being endogenous to the characteristics of engaged firms. By the same reasoning, we interpret the non-significant association of Board Changes as a reflection of the fact that demands for Board changes occur increasingly in the public domain, and that in small AIM firms with high insider ownership the removal of a CEO or Chairman is unlikely to occur without public and/or hostile campaigns.

To test the link between PVML effort allocation and engagement attitudes, we present summary statistics and univariate tests in Table 1.5 Panel B. As before, we show means (medians) side-by-side and report *t*- and *Z*-statistics for differences in means and medians between engagement attitudes. Non-collaborative engagements involve significantly greater attention by PVML, as reflected in the higher number of management contacts (8.2 versus 4 on average), Chairman meetings and letters (3 versus 1), the timeliness at which such contacts are first made (median of 54 versus 85 days), and the number of other activism actions (2.5 versus 0.8 on average) and stated objectives (4.3 versus 1.9 on average). Despite the extra effort consumed by non-collaborative engagements, success rates in such engagements are significantly lower than in collaborative ones (63% versus 92% success rate on average).

1.3.5 Determinants of engagement and impact on returns

In this section, we expand on our previous univariate analyses by examining multivariate probit and least squares regressions. We choose as independent variables those variables that we found to be significant in two-sample tests in Table 1.3. We begin by estimating the marginal effects of the following probit specification:

$$Pr(y_i = 1) =$$

$$\Phi(\beta_0 + \beta_1 Block\ value + \beta_2 Block\ score + \beta_3 No.of\ friendly\ stakes +$$

$$\beta_4 Chairman\ year\ of\ birth + \beta_5 CEO\ year\ of\ birth) \quad (1)$$

where Φ is the cumulative normal distribution. The results presented in Panel A of Table 1.6 report the marginal effect of each characteristic on the likelihood of engagement (column 1), of engagements being non-collaborative (column 2), and of engagements being successful (column

3). The results are largely consistent with our univariate findings. PVML is more likely to intervene in firms with a greater number of friendly stakes and an older Chairman (*t*-statistics of 2.18 and -4.39 respectively). Engagements are more likely to be non-collaborative as a CEO is younger (*t*-statistic of 4.14). Finally, engagements are more likely to be successful as the Chairman is older and the saleability of a block (measured by the Block Score) becomes easier (*t*-statistics of -3.98 and -2.57 respectively).

In Panel B, we report the results of a least squares regression using the same independent variables but adding 'days held' and 'number of analysts' to the regression. The dependent variables are three measures of returns achieved by PVML. We estimate the following OLS regression specification:

$$Return_i = \alpha + \beta_1 Block\ value + \beta_2 Block\ score + \beta_3 No.of\ friendly\ stakes + \beta_4 Chairman\ year\ of\ birth + \beta_5 CEO\ year\ of\ birth + \beta_6 Days\ held + \beta_7 No.of\ analysts \quad (2)$$

We find that IRRs (columns 1 and 2) decrease with CEO youthfulness and days held, but appear unrelated to Chairman age. This pattern is not evident in raw returns (column 3). This suggests that non-collaborative engagements (which take longer, and derive from differences in opinion between Chairmen and CEO) are a drain on IRR, but not on raw return. Interestingly, we find a negative relation between the number of friendly stakes and both IRRs and raw returns. This suggests PVML may be encouraged to engage with firms that have friendly stakes, but that these stakes may in fact be detrimental to achieving returns. It may be that friendly blockholders are fearful of concert party risks, and hence do not support PVML's actions as much as other blockholders might. Or it may be that they have a prior understanding of the potential returns available to activism, and chose not to sell their blocks to PVML as they did not believe activism actions would bear fruit. Importantly, we find a statistically significant and economically large positive association between returns (both IRRs and raw returns) and the number of analysts (*t*-statistics between 2.90 and 7.33). This finding suggests that unlocking returns might depend

more on encouraging research analysts to initiate coverage of a firm, rather than on any specific characteristic of the firm or of the engagement. Although many studies examine the relationship between increased research coverage, stock liquidity and returns, such associations may be accentuated in AIM small-cap firms where on average only one analyst covers each stock, compared to 6 analysts covering equivalent Russell 2000 stocks (see Appendix). We explore the returns to activism in greater detail in the next two sections.

1.4 Stock market responses to engagements

In this section, we analyze the cumulative abnormal returns associated with the public announcements of engagement activities by our activist. We also look at the market reactions to confrontational engagements and to specific governance outcomes being met. Finally, we consider the effects of PVML's actions on firms' long-term operating performance.

1.4.1 Returns to disclosure of Brookwell stakes

To facilitate comparison between our study and that of the Hermes fund, we follow the same methodology in measuring cumulative abnormal returns ("CARs") around the first disclosure of Brookwell's stakes, after adjusting for the FTSE AIM All-Share Index. As in the previous study, we restrict ourselves to investments that were disclosed either by RNS (being above the 3% ownership threshold) or in the press shortly after the date of Brookwell's acquisition, resulting in 39 disclosure events out of the 49 large block portfolio. The time delay between Brookwell acquiring its stakes and first disclosure is on average 12.2 days (median 13 days) with a maximum of 39 days. For the other 10 stakes, disclosures were either not required, or made after a substantial period of time.

In Table 1.7 Panel A, we find negative though statistically insignificant market responses to first disclosures relating to Brookwell's IPO (A shares). In particular, we find large negative reactions of approximately -10% in the [-3; +3] and [-5; +5] windows in both median and median CARs. Upon closer inspection, we find the negative CARs are in each case in the period preceding disclosure. Given the stock swap arrangement of the IPO, it is possible that

participating institutions possess information on Brookwell's stakes before RNS disclosures are made. In the case of Brookwell's IPO, first disclosures were made on average 4.2 days (median 4 days, maximum 25 days) after stocks were acquired. It is therefore possible that participating institutions would seek to provide price support in stocks up to the evening before the IPO (ensuring a high exit price for them), and to sell residual positions in the period between the IPO and Brookwell's first disclosures.

The pattern is not repeated when looking at Brookwell's follow-on offerings (B and D shares) in Panels B and C, where there is little evidence of either positive or negative market reaction. In both these cases, there was a longer time delay in making RNS disclosures than in Brookwell A. In Brookwell B, first disclosures were made on average 20.2 days (median 19.5 days, maximum 39 days) after acquisition. In Brookwell D, the average (median) was 14.2 (13) days with a maximum of 19 days. One interpretation is that the IPO involved a longer marketing period, allowing investors more time to exchange views and prepare stock swap and monetization strategies. Another explanation is that investors in the follow-on offerings had come to recognize Brookwell's tactics of using exit and voice, implying a blend of negative (exit overhang) and positive (voice value-enhancement) market reaction effects.

Our findings are consistent with the Hermes fund that experienced small, negative but generally insignificant CARs around disclosure dates, but significantly at odds with the majority of hedge fund activist studies worldwide. In the US, statistically significant CARs of 3-10% are commonly reported around the 13D filing dates of ownership stakes above 5% (e.g. Klein and Zur (2009) and Greenwood and Schor (2009)) with around half of these abnormal returns occurring in the few days leading up to the filing.

1.4.2 Event studies by engagement attitude

In Table 1.8, we examine the CARs in various windows around the announcement dates of activism objectives being met (outcome events), again following the methodology of the Hermes study, after adjusting for the FTSE AIM All-Share Index. To be precise, we restrict

ourselves to those engagement objectives recorded in Table 1.5 that by their nature led to an announcement event, for example the disposal of an asset, the removal of a CEO, or the increase in a payout policy.[6] There are 45 such events over the engagement period, an average of 1.67 events per engaged firm. Mean CARs range from 3.93% to 5.10% (medians from 1.84% to 2.27%) for these 45 events across our three event windows, with statistically significant differences from 0 in mean and median tests in the two shorter windows.

As discussed by Becht et al. (2009), the returns attributable to outcome events are frequently contaminated with returns attributable to other simultaneous announcements. For example, the resignation of a CEO may be announced at the same time as an earnings announcement, or the disposal of an asset may be contained in the same press release as a profit warning. Of our 45 outcome events, 16 are contaminated in this way with confounding information. When such events are excluded, the CARs increase in both magnitude and statistical significance in all event windows. Mean CARs range from 7.60% to 9.96% (medians from 2.98% to 3.78%) with a difference from 0 in mean and median tests significant at the 1% level in 5 out of 6 cases.

When examining the overall returns by the engagement attitude (i.e. collaborative, mixed and confrontational), we find statistically significant CARs only in confrontational engagements. Mean CARs range from 6-10% (medians 3-6%) in such engagements, with and without confounding events. Statistical significance is generally at the 1% level. Collaborative engagements are also associated with high positive CARs, but with no statistical significance. Only mixed engagements appear to result in negative CARs, but only when including confounding events, and again with no statistical significance.

Our key finding that only confrontational engagements are associated with high CARs is contrary to the Hermes study. The prior authors calculate "agency costs" by multiplying CARs

[6] In certain outcome events there may be two event dates for the same outcome, for example when an asset disposal, CEO resignation or equity offer is announced, and when the asset is finally disposed, a new CEO is appointed and the equity offer is determined.

by the average number of events per firm, finding that mixed engagement have the highest such costs (12.7%, or CAR of 6.8% times 3.3 events per firm), and confrontational engagements the lowest such costs (9.9%, or CAR of 3.21% times 3.1 events per firm). Using the same methodology, we find exactly the opposite pattern. Agency costs are highest in confrontational engagements (17.7% cost, or CAR of 8.86% times 2 events per firm) and lowest in mixed engagements (3.9% cost, or CAR of 5.44% times 0.71 events per firm). Our finding is also contrary to arguments often advanced by critics of activism, namely that confrontational engagements are detrimental to target firms as they occupy and distract management from running the firm.

Critics of activism also claim that returns achieved, particularly in adversarial interventions, are short term in nature. It is likely that the high magnitudes of positive CARs in the short event windows in our event study are a reflection of the low trading volumes and high stock volatility of our sample of AIM firms. In this sense, the positive CARs may be a temporary phenomenon of 'over-reaction' rather than evidence of long-term value enhancement. In unreported results, for windows of [0; +60 days] and [0; +180 days], we test for but are unable to find evidence of negative CARs (indicating mean reversion), finding instead that abnormal returns are not statistically different to zero. These findings are consistent with Brav, Jiang and Kim (2015) who report short-term post-event returns of around zero when examining specific short-term tactics such as 'pump and dump', 'asset stripping' and 'adversarial' intervention. In longer post-event studies, Clifford (2008) finds positive three- and four-factor alphas of up to 1.9% per month for windows of [0; 12 months] and [0; 24 months] when running calendar-time portfolio regressions for target firms. Studies of post-event periods up to 5 years (e.g. Bebchuck, Brav and Jiang (2015)) provide further evidence that abnormal returns do not revert.

1.4.3 Event studies by governance objectives

In Table 1.9, we present findings based on the same 45 outcome events, but this time presented according to the type of governance objective being met. We find the announcement

of restructuring outcomes is associated with the largest excess returns. When excluding confounding events, restructuring outcomes result in mean CARs of 14-16% (medians 6-7%) with 1% levels of significance in tests for difference from 0. CEO and Chairman turnover is the next most important constituent of overall returns with mean CARs of 4-5% in shorter event windows (medians 2-3%) within which Chairman turnover is more significant than CEO turnover with respect to return contribution. With respect to NED turnover, our findings are mixed. Frequently, NED turnover is announced simultaneously with CEO or Chairman turnover and thus appears to lead to positive mean CARs of 6-8%. When excluding such confounding events however, we find NED turnover is associated with negative mean CARs of -3.65% (median 3.7%) in our longest event window. One interpretation is that the market may have been hoping for turnover at the CEO or Chairman level, and is thus disappointed with turnover at the NED level.

Our findings consistent with those of the Hermes fund, in particular in the highest returns being associated with restructuring and then Chairman/CEO turnover, and the only negative returns being associated with NED turnover. The magnitudes of our CARs are in general higher than those of the Hermes fund, although our *t*- and *z*-statistics are somewhat lower (though still significant) and our number of sample events around half of the prior study. Studies of hedge fund activism report similar findings.

1.4.4 Restructuring and operating performance

In order to address concerns that PVML's interventions result in short-term positive abnormal stock returns at the expense of long-term firm performance, we examine changes in operating and market valuation measures for the one- and two-year period after Brookwell's exit from its investments. As before, we present mean and medians side-by-side and conduct univariate tests for mean and median difference between engaged and non-engaged firms, and successful and unsuccessful engagements.

Table 1.10 presents our results. We find that engaged firms have reduced numbers of employees and increased market-to-book ratios in both the one- and two-year periods after Brookwell has exited its investments. These results are significant at the 1% level in both mean and median difference tests relative to non-engaged firms. To a lesser extent, engaged firms also display a reduced amount of total assets (with significance at the 10% level in median difference) and a higher return on assets when compared to non-engaged firms, in both time periods. When comparing successful and unsuccessful engagements, we find that successful outcomes are associated with a smaller reduction in the numbers of employees in both one- and two-year periods, and a smaller reduction in total assets in the two-year period, although such firms display a lower increase in market to book ratio in this two-year period.

In summary, the impact of PVML's interventions appears to persist in the operating performance of firms after Brookwell has exited its stakes. Engaged firms have fewer employees, lower total assets, generate a higher return on assets and are rewarded with higher market-to-book ratios by investors than non-engaged firms in the years after Brookwell exits. Importantly, there is no evidence that any one-year changes reverse in the second year.

1.4.5 Discussion and robustness

We consider our findings on the stock market responses to PVML's activism as preliminary and do not draw causal inferences. In general, our observed statistical relations are likely to be the result of both selection and effort exertion by PVML. Although Brookwell does not select stocks in the traditional sense, PVML staff is highly sophisticated with many years of experience of small-cap activism. It is highly plausible that in deciding between exit and voice, PVML is able to discern firms with improving prospects, and pick those firms in which they are most likely to influence an outcome in their favor. It is also plausible that sophisticated institutions choosing to participate in Brookwell funds have selected stocks that are ripe for activism, even if they would prefer not to intervene themselves.

We recall the three alternative hypotheses described by Brav, Jiang and Kim (2015) and discussed in the earlier section. In order for our findings to be robust to the first alternative hypothesis, we would expect to find positive event returns in our sub-sample of non-collaborative and openly confrontational interventions. These are exactly our findings. With respect to the second and third hypotheses, although PVML has unique experience in small-cap activism, and benefits from UK institutions' historical reluctance to openly criticize or confront management, it has minimal equity research capabilities (either in-house or paid for by trading flows) when compared to the large, dedicated investment institutions that participate in Brookwell funds. Judging industry effects or idiosyncratic momentum in stocks is not part of PVML's expertise. By the same reasoning, should participating institutions believe their investments were 'poised' for improvement, they would certainly not select them for stock swap with Brookwell, thereby exchanging known single-stock risk for unknowable Brookwell portfolio risk. In this sense, we believe our setting helps to address certain identification concerns rather than add to them.

In addition to endogeneity, another challenge with our empirical study is that governance outcomes can be brought about by threats to intervene (or "jawboning" as in Shleifer and Vishny (1986)) rather than actual interventions. Private discussions with PVML staff reveal that, given the illiquidity and high insider ownership in AIM firms, it typically requires a threat to go public to persuade management to cooperate, even in apparently collaborative interventions; hence drawing inferences by comparing engagement attitudes may be misleading. We are reassured that our findings are consistent with other clinical studies using private data (Smith (1996); Carleton et al. (1998); Becht et al. (2009); Dimson, Karakas and Li (2015); Becht et al. (2019)). McCahery, Sautner and Starks (2016) provide recent corroborating survey evidence on which channels blockholders prefer, although the authors cannot identify the effect of these channels on firm characteristics or vice-versa. However, Brav, Jiang and Kim (2015) note that threats of intervention may be correlated with unobserved industry or firm characteristics that

are themselves correlated to outcomes. Our clinical study is narrow. Blockholders are endogenous and heterogeneous. Institutional and legal settings differ across countries. Our findings relate to one fund holding 4%+ blocks in UK AIM firms in the period 2008-15, and may not extend to other blockholder types or other markets, countries or time periods. Nevertheless, we are able to show certain previously documented results hold in our setting, while others do not.

1.5 Returns to small-cap activism

In this section, we compute the activist return and decompose it by type of engagement. We also compare the return earned by the activist with the return earned on various tracking portfolios based on public and private information.

1.5.1 Performance of Brookwell

Table 1.11 presents performance statistics for the fund from inception (IPO of A shares) to close (final liquidation of D shares). Using trading and valuation information provided by PVML, we construct the cash flows and compute monthly and annualized IRRs net of fees and expenses for the fund's life. Given Brookwell's value-realization objective and its return of cash to investors every six months, we employ a reinvestment rate of 0.5% on cash returns. Monthly IRRs average -0.04% for the fund's life, or +0.26% after adjusting for the FTSE AIM All-Share Index. When examining the 'large' block portfolio (the 49 investments that form the basis of our engagement and event studies), monthly IRRs are higher, with an average of +0.12%, or +0.41% after market adjustment. We also calculate total returns for the fund (namely the cash returned minus the cash raised, all divided by the cash raised). When comparing total returns, after market adjustment, the difference between the overall portfolio (-0.15%) and the large block portfolio (+11.75%) becomes more evident. The difference suggests PVML's engagements, concentrated as they are in the larger investments, contribute significantly to returns.

The returns presented in Table 1.11 do not adjust for other factors such as size, momentum and market-to-book. To examine these factors, we present performance attribution regressions in Table 1.12 using four models: a CAPM model, a Fama-French 3-factor model, a Momentum model, and a combined Fama-French and Momentum model. Brookwell's monthly alpha is positive in all four regressions, though not economically large or statistically significant. The market return factor is also positive throughout and significant at the 10% level in CAPM and Momentum regressions. This suggests Brookwell's performance is somewhat dependent on overall market performance. We find positive and economically larger coefficients on the SMB factor, but *p*-values are insignificant, which is perhaps surprising given the small-cap composition of Brookwell's portfolio. The momentum factor is also positive, though again not statistically significant, suggesting that Brookwell's returns are not simply related to the reversal in trend of previously underperforming firms.

We also examine the monthly risk profile of Brookwell. The portfolio beta averages 0.92 for the life of the fund, but changes significantly over time, with a low of 0.28 in the second year and a high of 3.1 in the final year. This reflects the fact the fund is fully invested at IPO and follow-on offerings, but has other periods in which there are fewer than 5 investments. The pattern of idiosyncratic risk varies for the same reasons. Idiosyncratic risk averages 29.1% for the life of the fund, with a low of 6.5% and a high of 49.9%. The resulting monthly Sharpe ratio of the fund is 0.04, indicating the high risk of activism in small-cap stocks.

1.5.2 Gains attributable to activism

In Table 1.13, we decompose Brookwell's returns by block size, and for the 49 'large' blocks by engagement and engagement attitude. In Panel A, we present cash raised, cash returned, and the resultant total return (cash returned minus cash raised, all divided by cash raised). Brookwell's overall portfolio delivered a total return of -26.3%, within which the 49 large blocks returned -14.4%. The 27 engagements contributed more to total return than the 22 non-engagements, despite both losing cash for investors. The 8 confrontational engagements

contributed the greatest portion of cash returns (£11.6 million) and represent the only segment to return more cash to investors than was raised (+23% total return).

In Panel B, we decompose Brookwell's annual IRR (as previously calculated in Table 1.11) by block size and engagement attitude, and examine the contribution of our event study. As with total buy-and hold-return, we find the largest annual IRR in confrontational engagements (+4.85%) and the lowest in mixed engagements (-3.97%). In order to examine the extent to which the event study returns previously reported (Tables 1.8 and 1.9) contribute to Brookwell's overall performance, we follow the methodology of Becht et al. (2009) in computing an Activism Contribution Ratio ("ACR"). The formula is as follows:

$$ACR = \frac{\sum_{i=1}^{N}\sum_{j=1}^{J}\left[(MV\ of\ block)_{i,j,t-1} \times CAR_{j,[t-1,t+1]}\right]}{Total\ Sterling\ Excess\ Return\ of\ Brookwell}$$

For each outcome in our event study (excluding those events with confounding information), we multiply the market value of the Brookwell block at day -1 before the announcement by the CAR for the [-1; +1] window, and sum the sterling returns across all J events and N firms in the large block portfolio. We take this sterling sum and divide it by the total sterling net return of Brookwell from inception to liquidation. We repeat the process for the [-2; +2] and [-5; +5] windows and present the results for the large block portfolio by engagement and engagement attitude. We find across our three event windows that around 60% of the total return from engagements is comprised of event study returns, with the highest contribution ratios (80-90%) in collaborative engagements. The ratio in confrontational engagements is lower at around 20-30%. When dividing the total sterling return in the event study (excluding confounding events) by engagement attitude in Panel C, we find that approximately one-quarter comes from collaborative interventions, 10% from mixed, and two-thirds from confrontational ones.

Hostility is thus associated with the highest returns, both in the amount of cash returned (£11.6 million), the total return (23%), the annual IRR (4.85%) and the proportion of event

study returns (65%). However, the lowest returns come from mixed engagements (£3.7m cash returned, -47% total return, -3.97% annual IRR, and 9% proportion of event study returns). Since PVML does not know at the outset if non-collaborative engagement is likely to be openly confrontational or mixed, the risks involved in non-collaboration are high. By contrast, collaborative interventions are quicker to resolve, and the returns associated are more linked to event study outcomes.

1.5.3 Returns to free riding on Brookwell

Table 1.14 examines whether outside investors could have earned similar or better returns than Brookwell, by adopting a tracking policy based on either public or private information. As a benchmark, in the first row we calculate Brookwell's annual IRR return net of fees, assuming 0.5% reinvestment and unadjusted for market returns. As previously reported, this annual return is -0.44%. In the second row, we add back the fees and expenses, resulting in an annual return of 0.30%. In rows three to six, we calculate the net and gross returns of the large block portfolio (1.44% and 2.11% respectively), and the net and gross returns of the confrontational engagements (4.85% and 5.33% respectively). As previously discussed, returns to hostility are greater than in friendly engagements.

In rows seven and eight, we run a 'public information' experiment, namely we calculate the returns that outside investors would have earned by buying firms in the large block portfolio at the time of the RNS announcements of Brookwell's purchases. In the seventh row, if investors had re-balanced their portfolios in the same way as Brookwell did in row 3, they would have earned a 1.93% return. In the eight row, if investors had held the investments until the liquidation date of each Brookwell share class (i.e. no re-balancing), they would have earned 5.88%. This suggests outside investors would have outperformed Brookwell by buying at the RNS announcements of the disclosed stakes, and that Brookwell's trading activities (designed to return cash to shareholders, as per the fund's stated objectives) are lower than buy-and-hold returns. Our finding is consistent with the negative pre-announcement CARs related to

disclosure of Brookwell's stakes (Table 1.7), allowing outside investors to purchase their shares at lower prices than Brookwell. It is also consistent with Brookwell generating positive externalities once its stakes are disclosed, and the generally higher long-term returns to equity than cash (absent risk-adjustments).

Finally, in the last two rows (ten and eleven), we run a 'private information' experiment, namely we calculate the returns that investors would have earned had they been able to invest on private information of Brookwell's 1st day and 1st week investments, and then simply held shares until the fund's liquidation date (without re-balancing). This is equivalent to trading on the rumor that Brookwell has invested, and hearing such rumors on the first day or after the first week, but having no further private information about Brookwell's dynamic trading activities thereafter. We find that such a strategy would have earned an annual return of 6.63% based on 1st day information (row ten), or 7.02% based on 1st week information (row eleven). These findings suggest that Brookwell's returns are unlikely to be associated with private or inside information, and that the fund receives its investments well in advance of starting the engagement process. The findings also confirm that Brookwell typically receives investments in firms with negative stock price momentum, suffering initial losses prior to its stakes being disclosed, but recovering such losses in particular from positive CARs on observable activism outcomes.

1.6 Conclusions

We conduct a clinical study of a UK small-cap fund possessing a series of unique characteristics that allow for an improved identification of the impacts of activism. With full access to comprehensive private data, we examine ownership blocks above 4% (as a percentage of market value and portfolio size) and separate voice and exit activities. We find our activist engages firms with friendly outside blockholders and older Chairmen, particularly when its dollar ownership is large and difficult to liquidate in the market. Contrary to most prior studies, weak near-term stock momentum or firm operating performance does not determine engagement.

The duration of investments increases with voice and the degree of non-collaboration. Engagements are hostile when the age difference between older Chairmen and younger CEOs is greatest. The majority of voice activities is behind the scenes and aimed at Chairmen and CEOs, seeking corporate restructuring (46% of cases) and Board changes (36% of cases). A high proportion of interventions are successful (76%) and give rise to positive returns in event studies where statistically significant CARs arise exclusively from confrontational situations (7-10%), and the highest CARs occur when restructuring objectives are met (14-16%). Engaged firms appear leaner (reduced total assets and employees) but not weaker (improved return on assets and higher market-to-book ratios) one and two years after PVML has exited its stakes. When examining the returns to small-cap activism, we estimate that 60% of the total return from engagements is due to activist outcomes, and that 65% of such returns derive from confrontational situations. As the likelihood of confrontational engagements increases with the age difference between an older Chairman and a younger CEO, we propose that the strategic direction of a small-cap firm is imbued with the personality traits of its Chairman and CEO, and that shareholder value may be destroyed (and unlocked by a tenacious activist) where a difference in opinion exists between the two.

If activism improves shareholder value, one may wonder why AIM firms in our study do not voluntarily pursue the strategies proposed by our activist. On one hand, many firms have poor corporate governance and entrenched owner/managers, indicating significant agency problems and a higher likelihood of not maximizing shareholder value. These problems are exacerbated by a lack of credible activism threat, prior to our fund receiving blocks. On the other hand, our activist possesses expertise that many AIM firms may simply lack, and thus plays an important role in providing guidance on what constitutes best practice in the eyes of institutional investors. The adoption of MiFID 2 appears to have caused a drop in trading liquidity and research coverage in smaller firms listed on AIM, leading to a greater likelihood of institutions

being trapped in 'lobster pot' investments.[7] Regulators may wish to address this new equilibrium by increasing the incentives and powers of activists, for example by changes in the AIM rules or via enhanced legal tools in the Companies Act.

Our clinical study has a number of limitations. We examine a single fund, investing in mainly AIM-listed firms, receiving initial portfolios in three installments in June 2008, February 2009 and February 2011. Portfolio firms are small, illiquid, under-researched, and sensitive to news flow. Hence the returns could be specific to these time periods, to AIM's auction-based trading system for illiquid securities, or to the small-cap market segment. Our activist is highly experienced with a long track record of engagements in UK small-cap firms. The value that could be realized by another manager is unknown, but likely to be lower. As investors in AIM firms become more discerning of well structured and professionally managed firms, the returns to these strategies may be reduced.

However, we believe our study provides the first detailed evidence on the long-term impact of behind-the-scenes activism in UK small-cap firms, including a unique setting that helps to control for selection effects. Future researchers might examine the determinants of stock market reactions to activism in news-sensitive small-cap stocks, and the links between market microstructure, risk-adjusted returns and corporate governance in junior markets.

[7] MiFID 2 is the Markets in Financial Instruments Directive 2 and has applied across the European Union since 3 January 2018.

Table 1.1: Comparison of PVML to a typical hedge fund activist

The table sets out various features of activist funds, their target companies, the setting in which they operate and the manner in which they report returns. We compare PVML with a typical hedge fund activist, and describe the confounding effects addressed by our setting and private data.

Key feature	PVML	Typical hedge fund activist	Confounding effect(s)
Portfolio selection	Blind	Transparent	Stock selection
Portfolio acquisition	1-day	Not time constrained	
Choice of stocks	Determined by 3rd parties	Determined in-house	
Choice to engage	Limited to initial portfolio	Unlimited	
Portfolio-to-staff ratio	222 stocks to 2 staff	<10 stocks to >10 staff	
Engagement style	Behind-the-scenes	Public	Free riding/causation
3rd party collaboration	None	Wolf pack	
Fund fee structure	1% management fee 10% capital return fee	2% management fee 20% performance fee	Incentives
Fund's redemption profile	None	Quarterly	
Fund's block size in target	100+ days trading volume	<20 days trading volume	Jawboning
Fund's financial resources	None	Extensive	
Typical insider ownership of target firms	>33%	<5%	
Highest contribution to Fund's returns	When governance objective is met after lengthy engagement	Stock-price uplift upon initial announcement of block acquisition	Short-termism
Fund's holding period	2-3 years	2-3 months	
Stock exchange of target firms	Junior listing (equivalent to 'pink sheets')	Main listing (equivalent to NYSE, NASDAQ)	Market, regulatory and legal factors
Governance rules	No specific requirements	'Comply or explain' type	
Activism tools	Limited	Extensive	
Concert party risks for outside block-holders	High	Low	
Share price of target	Penny stock	$10+	Idiosyncratic factors
Market cap	Small-cap	Mid- or large-cap	
Trading volume	Illiquid	Liquid	
Research coverage	0 or 1 analyst	10+ analysts	
Equity story of target	Growth stock	Value stock	Momentum factors
Prior stock performance	Mixed	Weak	
Prior operating performance	Mixed	Weak	
Capital structure of target	100% equity	Equity/public and private debt/hybrid securities	Wealth transfer from other stakeholders
Firm management "doing it anyway"	Measure confrontational events only	Typically cannot control for degree of confrontation	Endogeneity / private information
Event study CARs	Excludes events with confounding information	Typically includes all events	
Contribution of activism to total return	Measured as a % of total fund return	Not measurable; total fund return reported instead	
Contribution of private information to total return	Measureable	Not measurable	

Table 1.2: The Brookwell portfolio

Panel A lists institutional investors that received initial allocations of 3% or more in the IPOs of Brookwell A, B or D and were hence disclosed under the FCA's disclosure and transparency rules. In Column 4, the Brookwell portfolio is restricted to only those companies in which Brookwell owns 4% or more of the market capitalisation, or where the ownership block represents more than 4% of the initial portfolio. Using this 4% cut-off, Brookwell's portfolio is reduced from 222 companies to 49 companies or 'large blocks'. Column 4 reports the number of times the 3%+ IPO allottees were also 3%+ disclosed holders in these 49 companies at the time of the Brookwell IPOs. Such stakes are referred to as 'friendly'. Panel B reports the distribution of the 49 large blocks' relative performance to the FTSE AIM All Share index by performance decile, based on the 6-month and 1-year periods prior to sale to Brookwell. Performance decile 1(10) contains companies in the highest (lowest) 10% performance interval. Panel C reports summary statistics of the duration of Brookwell investments for the 49 large blocks (computed as the number of calendar days from the date of first purchase to the date of last sale). Statistics are reported separately for the 27 companies in which Brookwell undertook engagements, and for the 15 in which the engagement attitude was non-collaborative on the part of firm management. We report the mean [median] and *t*-statistic with Satterthwaite approximation (χ-statistic, Wilcoxon rank sum test) for differences in mean (median). We use ***, ** and * to denote two-sided significance at the 1%, 5% and 10% level respectively.

Panel A: Disclosed institutional participants in Brookwell IPOs

Investor	3%+ subscriptions in Brookwell A, B or D		No of 3%+ stakes in Brookwell's 49 large blocks ('Friendly' stakes)
	Value (£m)	Number	
Cazenove	8.2	3	5
Artemis	6.2	2	4
Allianz	3.9	1	5
Fidelity	3.6	2	4
East Riding	3.4	1	3
USS	3.3	3	3
Invesco	2.8	2	7
Octopus	2.5	1	3
Schroder	2.4	2	4
Teeside Pension	2.3	1	3
Aberdeen	2.3	1	4
JP Morgan	1.7	1	5
Guinness Peat	0.9	1	4
Noble	0.8	1	4
JO Hambro	0.8	1	3
Amati	0.6	1	3
Gartmore	0.5	1	10

Panel B: Relative stock performance prior to sale of large blocks to Brookwell

Performance decile	6 months prior	1 year prior
1	7	6
2	2	0
3	1	1
4	2	2
5	4	1
6	2	1
7	0	5
8	2	3
9	6	2
10	23	28
No. of Firms	49	49

Panel C: Duration of investments

	Large blocks	Non-Engaged	Engaged	Collab-orative	Non-Collab-orative	*t*-stat [χ-stat] (2) vs (3)	*t*-stat [χ-stat] (4) vs (5)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Days held	455	344	546	401	661	-2.43**	-2.17**
	[377]	[348]	[473]	[297]	[589]	[-1.83*]	[-2.27**]
No. of Firms	49	22	27	12	15	22/27	12/15
Total value (£m)	36.0	11.2	24.8	8.4	16.4		

Table 1.3: Characteristics of large blocks at time of acquisition

The table summarizes characteristics of firms in the PVML large block portfolio at the time of acquisition by Brookwell. For each variable the mean [median] is reported, and the *t*-statistic with Satterthwaite approximation (χ-statistic, Wilcoxon rank sum test) for differences in mean (median). We use ***, ** and * to denote two-sided significance at the 1%, 5% and 10% level respectively. Variables are defined in the Appendix.

	Large blocks	Non-Engaged	Engaged	Collab-orative	Non-Collab-orative	*t*-stat [χ-stat] (2) vs (3)	*t*-stat [χ-stat] (4) vs (5)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Firm size/mkt profile							
Market cap (£m)	17.4	18.6	16.4	11.8	20.1	0.23	-1.47
	[9.3]	[6.1]	[12.1]	[4.0]	[17.3]	[-1.07]	[-1.37]
Free float (%)	67.4	65.2	69.2	64.0	73.4	-0.71	-1.26
	[67.9]	[64.4]	[73.6]	[67.2]	[78.8]	[-0.94]	[-1.61]
Avg. daily trade vol. (£)	16,935	18,765	15,444	14,281	16,374	0.47	-0.27
	[5,293]	[8,019]	[4,721]	[3,964]	[12,054]	[0.14]	[-0.15]
No. of analysts	0.86	0.73	0.96	1.0	0.93	-0.69	0.13
	[0.0]	[0.0]	[0.0]	[0.0]	[0.0]	[-0.25]	[0.17]
Stock volatility (%)	64.0	67.9	60.8	52.2	67.6	0.85	-1.39
	[62.2]	[62.8]	[62.1]	[50.6]	[75.6]	[0.38]	[-1.32]
PVML block							
Block value (£k)	734.3	509.4	917.5	694.7	1,095.8	-2.51**	-1.46
	[593.0]	[501.4]	[707.0]	[477.0]	[1,062.1]	[-1.73*]	[-1.22]
Block size (% mkt cap)	6.7	5.8	7.4	7.6	7.3	-1.53	0.19
	[5.7]	[5.1]	[5.7]	[6.2]	[5.7]	[-1.07]	[0.59]
Block size (% of Fund)	3.9	3.0	4.6	3.6	5.5	-1.82*	-1.22
	[3.7]	[2.3]	[4.2]	[2.9]	[4.2]	[-1.05]	[-0.78]
Block score*	19.45	8.03	28.75	13.9	40.62	-2.22**	-1.67
	[3.79]	[3.21]	[5.58]	[3.7]	[18.04]	[-1.33]	[-0.98]
Other blocks							
No. of friendly stakes	2.7	1.8	3.4	3.8	3.2	-3.35***	0.71
	[2]	[2]	[3]	[3]	[3]	[-2.85***]	[0.38]
Sum of top 3 stakes (%)	34.4	33.2	35.4	37.4	33.8	-0.65	0.86
	[34.1]	[30.1]	[35.5]	[35.8]	[34.1]	[-0.84]	[0.78]
No. of stakes > 3%	5.29	4.68	5.78	6.0	5.60	-1.15	0.26
	[4]	[4]	[4]	[5]	[4]	[-0.71]	[0.15]
Firm attributes							
1yr excess return (%)	-27.8	-22.6	-32.1	-26.3	-36.6	0.74	0.76
	[-28.1]	[-23.8]	[-33.7]	[-29.7]	[-35.1]	[1.07]	[1.03]
Return on assets (%)	-25.2	-23.6	-22.8	-20.4	-22.7	-0.49	0.14
	[-10.0]	[-14.5]	[-7.5]	[-14.4]	[-6.0]	[-0.05]	[-0.19]
Total assets (£m)	45.0	39.9	50.4	48.0	52.4	-0.68	-0.17
	[19.07	[13.9]	[28.4]	[4.5]	[32.8]	[-0.51]	[-0.67]
Market-to-Book ratio	3.1	1.3	4.5	3.2	5.8	-1.66	-0.68
	[1.1]	[1.1]	[1.1]	[1.6]	[0.61]	[-0.32]	[1.23]
Chairman year of birth	1954.7	1959.2	1951.1	1950.9	1951.2	6.83***	-0.29
	[1954]	[1960]	[1951]	[1951]	[1951]	[4.68***]	[-0.30]
CEO year of birth	1960.2	1963.0	1957.9	1953.6	1961.4	3.90***	-6.69***
	[1961]	[1963]	[1956]	[1954]	[1962]	[3.41***]	[-3.78***]
No. of firms	49	22	27	12	15	22/27	12/15

* $Block\ Score = \frac{\frac{Block\ Value}{Daily\ volume} \times \sqrt{180d\ Volatility} \times Block\ Value \times Float\ Percent^{-1}}{\sqrt{Stock\ Price} \times 2(1+\ No\ of\ Analysts) \times No\ of\ Stakes > 3\%}$

Table 1.4: Engagement tactics

The table reports various engagement actions by PVML. Panel A reports the number (percent) of cases in which PVML had meetings with and wrote letters to various persons within the firm, and the number of days before such contacts were made after Brookwell acquired its ownership blocks. Panel B reports the number (percent) of cases of contact and cooperation with relevant third parties. Panel C reports the number (percent) of cases of intervention at shareholders general meetings. Panel D reports the number (percent) of cases of high-intensity actions such as threats to block rights issues, hostile takeover attempts and press campaigns.

Panel A: Contact with management of the 27 engaged firms

	Meetings			Letters			Days investment held before first contact made	
	No firms met	% sample	Total meetings	No firms written	% sample	Total letters	Median	Min.
CEO	25	92.6%	57	1	3.7%	1	59	11
Chairman	19	70.4%	38	11	40.7%	20	90	13
CFO	18	66.7%	33				86	11
COO	3	11.1%	3				240	155
Division Manager	2	7.4%	2				493	197
Head of Strategy	1	3.7%	1				200	200
SID	1	3.7%	1				197	197
Head of IR	1	3.7%	1				305	305
Chair Rem. Commit.	1	3.7%	1				305	305
Non-Exec. Directors	8	29.6%	9				289	72
Site Visits	6	22.2%	6				123	42

Panel B: Contact and cooperation with other shareholders and relevant parties

	Other shareholders				Banks/ Bondholders	Head-hunters*	Company brokers
	Calls/ Meetings	Solicit Support	Joint Letter	Joint Meetings	Solicit Support	Any contact	Any contact
No observed	5	3	1	1	1	10	7
% sample	18.5%	11.1%	3.7%	3.7%	3.7%	37.0%	25.9%

* includes contact with competitors, industry experts and other 3rd party advisers

Panel C: Shareholders general meetings

	AGM				EGM		
	Pose questions	Add item	Solicit hostile views	Planned	Requis-itioned	Planned by PVML	Planned by other shareholders
No observed	7	1	3	3	2	3	1
% sample	25.9%	3.7%	11.1%	11.1%	7.4%	11.1%	3.7%

Panel D: High-intensity actions

	Threaten to block rights issue	Hostile takeover attempt		Press campaign		UK litigation	
		Observed	PVML induced	Observed	PVML induced	Observed	PVML induced
No observed	1	0	0	0	0	0	0
% sample	3.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 1.5: Engagement objectives and success rates

Panel A reports governance objectives and success rates for engagements and the collaborative and non-collaborative subsamples. Column 1 lists possible governance issues. Columns 2, 4 and 6 report the cases in which PVML set out the governance issue as an objective in their investment committee papers: it adds one for firms in which the objective was set as primary, one-half for firms in which the objective was set as not primary, and zero otherwise. Column 3, 5 and 7 report the percentage of cases in which the governance objective was achieved: it adds one for firms in which the governance issue was both set as an objective in the investment committee papers, and we could establish based on a Factiva search, that the outcome was fully achieved, one-half for firms in which the outcome was partially achieved, and zero otherwise. The chi-squared tests compare Restructuring versus Board themes, and Restructuring versus Board and Other themes, and the relation with success rates. Panel B reports summary statistics for various characteristics of the engagements described in Tables 4 and 5. For each variable the mean [median] is reported, and the *t*-statistic with Satterthwaite approximation (z-statistic, Wilcoxon rank sum test) for differences in mean (median). We use ***, ** and * to denote two-sided significance at the 1%, 5% and 10% level respectively.

Panel A: Governance objectives and success rates

Governance objective	Engaged		Collaborative		Non-Collaborative	
	No. cases	% success	No. cases	% success	No. cases	% success
Restructuring						
Refocus Diversified Firms	4	75.0	0	-	4	75.0
Restructure Firms through Asset Sales	5	80.0	0	-	5	80.0
Stop Acquisition	2	50.0	0	-	2	50.0
Discipline Capital Expenditures	5	80.0	2	100.0	3	66.7
Reduce Discount to Fair Value	24	79.2	12	91.7	12	66.7
(1) All Restructuring themes	**40**	**77.5**	**14**	**92.9**	**26**	**69.2**
Board Changes						
Change CEO	8	50.0	0	-	8	50.0
Change Chairman	8	75.0	0	-	8	75.0
Change Non-Executive Directors	5	20.0	0	-	5	20.0
Strengthen "Independence" of Board	6	83.3	3	100.0	3	66.7
Change Remuneration Policy	4	25.0	0	-	4	25.0
(2) All Board themes	**31**	**54.8**	**3**	**100.0**	**28**	**50.0**
Financial and Other Policies						
Equity Issue	4	100.0	2	100.0	2	100.0
Increase Cash Payout to Shareholders	1	100.0	0	-	1	100.0
Improve Operational Management	3	0.0	1	0.0	2	0.0
Stop Unequal Treatment of Sharehldr.	2	100.0	0	-	2	100.0
Improve Investor Relations	6	83.3	3	100.0	3	66.7
(3) All Other themes	**16**	**75.0**	**6**	**83.3**	**10**	**70.0**
(1) vs (2) Chi-squared [*p*-value]	**22.74**	**[0.004]**	**-**	**-**	**17.40**	**[0.026]**
(1) vs (2&3) Chi-squared [*p*-value]	**37.88**	**[0.002]**	**6.00**	**[0.014]**	**26.60**	**[0.046]**

Panel B: PVML effort allocation by engagement attitude

	Engaged (1)	Collaborative (2)	Non-Collaborative (3)	*t*-stat [z-stat] (2) vs (3) (4)
Total management contact (Table 1.4A)	6.33	4.0	8.20	-3.35***
	[5]	[3.5]	[8]	[-2.70***]
Chairman meetings & letters (Table 1.4A)	2.11	1.00	3.00	-3.49***
	[2.0]	[1.0]	[3.0]	[-2.81***]
Days before first contact (Table 1.4A)	112.7	129.3	99.5	0.56
	[59]	[85]	[54]	[0.51]
All other activism actions (Table 1.4B-D)	1.78	0.83	2.53	-2.46**
	[1]	[0.5]	[2]	[-2.41**]
No. of stated objectives (Table 1.5A)	3.22	1.92	4.27	-4.15***
	[3]	[1.5]	[4]	[-3.46***]
Success rate (Table 1.5A)	0.76	0.92	0.63	2.26**
	[1]	[1]	[0.6]	[2.42**]
No. of Firms	27	12	15	12/15

Table 1.6: Engagement determinants and return regressions

Panel A reports the marginal effects of probit regressions corresponding to Equation (1). The dependent variable is a dummy equal to one if the firm is engaged (Column (1)), if the engagement is collaborative (Column (2)), and if the engagement is successful (Column (3)). Engagements are successful if the success rate is 100%. Panel B reports the coefficients of least squares regressions corresponding to Equation (2). The dependent variable in column (1) is IRR, the internal rate of return on each investment, in column (2) IRR with re-investment of cash returned during the Fund's life at 0.5%, and column (3) Raw Return, the cash returned as a percentage of initial investment without controlling for time value effects. We report *t*-statistics based on delta method standard errors in Panel A, and heteroscedasticity-consistent standard errors in Panel B. Variables are defined in the Appendix. We divide 'block value' by 1,000,000 for scaling purposes. We use ***, ** and * to denote two-sided significance at the 1%, 5% and 10% level respectively.

Panel A: Probit regression

	Engaged vs Non-Engaged (1)		Non-Collaborative vs Collaborative (2)		Successful vs Unsuccessful (3)	
	Marg. Effect	*t*-stat	Marg. Effect	*t*-stat	Marg. Effect	*t*-stat
Block value	-0.060	-0.81	-0.104	-1.10	-0.109	-1.00
Block score	0.002	1.39	0.002	1.12	-0.004***	-2.57
No. of friendly stakes	0.059**	2.18	-0.017	-0.82	-0.086**	-2.50
Chairman year of birth	-0.044***	-4.39	-0.045	-1.98	-0.109***	-3.98
CEO year of birth	0.005	0.50	0.071***	4.14	-0.005	-0.39
Obs	49		27		27	
Pseudo R-squared	0.54		0.64		0.49	

Panel B: Least squares regression

	IRR (1)		IRR with 0.5% re-investment (2)		Raw return (3)	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
Block value	0.109	1.36	0.018	0.84	-0.076	-0.48
Block score	-0.002	-0.83	-0.001	-0.84	-0.003	-1.30
No. of friendly stakes	-0.049*	-1.77	-0.017*	-1.82	-0.073**	-2.31
Chairman year of birth	0.009	0.64	0.004	0.87	0.002	0.06
CEO year of birth	-0.024**	-2.10	-0.008**	-2.39	-0.007	-0.29
Days held	-0.002*	-1.74	-0.01*	-1.70	0.000	0.13
No. of analysts	0.112***	2.90	0.039***	3.27	0.501***	7.33
Obs	49		49		49	
R-squared	0.40		0.42		0.67	

Table 1.7: Effect of disclosure of Brookwell's stake on stock prices, by Fund

The table reports mean and median cumulative abnormal returns (%) in various windows around the first disclosure dates of PVML's ownership stakes. First disclosure can be either by RNS or the press. *t*-statistics (z-statistic, Wilcoxon sign rank test) are reported for differences in mean (median) to zero. We use ***, ** and * to denote two-sided significance at the 1%, 5% and 10% level respectively.

Window	Mean (%)	*t*-stat	Median (%)	z-stat	% Positive	No. events
Panel A: Brookwell A						
[-1; +1]	-1.09	-0.74	0.92	-0.66	57.1	14
[-2; +2]	-2.99	-1.07	-5.37	-1.10	35.7	14
[-3; +3]	-10.87	-1.34	-9.85	-1.29	35.7	14
[-5; +5]	-10.71	-1.26	-7.85	-1.10	35.7	14
Panel B: Brookwell B						
[-1; +1]	0.30	0.40	0.52	1.78*	90.0	10
[-2; +2]	0.02	0.01	1.07	0.87	80.0	10
[-3; +3]	0.76	0.44	0.89	0.76	70.0	10
[-5; +5]	-0.75	-0.21	0.22	0.26	50.0	10
Panel C: Brookwell D						
[-1; +1]	-1.34	-0.74	0.05	-0.11	53.3	15
[-2; +2]	-0.04	-0.02	0.09	0.11	53.3	15
[-3; +3]	1.55	0.66	0.90	0.97	66.7	15
[-5; +5]	3.41	1.05	2.00	0.97	60.0	15

Table 1.8: Effect of governance outcomes on stock prices, by engagement attitude

The table reports mean and median cumulative abnormal returns (%) in various windows around the announcement dates of engagement outcomes, partitioned by engagement attitude. Engagement attitude can be collaborative, mixed and confrontational. Engagement attitudes are defined in the Appendix. *t*-statistics (z-statistic, Wilcoxon sign rank test) are reported for differences in mean (median) to zero. We use ***, ** and * to denote two-sided significance at the 1%, 5% and 10% level respectively.

Window	Mean (%)	*t*-stat	Median (%)	z-stat	% Positive	No. events
Panel A: All investments						
[-1; +1]	5.10	2.68**	1.84	2.52**	68.9	45
[-2; +2]	5.53	2.49**	2.27	2.34**	64.4	45
[-5; +5]	3.93	1.73*	2.24	1.04	55.6	45
Panel B: All investments excluding events with confounding information						
[-1; +1]	8.49	3.87***	3.72	4.31***	89.7	29
[-2; +2]	9.96	3.86***	2.98	4.14***	86.2	29
[-5; +5]	7.60	2.80***	3.78	2.48**	69.0	29
Panel C: Collaborative engagements						
[-1; +1]	4.89	1.18	0.38	0.80	61.5	13
[-2; +2]	3.66	0.75	0.39	0.31	61.5	13
[-5; +5]	4.39	0.95	1.08	0.59	53.8	13
Panel D: Collaborative engagements excluding events with confounding information						
[-1; +1]	9.65	1.58	2.84	1.68*	75.0	8
[-2; +2]	10.17	1.51	2.35	1.40	75.0	8
[-5; +5]	9.61	1.47	3.18	1.40	62.5	8
Panel E: Mixed engagements						
[-1; +1]	-0.96	-0.32	-0.01	-0.36	45.5	11
[-2; +2]	-0.43	-0.10	-0.18	-0.62	36.4	11
[-5; +5]	-2.24	-0.51	-8.57	-0.89	45.5	11
Panel F: Mixed engagements excluding events with confounding information						
[-1; +1]	5.44	1.51	1.34	1.75*	80.0	5
[-2; +2]	9.91	1.48	2.22	1.75*	80.0	5
[-5; +5]	8.93	1.44	8.13	1.21	80.0	5
Panel G: Confrontational engagements						
[-1; +1]	8.39	3.22***	5.15	3.04***	85.7	21
[-2; +2]	9.81	3.66***	5.48	3.46***	81.0	21
[-5; +5]	6.88	2.20**	3.15	1.69*	61.9	21
Panel H: Confrontational engagements excluding events with confounding information						
[-1; +1]	8.86	3.55***	5.26	3.52***	100.0	16
[-2; +2]	9.87	3.43***	5.90	3.47***	93.8	16
[-5; +5]	6.18	1.82*	3.36	1.50	68.8	16

Table 1.9: Effect of governance outcomes on stock prices, by type of objective

The table reports mean and median cumulative abnormal returns (%) in various windows around the announcement dates of engagement outcomes, partitioned by the type of governance objective. *t*-statistics (z-statistic, Wilcoxon sign rank test) are reported for differences in mean (median) to zero. We use ***, ** and * to denote two-sided significance at the 1%, 5% and 10% level respectively.

Window	Mean (%)	*t*-stat	Median (%)	z-stat	% Positive	No. events
Panel A: All investments						
[-1; +1]	5.10	2.68**	1.84	2.52**	68.9	45
[-2; +2]	5.53	2.49**	2.27	2.34**	64.4	45
[-5; +5]	3.93	1.73*	2.24	1.04	55.6	45
Panel B: All investments excluding events with confounding information						
[-1; +1]	8.49	3.87***	3.72	4.31***	89.7	29
[-2; +2]	9.96	3.86***	2.98	4.14***	86.2	29
[-5; +5]	7.60	2.80***	3.78	2.48**	69.0	29
Panel C: Restructuring						
[-1; +1]	6.27	2.00*	2.49	1.63	66.7	24
[-2; +2]	7.17	1.93*	2.53	1.60	66.7	24
[-5; +5]	5.83	1.57	3.46	1.14	66.7	24
Panel D: Restructuring excluding events with confounding information						
[-1; +1]	14.02	3.88***	7.36	3.41***	100.0	15
[-2; +2]	16.42	3.86***	6.62	3.41***	100.0	15
[-5; +5]	14.73	3.39***	6.78	3.01***	93.3	15
Panel E: CEO and Chairman turnover						
[-1; +1]	1.63	0.90	1.59	1.18	66.7	12
[-2; +2]	1.29	0.56	1.10	0.71	50.0	12
[-5; +5]	-1.30	-0.59	-2.00	-0.63	33.3	12
Panel F: CEO and Chairman turnover excluding events with confounding information						
[-1; +1]	3.98	2.52**	2.36	2.38**	87.5	8
[-2; +2]	4.81	2.57**	2.92	2.10**	75.0	8
[-5; +5]	1.09	0.44	0.59	0.42	50.0	8
Panel G: Chairman turnover						
[-1; +1]	1.66	0.66	1.59	1.12	62.5	8
[-2; +2]	2.51	1.48	1.10	1.12	50.0	8
[-5; +5]	-0.65	-0.29	-2.00	-0.70	25.0	8
Panel H: Chairman turnover excluding events with confounding information						
[-1; +1]	4.21	2.01	2.36	1.99**	83.3	6
[-2; +2]	3.37	1.55	2.52	1.57	66.7	6
[-5; +5]	-0.49	-0.16	-2.71	-0.31	33.3	6
Panel I: CEO turnover						
[-1; +1]	1.57	0.62	3.27	0.37	75.0	4
[-2; +2]	-1.15	-0.18	1.42	0.00	50.0	4
[-5; +5]	-2.62	-0.49	-1.27	-0.37	50.0	4
Panel J: CEO turnover excluding events with confounding information						
[-1; +1]	3.31	1.68	3.31	1.34	100.0	2
[-2; +2]	9.13	6.55*	9.13	1.34	100.0	2
[-5; +5]	5.86	2.57	5.86	1.34	100.0	2
Panel K: Payout						
[-1; +1]	1.21	2.75	1.21	1.34	100.0	2
[-2; +2]	1.99	7.08*	1.99	1.34	100.0	2
[-5; +5]	2.69	5.95	2.69	1.34	100.0	2
Panel L: NED turnover						
[-1; +1]	8.12	1.66	3.38	1.52	71.4	7
[-2; +2]	8.17	1.62	4.11	1.35	71.4	7
[-5; +5]	6.76	1.12	-0.36	0.68	42.9	7
Panel M: NED turnover excluding events with confounding information						
[-1; +1]	0.39	0.20	0.16	0.37	50.0	4
[-2; +2]	0.01	0.00	-0.60	0.00	50.0	4
[-5; +5]	-3.65	-2.76*	-3.70	-1.83*	0.0	4

Table 1.10: Restructuring and operating performance of portfolio firms

The table summarizes changes (Δ) in firm characteristics between the fiscal year in which Brookwell acquired its stakes, and one and two years following Brookwell's final exit of its investments. For each variable the mean [median] is reported, and the *t*-statistic with Satterthwaite approximation (χ-statistic, Wilcoxon rank sum test) for differences in mean (median). We use ***, ** and * to denote two-sided significance at the 1%, 5% and 10% level respectively.

	Large stakes	Non-Engaged	Engaged	Un-success-ful	Success-ful	*t*-stat (χ-stat) (2) vs (3)	*t*-stat (χ-stat) (4) vs (5)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ 1 year post							
Return on Assets	0.76	-0.84	2.22	1.01	3.43	-1.52	-1.12
	[0.99]	[0.87]	[1.19]	[0.79]	[1.37]	[-0.75]	[-0.92]
Total Assets	1.08	1.19	0.98	1.03	0.92	1.01	0.38
	[0.94]	[1.12]	[0.83]	[0.71]	[0.90]	[1.87*]	[-0.81]
No. Employees	1.01	1.24	0.80	0.66	0.96	3.20***	-2.92***
	[0.99]	[1.08]	[0.81]	[0.63]	[0.97]	[3.54***]	[-2.72***]
Market-to-Book	1.51	0.97	2.01	2.32	1.70	-2.04*	0.61
	[1.18]	[0.88]	[1.47]	[1.67]	[1.36]	[-2.72***]	[0.23]
Δ 2 year post							
Return on Assets	1.65	-0.15	3.29	1.35	5.71	-1.25	-1.12
	[0.87]	[0.86]	[0.87]	[0.55]	[1.09]	[-0.04]	[-1.04]
Total Assets	1.14	1.34	0.97	0.85	1.10	1.38	-0.81
	[0.97]	[1.33]	[0.81]	[0.61]	[0.97]	[1.83*]	[-1.91*]
No. Employees	1.12	1.48	0.81	0.74	0.98	2.70**	-2.51**
	[1.00]	[1.14]	[0.76]	[0.63]	[1.03]	[3.50***]	[-2.67***]
Market-to-Book	2.75	1.03	4.33	5.43	1.80	-2.29**	1.86*
	[1.34]	[0.86]	[1.63]	[3.39]	[1.58]	[-2.95***]	[1.16]
No. of Firms	46	22	24	12	12	22/24	12/12

Table 1.11: Performance of Brookwell, 2008-2015

The table reports performance of the Brookwell fund: the fund's IRR* and total return (cash returned minus cash raised, all divided by cash raised), net of management and performance fees.

		Brookwell portfolio (raw returns)	FTSE AIM All-Share	Brookwell portfolio (excess returns)
Total portfolio	IRR monthly*	-0.04%	-0.29%	0.26%
	IRR annual*	-0.44%	-3.53%	3.09%
	Total return	-26.34%	-26.19%	-0.15%
Large blocks only	IRR monthly*	0.12%	-0.29%	0.41%
	IRR annual*	1.44%	-3.53%	4.97%
	Total return	-14.44%	-26.19%	11.75%

* Brookwell's IRR assumes a 0.5% re-investment rate for capital returns during the holding period

Table 1.12: Performance attribution regressions

The dependent variable is the monthly rate of return net of management and performance fees of the Brookwell portfolio in excess of the risk-free rate, as proxied by the U.K. Short Gilts yield taken from the DMO office website. Factor regressions of monthly returns are then estimated and the results reported below. The table reports the intercept α and the coefficients (factor loadings) on the explanatory variables RMRF, SMB, HML and Momentum. These variables are the returns to zero-investment portfolios designed to capture market, size, book-to-market and momentum effects, respectively. Data for RMRF, SMB, HML and MOM are taken from Ken French's website. The sample period is from June 2008 to September 2013 (64 monthly observations) for the dependent variable. *p*-values are reported in parenthesis. We use ***, ** and * to denote significance at the 1%, 5% and 10% level respectively.

	CAPM (1)	FF (2)	Mom (3)	FF + Mom (4)
α	1.02	0.92	0.72	0.62
	(0.78)	(0.81)	(0.85)	(0.87)
RMRF	0.92*	0.94	1.09*	1.07
	(0.07)	(0.16)	(0.07)	(0.12)
SMB		1.35		1.62
		(0.45)		(0.38)
HML		-0.02		0.51
		(0.99)		(0.78)
Momentum			0.46	0.66
			(0.57)	(0.47)
Obs	64	64	64	64

Table 1.13: Activism contribution ratio ("ACR")

Panel A reports total returns (cash returned minus cash raised, all divided by cash raised), from Brookwell's investments by size and engagement attitude. Panel B reports the fund's annual IRR and the contribution of the event study CARs to the annual IRR ("ACR"). For each outcome in the event study we use the methodology of Becht et al. (2009) to compute the sterling return of the fund for the event. To be precise, we multiply the market value of the block held by Brookwell at days -1, -2 and -5 before the announcement by the CAR for the [-1,+1], [-2,+2] and [-5,+5] windows respectively. We then sum these sterling returns across all outcomes and firms in the Brookwell portfolio (a total of 29 events, once events with confounding information are excluded) and compute them as a proportion of the total sterling return of the fund between inception on 26/06/2008 and final value realization on 19/10/2015. Panel C reports the distribution of the total sterling return computed using the [-2;+2] window, by engagement attitude.

	Total portfolio		Large blocks by engagement		Large engaged blocks by engagement attitude		
	All stakes	Large blocks	Non-Engaged	Engaged	Collab-orative	Mixed	Confron-tational
Panel A: Total return by size and engagement							
No companies	222	49	22	27	12	7	8
Initial value	£54.9m	£36.0m	£11.2m	£24.8m	£8.3m	£7.0m	£9.5m
Cash returned	£40.4m	£30.8m	£9.1m	£21.7m	£6.4m	£3.7m	£11.6m
Total return	-26.3%	-14.4%	-19.0%	-12.4%	-23.4%	-47.0%	23.0%
Panel B: Annual IRR* and event study contribution ("ACR") by size and engagement							
Annual IRR*	-0.44%	1.44%	1.80%	1.37%	0.77%	-3.97%	4.85%
ACR [-1; +1] window	-	-	-	55.7%	82.2%	-3.7%	28.1%
ACR [-2; +2] window	-	-	-	62.6%	85.7%	-6.8%	30.8%
ACR [-5; +5] window	-	-	-	51.1%	90.8%	-10.6%	19.0%
Panel C: Distribution of event study total sterling return [-2: +2] window							
					25.8%	9.0%	65.2%

*Assumes a 0.5% re-investment rate for capital returns during the holding period

Table 1.14: Returns to various replicating portfolios

The table reports annual absolute IRRs to trading strategies designed to replicate PVML's strategy, based on private or public information, with or without rebalancing. Absolute returns to PVML's actual portfolio assuming a 0.5 percent re-investment rate for capital returns during the holding period, net and gross of fees, are reported as benchmarks.

Replicating Portfolio*	Rebalancing?	Annual IRR return (unadjusted for market return)
Brookwell (total portfolio) net of fees & expenses	Yes	-0.44%
Brookwell (total portfolio) gross	Yes	0.30%
Brookwell (49 large stakes only) net of fees & expenses	Yes	1.44%
Brookwell (49 large stakes only) gross	Yes	2.11%
Brookwell (8 confrontational stakes only) net of fees & expenses	Yes	4.85%
Brookwell (8 confrontational stakes only) gross	Yes	5.33%
Public info (RNS-announced large stakes only)	Yes	1.93%
Public info (RNS-announced large stakes only)	No	5.88%
Private info 1st day (large stakes only)	No	6.63%
Private info 1st week (large stakes only)	No	7.02%

* Assumes a 0.5% re-investment rate for capital returns during the holding period.

Appendix 1.1: Variable definitions

Variable	Definition
Categorization of engagement attitudes (source: PVML, Becht et al., 2009)	
Confrontational	Engagements are classified as confrontational when the target CEO or Chairman initially rejects the proposals for change that are put to the firm by PVML and this attitude does not change voluntarily throughout the engagement period.
Mixed	In mixed engagements the demands of PVML are implemented reluctantly or grudgingly, or after a prolonged period of resistance. The mixed category is less extreme and therefore more subjective but clearly non-collaborative.
Collaborative	In the vast majority of collaborative engagements there is little doubt about the attitude or response to the engagement.
Fundamental firm-level data (source: Bloomberg, Datastream, PVML)	
Market cap	Market value of equity (in million £) at Brookwell acquisition price
Free float	(Number of shares owned by insiders / Total shares outstanding) x 100
Average daily trading volume	Average no. of shares traded daily in prior 6 months x Average share price in prior 6 month period (in £)
No. of analysts	Number of investment banks/brokers with research analysts covering the firm
Stock volatility	180-day historic volatility of shares
1 year excess return	Buy-and-hold total stock return relative to the FTSE AIM All-Share Index for the 12 months prior to investment by Brookwell
Return on assets	Earnings before interest, taxes, depreciation and amortization (EBITDA) / Average total assets
Total assets	Value of average total assets for the fiscal year (£m)
Market-to Book ratio	Market value of equity / Book value of equity
No. of Employees	Average number of employees for the fiscal year
Chairman (CEO) year of birth	Year of birth of Chairman (CEO)
Shareholding and block data (source Bloomberg, Bureau van Dijk Fame, PVML)	
Block value	No. of shares in block x Brookwell acquisition price (in thousand £)
Block size (% market cap)	Block value / market capitalization
Block size (% fund)	Block value / Total value of Brookwell share class
Sum of top 3 stakes	(Sum of shares held by top 3 shareholders / Total shares outstanding) x 100
No of stakes > 3%	No. of blockholders with block size larger than 3% of market cap
Block score	$= \frac{\frac{Block\ Value}{Daily\ volume} \times \sqrt{180d\ Volatility} \times Block\ Value \times Float\ Percent^{-1}}{\sqrt{Stock\ Price} \times 2(1 + No\ of\ Analysts) \times No\ of\ Stakes\ >\ 3\%}$
Engagement and return data (source: Dow Jones Factiva, PVML)	
No. of friendly stakes	No of 3% blockholders that are also 3% shareholders in Brookwell funds at inception of each share class.
Days held	Number of calendar days from date of Brookwell acquisition to date of last sale
Engaged	A dummy variable defined as one if the firm is contacted by PVML with activism objectives
Success rate	No. of PVML's activism objectives met / Total number of PVML activism objectives
Successful dummy	A dummy variable defined as one if success rate = 100% (i.e. if PVML's activism objectives are met in full)
Total management contact	Total number of contacts between PVML and an engaged firm's officers
Days before first contact	Number of calendar days between Brookwell acquiring a stake and the first engagement contact with a firm's officers
IRR	The internal rate of return for a Brookwell fund-holder
IRR with reinvestment at 0.5%	The internal rate of return with early cash returns re-invested at 0.5% for the remainder of the holding period
Raw return	(Cash returned / Cash raised) – 1

Appendix 1.2: Comparison of UK Main Market and AIM legal and institutional shareholder activism environment

	London Stock Exchange ("LSE") Main Market			LSE Alternative Investment Market ("AIM")
	Premium segment (Official List)	Standard segment	High growth segment	
Legal status of market	Regulated market (rules set by EC) plus 'super-equivalent' rules imposed by FCA (LR 6-13)	Regulated market (rules set by EC) with no additional rules	Regulated market (rules set by EC) plus rules set by LSE in HGS Rules	Not a regulated market: rules set by LSE in AIM Rules for Companies
Minimum free float	25%	25% (with some UKLA exceptions)	10% (with value at IPO of at least £30m)	No minimum (Nomad confirms issuer is suitable)
Minimum market cap	£700,000	£700,000	None (but see free float)	None
Track record requirement at IPO	At least 3 years financial information	None	CAGR in revenue of at least 20% over prior 3 years	None
Liability for false statements in marketing documents	Issuer, directors and other persons responsible for IPO prospectus are personally liable under s.90 FSMA to pay compensation to any person who acquires shares at IPO or in after-market. FCA can fine issuer/directors for breach of PR/LR.		As premium segment, except LSE can fine issuer (but not directors) for HGS rules breach.	LSE can fine issuer (but not directors) for breach of AIM rules.
Corporate governance	All issuers must comply or explain against UK Corporate Governance Code (LR 9.8(56) and (6) and DTR 7.2). Must have an audit committee (DTR 7.1)	No obligation to comply or explain, but issuer must disclose details of any code to which it voluntarily complies	No particular code specified. Issuer must comply or explain against its national code (if so required by its domestic law)	No specific requirements
Insider lists	Yes (DTR2)	Yes (DTR2)	Yes (DTR2)	Not required
Pre-emption on new shares	Yes (LR 6.1.25 and 9.3.11)	Not required by LR	Not required by HGS rules	Not required by AIM rules
Max. discount for new shares	10%	No maximum	No maximum	No maximum
Regulation of share schemes	Shareholder approval for LTIPs and discounted options	No	No	No
Specific information required in shareholder circulars	Yes, for major transactions (LR 13). Circulars require FCA approval (LR 13.2.1-2)	No	No	No
Legal tools for activist shareholders	Statutory powers (CA06) and additional rights (s342, s527, s153) including raising "any matter" at AGM (s338A) and having such matters circulated at expense of issuer (s340A&B)			Statutory powers only

Abbreviations: EC = European Commission; LR = Listing Rules; FCA = Financial Conduct Authority; DTR = FCA's Disclosure and Transparency Rules; HGS = LSE's High Growth Segment rules; Nomad = Nominated Adviser; PR = FCA's Prospectus Rules; UKLA = UK Listing Authority; FSMA = Financial Services and Markets Act 2000; LTIP = Long term incentive plan; CA06 = Companies Act 2006.

Appendix 1.3: Comparison of US and UK research coverage

The table depicts small, mid and large cap market segmentation in the US and UK equity markets as categorized by FTSE Russell, the index services firm. Data on market cap segments are from FTSE Russell. Median market cap data for the Russell indices are correct as of May 8th, 2020. Data on the number of analysts are form FactSet as of September 30th, 2017.

US market			UK market					
			Main Market			AIM		
Russell Index	Market cap (median)	Analysts per stock (mean)	FTSE Index	Market cap (range)	Analysts per stock (mean)	AIM Index	Market cap (range)	Analysts per stock (mean)
2000	$580m	6	All-share	£0-600m	2.1	All-share	£0-200m	0.9
2500	$916m	7	250	£600m-5bn	6.5	100	£200-600m	2.8
1000	$9.3bn	16	100	>£5bn	15.7	50	>£600m	5.1

Appendix 1.4: Case study of a confrontational engagement

In this section we present a case study of a confrontational engagement, illustrating relations with firm management and how returns were realized by PVML.

Northern Investors

Brookwell D ("the Fund") received 1,350,000 shares at 172p per share, being 6.96% of the equity (7.33% of the free float) in Northern Investors ("NI"), from Teesside Pension Fund ("TPF") on 11 February 2011, valued at £2.322m. The block represented 14.14% of the Fund's total assets and 193 days of average daily trading volume in NI's shares. The shares had underperformed the FTSE AIM All-Share Index by -35.1% (-31.1%) in the prior 1 year (6 month) period. The holding in NI was the largest position in the Fund.

NI is a quoted investment company that takes positions in unquoted companies, often alongside the Venture Capital Trusts ("VCTs") that are managed by Northern Ventures Managers Ltd ("NVM"). The Company was formed in 1984, initially to purchase investments from British Technology Group, which was being privatised, and funds were raised mainly from institutions in the North East of England, mostly local authority pension funds, who were interested in supporting businesses and creating jobs in that area. At 31 March 2011, the Company's Net Assets were £59.1 million (304.1p per share), of which £12.2m was in cash (down from £19.6m as at 30 September 2010), and the equity market capitalisation was £33.4m

(at 210p per share), a discount of 30.9%. TPF owned 23.59% of the Company's equity and had been disappointed that no action had been taken to reduce the discount. In addition, NVM had persuaded the board of NI to significantly increase the management fee and incentives without consulting the shareholders and, in particular, the largest one, TPF.

TPF contacted PVML and asked for help to resolve the matter and their way of doing that was by transferring part of the holding into the Fund. 18 days after receiving the holding, PVML contacted the Chairman of NI, requesting a meeting. One of the factors was that there was to be a continuation vote that would be taking place in May 2012. In the meeting with the Chairman and NI's advisers, PVML had asked whether NI proposed to invest further before the continuation vote. The Chairman was not prepared to make a commitment that there would be no further investments; in fact, he indicated it would continue to invest in quality situations. Within a week, the Company announced that the cash balance of £20 million had been reduced to £12 million and PVML therefore deduced that the plan was to invest all the money right up to the continuation vote and then tell the shareholders that NI would need 5-7 years to wind it up, a most unsatisfactory situation from Brookwell D's point of view.

On 11 April 2011, Brookwell D wrote to the Board of the Company, requisitioning a General Meeting, proposing the following resolutions, namely that:

(1) the Directors of the Company are requested to put forward constructive proposals to address the lack of liquidity in the Company's ordinary shares and the high discount to Net Asset Value ("NAV") at which such shares have been traded historically on the LSE; (2) the proposals should benefit the interests of all shareholders and enable those shareholders who wish to realise their investments to do so at a value close the NAV over an agreed period; (3) the terms should also be on an equitable basis for continuing shareholders; (4) the Directors of the Company are requested to ensure that no further investments are made by the Company (other than those to which it is already irrevocably committed as of the date of this requisition) until the Board's

proposals, as a result of the above resolution, have been voted upon by shareholders in general meeting.

The Board publicly acknowledged receipt of this requisition on 14 April 2011. On 10 May 2011, the Board of NI announced a "Proposed change of investment strategy", following a consultation with its major shareholders and, as a result, decided to recommend an orderly realisation of the portfolio and efficient return of cash to shareholders. Brookwell D therefore withdrew its requisition notice. A circular was published on 24 June 2011 that reflected the announcement of 10 May and called a General Meeting ("GM"). In particular, the following resolutions were proposed, namely that:

(1) the Company's investment policy be amended to one which will achieve an orderly realisation of the assets of the Company, to be effected in a manner that seeks to achieve a balance between an efficient return of cash to Shareholders and maximising the value of the Company's investments; (2) subject to the passing of Resolution 1, the Investment Management Agreement ("IMA") be amended in order to achieve the aims and objective of the Company's new investment policy, including changes to the Manager's fee arrangements; (3) the Articles of the Company be amended by (a) deleting Articles 147 and 148 of the Company's Articles, and (b) amending Article 122 to make it clear that the Company's capital reserve can be used to fund share buy-backs and redemptions; (4) the share premium account of the Company be cancelled.

The key piece of new information was the proposed change to the IMA. The annual fixed management fee would be reduced in steps from £900k in the year to 31 March 2012 to £300k in the year to 31 March 2016. A performance fee was also introduced, which was a carry based on the return of cash at certain level of higher share prices. The Board also agreed to return £7.5m in cash almost immediately. On 21 July 2011, the GM took place and shareholders approved the arrangements for the management and the change of strategy. In addition, a number of shareholders, including the Fund, voted against the re-appointment of a director who was also on the Board of one of the NVM- managed VCTs and was therefore conflicted. He

retained his position by the margin of approximately 10,000 votes. PVML indicated that they would continue to campaign for his resignation. However, at this meeting, the Chairman may have inadvertently misled the meeting and, therefore, Brookwell D applied another requisition to replace the Chairman and another member of the board. The Chairman resigned on 15 September 2011 and was replaced by Nigel Guy as Chairman and Philip Marsden was also appointed as a NED. Both were executives of 3i, the private equity house, with responsibilities for disposing of private equity investments.

The change of strategy meant that the board made no further investments and focused on realisations. As a result, the share price increased and the NAV discount reduced, and Brookwell D was able to sell its shares in one of the sequence of tenders. The duration of the investment was 1,370 days, the second longest holding period of any investment made across Brookwell A, B or D shares. Total cash returned to investors was £8,819,394 representing a raw return of 279.8%. Brookwell's annual IRR was +3.7%. Assuming re-investment of cash during the holding period at 0.5%, the annual IRR was +4.3%.

Chapter 2:
The impact of advisory firms in IPOs

2.1 Introduction

Advisers are important intermediaries in initial public offerings (IPOs). In 2016, almost one-quarter of completed IPOs in excess of $100 million in the US included an adviser, rising to one-third of completed deals in Asia ex-Japan, and almost one-half in the UK and Europe (see Figure 2.1). From the perspective of underwriters, IPO advisers have become kingmakers whose recommendations determine whether an issuing firm will hire a particular bank or agree a gross spread.

Advisers command the trust of issuers because they are independent: they do not perform the legal, audit, underwriting or regulatory roles in an IPO, and do not suffer from the two-masters problem faced by banks that serve both issuers and investors. Instead, they perform two tasks exclusively for the issuer: advising the firm and monitoring banks. In the first task, they provide guidance on early strategic and tactical decisions such as capital structure optimization, M&A and pre-IPO investors; once the decision to launch is taken, they help with approaching early investors, running a parallel private sale (a so-called 'dual track' process), crafting the equity story, bank selection, syndicate and fee structuring, listing and roadshow venue selection, and offering timing, sizing and pricing decisions. In the second task, they act as 'process cops' collecting and scrutinizing data from banks, and also as paymasters. After an IPO is completed, advisers provide information to issuers on the performance of their underwriting banks in order for discretionary incentive fees to be disbursed.

IPO advisory firms have largely avoided the attention of academics, reflecting the fact that advisers disclose too little about the scope of their activities and incentives to allow for scrutiny. However, their increasing influence has attracted interest from policy-makers and regulators. Following the UK government's IPO of Royal Mail in 2013, the UK Secretary of State for

Business, Innovation and Skills opened an enquiry into the actions of the underwriting banks, lead investors and government adviser. The final report by Myners et al. (2014) highlights the incentives of the adviser to earn a completion fee for the IPO rather than to achieve the highest price. As part of its market study into investment and corporate banking launched in May 2015, the UK Financial Conduct Authority (FCA) surveyed the views of market participants on IPO advisers. In its interim report, the FCA (2016) suggests that advisers are "adding value for their issuer clients" by presenting summary statistics showing lower gross spreads in advised deals. Nevertheless, the FCA warns that issuers "should consider carefully the incentives they create when agreeing fee structures with advisers". In a paper related to the FCA market study, Jenkinson, Jones and Suntheim (2018) (henceforth JJS (2018)) describe advisers in European IPOs and provide summary statistics on syndicate structure and fees in advised versus non-advised IPOs. However, the authors do not conduct econometric tests or examine advisers' incentives.

Although the IPO advisory market comprises many small boutiques and even individuals, the industry is highly concentrated amongst the top firms. In our sample from January 2010 to June 2017, the top ten advisers have a 73% share of the European market by number of IPOs, rising to 86% by value of IPOs. We categorize the ten leading firms into two types: 'generalist' advisers who offer M&A and other services alongside IPO advice, and 'specialist' advisers who offer primarily IPO and equity-related services. The three leading firms are Rothschild (generalist) with 80 deals raising $60.5bn, Lazard (generalist) with 40 deals raising $47.6bn and STJ Advisors (specialist) with 33 deals raising $24.5bn. In a market with many capable underwriters and downward pressure on gross spreads, banks consider being well regarded by these leading advisers as critical to their success in IPOs. In parallel, since many advisers compete and co-operate with banks in their M&A businesses, there is ample scope for reciprocal relations to develop. The potential concern therefore is that advice given by advisers, in particular to unsophisticated issuers, may not always be aligned with the interests of the issuer.

The main question we address is whether advisers improve IPO outcomes. We examine three outcome variables. First, we measure the first-day return or 'money-left-on-the-table' by issuers. Second, we measure the withdrawn rate (a binary variable for IPOs that are withdrawn except when an M&A bid is preferred). Third, we measure the adjusted gross spread (applying a 50% haircut to any discretionary incentive component of gross spread).[8] Clearly, a large literature exists on IPOs. Much of the post-2000 literature has proposed that agency conflicts and behavioural biases (e.g. Loughran and Ritter (2004), Goldstein et al. (2011), JJS (2018)) offer a better explanation for the variation in first-day returns than earlier models of rational agents and informational asymmetry (e.g. Benveniste and Spindt (1989), Chemmanur (1993), Cornelli and Goldreich (2001)). Literature also exists on whether the IPO underwriting services market is competitive (e.g. Chen and Ritter (2000), Ljungqvist et al. (2003)) or anti-competitive (e.g. Abrahamson et al. (2011), Liu and Ritter (2011), Hatfield et al. (2017)). Other IPO papers examine the effect of withdrawals and gross spreads on underpricing. Withdrawal is costly for issuers and banks (Busaba et al. (2019)), hence a firm's willingness to withdraw an IPO reduces the underpricing required to induce truthful indications from investors (Busaba et al. (2001)). Higher gross spreads are associated with more prestigious underwriters who either extract fewer surpluses from issuers (Kang and Lowery (2014)) or deliver a superior marketing effort (Ljungqvist et al. (2003)), both resulting in smaller first-day returns. Independently of IPOs, there is a large literature examining the challenges faced by advisers/monitors when seeking to induce higher effort, compliance, cooperation or productivity in agents (e.g. Frey (1993), Pagano and Roell (1998), Kaplan and Stromberg (2004)). Finally, there is a large literature on investment funds. A strand of this literature explores the benefits to retail investors of using professional firms, either to select funds (Bergstresser et al. (2009)) or to gain the confidence to make financial investments (Gennaioli et al. (2013)). Other papers seek to reconcile the apparent lack of added value in the recommendations of investment consultants (e.g. Jenkinson et al. (2016)

[8] JJS (2018) report that discretionary incentive components of gross spreads are paid in around half of cases.

and Chava et al. (2018)) with their continued influence in driving investment flows (Goyal and Wahal (2008)). However, as far as we are aware, no paper has yet examined advisers' incentives in the IPO setting, their impact on IPO outcomes, and the relation with advisers' marketing claims about adding value.

We use IPO data from Dealogic and a sample designed to match that of the FCA (2016) and JJS (2018). As advisers do not disclose their contracting arrangements, it is not possible to observe fee amounts and percentages from deal to deal. Instead, we collect private information on the general contractual features of the three leading advisers in our sample from individuals at PE firms and investment banks who have worked with these advisers in IPOs. We record the presence (yes/no) of specific features (e.g. monthly retainers, completion fees, success/ratchet-based incentives) and bank monitoring powers (e.g. the ability to terminate a bank within an IPO syndicate due to poor performance or lack of compliance). We also record whether advisers' fees are generally paid out of the pot of underwriting fees (thus reducing overall bank remuneration), or as an additional expense for issuers (thus adding to all-in direct costs).

Establishing a causal link from adviser treatment onto IPO outcomes raises significant challenges. Advisers are not randomly assigned, and treatment assignment is likely impacted by the same observed and unobserved factors as our IPO outcome variables. To address endogeneity, we use an instrumental variable that exploits the relation between European firms' hiring decisions and the overall health of the US IPO market. Our first-stage regressions reveal a significant relation between the Bloomberg IPO Index (a capitalization-weighted measure of the aftermarket performance of first-year US IPOs) and treatment assignment, while placebo tests find no direct relation with our IPO outcome variables. Next, in order to test the causal effects of different adviser types (generalists vs. specialists) and leading firms (Rothschild, Lazard and STJ), we exploit a discontinuity in the prices of IPOs at the upper bound of the filing range. Our empirical design focuses on the cross-sectional effect on first-day returns associated with

different advisers both within IPOs pricing at the top of the range, and differentially between these IPOs and those pricing in the region immediately below the upper bound.

We have the following main results. First, we find no evidence that advisers in aggregate have any effect on first-day returns, withdrawals or adjusted gross spreads. The finding is at odds with the marketing claims advisers make relating to improved pricing terms, greater execution certainty, or reduced gross spreads. It also sits poorly with the high levels of fees advisers charge to issuers. The finding is important since advisers have a spurious correlation with reduced withdrawals and lower gross spreads (e.g. FCA (2016)); however, this association exists only in summary statistics and disappears entirely when introducing controls such as firm size, VC backing, and the ex-ante risk characteristics of issuing firms. Our finding is also important in providing a measure of all-in 'value-add' that accounts for risk (withdrawals), return (underpricing) and costs (adjusted gross spread).

Next, we find significant heterogeneity amongst advisers that is concealed in the aggregate null result. IPOs involving generalist advisers (offering M&A and other investment banking services alongside IPO advice) that price at the upper bound of the filing range are likely to be underpriced to meet early investors' limit prices. We compare the 1st day returns of these IPOs to the returns of other strongly-demanded generalist-advised IPOs where early investors' limit prices were likely not to have been binding, and identify a positive 91-percentage point differential in underpricing attributable to the conservative setting of the initial filing range. In contrast, IPOs advised by specialist firms (offering primarily IPO and equity-related advice) are not similarly underpriced. The finding is consistent with advisers' incentives. Generalists tend not to include monthly retainers or bank monitoring powers in their engagement letters, and earn their remuneration via completion fees. They may also earn higher total fees in the event of a successful concurrent M&A sale. Specialists have opposite incentives: they tend to have bank monitoring powers, monthly retainers and deal fees that are based on the IPO price achieved, but no competing M&A fees.

Finally, we find support for two agency-based explanations for the higher underpricing of generalist-advised IPOs. First, we find that unsophisticated (non VC-backed) issuers with small IPOs experience increased underpricing when advised by generalists. This may be evidence that generalists 'pick off' issuers who are one-time participants in their repeated game with banks and lead investors, as predicted by models of collusion in principal-agent-monitor hierarches (e.g. Tirole (1992)). Second, we find that leading generalists have dichotomous underpricing effects when handling deals from two leading IPO banks that are also important players in the M&A market. This may be evidence that generalists operate quid pro quos with banks, as predicted by models of block-booking and coalitions in IPOs (e.g. Gondat-Larralde and James (2008)).

Our findings complement the previously described strands of literature on IPO pricing, underwriting services, incentive design in principal-agent-monitor settings, and the value-add of professional brokerage firms and investment consultants in mutual funds and financial investments. We highlight the conflicts of generalist advisers, for example in advising on go/no-go decisions or between IPO and M&A exit, adding to work on efficient contracting in low-monitoring states (e.g. Hellmann (2006)). We consider the impact of specialist monitoring during IPO bookbuilding, adding to scarce survey evidence on the information production activities of investors in IPOs (Jenkinson and Jones (2009)). Finally, our findings relate to recent literature on coalitions (James and Valenzuela (2019)) and contemporaneous work on how investor valuations may be influenced by underwriter effort as proxied by gross spreads (Busaba and Restrepo (2020)).

We believe Europe is an ideal setting for a study on IPO advisers. First, the concept of independent IPO advice originates from Europe, dating back to government privatizations of the 1970s. Second, the European market has been a trailblazer for IPO advisers since the financial crisis of 2008, leading (and arguably causing) similar trends in the US and Asia. Third, Europe has the highest number of advised IPOs, representing 44% of completed IPOs in 2016 compared to 22% in the US and 34% in Asia. Finally, European IPOs are a major asset class

($248bn proceeds versus $356bn for the US in our sample period) in which the same leading advisers, banks, investors and PE firms operate as in other markets. Our analysis indicates that advisers' are influential in bank selection and in setting the initial filing range, but that their services have no effect on IPO outcomes, or may in fact contribute to higher underpricing in certain cases. That being said, our sample IPOs exhibit low first-day returns (mean 4.18%), low gross spreads (2.50%) and relatively high withdrawals (31%) when compared to an equivalent sample of US IPOs (16.9%, 6.29% and 20% respectively). It is possible, therefore, that advisers in other regions have different effects on IPO outcomes, which could form the basis of further studies.

The question remains why issuers employ advisers without evidence that they add value. We identify three possible reasons. First, consistent with a 'hand-holding' hypothesis (e.g. Lakonishok et al. (1992)), issuers may value the project management service advisers provide. Second, consistent with a 'headline risk' hypothesis (e.g. Goyal and Wahal (2008)), issuers (especially large PE firms) may use advisers to ward off possible criticism of bias in their bank selection decisions. Third, consistent with a 'naivety' hypothesis (e.g. Inderst and Ottaviani (2012)), issuers may misunderstand the value-add proposition of advisers, due to a combination of lack of disclosure and transparency on the part of advisers, and inexperience of IPOs on their own part. While advisers insist on full transparency from the investment banks they select and whose activities they monitor, they do not disclose their own contracting arrangements with issuers or the revenue relationships that may exist with banks and investors. In light of our findings, a natural response by issuers (or regulators) would be to require advisers to provide the same level of disclosure as required, for example, by investment bank research analysts in their stock recommendations.

2.2 Advisers in European IPOs

The role that advisers play in IPOs is distinct from that of banks. By definition, advisers have no underwriting capabilities and do not provide sales/trading or research publication

services. Instead, they act exclusively for the issuer and provide a combination of advising and monitoring services.[9] Nevertheless, there are many areas where advisory services and bank expertise overlap (e.g. valuation, equity story positioning). In these areas, advisers centralize and scrutinize the advice given by syndicate banks and provide a second (independent) opinion for the issuer. Such scrutiny can lead to tensions between advisers and banks during the IPO process. The FCA (2016) collects survey evidence from market participants and reports that certain banks and issuers question whether advisers add value to the IPO process, or create an additional layer of complexity to justify their advisory fees. In addition, some respondents question the independence of advisers. In this section, we discuss advisers' services in the European IPO setting, describe the leading advisory firms in our sample, and examine their degree of IPO specialisation and incentives.

2.2.1 Advisory services and the IPO timeline

Organizing a 'beauty parade' in which banks are selected and underwriting spreads agreed is one of many services provided by advisers in worldwide IPOs. In the sequence of decision making for issuers, the beauty parade comes after a number of other important services in the pre-IPO phase (see Figure 2.2). The first is to help the issuer determine and formulate its strategic objectives. At this preliminary stage, a firm may require debt refinancing or M&A advice, or may wish to explore a pre-IPO investor or a private sale. The advice given may result in the issuer completing a final round of private financing (a so-called 'crossover round') or exploring private sale options side-by-side with the IPO (a so-called 'dual track' process). Assuming an IPO is pursued, the adviser coordinates discussions with the firm's auditors and legal counsel around the key process issues (e.g. Board composition, capital structure, dividend policy, financial disclosures, tax issues, and so forth). The adviser also organises meetings with potential investors known as 'Early Look' meetings, in order to gauge demand and collect

[9] Advising and monitoring has received substantial attention in the VC literature (e.g. Kaplan and Stromberg (2004)), but the interaction of the two tasks remains somewhat overlooked. The combination of tasks within IPO advisers may help explain the success of these firms in the presence of consulting firms (pure advising) and audit/legal firms (pure monitoring) that might otherwise perform these functions.

feedback on the equity story. This early marketing stage may be extended or the Early Look process repeated so that valuation enhancements to the issuer can be carried out, or pre-IPO cornerstone or anchor investors can be considered. Banks may also be involved in early marketing, either by direct invitation of the adviser, or in an unsolicited fashion due to the market becoming aware of the investor sounding process. Banks are likely to approach the issuer directly at this stage to pitch for the IPO bookrunner role, often arguing that an adviser is not required, and that banks are better qualified to collect and assess early investor feedback.

The next stage is the beauty parade. Advisers agree the request for proposal (RfP) process with the issuer, which typically involves reviewing bank equity research, valuation assumptions and peer group selection. Advisers agree bank selection criteria and draw up a shortlist of banks, and the issuer or VC owner (or both) guided by the adviser make(s) the final decisions. The shortlist comprises banks suggested by the issuer for relationship reasons, as well as banks recommended by the adviser. Advisers may arrange private meetings between banks' research analysts and the issuer's senior management ahead of the formal beauty parade. These meetings, known as 'vetting meetings', led to claims that advisers might be leaning on banks' analysts to produce favourable IPO-related research and were investigated by the FCA (2016). The adviser makes its recommendations in various evidence-based ways (e.g. on the ranking of research analysts or the league table position in IPOs), but has the discretion to include its own relationship banks (e.g. banks that have worked effectively with the adviser on past IPOs). The adviser may also use private data collected from monitoring in previous IPOs to justify its shortlist choices. There are two empirical manifestations of the impact of advisers in conducting beauty parades (JJS (2018)): first, IPO syndicates tend to be larger with a higher number of active bookrunners; second, gross spreads tend to be lower and with a higher discretionary incentive component.

Once banks and syndicate roles are agreed, the IPO preparation phase begins. The adviser reviews any cornerstone or anchor investor interest arising from Early Look meetings, and

evaluates indicative bids in the dual track M&A process (if any). In parallel, the adviser reviews the issuer's desired approach to retail distribution, in particular if there is to be an employee or customer tranche, or a wider marketing effort involving other intermediaries. With respect to institutional investors, the adviser helps rehearse the issuer for the Analyst meeting in which sell-side research analysts of the syndicate banks receive information with which to prepare their pre-IPO research reports. The adviser also reviews the overall pre-bookbuilding marketing plan proposed by the syndicate banks. The pre-bookbuilding process is highly developed in European IPOs and involves meetings with a carefully selected group of investors known as 'Pilot Fish' before the Intention To Float ("ITF") press release publicly announces the IPO. Unlike in the US, such early meetings in Europe include specific discussions of demand and IPO pricing, often underpinned by the views of research analysts.[10] Hence, advisers incorporate extensive private information from informed investors when setting the initial filing range. The adviser manages overlaps in bank coverage, assigns priorities for Pilot Fishing meetings and helps the issuer fine-tune its marketing message. During the IPO preparation phase, the adviser also provides a second opinion on all documentation (e.g. analyst presentation, prospectus, underwriting agreement, etc.) as well as oversight of the various work streams (e.g. due diligence, financial disclosure, legal matters) and advice on key timing decisions (e.g. the ITF press release).

Next is the IPO marketing phase. This phase begins immediately following the ITF press release, which typically coincides with the publication of sell-side research reports. In European IPOs, the marketing phase comprises two 2-week periods: the first is Pre-Deal Investor Education ("PDIE") comprising hundreds of meetings between research analysts and potential investors; the second is the Roadshow comprising 30-40 one-on-one meetings between issuer's senior management and selected investors, together with a handful of larger group meetings. During PDIE, the adviser collects and centralizes investor feedback and reviews the shadow book, in anticipation of scrutinizing banks' recommendations for setting the initial filing range.

[10] We set out differences in US and European market practice in the Appendix.

The initial filing range is of particular significance in European IPOs since it is rarely changed once set, and IPOs overwhelmingly price within its upper and lower bounds (Jenkinson et al. (2006)). Once the range is set and the roadshow and bookbuilding begins, the adviser centralizes and scrutinizes all bank feedback relating to investor meetings, roadshow venues and demand indications, and oversees messaging with respect to oversubscription, pricing guidance and the closing of bookbuilding. During this phase, the adviser may also make recommendations for termination and replacement of syndicate banks if performance is unsatisfactory.

Next is the pricing and allocation of the IPO. Here the adviser can play a critical role in managing quid pro quo conflicts between banks and investors. The nature of the service provided, however, depends largely on the degree of monitoring already performed. If monitoring has been low, the advice given is necessarily abstract. However, if monitoring has been high (and the adviser has additional experience derived from monitoring in previous IPOs), the advice can be very specific and evidence-based, allowing the adviser to challenge banks on each individual investor's final allocation of shares.

The IPO aftermarket phase begins once the shares are allocated and trading begins. In this phase, the adviser monitors the stabilisation activities, aftermarket trading and timely research production of the syndicate banks. The adviser uses this information (alongside previously collected data) to recommend whether the issuer should pay the discretionary incentive proportion of the gross spread, in what amounts, and to which banks. The adviser may also provide guidance on establishing the issuer's investor relations programme and on any IPO-related press materials.

At what stage of the IPO process do advisers get hired? In some cases, advisers are hired years before an IPO to provide M&A, legal, audit, consulting or other professional services that allow the adviser to develop a relationship of trust with the issuer. At the other extreme, advisers may be hired on the day of IPO pricing in order to provide a fairness opinion on valuation and to monitor the allocation of shares. In many cases however, advisers are

appointed when the issuing firm is contemplating a sale (IPO or dual track M&A) and is close to an internal go/no-go decision with respect to hiring legal counsel and banks.

How do advisers market their services to potential issuers? As is the case with banks, advisers use league tables, case studies and descriptive statistics. Most firms have websites with details of key staff, their years of experience, the IPOs completed, the geographic or industry sectors in which they specialize, and the mix of IPO-related services offered (debt restructuring, M&A dual track, retail distribution, etc.). Advisers' claim their services add significant value for issuers (examples of website comments are provided in the Appendix). However, such claims are made without reference to specific IPO outcome variables, time periods, choice of benchmarks or control variables. Insofar as statistics are provided, there is no warning of potential selection bias or omitted variables. Advisers' contracting with prior IPO issuers is not disclosed in prospectuses. Revenue relationships that exist between advisers and banks or between advisers and lead investors are also not disclosed. In this sense, potential issuers cannot hope to verify advisers' claims or examine their incentives and possible conflicts, and may in a worst case scenario be following advisers' recommendations on false pretenses.

Why do issuers employ advisers in their IPOs? The FCA (2016) provides survey evidence suggesting there are three key reasons: first, to mitigate conflicts of interest within banks, particularly in the pricing and allocation process; second, to assist senior management where none of the directors has experience of conducting an IPO or the time required to do so; and third, to provide reputational insurance to senior managers should the IPO go badly, or favouritism in bank selection be argued. In practice, the presence of an adviser (and the scope of advice sought) depends on the experience and professional skills of the issuer and the nature and complexity of the exit strategy being pursued.

2.2.2 Leading advisers, IPO specialisation and incentives

We provide summary information on the leading advisers in our sample in Table 2.1 Panel A. The market comprises many start-up firms. Seven of the top ten advisers were founded after

2000, and six have fewer than 35 employees. New firms outside the top ten that have entered the market after 2010 include PJT Partners, Deloitte, KPMG and Nomura, as well as many smaller boutiques comprising fewer than 5 employees. Although the IPO advisory market is competitive[11], the top three firms (Rothschild, Lazard and STJ) account for 61% of the number of advised deals and 77% of such deals by proceeds in our sample.[12]

Conceptually, there are two types of adviser operating in the market. First, there are large established firms that offer M&A, corporate finance/debt advisory or asset management alongside IPO services (e.g. Rothschild, Lazard and Moelis). Such firms have significant resources and target a broad range of corporate and VC-backed issuers. We refer to these firms as 'generalist' advisers. Second, there are smaller start-up firms that offer only IPO or equity-related services (e.g. STJ Advisors, Lilja and Allegra). Given their limited resources, such firms may focus on issuers only in their geographic region, or only backed by certain PE firms, or on specific stages of the IPO process (e.g. due diligence, bank selection or pricing/allocation). We refer to these firms as 'specialist' advisers. Generalists have greater market share than specialists (127 versus 51 IPOs) and are involved in larger IPOs ($627mn versus $472mn median size) for larger issuers ($1,423mn versus $939mn median market value) although the degree of VC backing is lower (63.8% versus 82.4%). In IPO outcomes, generalists are associated with higher underpricing than specialists (mean 5.65% versus 1.77%) and have a higher withdrawn rate (19% versus 4%) but there is no significant difference in adjusted gross spreads (2.27% versus 2.26%).

In Panel B, we construct an IPO specialisation score for the three leading advisers in the market. Despite a lower market share in advised IPOs, STJ is the most specialised with a score of +10, as it has bespoke contracting features and no corporate finance/M&A or asset management business. Lazard is the least specialised with a score of +2 due to its higher M&A market share and lower proportion of capital markets revenue than Rothschild (+5).

---

[11] A non-technical discussion of the competitive dynamics of the European IPO advisory market is contained in *Financial News'* report "Evercore and others fight for the throne" in the August 2017 issue.

[12] The FCA (2016) report the three leading advisers account for 75% of the number of advised IPOs and 96% of the volume of such deals in their sample of UK-managed IPOs from January 2010 to May 2015.

Generalists and specialists differ in their contracting arrangements and incentives.[13] Generalist advisers tend not to include monthly retainers or bank monitoring features in their engagement letters, and receive more of their remuneration via completion fees rather than success or ratchet fees. They may also earn higher total fees in the event of an M&A sale rather than an IPO, and hence the launch and subsequent withdrawal of an IPO during a dual track process may be interpreted as an attempt to flush out private bidders[14].

Specialist advisers have different incentives: they have bank monitoring features, monthly retainers and a higher degree of success-based remuneration, but no M&A fees. Hence, they may be more willing to advise against launching an IPO (or advise in favour of withdrawing a launched deal) if market conditions are not supportive, as they continue to earn monthly fees and do not need to consider any potential impact on M&A fees. They are also more incentivized to satisfy the valuation objectives of the issuer (in order to earn their own success or ratchet fees that are calculated based on the final IPO price achieved), rather than simply completing an IPO at a lower valuation in order to earn completion fees. In summarising its survey evidence, the FCA (2016) recognises the impact of advisers' incentives and concludes: "Whilst it is possible that both ratchet fees and completion fees can misalign incentives between corporate finance advisers and their issuing clients, we consider that it is within the client's means to choose a fee structure that suits it needs."

Finally, advisory fees differ in their impact on IPO banks. In the case of specialists, advisory fees tend to be paid from the available fee pot assigned to bookrunners (i.e. causing a reduction in overall bank remuneration, but no additional fees to the issuer). In the case of generalists, advisory fees tend to be paid from a separate pot (as is the case with legal or audit fees) causing no reduction in bank remuneration.

[13] We provide details of advisory services, contracts and monitoring intensity in the Appendix.
[14] We provide details of the trade-offs between M&A and IPO tracks in the Appendix.

2.3 Data and methodology

We conduct our analysis using IPOs completed or withdrawn in Europe during the period January 1st 2010 to June 30th 2017. Data on these IPOs are obtained from Dealogic. Additional information is obtained from issuer prospectuses, press announcements, company websites and the International Financing Review. Bloomberg IPO Index prices and post-IPO trading volume are obtained from Bloomberg. Data on advisers are obtained from firm websites and public filings. Private data on advisers' contracts are collected from PE/VC professionals and investment bankers. We aim to replicate the setting of JJS (2018) and FCA (2016), except that we include withdrawn IPOs.[15] As is common in the literature, we exclude fixed price IPOs, funds and preferred shares, special purpose entities, blind capital pools and acquisition vehicles. Although our focus on bookbuilt IPOs means the sample is skewed towards larger deals, bookbuilding is the dominant approach in European IPOs (Ljungqvist, Jenkinson and Wilhelm 2003) and it allows us to compare our findings with US studies.

2.3.1 Sample and variables

Table 2.2 Panel A provides descriptive statistics for our sample. There are 739 bookbuilt IPOs above $30 million listed on European stock exchanges raising total proceeds of almost $248 billion with a median size of $268 million. The number of IPOs ranges from 54 deals in 2012 to 148 deals in 2015 with more than 100 IPOs in 2010, 2014 and 2015 supporting the theory that IPOs come in waves. The rate of advised IPOs increases from 22% in 2010 and 2012 to 42% in 2016. Mean 1st day return is 4.18% with a low of 2.12% and a high of 6.86%.[16] The withdrawn rate falls from 46% in 2010 to 18% in 2017. Mean adjusted gross spread is 2.50% and is relatively constant during the period. Overall, our sample does not appear to be dominated by any individual year, country or sector.

[15] In order to test the comparability of our setting, we replicate the syndicate structure analysis of JJS (2018) and the IPO mandate distribution analysis of FCA (2016) in the Appendix.

[16] Chambers and Dimson (2009) find average 1st day IPO underpricing on the London Stock Exchange for 2000-2007 is 19.86%. JJS (2018) report average *1st day returns* of 4.8% for their sample IPOs in the period 2010 to May 2015. Dealogic reports *1st day returns* in the US for our sample period of 16.9%.

Table 2.2 Panel B presents descriptive statistics for the variables used in our analysis, separately for advised and non-advised IPOs. Our outcome variables are *1st day return, withdrawn rate* and *adjusted gross spread*. The equilibrium relation (see Figure 2.3) between 1st day return and withdrawn rate is significant in our sample, suggesting underpricing may be lower when the threat to withdraw an IPO is greater (Busaba, Benveniste and Guo (2001)).

We employ two sets of independent variables: covariates and dummy controls. Butler, Keefe and Kieschnick (2014) identify 48 issuer characteristics commonly used in IPO studies. We select covariates that we judge affect both the decision to hire an adviser and our IPO outcomes, while excluding variables affected by treatment assignment either ex post or ex ante. Since advisers are involved in many decisions relating to an IPO, our model is necessarily parsimonious. We control for market conditions using the *mean lagged withdrawn* rate (the mean withdrawn rate of the twenty IPOs before pricing date, lagged by ten IPOs to take into account that adviser hiring decisions are made well in advance of IPO) and the *file to offer* period (for which we take the log due to skewness). We control for firm and offer characteristics using firm size (the *log of equity market value*), *VC* backing (a dummy variable) and the percentage of *Secondary* shares offered (the number of insider's shares sold divided by the total number of IPO shares offered). We control for firm riskiness and information asymmetry by constructing a *Firm Risk Score* variable ranging from 0 to 3: firms score +1 if they are internet firms, +1 if they are listed on the junior segments of stock exchanges where track record and disclosure requirements are reduced, and +1 if they are domiciled in emerging markets where macroeconomic risks and accounting standards differ from developed markets. Finally, we control for inexperienced banks, small deal sizes, and infrequent issuance countries, sectors and months by setting dummy control variables *Top 8 banks, large, active country, active sector,* and *active month* equal to one. We assess the fit of covariates to treatment assignment and IPO outcomes in the Appendix. The most consistent determinants of adviser choice are firm market value and VC backing. 1st day

return increases with Secondary shares. Withdrawn rate increases with the file to offer period, and decreases with firm market value. Adjusted gross spread decreases with firm market value.

Based on two-sample tests, advised IPOs show no difference in 1st day returns compared to non-advised IPOs. However, withdrawn rate and adjusted gross spread are both significantly lower in advised IPOs, with *t*- and *z*-statistics above 3. Turning to covariates, we find that firms that hire advisers are less risky, have larger market values, a higher incidence of VC backing, and launch in periods of lower market risks than non-advised firms (*t*- and *z*-statistics ranging from 3 to 8 in two-sample tests). Turning to dummy control variables, advised IPOs raise more proceeds, involve top 8 banks, and hail from active issuance countries to a far greater extent than non-advised IPOs (*t*- and *z*-statistics ranging from 3 to 8).

2.3.2 Instrumental variable estimation

As discussed in the introduction, advisers are not randomly assigned and adviser choice is likely to be impacted by the same observed and unobserved factors as our IPO outcome variables. To address endogeneity, we employ an excludable instrument that is internally valid to measure the causal effects of our *Advised* variable.

We combine elements inherent in instruments used in prior IPO studies, namely news coverage (Liu, Sherman and Zhang (2014)) and market returns (Bernstein (2015)), and instrument our Advised variable with the Bloomberg IPO Index ("BIPO") closing price on the announcement day of each IPO in our sample. BIPO is a capitalization-weighted index that tracks the performance of first-year IPOs in the US. As such, it reflects the broad health of the new issue market (news coverage, deal volumes, aftermarket performance, etc.) but is otherwise exogenous to European firms and should not have any direct effect on IPO outcomes in our sample, particularly as we take BIPO levels on the day of announcement of IPOs in our sample. For the same geographic and temporal reasons, there also cannot be a reverse effect of our IPO outcome variables on BIPO levels. We therefore believe the exclusion restriction is satisfied. At the same time, we believe our instrument is relevant and influences our endogenous *Advised*

variable. The significant press attention given to US IPOs means conditions in that market influence European firms preparing to IPO. In particular, we believe a high BIPO level stimulates adviser hiring decisions. Some firms may be anxious about a BIPO momentum reversal and a possible closing of the IPO window ('fear of missing out'). Others may be concerned the market is crowded and banks may be distracted working on other IPOs. Finally, firms may fear that IPOs are performing too strongly in the aftermarket, setting a high bar for 1st day return expectations. In each case, issuing firms are drawn to hiring an adviser.

As our endogenous treatment variable is binary, we follow the method outlined by Wooldridge (2002) and instrument *Advised* with the predicted probabilities from the probit regression $P_i = \Phi(BIPO_i, Covariates_i, Controls)$.[17] After obtaining $\hat{P}_i$, we conduct the following two-stage estimation:

$$Advised_i = \beta_0 + \beta_1 \hat{P}_i + \beta_2 Covariates_i + Controls + \varepsilon_i \quad (1)$$

$$IPO\ outcome_i = \gamma_0 + \gamma_1 \widehat{Advised}_i + \gamma_2 Covariates_i + Controls + \varepsilon_i \quad (2)$$

Table 2.3 reports our first-stage regressions. In Panel A, columns (1) to (3) we present the marginal effects from the initial probit regression $P_i = \Phi(BIPO_i, Covariates_i, Controls)$. In columns (4) to (6) we form the instrument $\hat{P}_i$ from the predicted values of the respective probit regressions and report estimates of our first-stage regression corresponding to Equation (1). The results in columns (1) to (3) show that BIPO is statistically significant at the 1% level. The coefficient estimates in columns (4) to (6) are significant throughout at the 1% level. Although the *F*-statistics are generally within Wald critical values, and above the *F*=10 threshold proposed by Staiger and Stock (1997)), we remain cautious in interpreting results (Stock and Yogo (2005)).

In Panel B, we perform additional regressions to examine the exclusion restriction. Although BIPO levels cannot be predicted (assuming efficient markets), the returns of US IPOs that comprise the index may affect the aggregate number of IPOs launching in Europe, possibly

[17] Wooldridge (2002) describes the estimation in Chapter 18 (p. 623 procedure 18.1).

encouraging weaker firms to go public that would otherwise not be in our sample.[18] If this were true, BIPO levels might directly affect some IPO outcomes in our sample. However, coefficient estimates from regressions on our three dependent variables in columns (1) to (6) on both BIPO levels and lagged BIPO levels are statistically insignificant throughout. We perform additional placebo tests for the exclusion restriction in the Appendix, and find no association between BIPO levels and the market shares of leading US underwriters, and in parallel, no relation between the market shares of the same underwriters and IPO outcomes. Whilst not conclusive, these findings support the view that the exclusion restriction is satisfied.

2.3.3 Regression discontinuity design

As we lack instruments for our adviser types (*Generalist* and *Specialist*) and firms (*Rothschild*, *Lazard* and *STJ*), we instead employ an empirical design that elicits the causal effects of these indicator variables. We follow Busaba et al. (2019) and exploit three empirical characteristics of European IPOs: first, that filing ranges are rarely revised once set (there are only 6 such instances in our sample, or 0.8% of total IPOs); second, that IPOs rarely price above the filing range (Figure 2.4 depicts only 3 such instances in our sample, or 0.4% of total IPOs); and third, that the frequency distribution of IPO prices relative to the top of the filing range is highly discontinuous at zero (Figure 2.5 shows there are 32 times more IPOs pricing at the top of the filing range than within a 5% band above it).

We propose that the adviser takes a proactive role in setting the initial filing range after extensive pilot fishing, and that the upper and lower bounds are driven by the adviser's incentives: generalists (with IPO completion fees only) are incentivised to set a 'conservative' filing range where the lower bound is close to the issuer's reservation price and the upper bound rewards pilot fish investors for their pre-IPO information production; specialists (with IPO success/ratchet fees and monthly retainers) are incentivised to set an 'aspirational' filing range

[18] Another potential bias is that high BIPO levels might encourage European firms to IPO in the US, either via a dual or US listing. We find 2 (33) European firms in our sample chose a dual (US) listing. Dummy variables for these firms show no relation to BIPO levels in OLS regressions employing our covariates and controls.

where the upper bound allows the issuer to benefit from strong bookbuilding demand, and the lower bound signals the issuer's willingness to withdraw the IPO. If our hypothesis were true, and based on the empirical characteristics of European IPOs noted above, we should expect to find that generalist-advised IPOs are more underpriced when pricing at the top of the filing range, whilst specialist-advised IPOs are less underpriced at this upper bound.

In order to test our hypothesis, our research design must identify instances of higher or lower underpricing by advisers that are distinct from the average underpricing (or the inadvertent and empirically unpredictable mispricing) that might otherwise exist. We face three challenges. First, an adviser's pricing intention is not observable. Second, instances where pilot fish investors' maximum limit prices are binding are equally unobservable. Third, we must estimate counterfactual outcomes for a control group of IPOs that were not underpriced by the adviser. We address these three challenges in turn. First, as the adviser is fully informed at the time of final pricing, we consider his pricing intention manifests itself in the first-day return of the IPO shares. We would therefore expect underpricing by advisers seeking to reward pilot fish to increase the first-day return relative to IPOs that generated the same degree of bookbuilding demand but were not constrained by a conservatively-set filing range.

Next, we identify situations in which the price limits of pilot fish are likely to have been binding. We use seven 'pricing bracket' indicator variables (ABOVE, TOP, HIGH, MID, LOW, BOTTOM, BELOW) to indicate the position of the final IPO price relative to the initial filing range. Figure 2.4 depicts the distribution of completed IPOs by these pricing brackets. Consistent with our predictions, we find no advised IPOs in the ABOVE bracket, twice as many generalist- than specialist-advised IPOs (29 versus 15 deals) in the HIGH and TOP pricing brackets, and a similar number of generalist and specialist IPOs in the BOTTOM bracket (15 vs. 13 deals).

Finally, we identify a control group of IPOs. We do this by exploiting the discontinuity in IPO prices around the TOP of the pricing range. We consider that the TOP bracket contains

many IPOs that might have priced above the range, had it been set less conservatively. Our analysis therefore focuses on the cross-sectional effect on 1st day return associated with generalist- versus specialist-advised IPOs in this TOP bracket. We also consider the group of IPOs pricing in the HIGH bracket (i.e. immediately below the TOP bracket) as a control group. Issuers in this HIGH bracket are similar in many key observable and unobservable dimensions that are ultimately reflected in strong bookbuilding demand. Furthermore, the HIGH bracket is the region where offerings in the TOP bracket would have been priced were it not for the conservative setting of the filing range. This empirical design allows us to obtain closer estimates of unobserved counterfactual outcomes for the underpricing of strongly-demand IPOs.

In order to implement our testing strategy, we estimate the following OLS regression specification for IPOs within our Pricing Brackets:

$$1st\ day\ return = \beta_0 + \beta_1 PricingBracket + \beta_2 PricingBracket\ x\ AdviserType + Covariates + Controls + \varepsilon_i \quad (3)$$

The Pricing Bracket indicator variables are included in the regression as standalone variables and then interacted with the Adviser Type dummy. We omit MID for reasons of collinearity and the interacted term 'ABOVE x Adviser Type' as there are no observations in this category. The specification allows us to estimate the slope coefficient on Adviser Type for each Pricing Bracket. We focus in particular on the coefficient of the interaction term for IPOs pricing in the TOP and HIGH brackets.

2.4 Main results

2.4.1 The impact of advisers on IPO outcomes

To test the effects of our *Advised* variable, we use the specification denoted in Equation (2). Table 2.4 reports the coefficient estimates from this regression. The dependent variables are 1st day return (Panel A), withdrawn rate (Panel B) and adjusted gross spread (Panel C). In columns (1) to (3) we present the results for IV estimations. In each case, we begin with a univariate analysis then add covariates and controls. We present results from corresponding

OLS regressions in columns (4) to (6), and a nearest-neighbour matching (NNM) estimator without and with controls in columns (7) and (8) respectively. Matching is with replacement, standard Mahalanobis distance, two matches per observation, large-sample bias adjustment on our continuous covariates, and an exact match on our binary covariate (VC), and the estimator is derived by Abadie and Imbens (2006 and 2011). We assess the balance of covariates across raw and matched samples in the Appendix.

In Panel A, we find the estimates from all of the IV, OLS and NNM specifications are insignificant. This suggests advisers in aggregate have no causal relation with 1st day return, confirming the previous summary statistics of JJS (2018). However, the earlier paper does not draw causal inference, or examine possible equilibrium effects with withdrawn rates or underwriting fees. It may be that advisers reduce withdrawn rates or underwriting fees while keeping 1st day return constant, thus adding value to their issuing clients. Certainly, prima facie, the aggregate null effect on underpricing seems at odds with the sophisticated nature of VC-backed issuers, the fees charged by advisers themselves, and the competitive nature of the market for advisory services.

In Panel B, we find estimates in respective fullest specifications in columns (3), (6) and (8) are again insignificant. In column (4) however, the OLS coefficient is significant, large and negative before covariates and controls. The results suggest advisers in aggregate have no causal association with withdrawn rate, but have a spurious correlation with lower withdrawn rates. Unsophisticated issuers are therefore at risk of advisers pointing to higher execution certainty as a justification for their own advisory fees. For our purposes, the null effect on withdrawn rate is helpful in interpreting our previous findings with respect to underpricing. Our conjecture that advisers might be keeping 1st day return constant while reducing execution risk is false. The question remains whether advisers might still be reducing underwriting fees.

In Panel C, we find estimates from IV, OLS and NNM specifications are significant, economically large and negative in columns (1), (4) and (7). However, the significance disappears

when introducing covariates and controls. As is the case with withdrawn rate, the finding is important insofar as advisers have a spurious correlation with lower adjusted gross spreads. The finding is also helpful in confirming the null overall (equilibrium) causal effect of advisers across our three IPO outcome variables.

2.4.2 The impact of adviser types/firms on 1st day return

To test the effects of our *Generalist, Specialist, Rothschild, Lazard* and *STJ* variables, we use the specification denoted in Equation (3). Table 2.5 reports the coefficient estimates from this regression. The dependent variable is 1st day return. Column (1) regresses all of the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (2) to (6) include the interaction of pricing bracket variables with each adviser variable in turn. For brevity, we report only the coefficients for the TOP and HIGH brackets and their interaction terms.

In the baseline regression in column (1), we find IPOs priced in the TOP bracket (treatment group) are associated with a 148-percentage point increase in 1st day return. In comparison, IPOs in the HIGH bracket (control group) are associated with a 50-percentage point increase in 1st day return. This leaves a statistically significant 98-percentage point differential effect attributable to the conservative setting of the filing range. Importantly, falsification tests reveal no significant coefficients on other pricing bracket variables elsewhere in the filing range, and no economically large differential effects between such brackets.

Next, in columns (2) and (3), we examine the effect of generalists versus specialists by adding interacted terms to the baseline regression. In column (2), we find the effect of being advised by a generalist is statistically and economically pronounced among IPOs pricing at the TOP of the filing range. Conditional on an IPO being in this bracket, the effect of being advised by a generalist firm is associated with an increase of 163-precentage points in 1st day return. Comparing the coefficients on Generalist x TOP (treatment group) versus Generalist x HIGH (control group), we find a differential effect of 91-percentage points (coefficients of 1.63 vs. 0.72) that is attributable to the conservative setting of the filing range. Turning to column (3),

we find no such effects. The coefficients on the interacted terms Specialist x TOP and Specialist x HIGH are statistically insignificant and in any event negative.

Finally, in columns (4) to (6), we examine our Rothschild, Lazard and STJ indicator variables. We recall that the first two firms are generalists, and that Lazard is less specialised in IPOs than Rothschild (IPO specialisation score of +2 versus +5 respectively). In column (4), Rothschild is associated with increased 1st day return in the control group (HIGH bracket, coefficient 0.53), but not in the treatment group (TOP bracket). In column (5), Lazard has the opposite association. The interacted term Lazard x TOP (coefficient 2.50) has eighteen times the economic magnitude of the interacted term Lazard x HIGH (coefficient 0.14). Conditional on an IPO being in the TOP pricing bracket, the effect of Lazard is associated with an increase of 236-precentage points in 1st day return, attributable to the conservative setting of the upper bound of the initial filing range. Turning to column (6), we find no such effects. We recall that STJ is a specialist firm with an IPO specialisation score of +10. We find a significant, negative and large coefficient (-0.51) on the interacted term STJ x HIGH, together with a negative though insignificant coefficient on STJ x TOP (-0.42).

These findings suggest that the differences in IPO specialisation and contractual features described in the earlier section may be associated with differences in 1st day return. One explanation might be that generalists and their issuer clients are more focused on avoiding IPO withdrawal or reducing gross spread, and achieve these goals by setting a more conservative initial filing range. This could be the expected outcome where the issuer-adviser contract contains no monthly retainer, no success fee, no bank monitoring features, and only a completion fee. We are unable to test this hypothesis as our empirical design exploits the discontinuity in the pricing of completed IPOs only. Another explanation might be that IPO underpricing is intrinsically difficult to mitigate. Lowry, Officer and Schwert (2010) report that underwriters, despite many information advantages, still have difficulty in accurately pricing IPOs due to the lack of detail about prevailing levels of market-wide demand for the new shares.

A generalist adviser with high M&A market share may have skill in valuing private firms, but less in assessing such IPO demand. If so, this might explain the difference in underpricing effects between Rothschild and Lazard, despite both firms having similar contracting features. Rothschild's higher number of IPOs may contribute to a greater ability to predict bookbuilding demand. Alternatively, Rothschild's market share may have a disciplining effect on banks, with an increased cost to them of being excluded from future IPOs in the event of excessively positive 1st day returns.[19] Higher market share may also allow Rothschild to capture the benefits of monitoring at a lower (per deal) intensity since it is able to gather more information on banks from deal to deal.

2.4.3 Robustness

We perform various tests in the Appendix. As median 1st day return is significantly below the mean in our sample (1.53% vs. 4.18%), we follow Benveniste et al. (2003) and estimate our results for 1st day return in logs. We examine unadjusted price returns at the one-month level post-IPO. We follow Busaba et al. (2019) and measure underpricing as the one-month STOX600-adjusted return from the IPO price. In each case, we find our results are largely invariant. We also measure the first-day trading volume in the shares, a proxy for aftermarket 'flipping' by investors, and find specialists and STJ are associated with significant reductions.

2.4.4 Are unsophisticated issuers at risk?

We find that advisers make claims about adding value when marketing their services to potential IPO clients; however, we find no evidence that advisers in aggregate affect IPO outcome variables (Table 2.4). In parallel, advisers are not required to disclose their contracting arrangements in IPOs, or their potential conflicting revenue relationships with banks and investors; however, we find evidence that contracting differences between generalists and specialists, and the degree of IPO specialisation of leading firms, affect underpricing (Table 2.5).

[19] Benveniste and Spindt (1989) report that banks are able to threaten informed investors with being cut-off from future deals as punishment for deliberately understating valuation information during bookbuilding. The value of such threats increases the larger the market shares of the banks.

In such an environment, issuers may be making uninformed choices when appointing advisers. In a worst-case scenario, advisers may be 'picking off' unsophisticated issuers who are one-time participants in their repeated game with banks and lead investors, as predicted by models of collusion in principal-agent-monitor hierarches (e.g. Tirole (1992)).

To test this hypothesis, we repeat the analysis of Table 2.5 using the regression specification denoted in Equation (3), but divide our sample into low and high issuer sophistication samples. Table 2.6 reports coefficients estimates. Columns (1) to (4) limit the sample to 207 IPOs from unsophisticated (i.e. small, non-VC backed) issuers. Columns (5) to (8) limit the sample to 102 IPOs from sophisticated (i.e. frequent VC) issuers. As before, columns (1) and (5) regress only the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (2) to (4) and (6) to (8) include interacted terms.

We find significant, positive and large coefficients on the TOP variable in all columns. The economic magnitude is higher with frequent VC IPOs than with unsophisticated issuers. One explanation might be that PE/VC firms are repeat vendors of IPOs and therefore have a positive aftermarket bias in order to preserve market access for follow-ons and future IPOs. Consistent with our results in Table 2.4, we find no significant coefficients on the interacted terms Adviser x TOP and Adviser x HIGH in either columns (2) or (6). Consistent with our results in Table 2.5, we find a significant, positive and economically large coefficient (1.58) on the term Generalist x TOP in column (3). Taking into account the control group Generalist x HIGH (coefficient 1.12), the differential effect of generalists equates to a 46-prercentage point increase in 1st day return amongst IPOs pricing at the TOP of the range. However, we find no equivalent significant coefficient for Generalist x TOP in column (7). This suggests the association of generalists with higher underpricing we find in Table 2.5 derives in large part from unsophisticated issuers. When examining the effect of specialists in columns (4) and (8), we find the exact opposite relation. The coefficient on Specialist x TOP is insignificant with unsophisticated issuers in column (4), but in column (8) it is statistically significant and negative

with frequent VCs (coefficient -1.54). Taking into account the control group Specialist x HIGH (coefficient -0.18), the differential effect of specialists is a 136-percentage point reduction in 1st day returns for IPOs pricing at the TOP of the range. We recall that specialists derive a higher proportion of their IPO business from frequent PE/VC firms than generalists. Our finding suggests specialists are associated with significantly reduced underpricing for these sophisticated clients.

2.4.5 Do advisers form coalitions with banks?

We find that generalists are associated with increased underpricing among IPOs at the top of the price range. We recall that one of the key services provided by advisers is bank selection, often via a 'beauty parade'. This gives rise to concerns of favouritism and the possibility that advisers and banks have reciprocal relationships across business areas outside of IPOs (e.g. M&A, debt restructuring, and so forth). In parallel, much of the recent IPO literature has proposed that agency conflicts offer a better explanation for IPO pricing than informational models. Consistent with IPO block-booking and coalition theories (e.g. Gondat-Larralde and James (2008)), it is therefore possible that leading generalists form coalitions with leading IPO underwriters, particularly banks that are heavily involved in M&A where generalists earn a large share of their overall revenues.

To test this hypothesis, we repeat the analysis of Table 2.5 using the regression specification denoted in Equation (3), but limit our sample to IPOs bookrun by banks that are leading underwriters in our sample and also top-three ranked each year in the Thomson Reuters Announced Global M&A league table during our sample period. Table 2.7 reports coefficients estimates. Columns (1) to (4) limit the sample to 92 IPOs bookrun by Goldman Sachs. Columns (5) to (8) limit the sample to 94 IPOs bookrun by Morgan Stanley. As before, columns (1) and (4) regress only the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (2) to (3) and (5) to (6) include interacted terms.

We find significant, positive and large coefficients on the TOP variable in columns (1) to (3), although not in columns (4) to (6). In column (2), we find a significant, large and negative coefficient (-2.17) on Rothschild x TOP. In contrast, in column (3) we find a significant, large and positive coefficient (2.48) on Lazard x TOP. These results are inverted when we consider columns (5) and (6). In these columns, the coefficient on Rothschild x TOP is positive (0.71) while the coefficient on Lazard x TOP is negative (-0.45). In unreported results, we find no 1st day return effects of STJ in either of the bank samples. Consistent with theory, these findings provide empirical evidence that coalitions may exist between leading generalists and IPO underwriters.

2.4.6 Welfare implications

JJS (2018) discuss the implications of quid pro quos between banks and investors, both in enhancing and diminishing welfare for issuers. The link we find between IPO specialisation and 1st day return, and the possibility of coalitions between leading generalists and banks, points towards possible quid pro quos between generalists and banks. The welfare implications are therefore similar to those examined in the prior study. Whilst it is outside the scope of our study to test agency-based interpretations, such behaviour is predicted in theoretical models, and in equilibrium would allow coalitions to compete more aggressively for IPOs from sophisticated or larger issuers. In an environment where advisers' contracting is not disclosed and the balance of incentives is not transparent, unsophisticated issuers may be at risk.

We are limited by micro-level fee data in measuring welfare effects. In particular, we lack data on the amount of incentive fees actually paid, and to which banks. However, gross spreads and 1st day return in our sample are low by historic standards and compared to other markets, especially the US. Meanwhile, advised rates increased rapidly in our sample period, with a triopoly of leading advisers becoming established with heterogeneous contractual features. It is possible therefore that during our sample period European issuers benefitted from a competitive

equilibrium in which some of the quid pro quos were benign. This may not hold true in future European IPOs, and may not have been the case in other markets or other time periods.

Finally, we note that during our sample period US IPOs had higher 1st day returns along with far higher and non-discretionary underwriting fees. In the past, quid pro quos (e.g. of underpriced IPO shares) have been found to be more indicative of agency problems in a high fee and high 1st day return environment. This was certainly the case in IPOs during the dot-com period of 1999-2000 where subsequent research has unearthed a variety of agency-based, welfare-destroying practices. Underpricing effects and possible quid pro quos of advisers in the US IPO market would make an interesting area of research, particularly as specialist firms such as Solebury Capital and ICR Capital have established themselves over the past decade alongside generalist firms such as Evercore and Moelis.

2.5 Conclusions

This paper examines IPO advisers' services and incentives, and their effect on first-day returns, withdrawals and underwriting spreads in a sample of European firms from January 2010 to June 2017. Advisers are increasingly important intermediaries in IPOs, taking part in almost half of completed deals in 2016 in our sample. They provide independent guidance to issuers and are key gatekeepers in determining which banks are hired and what gross spreads they can earn. Three firms with different business models dominate the market, together sharing 77% of the volume of advised deals. After that, a handful of firms have experience of 3 or more IPOs each, while a further thirty boutiques and individuals have advised on only one or two IPOs. While the market is competitive, advisers can earn significant fees (more than $1 million per deal), sometimes taking their remuneration from the underwriting spread, but typically as an additional cost to the issuer. At the same time, advisers' contracting with issuers and advisers' revenue relationships with banks and investors are not disclosed, and advisers are free to make marketing claims of their value-add in ways that may be misleading and are largely unverifiable by potential issuers.

We find no evidence that advisers in aggregate add value in IPOs, either by reducing first-day returns (or 'money-left-on-the-table' by issuers), by improving execution certainty (i.e. reducing withdrawals) or by lowering gross spreads. This aggregate null result is important since advisers have a spurious correlation with reduced withdrawals and lower gross spreads that can be gleaned from summary statistics; however, this association disappears entirely when introducing controls such as firm size, VC backing, and the ex-ante risk characteristics of issuing firms. In other words, advisers may be justifying their fees by pointing to improved execution certainty or reduced underwriting costs that are in fact entirely due to the characteristics of their issuing clients.

When we decompose the aggregate null result, we find significant concealed heterogeneity amongst different advisers. IPOs involving generalist advisers (offering M&A and other investment banking services alongside IPO advice) that price at the upper bound of the filing range are likely to be underpriced to meet early investors' limit prices. We compare the 1st day returns of these IPOs to the returns of other strongly-demanded generalist-advised IPOs where early investors' limit prices were likely not to have been binding, and identify a positive 91-percentage point differential in underpricing attributable to the conservative setting of the initial filing range. In contrast, IPOs advised by specialist firms (offering only IPO and equity-related advice) are not similarly underpriced. The finding is consistent with advisers' incentives. Generalists tend not to include monthly retainers or bank monitoring powers in their engagement letters, and earn their remuneration via completion fees. They may also earn higher total fees in the event of a concurrent successful M&A. Specialists have opposite incentives: they tend to have bank monitoring powers, monthly retainers and deal fees that are based on the IPO price achieved, but no competing M&A fees.

Consistent with theoretical models, we find empirical support for two agency-based explanations for the higher underpricing of generalist-advised IPOs. First, we find that unsophisticated (non VC-backed) issuers with small IPOs experience increased underpricing

when advised by generalists. This may be evidence that generalists 'pick off' unsophisticated issuers who are one-time participants in their repeated game with banks and lead investors, as predicted by models of collusion in principal-agent-monitor hierarches. Second, we find that leading generalist firms have dichotomous underpricing effects when handling IPOs from two leading banks that are also leading players in the M&A market. This may be evidence that generalists and banks enter into quid pro quo arrangements, as predicted by models of block-booking and coalitions in IPOs.

Issuers have reasons to employ advisers other than first-day return mitigation, execution certainty and fee reduction, which are outside the scope of our study. Firms may benefit from early strategic and tactical advice, or may be using other unobserved services of advisers either concurrently or after the IPO. Based on survey evidence (FCA (2016)), issuers value the day-to-day project management roles of advisers, and the ability to shield themselves from criticism if an IPO goes badly. This raises the question of whether sophisticated issuers, knowing that advisers' recommendations may not impact IPO outcomes, nevertheless follow their advice even against their own judgement. If so, this might be evidence of an agency problem.

It seems more likely that issuers, no matter how sophisticated, have difficulty in assessing whether advisers add value or not, or in differentiating between firms. Whilst banks experience a high degree of scrutiny from advisers during IPOs, advisers themselves do not disclose the type of data and information that would allow issuers to measure their own performance. The heterogeneity we find in first-day return effects between generalists and specialists, and also between leading advisory firms, suggests a knowledge of differential performance would inform an issuer's decision about which (if any) adviser to appoint. Without such knowledge, issuers are making uninformed appointments, and some may be naïve about the marketing claims made by rival advisory firms.

Figure 2.1: Prevalence of advisers in worldwide IPOs

The figure shows the evolution in the number of advised IPOs as a share of total IPOs for worldwide deals that raised more than $100 million between 2000 and 2016. The sample comprises 3,803 IPOs raising proceeds of $1,936 billion of which 437 were advised raising proceeds of $422 billion. The data are from Dealogic.

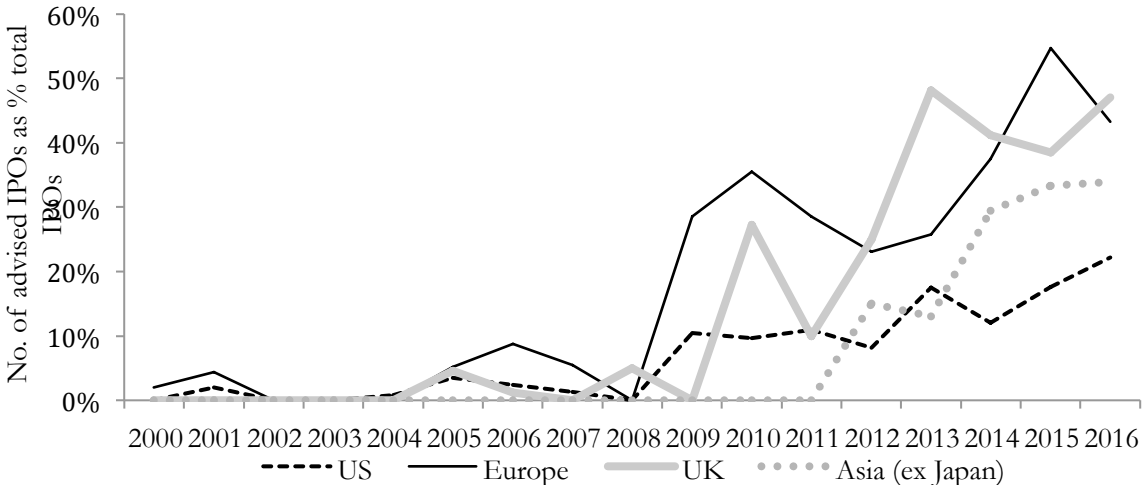


Figure 2.2: Advisory services and the European IPO timeline

The figure sets out the European IPO timeline from left to right showing key decisions to be taken by issuing firms and the emphasis on advising versus monitoring services provided by advisers. 'Crossover round' refers to investments made close in time but before the filing of a registration statement. 'Early Look' meetings are private meetings between the issuer and potential investors before the IPO launch. 'RfP' is the Request for Proposal sent to banks invited to the beauty parade. 'Cornerstone' and 'Anchor' investors commit to subscribing for shares before the IPO is publicly launched. 'Pilot Fishing' meetings are similar to Early Look meetings but with more substantive marketing materials and a greater specificity of pricing and demand feedback collected. 'ITF' is the Intention To Float press release signifying when the IPO launch becomes public. 'PDIE' is Pre-Deal Investor Education. We provide a detailed European IPO timeline and stylized facts on Early Look/Pilot Fishing, Pre-IPO Investors, Retail Offers and Dual Track processes in the Appendix.

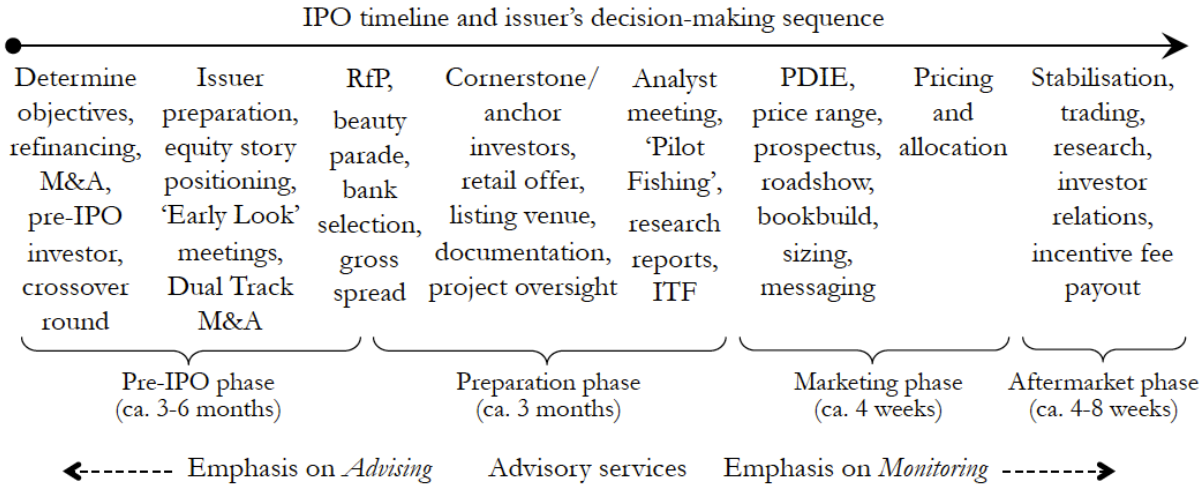


Figure 2.3: IPO outcomes in our sample

The figure shows mean 1st day return, withdrawn rate and adjusted gross spread by year in our sample. The R-squared between 1st day return and withdrawn rate is 0.63.

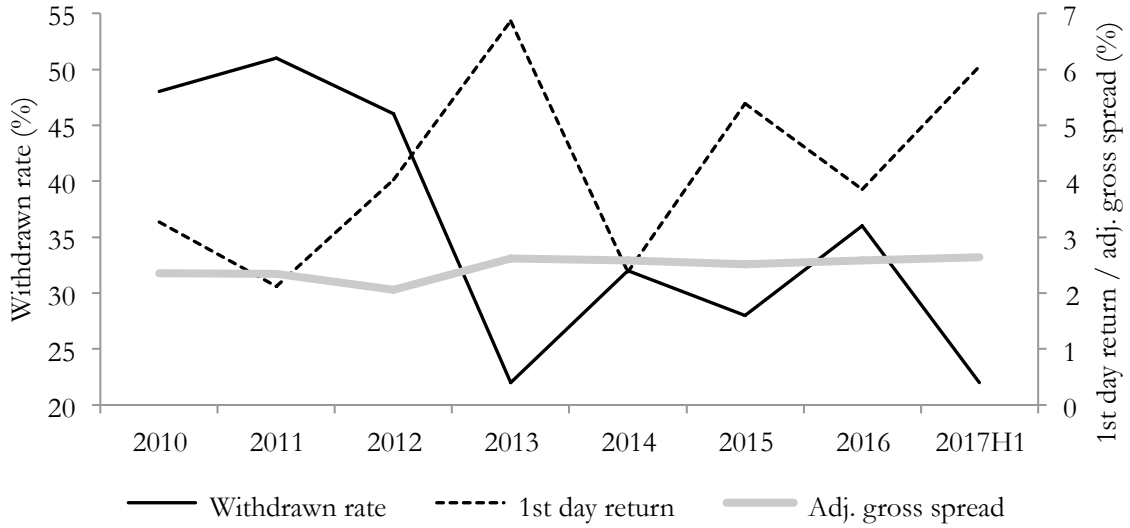


Figure 2.4: Distribution of IPOs by pricing brackets and advisers

The figure shows completed IPOs with and without advisers grouped into pricing brackets according to whether they are priced BELOW the filing range, priced at the BOTTOM (i.e. low boundary) of the filing range, priced between the LOW boundary and the mid-point of the filing range, priced at the MID point of the filing range, priced between the mid- and the HIGH boundary of the filing range, priced at the TOP of the filing range, and priced ABOVE the filing range. There are no observations of advised IPOs pricing above the filing range. The dashed line represents the proportion of advised IPOs in each pricing bracket.

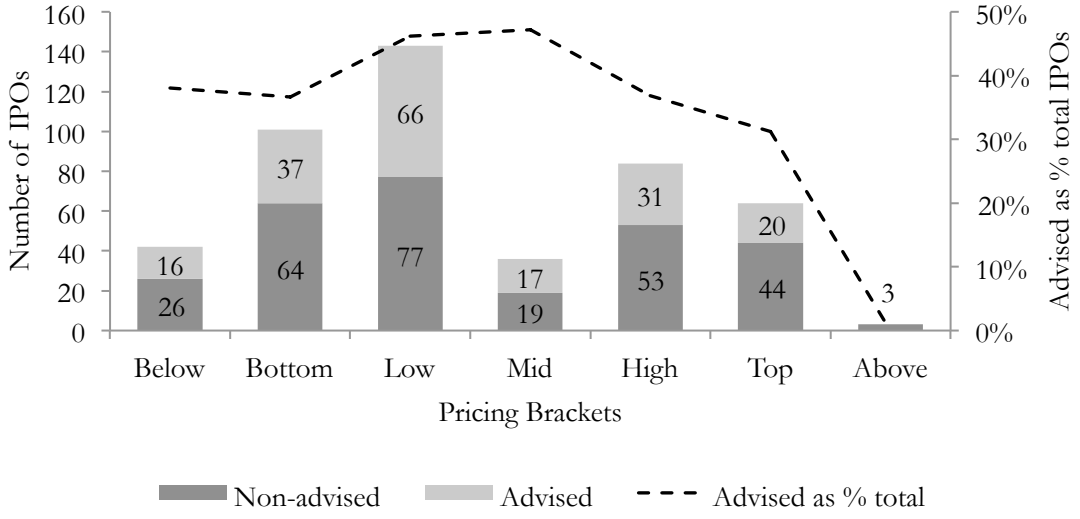


Figure 2.5: IPO prices relative to the top of the filing range

The figure shows the frequency distribution of IPO prices relative to the top of the filing range, namely (IPO Price – Top of Filing Range)/Top of Filing Range. Partitions have a width of 0.01. The bin beginning at zero and ending +/- 0.01 contains observations where the IPO price is exactly equal to the boundary, as well as observations within +/-1% of this level. The dashed line fits a normal density to the observed distribution.

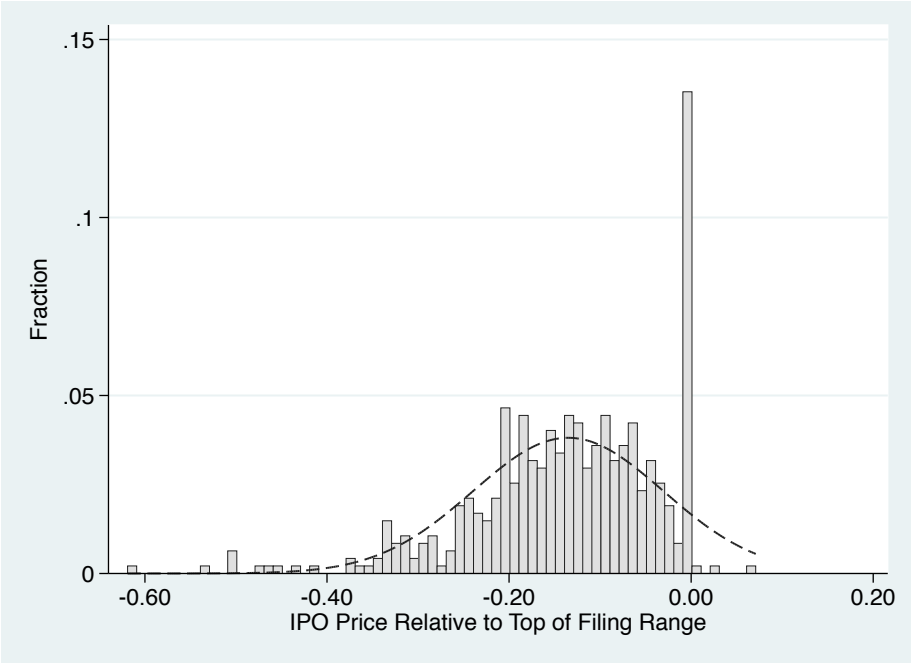


Table 2.1: Leading advisers, IPO specialisation and incentives

Panel A provides summary information on the ten most frequent advisers in our sample. Number of IPOs includes completed and withdrawn deals. Proceeds and median size refer to completed IPOs only. Joint-advised deals are apportioned fully to each adviser. Type refers to generalist (G) and specialist (S). We report *t*-statistics (χ-statistics, Wilcoxon rank sum test) for differences in mean (median). ***, ** and * denotes significance at the 1%, 5% and 10% level. Panel B provides further information on the top three advisers. Revenue data are from company filings. Global M&A ranking refers to the Thomson Reuters Announced Global M&A league table. In both cases, we omit half-year 2017 figures and report the average for the period 2010-2016. Monthly retainer, bank monitoring features and success/ratchet fees refer to advisers' contractual terms as described in the Appendix. IPO specialisation score is a categorical variable ranging from 0 (least) to 12 (most). Equities/Corp. Finance & M&A/Asset management score 0/1 for Yes/No. IPO market share, Capital markets revenue and M&A ranking score 0/1/2. Advisory contract features score 1/0 for Yes/No (and Rarely). Variables are defined in the Appendix.

Panel A: Descriptive statistics for the top 10 advisers in our sample

	No. IPOs	Total proceeds ($m)	IPO size med. ($m)	Market value med. ($m)	VC (%)	1st day return (%)	Withdrawn rate (%)	Adj. gross spread (%)	Year founded	No. employees	Type
Rothschild	80	60,460	693	1,455	62.5	5.17	22.5	2.20	1811	2,800	G
Lazard	40	47,603	768	1,627	60.0	6.54	12.5	2.24	1848	2,843	G
STJ Advisors	33	24,482	561	1,379	84.8	1.02	3.0	2.18	2008	25	S
Lilja & Co	7	3,671	261	903	71.4	9.40	14.3	3.13	2004	5	S
Moelis	7	2,238	497	1,117	100.0	1.94	28.6	2.49	2007	750	G
Allegra Finance	6	327	53	234	66.7	-2.06	0.0	-	2006	8	S
Sundling Warn	5	1,179	184	445	100.0	3.41	0.0	-	2006	2	S
FIH Partners	4	4,120	742	1,768	75.0	12.87	0.0	1.38	2006	25	G
Evercore	4	3,584	630	1,818	75.0	8.01	0.0	2.20	1995	1,525	G
Gleacher	3	888	278	570	66.7	-1.01	0.0	2.44	2003	35	G
(1) Advised	245	147,140	499	1,183	54.3	4.14	21.2	2.30			
(2) Generalist	127	96,926	627	1,423	63.8	5.65	18.9	2.27			
(3) Specialist	51	29,659	472	939	82.4	1.77	3.9	2.26			
(4) Full sample	739	247,818	268	674	34.4	4.18	31.3	2.50			
Two-sample diff. (1) v (4)			-8.63***	-7.32***	-7.99***	0.07	4.42***	3.13***			
Two-sample diff. (2) v (3)			-2.71***	-2.42**	2.70***	-2.65***	-3.37***	-0.05			

Panel B: IPO specialisation and incentives of the top 3 advisers in our sample

	IPO advice rank	Equities business	Corp. Finance & M&A business	Asset management business	Capital markets (% total revenue)	Global M&A rank	IPO contracts include: Monthly retainer	Monitoring powers	Success/ratchet fees	IPO specialisation score
Rothschild	1st	No	Yes	Yes	30.2	12th	No	No	Rarely	5
Lazard	2nd	No	Yes	Yes	22.8	8th	No	No	Rarely	2
STJ	3rd	No	No	No	100.0	None	Yes	Yes	Yes	10

Table 2.2: Descriptive statistics

Panel A summarizes our sample by year, by top five countries of primary exchange and by top five industry sectors as reported by Dealogic. We lack market cap data for 198 firms, Secondary data for 149 withdrawn IPOs and proceeds data for 176 withdrawn deals. Panel B presents summary statistics separately for advised and non-advised IPOs. We report *t*-statistics (z-statistics, Wilcoxon rank sum test) for differences in mean (median). ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Panel A: Sample

	No. of IPOs			Proceeds		Issuer and offering details				IPO outcomes		
	Total	Advised		Med.	Total	Mkt	VC	Secon	File to	1st day	With-	Adj.
	No.	No.	%			Val. med.		-dary	offer med.	return	drawn rate	gross spread
				($m)	($m)	($m)	(%)	(%)	(days)	(%)	(%)	(%)
Full sample	739	245	33	268	247,818	674	34.4	49.8	29.0	4.18	31	2.50
2010	112	25	22	265	32,906	831	25.9	34.5	28.0	3.27	46	2.36
2011	98	25	26	137	27,842	478	21.4	44.6	30.5	2.12	45	2.34
2012	54	12	22	206	13,313	444	9.3	47.6	40.5	4.03	43	2.06
2013	64	23	36	389	27,098	1,045	37.5	63.1	28.5	6.86	20	2.62
2014	136	53	39	351	47,690	810	47.8	52.1	28.0	2.38	24	2.58
2015	148	59	40	251	57,755	517	41.2	51.7	28.0	5.39	22	2.52
2016	76	32	42	259	27,335	692	38.2	54.0	36.5	3.85	32	2.58
2017 H1	51	16	31	220	13,879	604	39.2	54.2	28.0	6.05	18	2.64
UK	180	72	40	394	64,992	1,145	46.7	53.9	29.0	4.42	41	2.65
Germany	77	27	35	292	29,704	618	31.2	40.0	28.0	2.58	27	2.37
Poland	69	21	30	79	10,813	241	13.0	48.3	29.0	4.60	42	2.08
France	61	25	41	63	18,022	258	41.0	25.1	35.0	2.03	18	4.83
Sweden	56	15	27	165	11,824	351	51.8	59.0	23.0	8.68	9	2.73
Financials	72	23	32	407	36,085	1,112	30.6	61.2	30.0	3.67	25	2.33
Healthcare	66	15	23	66	9,844	242	30.3	18.6	24.0	3.10	21	2.95
Electronics	66	25	38	273	25,937	711	34.8	52.1	25.0	7.87	24	2.62
Transport	66	21	32	227	23,756	786	24.2	50.1	35.0	4.04	36	2.37
Real Estate	58	10	17	258	11,406	692	15.5	33.4	31.0	3.57	43	2.16

Panel B: Variables

	Non-advised IPOs				Advised IPOs				Tests for diff.	
	Obs.	Mean	Med.	SD	Obs.	Mean	Med.	SD	*t*-stat	z-stat
IPO Outcomes										
1st day return (%)	286	4.20	1.30	9.78	186	4.14	2.10	9.08	0.07	-0.13
Withdrawn rate	494	0.36	0.00	0.48	245	0.21	0.00	0.41	4.42***	4.14***
Adj. gross spread (%)	100	2.71	2.55	1.09	105	2.30	2.38	0.74	3.13***	3.20***
Covariates										
Mean lagged w/drwn.	494	0.38	0.37	0.18	245	0.34	0.32	0.17	3.06***	3.10***
Ln (File to offer)	493	3.87	3.40	1.27	244	3.73	3.33	1.06	1.59	1.24
Ln (Market value)	337	6.25	6.10	1.18	204	7.03	7.08	1.16	-7.53***	-7.32***
Secondary	370	48.16	46.15	42.17	220	52.55	54.72	39.61	-1.27	-1.43
VC	494	0.25	0.00	0.43	245	0.54	1.00	0.50	-7.99***	-8.02***
Firm Risk Score	494	0.35	0.00	0.53	245	0.15	0.00	0.35	6.14***	5.21***
Controls										
Top 8 banks	494	0.46	0.00	0.50	245	0.74	1.00	0.44	-7.96***	-7.34***
Large	353	0.21	0.00	0.41	211	0.55	1.00	0.50	-8.25***	-8.16***
Active country	494	0.94	1.00	0.23	245	0.99	1.00	0.09	-4.07***	-3.14***
Active sector	494	0.99	1.00	0.10	245	0.99	1.00	0.09	-0.27	-0.26
Active month	494	0.99	1.00	0.11	245	1.00	1.00	0.06	-1.26	-1.07

Table 2.3: First-stage regressions and placebo tests

In Panel A, the dependent variable is *Advised*. Columns (1) to (3) report the marginal effects of probit regressions with *t*-statistics based on delta-method standard errors in parentheses. In these columns, BIPO is the Bloomberg IPO Index closing price on the day of announcement of the IPO, standardized. The instrument $\hat{P}_i$ in columns (4) to (6) are the predicted values from the estimations in columns (1) to (3) respectively. We report coefficient estimates with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. The specification for the IV estimation is given in Equation (1):

$$Advised_i = \beta_0 + \beta_1 \hat{P}_i + \beta_2 Covariates_i + Controls + \varepsilon_i$$

In Panel B, the dependent variable is *1st day return* standardized (columns (1) and (2)), *withdrawn rate* (columns (3) and (4)) and *adjusted gross spread* standardized (columns (5) and (6)). We report the coefficients from OLS regressions with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. BIPOlag30 is the BIPO level 30 observations prior to the IPO when the sample is sorted by announcement date, standardized. Covariates are *Mean lagged withdrawn, Ln (File to offer), Ln (Market value), Secondary, VC* and *Firm Risk Score*. Controls set *Top 8 banks, large, active country, active sector,* and *active month* all equal to one. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Panel A: First Stage Estimation of IV Analysis						
Dependent Variable: Advised						
	(1)	(2)	(3)	(4)	(5)	(6)
BIPO	0.06***	0.13***	0.12***			
	(3.72)	(3.59)	(2.94)			
$\hat{P}_i$				0.99***	1.00***	1.07***
				(3.68)	(3.36)	(3.13)
Controls	NO	YES	YES	NO	YES	YES
Covariates	NO	NO	YES	NO	NO	YES
Psd/Adj R-sq	0.01	0.05	0.15	0.02	0.06	0.19
F-statistic	-	-	-	13.55	11.30	10.83
Obs.	739	173	167	739	173	167

Panel B: Placebo Tests for Exclusion Restriction						
Dependent Variable:	1st Day Return		Withdrawn Rate		Adj. Gross Spread	
	(1)	(2)	(3)	(4)	(5)	(6)
BIPO	0.02		-0.02		-0.02	
	(0.18)		(-0.86)		(-0.26)	
BIPOlag30		-0.04		-0.04		0.05
		(-0.49)		(-1.09)		(0.61)
Controls	YES	YES	YES	YES	YES	YES
Covariates	YES	YES	YES	YES	YES	YES
R-sq	0.08	0.09	0.15	0.18	0.31	0.32
Obs.	153	149	167	163	100	97

Table 2.4: The impact of advisers on IPO outcomes

The dependent variable in Panel A is *1st day return* standardized, Panel B is *withdrawn rate*, Panel C is *adjusted gross spread* standardized. In each panel, columns (1) to (3) report the results from IV regressions corresponding to the second stage represented in Equation (2):

$$IPO\ outcome_i = \gamma_0 + \gamma_1 \widehat{Advised}_i + \gamma_2 Covariates_i + Controls + \varepsilon_i$$

Columns (4) to (6) report the results from corresponding OLS regressions. Columns (7) and (8) report the results from our Nearest Neighbour Matching (NNM) estimator. Covariates are *Mean lagged withdrawn, Ln (File to offer), Ln (Market value), Secondary, VC* and *Firm Risk Score.* Controls set *Top 8 banks, large, active country, active sector,* and *active month* all equal to one. The control sample has a median IPO size of $906 million. We report IV/OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. For the NNM model, we report the average treatment effect on the treated (ATET) with *t*-statistics based on Abadie Imbens (2006 and 2011) standard errors in parentheses. . ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Panel A: Impact of advisers on 1st day return

Dependent Variable: 1st Day Return								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV	IV	IV	OLS	OLS	OLS	NNM	NNM
Advised	-0.08	0.59	0.08	-0.01	0.04	0.14	0.13	0.17
	(-0.35)	(0.37)	(0.12)	(-0.07)	(0.44)	(0.93)	(0.99)	(0.76)
Covariates	NO	YES	YES	NO	YES	YES	YES	YES
Controls	NO	NO	YES	NO	NO	YES	NO	YES
R-sq	0.00	0.00	0.09	0.00	0.05	0.09	-	-
Obs.	469	469	153	472	469	153	469	153

Panel B: Impact of advisers on withdrawn rate

Dependent Variable: Withdrawn Rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV	IV	IV	OLS	OLS	OLS	NNM	NNM
Advised	-0.04	-1.01	-0.19	-0.15***	-0.04	-0.04	-0.04	-0.05
	(-0.54)	(-0.96)	(-1.03)	(-4.42)	(-1.56)	(-1.01)	(-1.13)	(-1.38)
Covariates	NO	YES	YES	NO	YES	YES	YES	YES
Controls	NO	NO	YES	NO	NO	YES	NO	YES
R-sq	0.00	0.00	0.09	0.02	0.19	0.16	-	-
Obs.	532	532	167	739	532	167	532	167

Panel C: Impact of advisers on adjusted gross spread

Dependent Variable: Adjusted Gross Spread								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV	IV	IV	OLS	OLS	OLS	NNM	NNM
Advised	-0.93***	-1.41	-0.24	-0.43***	-0.27**	-0.10	-0.21*	-0.10
	(-2.68)	(-1.46)	(-0.53)	(-3.13)	(-2.29)	(-0.67)	(-1.77)	(-0.64)
Covariates	NO	YES	YES	NO	YES	YES	YES	YES
Controls	NO	NO	YES	NO	NO	YES	NO	YES
R-sq	0.00	0.16	0.31	0.05	0.42	0.32	-	-
Obs.	204	204	100	204	204	100	204	100

Table 2.5: The impact of adviser types/firms on 1st day return

The dependent variable is *1st day return* standardized. The regression is specified in Equation (3):

$$1d\ return = \beta_0 + \beta_1 PricingBracket + \beta_2 PricingBracket\ x\ AdviserType + Covariates_i + Controls + \varepsilon_i$$

Column (1) regresses all of the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (2) to (6) include the interaction of all pricing bracket variables with the adviser type/firm indicator variables. Covariates are *Mean lagged withdrawn, Ln (File to offer), Ln (Market value), Secondary, VC* and *Firm Risk Score*. Controls set *Top 8 banks, large, active country, active sector,* and *active month* all equal to one. The control sample has a median IPO size of $906 million. Pricing brackets are ABOVE, TOP, HIGH, MID, LOW, BOTTOM and BELOW. We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Dependent Variable: 1st day return	(1)	(2)	(3)	(4)	(5)	(6)
TOP	1.48***	1.02***	1.32***	1.64***	1.07***	1.38***
	(4.18)	(3.36)	(3.21)	(3.76)	(3.44)	(3.40)
HIGH	0.50**	0.44**	0.32	0.61***	0.45*	0.41*
	(2.36)	(2.17)	(1.27)	(2.87)	(1.89)	(1.74)
Generalist x TOP		1.63***				
		(3.01)				
Generalist x HIGH		0.72***				
		(3.14)				
Specialist x TOP			-0.42			
			(-1.05)			
Specialist x HIGH			-0.21			
			(-0.82)			
Rothschild x TOP				0.28		
				(0.42)		
Rothschild x HIGH				0.53**		
				(2.10)		
Lazard x TOP					2.50***	
					(3.77)	
Lazard x HIGH					0.14	
					(0.48)	
STJ x TOP						-0.42
						(-1.05)
STJ x HIGH						-0.51**
						(-2.33)
Covariates	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
R-sq.	0.31	0.45	0.33	0.35	0.43	0.33
Obs.	153	153	153	153	153	153

Table 2.6: The impact of adviser types on 1st day return in issuer samples

The dependent variable is *1st day return* standardized. The regression is specified in Equation (3):

$$1d\ return = \beta_0 + \beta_1 PricingBracket + \beta_2 PricingBracket\ x\ AdviserType + Covariates_i + \varepsilon_i$$

Columns (1) to (4) limit the sample to IPOs from non-VC backed issuers raising proceeds below $455mn (i.e. the bottom two-thirds of the full sample ranked by IPO proceeds). Columns (5) to (8) limit the sample to IPOs from VCs with 3 or more IPOs in the full sample. Columns (1) and (5) regress all of the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (2) to (4) and (6) to (8) include the interaction of all pricing bracket variables with the adviser type/firm indicator variables. Covariates are *Mean lagged withdrawn, Ln (File to offer), Ln (Market value), Secondary, VC* and *Firm Risk Score*. Controls set *Top 8 banks, large, active country, active sector,* and *active month* all equal to one. Pricing brackets are ABOVE, TOP, HIGH, MID, LOW, BOTTOM and BELOW. We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

DepVar: 1st day return	Sample of non-VC IPOs < $455mn				Sample of IPOs from frequent VCs			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TOP	1.17***	1.17**	1.13**	1.17**	2.15***	1.90***	2.15***	1.86***
	(2.62)	(2.22)	(2.36)	(2.53)	(4.37)	(2.80)	(3.88)	(3.35)
HIGH	0.15	0.17	0.13	0.17	0.55**	0.20	0.74***	0.14
	(0.41)	(0.37)	(0.30)	(0.43)	(2.53)	(0.53)	(4.09)	(0.70)
Adviser x TOP		0.10				0.29		
		(0.18)				(0.31)		
Adviser x HIGH		0.09				0.35		
		(0.26)				(1.09)		
Generalist x TOP			1.58***				0.82	
			(5.17)				(0.89)	
Generalist x HIGH			1.12***				0.50*	
			(5.04)				(1.84)	
Specialist x TOP				-0.01				-1.54**
				(-0.03)				(-2.33)
Specialist x HIGH				-0.33				-0.18
				(-1.57)				(-0.80)
Covariates	YES	YES	YES	YES	YES	YES	YES	YES
Controls	NO	NO	NO	NO	NO	NO	NO	NO
R-sq.	0.28	0.29	0.29	0.28	0.50	0.54	0.55	0.55
Obs.	207	207	207	207	102	102	102	102

Table 2.7: The impact of adviser firms on 1st day return in bank samples

The dependent variable is *1st day return* standardized. The regression is specified in Equation (3):

$$1d\ return = \beta_0 + \beta_1 PricingBracket + \beta_2 PricingBracket\ x\ AdviserFirm + Covariates_i + \varepsilon_i$$

Columns (1) to (3) limit the sample to IPOs where the bookrunner is Goldman Sachs. Columns (4) to (6) limit the sample to IPOs where the bookrunner is Morgan Stanley. Columns (1) and (4) regress all of the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (2) to (3) and (5) to (6) include the interaction of all pricing bracket variables with the adviser firm indicator variables. Covariates are *Mean lagged withdrawn, Ln (File to offer), Ln (Market value), Secondary, VC* and *Firm Risk Score*. Controls set *Top 8 banks, large, active country, active sector,* and *active month* all equal to one. Pricing brackets are ABOVE, TOP, HIGH, MID, LOW, BOTTOM and BELOW. We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

DepVar: 1st day return	Goldman Sachs sample			Morgan Stanley sample		
	(1)	(2)	(3)	(4)	(5)	(6)
TOP	1.68***	2.21***	1.03**	0.39	0.15	0.28
	(3.36)	(4.36)	(2.19)	(0.73)	(0.20)	(0.46)
HIGH	0.74**	1.08***	0.65	0.37	0.08	0.20
	(2.21)	(3.47)	(1.66)	(0.80)	(0.12)	(0.39)
Rothschild x TOP		-2.17***			0.71**	
		(-3.49)			(2.05)	
Rothschild x HIGH		0.42			0.58*	
		(0.73)			(1.70)	
Lazard x TOP			2.48***			-0.45
			(3.22)			(-0.56)
Lazard x HIGH			0.19			-0.08
			(0.38)			(-0.17)
Covariates	YES	YES	YES	YES	YES	YES
Controls	NO	NO	NO	NO	NO	NO
R-sq.	0.41	0.55	0.35	0.29	0.44	0.44
Obs.	92	92	92	94	94	94

Appendix 2.1: Variable definitions

1st day return. The first day closing price divided by the IPO price, minus one.

1st day trading volume. The number of shares traded on the first of trading day (source: Bloomberg) divided by the number of IPO shares excluding overallotment multiplied by 100.

1st month market-adjusted return. STOXX Europe 600 Index adjusted percentage change from the IPO price to the closing price one-month following the IPO date.

ABOVE. Indicator variable equal to one for IPOs pricing above the initial filing range.

Active country. Indicator variable equal to one for IPOs from primary exchanges with more than 10 IPOs in total in our sample.

Active month. Indicator variable equal to one for IPOs from pricing months with more than 10 IPOs in total in our sample.

Active sector. Indicator variable equal to one for IPOs from issuer sectors with more than 5 IPOs in total in our sample.

Adjusted gross spread. Gross spread with a 50% haircut applied to any *Incentive fee* component.

Advised. Indicator variable equal to one for IPOs that had a pure advisory firm overseeing the IPO process.

BELOW. Indicator variable equal to one for IPOs pricing below the initial filing range.

BIPO. The closing level of the Bloomberg IPO Index on the day of IPO announcement.

BIPOlag30. BIPO level 30 deals prior to the IPO when the sample is sorted by announcement date.

Books. The number of bookrunners in an IPO syndicate, whether active or not (see JJS (2018)).

BOTTOM. Indicator variable equal to one for IPOs pricing at the bottom of the initial filing range.

DB. Indicator variable equal to one for IPOs bookrun by Deutsche Bank. The sample contains 132 IPOs raising $84,898m with a median size of $677m.

Emerging market. Indicator variable equal to one for IPOs listed (or dual-listed) on stock exchanges in the following cities: Almaty, Athens, Bahrain, Belgrade, Bratislava, Bucharest, Budapest, Cairo, Hong Kong, Istanbul, Ljubljana, Moscow, Lagos, Prague, Reykjavik, Riga, Sao Paolo, Sofia, Tallinn Tunis, Vilnius and Zagreb.

File to offer. The number of calendar days between filing of the IPO prospectus and the pricing/withdrawal date.

Firm Risk Score. Scoring variable from 0 to 3. Firms score +1 if they are internet firms, +1 if they are *Junior Segment* firms and +1 if they are *Emerging Market* firms.

Frequent VC. Indicator variable equal to one for IPOs backed by VCs with 3 or more IPOs in our sample.

Generalist. Indicator variable equal to one for IPOs advised by Rothschild, Lazard, Moelis, Evercore, FIH Partners or Gleacher Shacklock. The sample contains 127 IPOs raising $96,926m with a median size of $627m.

Gross spread. The gross underwriting spread, totaling base and incentive components (if any).

GS. Indicator variable equal to one for IPOs bookrun by Goldman Sachs. The sample contains 133 IPOs raising $94,127m with a median size of $654m.

HIGH. Indicator variable equal to one for IPOs pricing between the mid-point and the top of the initial filing range.

Incentive fee. The percentage of IPO proceeds that are payable at the discretion of the issuer.

Infrequent VC. Indicator variable equal to one for IPOs backed by VCs with 1 or 2 IPOs in our sample.

JPM. Indicator variable equal to one for IPOs bookrun by JP Morgan. The sample contains 161 IPOs raising $109,611m with a median size of $662m.

Junior segment. Indicator variable equal to one for IPOs listing on London AIM, Frankfurt General, Frankfurt Scale, Paris Alternext, NASDAQ OMX, Norwegian Fund Broker Association, Oslo Axess, Russian Trading System or Warsaw NewConnect.

Large non-VC. Indicator variable equal to one for IPOs that are *Large* but not *VC*.

Large. Indicator variable equal to one for IPOs in the top third of our sample by proceeds ($455 million and above).

Lazard. Indicator variable equal to one for IPOs advised by Lazard. The sample contains 40 IPOs raising $47,603m with a median size of $767m.

LOW. Indicator variable equal to one for IPOs pricing between the mid-point and the bottom of the initial filing range.

Market value. The firm's total common shares outstanding times the IPO price for completed deals, or the mid-point of the price range for withdrawn deals.

Mean lagged withdrawn. The mean withdrawn rate of the twenty IPOs before pricing date, lagged by ten IPOs.

MID. Indicator variable equal to one for IPOs pricing at the mid-point of the initial filing range

MS. Indicator variable equal to one for IPOs bookrun by Morgan Stanley. The sample contains 133 IPOs raising $113,552m with a median size of $781m.

Proceeds. The offer price times the number of shares sold including overallotment (completed IPOs only).

Rothschild. Indicator variable equal to one for IPOs advised by Rothschild. The sample contains 80 IPOs raising $60,460m with a median size of $693m.

Secondary. The number of shares sold by pre-IPO owners divided by the total number of IPO shares.

Small non-VC. Indicator variable equal to one for IPOs not in *Large* or *VC* categories.

Specialist. Indicator variable equal to one for IPOs advised by STJ, Lilja & Co, Allegra Finance or Sundling Warn. The sample contains 51 IPOs raising $29,659m with a median size of $472m.

STJ. Indicator variable equal to one for IPOs advised by STJ Advisors. The sample contains 33 IPOs raising $24,482m with a median size of $561m.

Top 8 bank. Indicator variable equal to one for IPOs bookrun by one of the leading 8 banks by bookrun volume per year for the sample period (namely, *GS*, *MS*, *DB*, *JPM*, BofAMerrill Lynch, Credit Suisse, Citigroup, Union Bank of Switzerland). The sample contains 408 IPOs raising $224,194m with a median size of $543m.

TOP. Indicator variable equal to one for IPOs pricing at the top of the initial filing range

VC. Indicator variable equal to one if the issuer is backed a venture capital/private equity firm prior to IPO whether or not such VC/PE firm sells shares in the IPO.

Withdrawn. Indicator variable equal to one if an IPO is withdrawn, except if such withdrawal is due to an issuer accepting an M&A bid after the IPO has been launched (35 of 266 cases).

Appendix 2.2: Advisory services

Panel A describes IPO services. Advisers offer other services during IPOs such as audit, investor relations and press advice, but we consider these as ancillary. Panel B describes M&A dual-track considerations.

Panel A: IPO services

Pre-IPO planning	Evaluate strategic options (e.g. trade/partial sale, anchor investors, leveraged recap, M&A). Co-ordinate discussions with auditors, legal counsel and other professional advisers. Independent review of Issuer's business plan, projections and equity story.
Structure and process	Advise on M&A dual track (if any), anchor process (if any), go/no-go decisions. Review/identify key value or process issues (e.g. marketing impact of proposed Board composition, corporate governance, financing facilities, capital structure, dividend policy, financial disclosure, tax issues, and recommended offering structure). Coordinate early look meetings and pilot fishing.
Appointment of syndicate and other advisers	Agree request for proposal (RFP) process, bank selection criteria, engagement letters and timing, syndicate structure, fee arrangements, bank terms and conditions. Review equity research, valuation assumptions, peer group selection. Appointment of additional advisers (e.g. press relations, industry consultants).
Timetable/ project management	Advise on allocation of responsibilities between Bookrunners, coordinate work streams (due diligence, equity story, financial disclosure, legal matters), progress calls and meetings. Review key timing decisions (e.g. intention to float, launch, books close, withdrawal).
Documentation	Advise on terms and conditions recommended by Bookrunners. Review all materials to be made available to investors (e.g. prospectus, analyst presentation, roadshow materials). Rehearse management for all presentations.
Investor education and pre-marketing	Review marketing plan proposed by Bookrunners, manage overlaps, assign priorities. Design investor feedback forms for use in collecting feedback, hold daily calls. Advise on fine-tuning marketing message and sizing, price range and timing decisions. Review shadow book with Bookrunners, assign preliminary allocation rankings.
Roadshow and bookbuilding	Review all recommendations by Bookrunners regarding roadshow venues, allocation of one-on-one meetings, bookbuilding, and investor messaging. Analyze real-time progress of book, daily calls with Bookrunners and Issuer. Advise on briefing of independent analysts, trade press, other 3rd parties.
Pricing and allocation	Review Bookrunners recommendations on narrowing of price range, guidance, books close timing, sizing adjustments, final pricing and allocation, and advise on any adjustments.
Stabilization and aftermarket	Review stabilization strategy and trading activity of Bookrunners. Review Bookrunners' advice on establishing investor relations, research and market making.
Incentive fee	Review performance of syndicate banks and advise on award and allocation of *incentive fees.*

Appendix 2.2 (*cont.*): Advisory services

Panel B: M&A dual-track considerations

Timeline	IPO process, being more complex and less flexible given documentary and regulatory time requirements, should establish base timeline in which to integrate custom-made M&A track.
Documents/ information	Same data room for both tracks. Use documents prepared in IPO track as basis for M&A. Information provided to bidders guided by extent of IPO disclosure. Limited vendor due diligence (VDD).
Bidder group	Tight group focused on specific transaction concepts/applicable synergies that can create price maximisation compared to the IPO track. Synchronous progress of all bidders.
Creation of uncertainty	Sustain flexibility in decision-making. Avoid predictability of seller's decision or perception of time pressure. No exclusivity or pre-commitment to buyers. Manage press coverage.
Financing	Early finance dialogue (e.g. bank stapling) to back up valuation views of potential bidders.
T&Cs	Conditions precedent in SPA documentation analogous to IPO scope of liability.
IPO track	No termination of IPO track prior to firm agreement on terms of M&A sale.
Communication	Communication should focus on progress of IPO and not divulge information on interest received from other parties. M&A bidders should be given clarity on IPO process and timing.
Go/No-Go decisions	1st decision point: receipt of draft research reports and post pilot fishing. M&A track should have indicative bids and be well advanced into due diligence/negotiation phase. 2nd decision point: based on final bids post investor education/before start of roadshow. 3rd decision point: immediately before subscription of shares by underwriters.
Bank fees	Prevailing track receives full fees. In case M&A prevails, IPO bookrunner(s) receive(s) around 50% of what they would have earned had the IPO taken place at the valuation level validated by the IPO bookrunner(s). Such downside fees can be made partially discretionary.

Appendix 2.3: Advisory contracts

Panel A describes contractual terms between advisers and issuers. The breakdown of specific adviser remuneration is not disclosed in IPO prospectuses. Panel B describes the terms advisers can demand of underwriting banks before syndicate appointments are formalized. We refer to these as bank monitoring features.

Panel A: Terms and conditions

Monthly retainer	Fixed amount. Non-refundable. Paid monthly, typically in advance, until completion. Initial term (e.g. 3 months) often agreed. Subject to extension. Example: $25-50k per month.
Completion fee	Fixed amount payable upon pricing of the IPO, or shortly thereafter. Example: $500k.
Success fee	Variable amount. Payable at the sole discretion of the Issuer. Typically defined as a multiple of the completion fee, depending on the Issuer's level of satisfaction. Payable a month or two after the IPO. Example: 1-2x.
Ratchet fee	Similar to success fee, except the multiple of completion fee is calculated with reference to the IPO price or valuation multiple achieved. Payable 1-2 months after the IPO. Example: 1-2x.
Additional compensation	Work undertaken outside the scope of the engagement letter, agreed between the adviser and the Issuer. Example: $25-50k.
Future business	Agreement in good faith to be invited to pitch for follow-on offerings, equity-linked or debt securities offerings, or other corporate finance and M&A assignments.
Expenses	Reasonable and documented project-related expenses (e.g. business class travel, out of pocket expenses). Often accompanied by a cap on any individual item, or in total.
Term	Initial term can be as long as one year. Automatic continuation in the event IPO has not completed or contract not terminated. Termination by either party with written notice.
Trade sale fee	Break fee payable to IPO adviser if trade/partial sale or other sale of assets or control. Example: $500k.
Other adviser appointment fee	Break fees payable to IPO adviser up to, for example, 6 months after termination of contract if another adviser is contracted to perform a similar scope of services. Example: $500k.
Standard terms	Adviser is not responsible for specialist advice in legal, accounting, taxation or actuarial matters, nor for due diligence in relation to these matters (but may rely on such advice). Issuer acknowledges that a law firm, and audit firm and a bank (or banks) will be appointed to diligence, audit, manage, underwrite and market the IPO to institutional investors.
Conflicts policy	Advisers active in the UK and regulated by the FCA have conflicts policies available for inspection.

Appendix 2.3 (*cont.*): Advisory contracts

Panel B: Bank monitoring features

Key man clause	Bank personnel listed in the working parties list cannot be changed without the written approval of the Issuer.
Analyst views	Prompt and regular updates on research analysts' recommendations on peer companies.
Investor targets	Coverage of investor targets assigned by adviser during pre-marketing and the IPO itself.
Investor feedback	Quantity and quality of feedback will be a criterion in the allocation of discretionary fees.
Roadshow	Issuer to retain full discretion over the location and hosting responsibilities of banks.
Price range	Banks will be expected to give independent presentations of their price range recommendations.
Book of demand	Banks will give real-time access to unfiltered bookbuilding reports.
Pricing/ Allocation	Issuer retains full discretion over pricing and allocation, once bank recommendations made.
No adverse trading	Banks shall not engage in adverse trading in peer group companies during the IPO marketing period, whether for their own account, or in investor client facilitation or solicitation (save for regulatory exemptions such as market making, buy-back programs, stabilization and analyst freedom of opinion).
No risk off-setting	Banks shall not enter into sub-underwriting agreements with other banks or investors in the IPO shares without the prior approval of the Issuer.
Stabilization	Stabilization strategy will be pre-agreed with the Issuer. Trades will be notified immediately. Naked short positions are not permitted without the prior approval of the issuer.
Termination	Banks may be removed if they fail to perform according to the Issuer's expectations.
No conflict	Banks confirm they have no present conflicts of interest, and undertake not to enter into any engagements that would constitute such a conflict.

Appendix 2.4: European IPOs in high and low monitoring states

The table reports banks' and advisers' actions in low and high monitoring states at each stage of a European IPO.

IPO stage	Low monitoring state	High monitoring state
Bank terms	Engagement letter negotiated with joint bookrunners only, typically guaranteeing the split of selling fees.	Syndicate guidelines ensuring low guaranteed fees per Bookrunner and a large element of discretionary fees to incentivise Co-managers.
Valuation	High valuations from banks in pitch mode may jar with early investors. M&A track may lean on high IPO valuation.	Manage likely extent of bait and switch from banks' pitch levels. Advise on research analysts' forecasts and eventual reports.
Time-table/ launch	Default position is often to IPO as soon as possible. M&A track may benefit from IPO launch to flush out bidders.	Advisers of pure IPO track with monthly retainers are less conflicted. Cost/benefits of timing, launch and withdrawal decisions examined.
Investor targeting	Danger that each bank markets to its most important clients without orchestration (e.g. top 20-30 only).	Banks provide investor target lists, adviser allocates priorities for feedback collection and provides guidance on value-added extra investors for marketing by Co-managers (important for aftermarket support)
Pilot Fishing	Banks naturally secretive. Prefer not to disclose pilot fish clients. Feedback given in anonymous/aggregate manner.	Banks provide pilot fish targets, adviser allocates meetings and provides guidance on value-added extra investors. Transparent feedback per investor.
Launch press release	Banks may prefer to have press release for internal compliance reasons. M&A track may benefit from IPO disclosures.	Challenge default position that banks' advice is always in best interest of issuer. Cost/benefits of keeping timing, sizing and valuation uncertainty assessed.
Docum-entation	Lowest common denominator effect between banks. M&A track based on IPO documentation may prefer greater disclosure.	Review all materials to be made available to investors with benefit of transparent and comprehensive investor feedback.
Pre-marketing investor feedback	Summarised by bookrunners once on a joint call halfway through pre-marketing, and again as part of the price range presentation.	Individual feedback received daily from all banks and summarized in daily reports. Ability to leverage superior performance of one bank to motivate others.
Price range setting	Joint presentation by the bookrunners, with price range recommendation typically presented as a fait accompli.	Individual presentations by all banks. Improved control and clearer decision-making (e.g. in limiting overall size to achieve early order coverage, price momentum, etc.)
Road-show venues	Bookrunners determine roadshow locations and 1on1s without consulting issuer.	Locations and 1on1 investors discussed with issuer based on pre-marketing feedback. Schedule driven by investor interest not bank preferences.
Hosting meetings	Meetings split between bookrunners only. Co-managers assume passive role.	Co-managers host 1on1s where they have done the work and feedback justifies a meeting.

Appendix 2.4 (*cont.*): European IPOs in high and low monitoring states

IPO stage	Low monitoring state	High monitoring state
Book-building	Book coverage message may not be in interests of early investors who suffer lower allocations and higher prices.	Utilise book coverage message to move investors up price range. Achieve maximum price in the range commensurate with a successful aftermarket
Pricing and allo-cation	Recommendations prepared by the bookrunners. Issuer typically has 10-15 minutes to review.	Full 1-2 hour discussion with issuer. Clear picture of price/demand curve and banks' broking revenues. Understand which investors fall out at which price. Avoid pitfalls of too high a concentration, or overallotment to opportunistic bidders.
Stabil-isation	Undertaken by stabilisation manager with trades reported at end of each day.	Strategy agreed before and discussed after each trading day. Intraday ad hoc calls if necessary.
After-market trading/ research	Bookrunners motivated by prospect of follow-on offerings and broking revenues. Co-managers passive, particularly given unbundled cost of research under MiFID 2.	Bookrunners and Co-managers incentivised by discretionary incentive fees that may not be disbursed until 1-2 months after IPO.
Incentive fee payment	Fees follow established seniority structure, notionally to reward the process of coordination/leadership that has already been recognised in bank roles.	Decisions taken on overall quantum of fee to reflect success achieved. Relative shares to syndicate banks based on actual investor feedback, orders received, and aftermarket commitment.

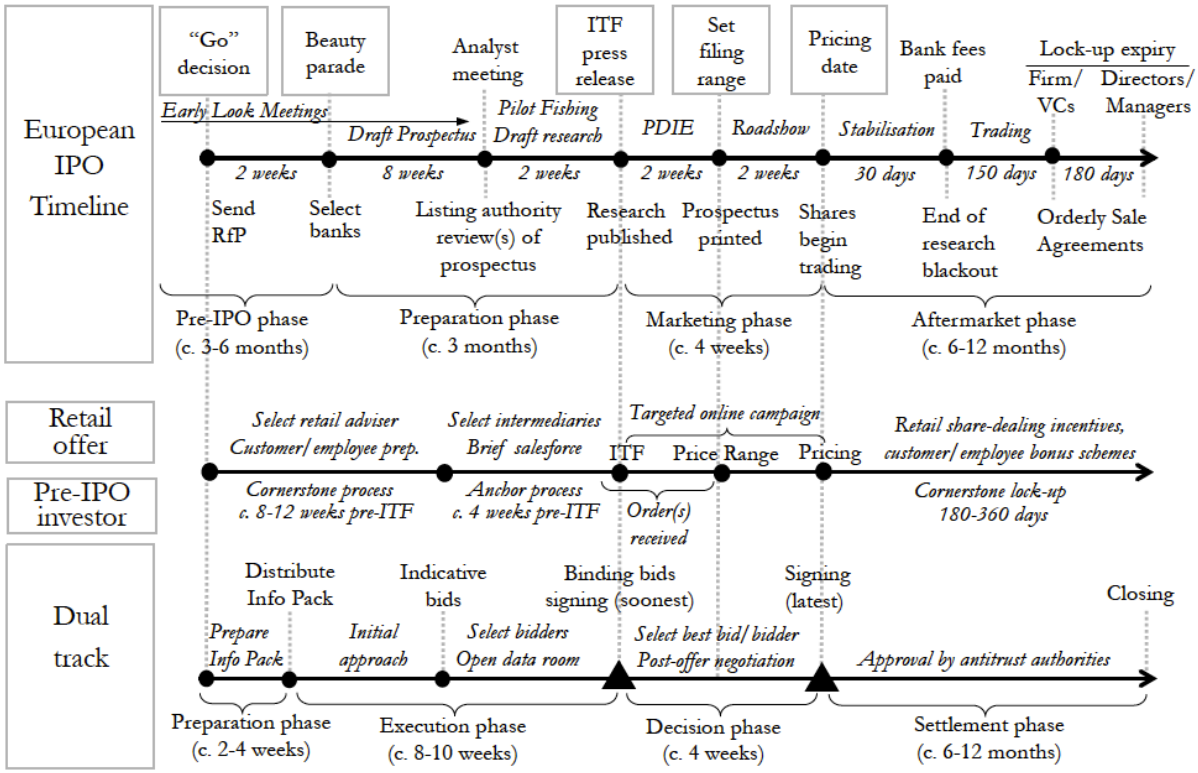
Appendix 2.5: Excerpts from advisers' websites relating to IPO credentials

The table reports excerpts from the websites of the top 10 advisers in our sample relating to credentials, experience and service provision in IPOs. Data is correct as of October 2020.

	Credentials/data	Commentary/text
Rothschild	1st and leading equity advisor, worldwide. Global office network. Sector-based expertise.	Our advice is objective and impartial. As a family controlled business, we are under no pressure to deliver results in any particular period. Always on the client's side. Achieving the best result for clients. Negotiating the best terms for clients. Executing the toughest deals to completion. Creating competitive tension between banks to obtain best terms of execution.
Lazard	Deal tombstones. Global office network. Industry expertise.	We have a track record of innovative solutions for challenging market conditions. Lazard prides itself on… the objective nature of our advice.
STJ Advisors	Team CVs. Case studies. 1,000+ transactions. €390bn+ total value. Client testimonials.	Only advisor to materially improve IPO results. STJ will greatly enhance management decision-making and efficiency. Best team + best technology = best results. STJ will ensure that you achieve the best result.
Lilja & Co	Team CVs. Deal tombstones. 50+ transactions. €50bn+ total value.	We add substantial value in… In addition to the specific value add provided directly in relation to the IPO…
Moelis	Senior team CVs. Deal tombstones.	We leverage our extensive global network to deliver the best solutions.
Allegra Finance	Team CVs. Deal tombstones. 100 offerings. €1bn+ total value.	Allegra Finance accompanies firm management throughout the IPO process to ensure its success.
Sundling Warn	Team CVs. Deal tombstones. Case studies.	Help create value for our clients. Un-conflicted, relevant and value added advice to owners.
FIH Partners	Team CVs. Deal tombstones. 250+ transactions. €100bn+ total value.	Problem-solving and dispute resolution to ensure a smooth, efficient process. Implementation of cost control measures.
Evercore	Team CVs.	Superior results for clients. Maximize value and minimize execution risk. Evercore's ECM team has the flexibility to engage with our corporate clients as an underwriter or an independent advisor.
Gleacher	Team CVs. Deal tombstones.	Highest quality advice to its clients to enhance their long-term success. The firm prides itself on its excellent execution capability.

Appendix 2.6: European IPO timeline

The figure sets out the typical European IPO timeline from the internal "Go" decision (left hand side) to the expiry of post-IPO lock-ups for senior management (right hand side). The lower half of the figure shows how a Retail Offer, Pre-IPO Investor and Dual Track process can be assimilated into the timeline. 'Early Look' Meetings are private meetings between the issuer and potential investors ahead of the IPO (equivalent to Testing-the-Waters meetings in US IPOs). 'RfP' is the Request for Proposal sent to banks invited to the beauty parade. 'Cornerstone' and 'Anchor' investors commit to subscribing for shares in the IPO before it is publicly launched. 'Pilot Fishing' meetings are similar to Early Look meetings but with more substantive marketing materials and a greater specificity of feedback collected. 'ITF' is the Intention To Float press release signifying when the IPO launch becomes public. 'PDIE' is Pre-Deal Investor Education. We provide stylized facts about Retail Offers, Pre-IPO Investors and Dual Tracks in the Appendix. The retail offer timeline is for an intermediaries approach including an employee and customer tranche. The triangles on the Dual Track timeline represent the earliest/latest decision points for the M&A track to extinguish the IPO track.



Appendix 2.7: Early marketing and price range setting – Europe vs. US

The table sets out differences in European and US institutional practice with respect to the early marketing of IPOs and the setting of the initial filing range.

	European approach	US approach (post-JOBS Act)[20]
Early marketing	Pre-IPO marketing including valuation discussions is allowed and encouraged via so-called 'early look' and 'pilot fish' meetings well in advance of the IPO becoming public. Educate a group of 40-50 thought leaders that help to shape the equity story and create early demand visibility ahead of the launch. Pre-IPO marketing documents with details of valuation shared but typically not left with investors. Management participates in meetings, with follow-up done by syndicate, sales and research.	Pre-filing 'quiet period' with no offers, sales or IPO-related communications. Pre-IPO marketing for Emerging Growth Companies ("EGCs") allowed under US Securities laws. Non-deal roadshows and pre-IPO 'testing the waters' ("TTW") activities permitted under the JOBS Act with Qualified Institutional Buyers ("QIBs") and Institutional Accredited Investors ("IAIs"), subject to Regulation FD. No pre-deal documentation and no discussion of valuation in TTW meetings. Management participates in meetings, with follow-up done by syndicate, sales and research.
Research analysts participation in setting the filing range	Analysts publish report 2-3 weeks in advance of the roadshow. Analysts spend ca. 2 weeks on the road educating ca. 200 investors prior to the roadshow in the so-called Pre-Deal Investor Education ("PDIE") period. Analyst research is a pivotal part of the IPO marketing process, helps shape investor sentiment, and provides valuation guidance prior to setting Initial Filing Range. Pre-IPO research typically has no recommendation (BUY/SELL, etc.) or target price, but includes valuation model (e.g. DCF) and peer-group benchmarking.	Research can be published before, during and post-IPO for EGCs, however convention for bookrunners has been to publish 25 days post-IPO. Research analysts provide a teach-in on positioning and valuation to the underwriters' salesforces. Research analysts engage in discussion with investors during the roadshow, assisting with the building of valuation models that are incorporated in the post-IPO report.
When does the IPO go live?	IPO becomes public at the moment of the Intention to Float ("ITF") press release that takes place ca. 4 weeks prior to IPO pricing.	For an EGC, the F-1 filing (including company's financials and business model) is filed confidentially until the public filing at latest 15 days prior to the roadshow launch.
Review process / ability to change filing range	All filings are confidential. Local regulator conducts the reviews. Filing range typically cannot be changed without triggering prospectus amendment, investors' withdrawal rights and new minimum marketing period.	Ability to file F-1 confidentially, both initially and on each subsequent amendment, up until 15 days prior to launch. SEC conducts the reviews. Filing range can be changed without triggering investors' withdrawal rights.

[20] Prior to September 2019, when the SEC adopted Rule163B under the Securities Act 1933 allowing all issuers to engage in TTW activities.

Appendix 2.8: Advisers and IPO de-risking techniques

Panel A provides summary information for IPOs involving de-risking techniques (dual tracks, pre-IPO investors and retail offers). In each case, we distinguish between IPOs involving an adviser, a top-10 generalist adviser and a top-10 specialist adviser. We report *t*-statistics (z-statistics, Wilcoxon rank sum test) for differences in mean (median) for each de-risking technique versus the full sample. Panel B presents summary statistics for de-risking techniques separately for generalist (G) and specialist (S) advised IPOs. We report *t*-statistics for differences in means. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Panel A: IPOs involving de-risking techniques								
	No. of IPOs	Total IPO proceeds ($m)	IPO size med. ($m)	Market value med. ($m)	VC (%)	1st day return (%)	With-drawn rate (%)	Adj. gross spread (%)
Dual Track (1)	108	55,282	649	1,708	72.2	6.10	14.8	2.24
- Advised	70	49,583	649	1,708	82.9	6.45	17.1	2.25
- Generalist	52	37,626	849	1,847	84.6	6.34	19.2	2.30
- Specialist	11	6,999	776	1,541	90.9	8.30	9.1	1.40
Pre-IPO Investor (2)	99	76,914	387	863	41.4	11.09	11.1	2.29
- Advised	41	48,735	811	1,952	53.7	10.38	4.9	2.08
- Generalist	28	39,208	918	1,985	50.0	13.83	3.6	2.02
- Specialist	9	7,269	474	1,357	77.8	3.48	0.0	2.17
Retail Offer (3)	162	118,816	455	1,056	38.8	5.19	12.3	2.25
- Advised	72	76,924	906	1,801	54.2	5.42	11.1	2.02
- Generalist	40	48,626	916	1,991	57.5	6.41	10.0	2.03
- Specialist	16	17,790	762	1,572	87.5	3.93	0.0	2.08
Full Sample (4)	739	247,818	268	674	34.4	4.18	31.3	2.50
Two-sample diff. (1) v (4)			-7.78***	-6.89***	-9.46***	-1.69*	4.91***	2.76***
Two-sample diff. (2) v (4)			-3.41***	-2.79***	-1.53	-5.91***	6.31***	1.52
Two-sample diff. (3) v (4)			-4.86***	-4.14***	-1.34	-1.48	7.39***	2.61**

Panel B: Advisers and IPO de-risking techniques								
	Full sample (F)		Generalist (G)		Specialist (S)		Mean diff. (*t*-statistic)	
	Obs.	Mean	Obs.	Mean	Obs.	Mean	(G&S) vs. F	G vs. S
Dual Track M&A	739	14.6	127	40.9	51	21.6	-7.25***	-2.66***
Pre-IPO Investor	739	13.4	127	22.0	51	17.6	-2.93***	-0.67
Retail Offer	739	21.9	127	31.5	51	31.4	-3.25***	-0.02

Appendix 2.9: Dual track M&A process considerations

Panel A sets out different approaches to Dual Tracks with the desire for (and likelihood of) IPO running from left to right. Panel B sets out decision points at which the M&A track can extinguish the IPO track and the reputational damage to IPO investors in case of a future IPO.

Panel A: Dual track styles

	M&A driven – 'soft' IPO	'Half and Half'	IPO driven – 'reactive' M&A
Description	IPO initially determines timeline but may be abandoned. M&A preparation has priority.	IPO determines timeline. Full M&A process involving broad auction/large number of bidders.	IPO track dictates timeline and has priority. Focused M&A/few bidders. Only consider bids if highly credible.
Rationale	Early conviction that M&A will win, but IPO needed for other reasons (tactics, political considerations, etc.). Where 100% exit is desired to meet PE fund return IRR targets.	Where public markets are volatile and a desired IPO market cap is not assured. Where management is highly process-experienced.	Where management resources are limited and dual track is not feasible. Where an IPO is preferred to achieve initial liquidity, followed by upside participation.
Pros	Openly pursue all private bidders while moving closer to an IPO. Strong bidder universe with likely valuation advantage.	Highest competitive tension. IPO launch establishes a price floor. Private bids possible at a premium. Exit price within a more predictable range if IPO market is volatile.	Lean dual track. Keep M&A optionality without damaging IPO process.
Cons	IPO unlikely to be seen as credible. Distraction of management resources (unless IPO track terminated early).	Risk of damaging IPO process.	Expected IPO price becomes reference price for any M&A bids, unless competitive tension can be maintained.

Panel B: Go/No-Go decision points and implication for IPO track

Timing point	Information available	Risk of damaging IPO track
Before Analyst presentation	Indicative M&A bids. No research valuation or substantive investor feedback. Little visibility on market conditions at IPO time.	No risk – neither research analysts nor IPO investors have been involved
Before publication of research reports/ start of PDIE	Negotiated (and potentially firm) M&A bids. Research valuation and feedback from pilot fishing on IPO discount. Certain degree of visibility on IPO market conditions.	Limited risk – research analyst disappointment, but no public focus on IPO and few investors involved.
Before start of roadshow and bookbuilding	Firm M&A bids. PDIE feedback and price range setting. Good visibility on IPO market conditions.	High risk – investors have completed a great deal of work required for investment. Damage to reputation of seller.
After start of roadshow	Feedback from meetings and pricing indications in order book.	Significant damage for future IPO attempt.

Appendix 2.10: Pre-IPO investor process considerations

The table reports three types of pre-IPO indication of interest, with the timing and number of investors running from left to right

	Strategic investor [21] (3-18 months before IPO)	Cornerstone investor (1-3 months before IPO)	Anchor investor [22] (4-8 weeks before IPO)
Description	Investor buys shares in the company prior to IPO. Investor name, size and valuation are usually published in a press release. Typically 1 investor only.	Investor subscribes for guaranteed allocation in the IPO. Tight process usually targeted at a small group of investors (e.g. 1-10 investors).	Pre-sounding of major institutional investors who verbally commit to place large orders when bookbuilding starts. IPO not definitively announced when sounding occurs. Typically 1-25 investors.
Mechanism	Investment closed pre-IPO. Meaningful discount expected or structured security (e.g. warrants). Lock-up: 6M-1YR. Fully disclosed at IPO.	Upfront binding commitment to invest in IPO, disclosed in prospectus, with full allocation. Lock-up: 6M-1YR. Incorporated within the IPO process, so constrained by its parameters (e.g. timing, IPO documents, etc.).	Not contractually committed; aim is for investors to be ready to provide early demand momentum. Based on publicly available information. No lock-up. No disclosure in prospectus.
Advantages	Signals support for IPO. May help company refinance debt or provide exit for insiders.	Acts as validation capital. Underpins valuation at price range announcement. Creates perception of scarcity during bookbuilding.	IPO can be launched with strong demand visibility and momentum. Well-understood process. Pricing purely determined by the bookbuilding.
Drawbacks	Sets a reference valuation that may be too low or too high, especially if proximate to the IPO. May delay company if too close to the IPO launch date.	Reduces allocable shares for other institutions. May set upper limit on valuation. More complex to execute. Works best with large ticket sizes in large IPOs (i.e. investors do not suffer illiquidity on lock-up expiry).	No firm commitment from investors prior to ITF or price range setting. No reduction in demand 'ask' from the market. Some room for investors to game the process.

[21] In the US, so-called 'crossover financings' refer to investments made close in time but before the filing of a registration statement.

[22] In the US, 'gun jumping' refers to situations where an issuer sells IPO shares to investors with whom it discussed a private crossover financing, potentially giving that IPO investor an advantageous position with respect to company information.

Appendix 2.11: Retail offer process considerations

Panel A reports three approaches to European retail offers, with expenses, time commitment and number of investors running from left to right. Panel B highlights the extra marketing considerations involved in a Direct-style approach.

Panel A: Types of retail offers

	Employee/Customer offer (1 month pre-IPO)	Intermediaries-style offer (1-2 months pre-IPO)	Direct-style offer (6 months pre-IPO)
Descript-ion	Tranche of shares reserved for a defined audience.	Retail brokers act as 'intermediaries' to solicit demand form their existing clients (e.g. in the UK, Hargreaves Lansdown, Rathbones, etc.).	Individuals subscribe directly for shares with paper and online application and payment processes.
Mechanism	Usually web-only (with click-through from company website). Easily combined with an intermediaries offer.	Investors sign up as clients of the intermediary and hold shares via that broker in the aftermarket. Intermediary liaison process can be outsourced to a retail adviser (e.g. in the UK, Direct Line) or managed by syndicate banks together with the registrar (e.g. eSure).	Retail coordinator/registrar led process. Can be combined with an intermediaries offer. Can be web-only (with click-through from company website) thus eliminating paperwork and timetable complexity.
Pros	Easier to manage and execute. Diversifies shareholder base – customers as owners.	Process more easily incorporated alongside an institutional bookbuilt offer. Focus on active retail investors and discretionary wealth managers.	Highest profile offer. Raises company's brand awareness. Typically improved post-IPO liquidity.
Cons	Lower profile. May entail similar legal, execution and disclosure considerations as Intermediaries offer.	Target investor audience smaller than for direct offer. Information provided by intermediaries to customers can introduce extra deal risks, setting a high bar for disclosure standards.	Almost always accompanied by public marketing campaign (e.g. TV and press costs and scrutiny). Long process exposes issuer to market risk and reduces flexibility.

Panel B: Marketing considerations for a Direct-style offer

Marketing campaign	Typically split into an 'image/branding' campaign approximately 6 months in advance of the IPO, and an 'IPO campaign' 6 weeks before the IPO.
Market research	Tests the awareness and sentiment towards the IPO approximately 6 months prior to launch. Issuer and banks use the results to craft the advertising campaign and provide retail incentives (if any).
Advertising	During the 'image/branding' phase, advertising is used to strengthen the profile of the company. In the 'IPO campaign', advertising reflects key equity story messages and information about the offering (e.g. application process, timing, incentives)
Information distribution	Information materials (flyer, brochure, etc.) are distributed through bank branches or retail syndicate banks and a telephone hotline and dedicated website are set up. Presentations for retail sales forces of syndicate banks (multiplier meetings).

Appendix 2.12: Comparability of setting to Jenkinson et al. (2018)

Panel A provides summary information on syndicate structure in our full sample. Number of IPOs comprises completed and withdrawn deals. Proceeds refer to completed IPOs only. We lack syndicate data for 7 IPOs. Panel B summarizes fees for 205 completed IPOs where data are available. In 141 of these, gross spreads are split into fixed and incentive (i.e. discretionary) components. We report the % of total fees that are discretionary. Variables are defined in the Appendix.

Panel A: Syndicate Structure						
	Mean	Median	Min	Max	Median IPO size ($m)	No. of IPOs
Total syndicate size, whole sample	4.02	3	1	26	268	732
-IPOs with advisers	5.28	5	1	26	499	245
-IPOs without advisers	3.38	3	1	23	159	487
No. of Bookrunners, whole sample	2.88	2	1	12		
-IPOs with advisers	3.69	3	1	12		
-IPOs without advisers	2.46	2	1	9		

Panel B: Fees						
	Mean	..of which discret-ionary	Median	..of which discret-ionary	Median IPO size ($m)	No. of IPOs
Gross spreads (where available)	2.86%	24.4%	3.00%	28.6%	476	205
-IPOs with advisers	2.74%	31.5%	3.00%	37.5%	591	105
-IPOs without advisers	2.99%	17.0%	3.00%	18.8%	356	100

With respect to syndicate structure and fees, JJS (2018) report 5.6 versus 4.9 total banks, 3.68 versus 3.24 bookrunners and total fees of 2.41% versus 2.90% on average in advised versus non-advised IPOs. In their sample, 71% of advised IPOs have a discretionary fee, rising to 87% in the top size quartile.

In our sample, advised IPOs have a higher number of banks (5.28 versus 3.38) and bookrunners (3.69 versus 2.46) than non-advised IPOs.[23] Advised IPOs have a lower mean gross spread (2.74% versus 2.99%) and the incentive proportion is higher (31.5% versus 17.0%).[24] 80% of advised IPOs in our sample have a discretionary fee (versus 57% for non-advised deals).

[23] Lowry, Michaely and Volkova (2017) report syndicate composition in US IPOs from 1973-2016. In recent years, nearly all US IPOs have multiple bookrunners (mean 3.3 per IPO) and there is an increase in the number of Co-managers. Total syndicate size in the last decade is around 6 banks.

[24] Abrahamson et al. (2011) report a mean gross spread of 2.8%. JJS (2018) report a mean fee of 2.77%. See Chen and Ritter (2000) for a contrasting discussion of the uniformity of 7% gross spreads in US IPOs.

Appendix 2.13: Comparability of setting to FCA (2016)

Panel A summarizes the distribution of mandates by issuer type in a sample of 616 IPOs for which offer size data are available. We distinguish between IPOs from Frequent versus Infrequent VCs, and large versus small non-VCs. In Panel B, market share is the number of IPOs in which a bank has participated divided by the total number of IPOs of that adviser. Variables are defined in the Appendix.

Panel A: Distribution of IPO mandates by issuer sophistication								
	Full sample	Bank mandates		Adviser mandates			Proceeds ($m)	
	with offer size data	Top 8 banks	Other banks	Top 3 adviser	Other advisers	No adviser	Med.	Total
No. of mandates	616	363	253	140	86	390	268	247,818
...distributed as follows								
- Frequent VCs	25%	36%	9%	54%	23%	15%	506	71,805
- Infrequent VCs	16%	16%	17%	16%	19%	16%	254	29,418
- Large Non-VCs	16%	25%	2%	19%	19%	14%	909	115,928
- Small Non-VCs	43%	23%	72%	11%	39%	55%	103	30,667

Panel B: Bank market shares (% of IPOs as bookrunner) in adviser samples										
	Advised		Rothschild		Lazard		STJ		Non-advised	
Rank	Bank	(%)	Bank	(%)	Bank	(%)	Bank	(%)	Bank	(%)
1st	JPM	34.7	JPM	48.8	MS	45.0	JPM	57.6	JPM	15.4
2nd	DB	29.8	DB	42.5	DB=	40.0	MS	36.4	MS	13.6
3rd	GS	27.3	GS	33.8	GS=	40.0	DB	33.3	GS	13.4
4th	MS	26.9	MS	31.3	JPM=	40.0	GS	30.3	DB	11.9

With respect to IPO mandates, the FCA (2016) finds 40% (4%) of large (small) investment banks' IPO mandates were from the largest issuing clients with 65% of such mandates awarded after a competitive selection process (rising to 77% for large clients). When testing for adviser favouritism vis-à-vis banks, the study finds success rates as high as 63% and 51% for one bank in IPOs with different advisers, falling to 28% for the same bank in non-advised IPOs.

In our sample, IPOs from VCs with 3 or more IPOs in our sample (a proxy for the highest sophistication) represent 54% of total mandates for top 3 advisers, and 36% of total mandates for top 8 banks.[25] By contrast non-VCs with IPOs below $455 million account for 39% of the mandates for non-top 3 advisers, and 72% of mandates for non-top 8 banks. With respect to adviser-bank relationships, we find the leading four banks have 3-4x higher market shares in advised versus non-advised IPOs, with one bank enjoying a success rate of 58% with one adviser.

[25] Lowry, Michaely and Volkova (2017) report 36% VC ownership in their sample of US IPOs from 1973 to 2016.

Appendix 2.14: Additional placebo tests for instrumental variable

The table reports coefficients of multivariate least squares regressions. The dependent variables are indicator variables for the leading US underwriters in columns (1) to (5) and 1st day return standardized in column (6). Independent variables are BIPO standardized (row (1)), and the leading US underwriters in our sample (rows (2) to (6)). Covariates are *Mean lagged withdrawn, Ln (File to offer), Ln (Market value), Secondary, VC* and *Firm Risk Score*. Controls set *Top 8 banks, large, active country, active sector,* and *active month* all equal to one. We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Dependent Variable:	GS	MS	ML	JPM	Citi	1d return
	(1)	(2)	(3)	(4)	(5)	(6)
BIPO	0.06	-0.01	0.04	-0.03	0.05	
	(1.15)	(-0.29)	(0.93)	(-0.50)	(1.24)	
GS						0.27
						(1.60)
MS						0.10
						(0.65)
ML						-0.04
						(-0.22)
JPM						0.15
						(0.94)
Citi						-0.19
						(-1.11)
Covariates	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
R^2	0.04	0.10	0.12	0.04	0.20	0.11
Obs.	167	167	167	167	167	153

Appendix 2.15: Fit of covariates to treatment assignment

The table reports the marginal effects of multivariate probit regressions corresponding to the equation $Pr(Advised_i = 1) = \Phi(\beta_0 + \beta_1 X_i)$ where X_i are covariates. The dependent variable is a dummy variable equal to one if the IPO is advised in column (1), advised by a generalist adviser (2), a specialist adviser (3), Rothschild (4), Lazard (5), and STJ (6). We report marginal effects with *t*-statistics based on delta-method standard errors in parentheses. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Dependent variable	Advised (1)	Generalist (2)	Specialist (3)	Rothschild (4)	Lazard (5)	STJ (6)
Mean lagged withdrawn	-0.18*	-0.15*	-0.09	-0.09	-0.10*	-0.14**
	(-1.66)	(-1.68)	(-1.38)	(-1.09)	(-1.78)	(-2.33)
Ln (File to offer)	0.01	0.04***	-0.03**	0.04***	0.01	-0.02*
	(0.69)	(2.62)	(-2.46)	(2.83)	(1.15)	(-1.84)
Ln (Market value)	0.11***	0.11***	0.02**	0.07***	0.05***	0.03***
	(7.40)	(9.25)	(2.09)	(6.67)	(5.11)	(3.80)
Secondary	-0.00	0.00	-0.00	0.00	-0.00	-0.00
	(-1.21)	(0.53)	(-1.64)	(0.75)	(-0.27)	(-0.79)
VC	0.25***	0.18***	0.15***	0.11***	0.05**	0.10***
	(6.07)	(5.51)	(4.96)	(3.92)	(2.13)	(4.19)
Firm Risk Score	-0.17***	-0.11***	-0.02	-0.07**	-0.06*	-0.02
	(-3.79)	(-2.72)	(-0.78)	(-1.98)	(-1.87)	(-0.71)
Controls	NO	NO	NO	NO	NO	NO
Wald test	92.13***	100.50***	55.79***	68.61***	40.65***	49.04***
Pseudo R-squared	0.16	0.23	0.16	0.19	0.17	0.21
Obs.	532	532	532	532	532	532

Appendix 2.16: Fit of covariates to IPO outcomes

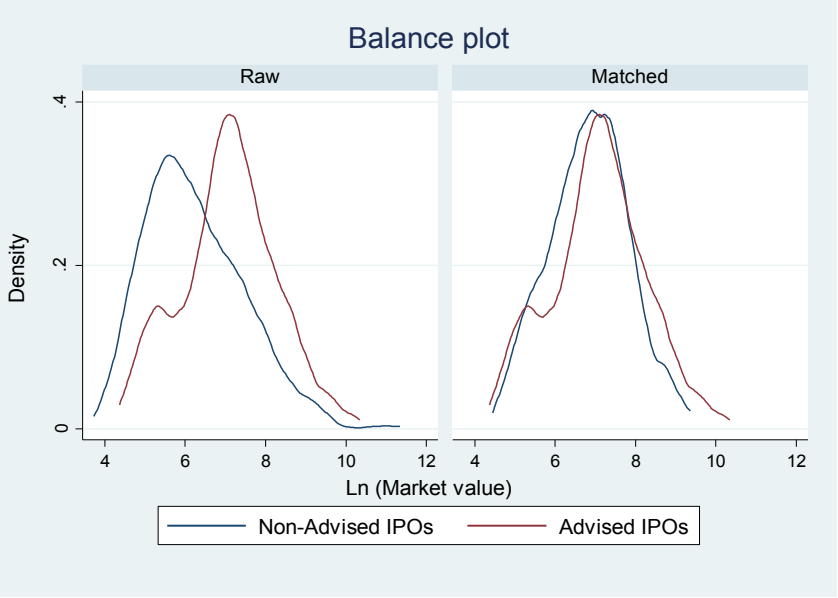
The table reports the coefficients of multivariate least squares regressions corresponding to the equation $IPO\ outcome_i = \beta_0 + \beta_1 X_i + Controls + \varepsilon_i$ where X_i are covariates. The dependent variable is 1st day return (columns (1) and (2)), withdrawn rate (columns (3) and (4)) and Adjusted Gross Spread (columns (5) and (6)). Controls set *Top 8 banks, large, active country, active sector,* and *active month* all equal to one. We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

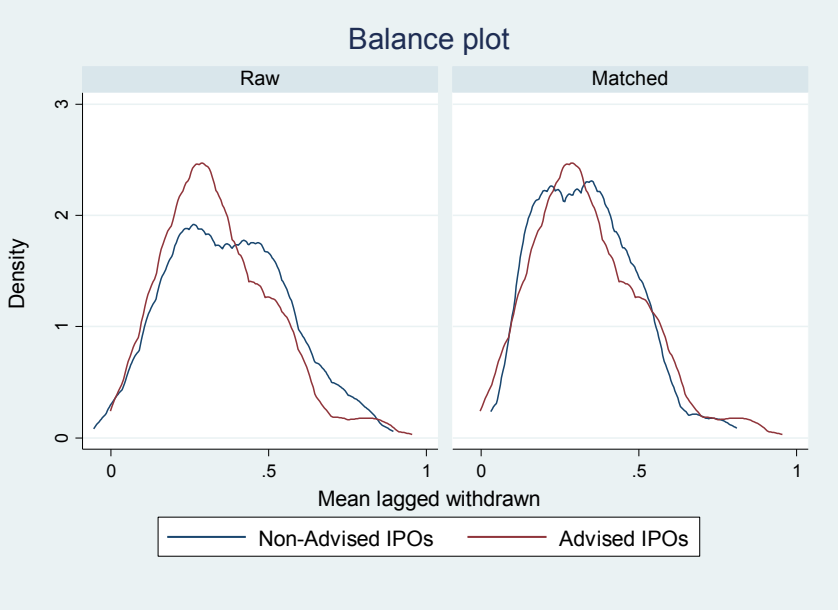
Dependent variable	1st Day Return		Withdrawn Rate		Adj. Gross Spread	
	(1)	(2)	(3)	(4)	(5)	(6)
Mean lagged withdrawn	-0.55*	-0.33	0.03	0.03	-0.67**	-0.25
	(-1.88)	(-0.68)	(0.48)	(0.33)	(-2.14)	(-0.59)
Ln (File to offer)	-0.09	-0.07	0.15***	0.11***	-0.05	-0.25
	(-1.36)	(-0.54)	(7.34)	(2.77)	(-0.33)	(-2.30)
Ln (Market value)	0.00	0.09	-0.02*	-0.08**	-0.51***	-0.47***
	(0.10)	(0.91)	(-1.91)	(-2.37)	(-7.95)	(-4.85)
Secondary	0.00***	0.01***	-0.00	-0.00	-0.01***	-0.00
	(3.80)	(3.56)	(-0.32)	(-0.78)	(-3.32)	(-1.50)
VC	-0.16*	0.10	-0.01	-0.01	-0.19*	-0.20*
	(-1.69)	(0.55)	(-0.56)	(-0.20)	(-1.82)	(-1.20)
Firm Risk Score	0.10	-0.16	0.00	0.09	0.21*	0.49*
	(0.93)	(-0.71)	(0.02)	(1.56)	(1.76)	(2.66)
Controls	NO	YES	NO	YES	NO	YES
F-Statistic	4.21***	2.61**	9.62***	2.37**	23.64***	6.13**
R-squared	0.05	0.08	0.19	0.15	0.41	0.31
Obs.	469	153	532	167	204	100

Appendix 2.17: Covariate balance

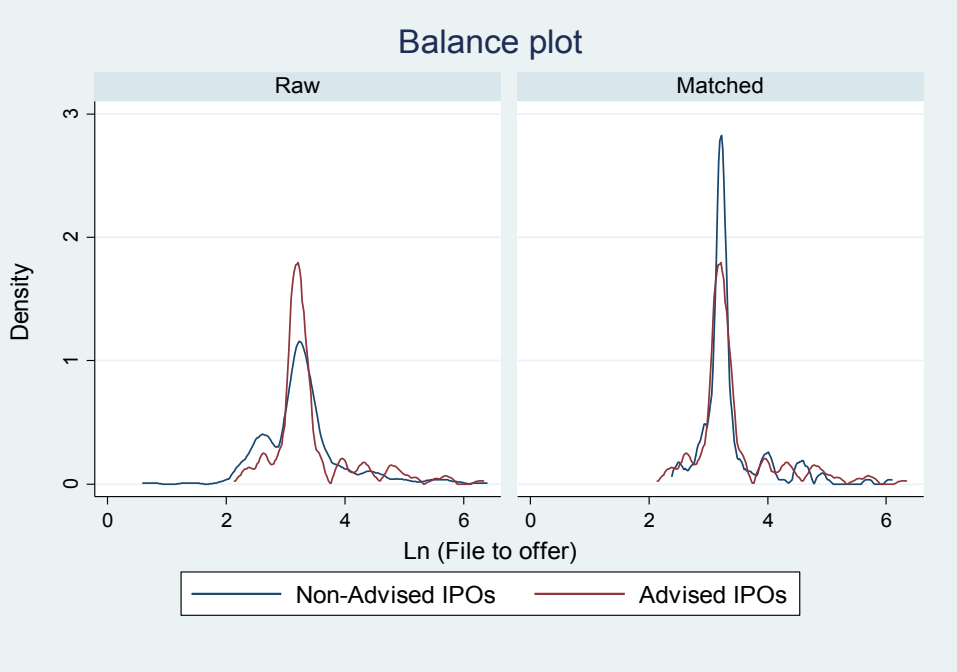
The table reports the standardized differences and variance ratio of continuous covariates in raw and matched samples corresponding to the NNM estimation of the *Advised* variable on *1st Day Return*. The graphs show corresponding density plots of covariates in raw and matched samples.

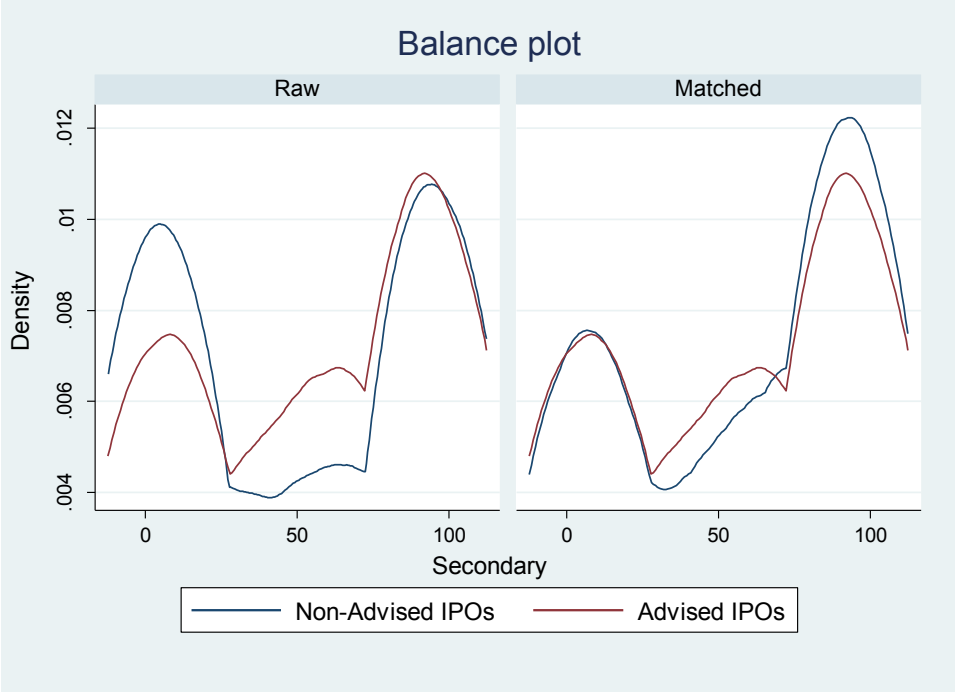
	Standardized Differences		Variance Ratio	
	Raw	Matched	Raw	Matched
Ln (Market value)	0.697	0.205	0.937	1.308
Mean lagged withdrawn	-0.194	0.052	0.850	1.160
Secondary	0.120	-0.057	0.853	0.947
Ln (File to offer)	0.209	0.110	0.979	1.472
Firm Risk Score	-0.440	0.000	0.461	1.000
Obs.	469	368	469	368
Treated obs.	184	184	184	184
Control obs.	285	184	285	184



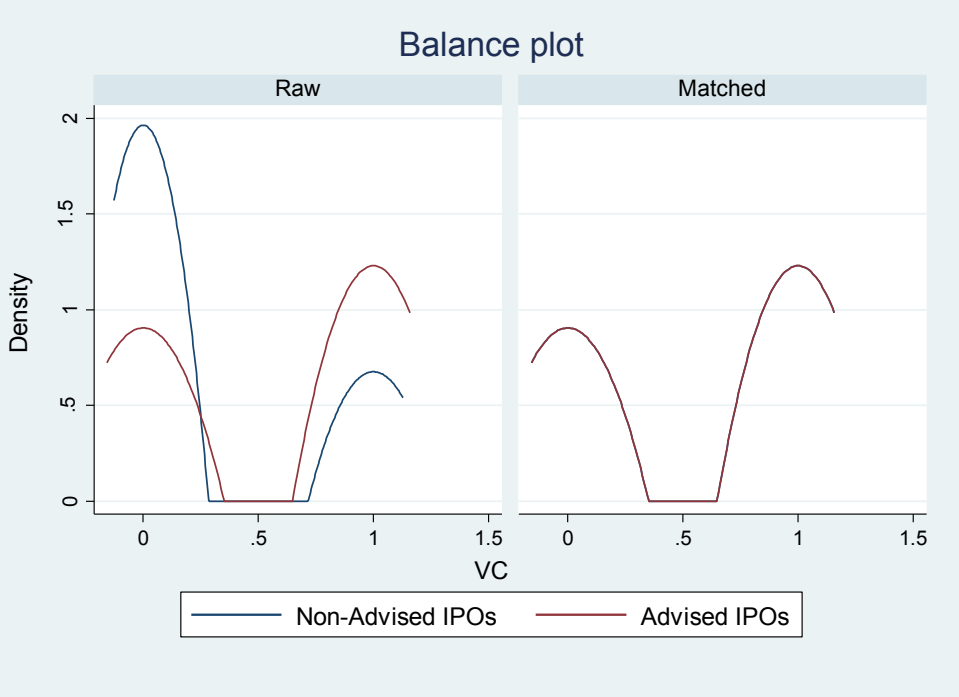


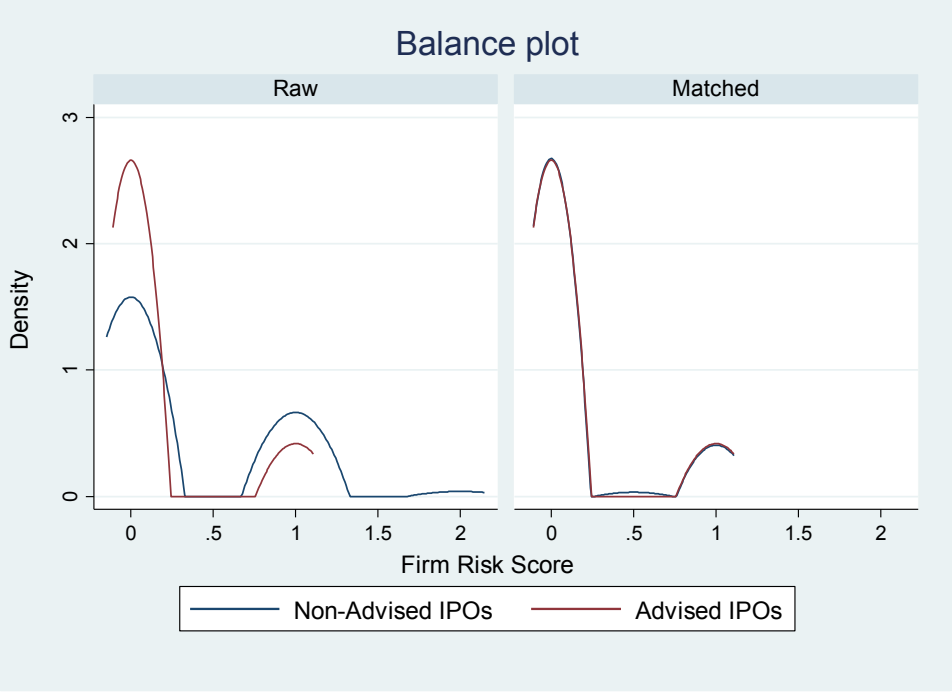
Appendix 2.17 (*cont.*): Covariate balance





Appendix 2.17 (*cont.*): Covariate balance





Appendix 2.18: Advisers and logged 1st day return

The dependent variable in both panels is logged 1st day return standardized. In Panel A, columns (1) to (3) report the results from IV regressions corresponding to the second stage represented in Equation (2). Columns (4) to (6) report the results from corresponding OLS regressions. Columns (7) and (8) report the results from our Nearest Neighbour Matching (NNM) estimator. We report IV/OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. For the NNM model, we report the average treatment effect on the treated (ATET) with *t*-statistics based on Abadie Imbens (2006 and 2011) standard errors in parentheses. In Panel B, the regression specification corresponds to Equation (3). We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Panel A: Impact of advisers (various models)								
Dependent Variable: Logged 1st Day Return								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV	IV	IV	OLS	OLS	OLS	NNM	NNM
Advised	-0.08	0.59	0.08	-0.01	0.04	0.14	0.13	0.17
	(-0.35)	(0.37)	(0.12)	(-0.07)	(0.44)	(0.93)	(0.99)	(0.76)
Covariates	NO	YES	YES	NO	YES	YES	YES	YES
Controls	NO	NO	YES	NO	NO	YES	NO	YES
Obs.	469	469	153	472	469	153	469	153

Panel B: Impact of adviser types/firms (OLS model)						
Dependent Variable: Logged 1st Day Return						
	(1)	(2)	(3)	(4)	(5)	(6)
TOP	1.48***	1.02***	1.32***	1.64***	1.07***	1.38***
	(4.18)	(3.36)	(3.21)	(3.76)	(3.44)	(3.40)
HIGH	0.50**	0.44**	0.32	0.61***	0.45*	0.41*
	(2.36)	(2.17)	(1.27)	(2.87)	(1.89)	(1.74)
Generalist x TOP		1.63***				
		(3.01)				
Generalist x HIGH		0.72***				
		(3.14)				
Specialist x TOP			-0.42			
			(-1.05)			
Specialist x HIGH			-0.21			
			(-0.82)			
Rothschild x TOP				0.28		
				(0.42)		
Rothschild x HIGH				0.53**		
				(2.10)		
Lazard x TOP					2.50***	
					(3.77)	
Lazard x HIGH					0.14	
					(0.48)	
STJ x TOP						-0.42
						(-1.05)
STJ x HIGH						-0.51**
						(-2.33)
Covariates	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
R-sq.	0.31	0.45	0.33	0.35	0.43	0.33
Obs.	153	153	153	153	153	153

Appendix 2.19: Advisers and 1st month return

The dependent variable in both panels is 1st month return standardized. In Panel A, columns (1) to (3) report the results from IV regressions corresponding to the second stage represented in Equation (2). Columns (4) to (6) report the results from corresponding OLS regressions. Columns (7) and (8) report the results from our Nearest Neighbour Matching (NNM) estimator. We report IV/OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. For the NNM model, we report the average treatment effect on the treated (ATET) with *t*-statistics based on Abadie Imbens (2006 and 2011) standard errors in parentheses. In Panel B, the regression specification corresponds to Equation (3). We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Panel A: Impact of advisers (various models)								
Dependent Variable: 1st Month Return								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV	IV	IV	OLS	OLS	OLS	NNM	NNM
Advised	0.14	0.93	0.01	0.04	0.06	0.35**	0.10	0.32
	(0.63)	(0.46)	(0.02)	(0.43)	(0.61)	(2.07)	(0.84)	(1.32)
Covariates	NO	YES	YES	NO	YES	YES	YES	YES
Controls	NO	NO	YES	NO	NO	YES	NO	YES
Obs.	467	467	153	470	467	153	467	153

Panel B: Impact of adviser types/firms (OLS model)						
Dependent Variable: 1st Month Return						
	(1)	(2)	(3)	(4)	(5)	(6)
TOP	1.25***	0.81**	1.15**	1.48***	0.80**	1.17***
	(3.27)	(1.98)	(2.58)	(2.98)	(2.34)	(2.66)
HIGH	0.64***	0.63***	0.53*	0.70***	0.65***	0.58**
	(2.90)	(3.01)	(1.85)	(3.70)	(2.71)	(2.20)
Generalist x TOP		1.52**				
		(2.32)				
Generalist x HIGH		0.54**				
		(2.30)				
Specialist x TOP			0.19			
			(0.41)			
Specialist x HIGH			0.13			
			(-0.55)			
Rothschild x TOP				-0.17		
				(-0.29)		
Rothschild x HIGH				0.52*		
				(1.90)		
Lazard x TOP					2.97***	
					(4.87)	
Lazard x HIGH					-0.06	
					(-0.24)	
STJ x TOP						0.19
						(0.41)
STJ x HIGH						-0.02
						(-0.07)
Covariates	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
R-sq.	0.18	0.29	0.18	0.22	0.34	0.18
Obs.	153	153	153	153	153	153

Appendix 2.20: Advisers and 1st month market-adjusted return

The dependent variable in both panels is 1st month market-adjusted return standardized. In Panel A, columns (1) to (3) report the results from IV regressions corresponding to the second stage represented in Equation (2). Columns (4) to (6) report the results from corresponding OLS regressions. Columns (7) and (8) report the results from our Nearest Neighbour Matching (NNM) estimator. We report IV/OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. For the NNM model, we report the average treatment effect on the treated (ATET) with *t*-statistics based on Abadie Imbens (2006 and 2011) standard errors in parentheses. In Panel B, the regression specification corresponds to Equation (3). We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Panel A: Impact of advisers (various models)								
Dependent Variable: 1st Month Market-Adjusted Return								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV	IV	IV	OLS	OLS	OLS	NNM	NNM
Advised	0.15	1.18	0.06	0.06	0.08	0.35**	0.12	0.33
	(0.65)	(0.55)	(0.08)	(0.65)	(0.80)	(2.03)	(1.01)	(1.31)
Covariates	NO	YES	YES	NO	YES	YES	YES	YES
Controls	NO	NO	YES	NO	NO	YES	NO	YES
Obs.	467	467	153	470	467	153	467	153

Panel B: Impact of adviser types/firms (OLS model)						
Dependent Variable: 1st Month Market-Adjusted Return						
	(1)	(2)	(3)	(4)	(5)	(6)
TOP	1.24***	0.80*	1.11***	1.39***	0.83**	1.13***
	(3.38)	(1.96)	(2.61)	(2.98)	(2.38)	(2.70)
HIGH	0.64***	0.48***	0.56*	0.61***	0.59**	0.60**
	(2.92)	(2.65)	(1.97)	(3.55)	(2.46)	(2.32)
Generalist x TOP		1.38**				
		(2.24)				
Generalist x HIGH		0.76***				
		(3.31)				
Specialist x TOP			0.38			
			(0.76)			
Specialist x HIGH			-0.08			
			(-0.28)			
Rothschild x TOP				-0.04		
				(-0.06)		
Rothschild x HIGH				0.69***		
				(2.67)		
Lazard x TOP					2.52***	
					(3.76)	
Lazard x HIGH					0.10	
					(0.36)	
STJ x TOP						0.38
						(0.75)
STJ x HIGH						-0.26
						(-0.87)
Covariates	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
R-sq.	0.17	0.28	0.19	0.21	0.31	0.19
Obs.	153	153	153	153	153	153

Appendix 2.21: Advisers and 1st day trading volume

The dependent variable in both panels is 1st day trading volume standardized. In Panel A, columns (1) to (3) report the results from IV regressions corresponding to the second stage represented in Equation (2). Columns (4) to (6) report the results from corresponding OLS regressions. Columns (7) and (8) report the results from our Nearest Neighbour Matching (NNM) estimator. We report IV/OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. For the NNM model, we report the average treatment effect on the treated (ATET) with *t*-statistics based on Abadie Imbens (2006 and 2011) standard errors in parentheses. In Panel B, the regression specification corresponds to Equation (3). We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Panel A: Impact of Advisers (various models)								
Dependent Variable: 1st Day Trading Volume								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV	IV	IV	OLS	OLS	OLS	NNM	NNM
Advised	-0.00	-1.82	-0.49	0.04	0.01	0.00	0.00	-0.04
	(-0.01)	(-0.87)	(-1.15)	(0.44)	(0.14)	(0.02)	(0.02)	(-0.28)
Covariates	NO	YES	YES	NO	YES	YES	YES	YES
Controls	NO	NO	YES	NO	NO	YES	NO	YES
Obs.	470	470	153	473	470	153	470	153

Panel B: Impact of adviser types/firms (OLS model)						
Dependent Variable: 1st Day Trading Volume						
	(1)	(2)	(3)	(4)	(5)	(6)
TOP	0.69***	0.49**	0.81***	0.54**	0.66***	0.83***
	(4.01)	(1.98)	(4.19)	(2.40)	(3.54)	(4.46)
HIGH	0.23	0.03	0.37*	0.03	0.25	0.37**
	(1.35)	(0.14)	(1.84)	(0.18)	(1.40)	(1.98)
Generalist x TOP		0.18				
		(0.73)				
Generalist x HIGH		0.18				
		(0.75)				
Specialist x TOP			-0.61***			
			(-4.35)			
Specialist x HIGH			-0.45***			
			(-3.63)			
Rothschild x TOP				0.07		
				(0.27)		
Rothschild x HIGH				0.25		
				(0.80)		
Lazard x TOP					0.17	
					(0.52)	
Lazard x HIGH					-0.14	
					(-0.66)	
STJ x TOP						-0.61***
						(-4.31)
STJ x HIGH						-0.47***
						(-4.28)
Covariates	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
R-sq.	0.25	0.27	0.30	0.27	0.27	0.31
Obs.	153	153	153	153	153	153

Chapter 3:
The impact of early investors on IPO pricing

3.1 Introduction

Early investors are important participants in initial public offerings (IPOs). In the US, of the 87 technology and life sciences IPOs completed in 2019, 32 (or 37%) involved pre-IPO indications of interest representing 36% on average of the IPO shares offered (source: CapitalIQ). In Asia, so-called 'cornerstone' investors (typically sovereign wealth funds or high-profile local tycoons) have become a staple of IPOs over recent years, pre-committing to 32% on average of the shares offered in the largest four Hong Kong IPOs during 2016-2019 (source: GlobalCapital). In Europe, whilst pre-IPO commitments were first used in 2010 as a means to de-risk primary markets following the financial crisis, by 2017 almost one-quarter of IPOs involved early investors, despite market conditions having returned to pre-crisis levels (see Figure 3.1).

Early investors commit to subscribe for shares in an IPO before it is publicly launched. They may also agree to a lock-up, preventing them from selling shares for a period after the IPO. In exchange, they receive a preferential or guaranteed allocation at the IPO and hence a potentially larger stake than they might otherwise receive. In some cases, they may also gain board representation. For issuers, pre-IPO demand commitments provide an endorsement of the equity story and allow for a portion of the IPO shares to be covered before launch, thereby de-risking the offering. Early investors may also bring strategic, industry or other expertise to the firm, lending increased credibility to the IPO. In some cases, pre-IPO commitments can satisfy an issuer's financing requirement, allowing the firm to remain private for longer via a so-called 'private IPO' or 'crossover round'.

US, Asian and European market practices have evolved differently in their approach to pre-IPO investor commitments. In each market, issuers are permitted to hold private meetings

with potential investors before the launch of their IPOs.[26] In Europe however, such meetings typically include a specific discussion of IPO pricing and investor demand indications, underpinned by the views of investment bank research analysts. Hence in European IPOs, underwriters incorporate extensive private information from informed investors when setting the initial filing range. The empirical manifestation of this difference is that very few European IPOs price outside the initial filing range and a disproportionate number price at the upper and lower boundaries, especially when compared to the US (Jenkinson et al., 2006). The concern therefore is that early investors in European IPOs have an incentive to understate their pricing views since they know that positive pricing information will result in a higher initial filing range. In parallel, underwriters have an incentive to underprice IPOs and give preferential allocations to early investors as banks receive greater commissions via their broking business with such investors than via their IPO fees from issuers (Jenkinson et al., 2018).

The role played by early investors in European IPOs has largely escaped the attention of academics, reflecting the fact that banks and issuers do not disclose the scope of their private interactions with such investors. However, their increasing influence has attracted interest from policy-makers and regulators. Following the UK government's IPO of Royal Mail in 2013 in which a handful of early investors (known as 'pilot fish') received preferential allocations of heavily underpriced shares, the UK Secretary of State for Business, Innovation and Skills launched an inquiry into the pre-bookbuilding process. The final report by Myners et al. (2014) finds no evidence of collusion between the banks and the pilot fish, but recommends that issuers have the flexibility to change the filing range once it is set. The authors also note that the pilot fish committed to salvage the IPO below the filing range and that their underwriting price was equal to the Government's reservation price, thereby giving it confidence to launch the IPO. Following the Myners report, the UK Financial Conduct Authority (FCA) surveyed market

[26] Such meetings are known as 'testing-the-waters' meetings in the US and 'pilot fishing' meetings in Europe. We compare European and US approaches to early IPO marketing in the Appendix.

participants in 2016 for their views on the private pre-bookbuilding phase of European IPOs. The feedback received suggested that early investors, especially those with access to the research analysts of the lead underwriters, were de facto 'gatekeepers' in setting the initial filing range.

The main question we examine is whether banks price strongly-demanded IPOs lower than they might otherwise, in order to satisfy early investors' price limits and ensure their participation in future IPOs. In parallel, we examine whether banks price weakly-demanded IPOs higher than they might otherwise, in order to satisfy the reservation prices of issuing clients, and whether early investors help underwriters salvage such IPOs. The baseline in early models of IPO pricing is that offerings are underpriced on average (e.g. Rock, 1986), and fully priced when bookbuilding demand is weak (e.g. Benveniste and Spindt, 1989). Recent models allow for a more proactive role for the underwriter. Jenkinson et al. (2006) propose that the underwriter commits to scaling back allocations to informed investors to induce truthful information revelation. Busaba et al. (2019) propose that the underwriter can select certain offerings to deliberately overprice when bookbuilding demand is insufficient. James and Valenzuela (2019) propose that the issuer selects its underwriter based on the promise of deal certainty. We draw on these models and focus on instances of targeted underpricing and overpricing that are distinct from the average underpricing (or the inadvertent and empirically unpredictable mispricing) that might otherwise exist.[27]

For the underwriter, when bookbuilding demand is stronger than anticipated, setting an offer price above early investors' limit prices results in a higher underwriting commission (and higher proceeds for the issuer), but increases the likelihood of having to buy back shares in the aftermarket, and may result in the loss of future broking commissions from early investors and jeopardize their participation in future IPOs. When bookbuilding demand is weaker than anticipated, the failure to meet an issuer's reservation price (leading to IPO withdrawal) results

[27] In Gondat-Larralde and James (2008), all IPOs are underpriced and have the same downside risk ex-ante, but some turn out to be overpriced at random. In Lowry et al. (2010), underwriters have difficulty in accurately pricing IPOs due to the lack of detail about prevailing levels of market-wide demand for the new shares.

not only in the forfeiture of the gross spread, but also in the loss of other benefits associated with a completed IPO (Busaba et al., 2019). Since the loss investors might be willing to accept on a marginal IPO is bounded to the present value of future expected profits from underpriced IPOs, underwriters must be selective in the IPOs they choose to salvage. We propose that the underwriter takes a proactive role in setting IPO prices in order for equilibrium to exist between overpriced and underpriced offerings.[28] We test this hypothesis using a sample of European IPOs from 2010 to mid-2017 of which 13% (99 offerings) involved early investors.

Our research design must identify instances of deliberate underpricing and overpricing by the underwriter, and test for equilibrium effects on gross spreads and IPO withdrawals. First, we identify the underwriter's pricing intention. We take the closing stock price one month after the first trading day of the IPO and consider this as the 'fair market value' of the shares (henceforth, FMV price).[29] As the underwriter is fully informed at the time of pricing, we consider his pricing intention manifests itself in the STOXX600-adjusted percentage change from the IPO price to the FMV price (henceforth, FMV return). Second, we identify situations in which price limits are likely to have been binding. We proxy the strength of ex-post bookbuilding demand relative to ex-ante expectations by the position of the IPO price relative to the initial filing range. Since European IPOs almost never price outside the range, we identify IPOs that contain early investors and price at the boundaries of the range as the set of IPOs in which limit prices are most likely to have been binding. Third, we identify a control group of IPOs. We exploit the discontinuity in IPO prices at the boundaries of the pricing range to establish counterfactual outcomes. Our analysis focuses on the cross-sectional effect on FMV returns associated with early investors both within IPOs pricing *exactly* at the boundaries of the filing range (treatment group), and differentially between these IPOs and those pricing in the region immediately *below*

[28] Cornelli and Goldreich (2001) and Jenkinson and Jones (2004) report that investors take part in both underpriced and overpriced IPOs. However, the studies do not identify instances of deliberate underpricing and overpricing by the underwriter, and investors do not know ex ante the profitability of the IPOs in which they take part.
[29] Busaba et al. (2019) present reasons why one-month market-adjusted return is better suited to capture an underwriter's pricing intention than other commonly used measures of underpricing such as first-day returns.

these boundaries (control group). Finally, we identify the effects of early investors on gross spreads and IPO withdrawals using a difference in difference estimation that exploits a change in the bidding behaviour of early investors during our sample period.

We have the following main results. First, in preliminary statistics, we find only 6% of IPOs in our sample price outside the initial filing range and that the prevalence of early investors increases upwards throughout the range (7% of IPOs at the bottom vs. 44% at the top). When examining the characteristics of early investor IPOs, we find they are ex-ante less risky yet ex-post more underpriced. In two-sample tests, early investor IPOs involve larger issuing firms, greater IPO proceeds, fewer emerging market listings, a higher number of bookrunners, more experienced underwriters, and are launched in periods of stronger IPO market conditions than other IPOs. In cross-sectional statistics of IPOs pricing at the top of the range, early investor IPOs have a 24.3% average FMV return compared to an 8.2% return for other IPOs. Contrary to our salvaging hypothesis, we find no association between early investors and overpricing (i.e. negative FMV returns) in IPOs at the bottom of the range.

Next, in multivariate regressions using our regression discontinuity design, we find early investors are associated with a 102-percentage point increase in FMV return amongst IPOs pricing at the top of the filing range. In comparison, when examining the effect of early investors in the control group (i.e. IPOs pricing in the region immediately below the upper boundary), we find they are associated with a 50-percentage point increase in FMV return. This leaves a statistically significant 52-percentage point differential effect attributable to the conservative pricing inherent in setting the offer price exactly at the high boundary even though bookbuilding demand is strong. This differential effect persists in the presence of firm, bank and market specific controls, adjusting for time effects, and using alternative measures of underpricing. Importantly, falsification tests reveal no such differential effect for IPOs pricing elsewhere within the filing range. Contrary to our salvaging hypothesis, we find no association

between early investors and overpricing amongst IPOs at the bottom of the range, or differentially between these IPOs and those in the region immediately below the lower bound.

Finally, using our difference in difference estimation, we find results consistent with our regression discontinuity approach: early investors are associated with a 118-percentage point increase in FMV return in the post-treatment period. However, when using the same difference in difference estimation, we find no association of early investors with either reduced gross spreads or lower IPO withdrawals. We instead explore whether early investors are being rewarded with underpriced shares for their value-added/informational contributions or for agency-based reasons. We find no relation between the number of cornerstone investors (or the amount allocated to cornerstone investors) and underpricing, providing little support for value-added explanations. We also find no association between early investors and FMV return when examining sub-samples of IPOs designed to capture informational explanations. Instead, we find significant and economically large associations between early investors and FMV return when examining agency-based explanations. In these sub-samples, early investors are associated with an average 105-percentage point differential increase in underpricing when comparing treatment and control group (i.e. more than twice the differential effect found in the full sample).

Our paper makes a number of contributions to the IPO literature. We add to the understanding of the role of early investors in IPOs and shed light on the debate surrounding informational versus agency-based theories of IPO underpricing. Prior European literature on early investors is scarce due to the unavailability of data on the pre-bookbuilding phase. Jenkinson et al. (2006) propose a model that resolves the incentive conflict of early investors when setting the price range. Myners et al (2014) and the FCA (2017) provide case study and survey evidence respectively. Asian literature on pre-IPO investors focuses instead on the effects of value-added services on firms or on IPO survival (e.g. McGuinness, 2012 and 2014; Espenlaub et al., 2012). In US studies, Brown and Kovbasyuk (2016) identify persistent IPO investors from 13F filings, Grullon et al. (2014) examine the covariance of aftermarket prices by

IPO underwriter, and Krigman and Jeffus (2016) study the upward shift in average underpricing of IPOs from the lead underwriters in the Facebook IPO. To our knowledge however, there are no studies examining the pricing impact of early investors in US IPOs. Much of the post-2000 IPO literature has proposed that agency conflicts and behavioural biases (e.g. Nimalendran, Ritter and Zhang (2007); Goldstein et al. (2011); Jenkinson et al. (2018)) offer a better explanation for the variation in first-day returns than previous models of rational agents/informational asymmetry (e.g. Benveniste and Spindt (1989) and Benveniste and Wilhelm (1990)). Our paper provides empirical evidence of the higher levels of underpricing associated with early investors and fails to find equilibrium, value-added or informational explanations for it. Instead we find agency-based explanations, suggesting there are costs associated with the early marketing of IPOs encouraged by post-crisis regulations designed to re-invigorate markets.

Our paper also adds to the literature examining the role of the IPO underwriter. Recent studies suggest that low market-share banks extract higher surpluses from issuers (e.g. Kang and Lowery, 2014) and high market-share banks favour early investors with profitable allocations (e.g. Jenkinson et al., 2018). Other studies suggest that underwriters do not set out to underprice IPOs in order to collect kickbacks (Goldstein et al., 2011), but that they nevertheless receive kickbacks precisely because they must underprice IPOs on average (James and Valenzuela, 2019). We lack micro-level data on the IPO allocations and secondary trading commissions of early investors to test these theories. However, we identify situations in which the underwriter underprices IPOs more than average (Benveniste and Spindt, 1989) and find that such mispricing occurs when early investors' limit prices are most likely to have been binding. Our findings therefore suggest a proactive pricing role for the underwriter and a price-signaling role for the upper boundary of the initial filing range in European IPOs.

3.2 Institutional setting and hypothesis development

3.2.1 Early investors in European IPOs

European market participants distinguish between three types of early IPO investors.[30] First, 'strategic' investors close their investment before the IPO is launched, but the timing is sufficiently proximate to the IPO that details of the investment are disclosed in the prospectus. This may be because the investment signals support for the issuing firm or sets a reference valuation. Such situations typically comprise only one investor, and may be in equity-linked or preferred stock, and in any event do not impact the number of IPO shares otherwise available for investors. Second, 'cornerstone' investors make a binding commitment to invest in the IPO ahead of the launch and to hold the shares for a lock-up period after the IPO, in exchange for a guaranteed allocation of shares.[31] Details are again disclosed in the IPO prospectus. Such situations typically comprise a group of 1-10 investors and strictly reduce the number of shares available for other IPO investors. Third, 'anchor' investors verbally promise ahead of launch to place large orders when the bookbuilding starts, but without committing to a lock-up. As the promises are not binding and allocations not guaranteed, there is no disclosure in the IPO prospectus. Such situations typically involve 1-25 investors and de-risk the IPO by providing demand visibility, but do not strictly reduce the shares available for other IPO investors.

We identify IPOs in which pre-IPO indications of interest are received by issuers, either by way of a formal cornerstone or anchor process, or in which extensive early marketing leads to orders that cover the entire IPO on the first day of bookbuilding. We refer to these as *Early Investor IPOs*. Within this categorization, there is significant heterogeneity with respect to the early demand solicitation processes conducted.[32] The process can be publicly advertised or conducted in private. Initial contact between the issuer and the early investor ranges from one

[30] We provide information on the categorizations of early investors in the Appendix.
[31] A non-technical discussion of European cornerstone investors is contained in Global Capital's 20th June 2019 edition: "Cornerstones bring a new dynamic to European IPOs."
[32] We provide micro-level information on four early investor IPOs in our sample in the Appendix.

to four months ahead of the IPO. Investors can be given access to private data subject to signing non-disclosure agreements, or rely on draft IPO documents only. Orders may be at a fixed price, a range, or without price limits (i.e. at strike). Commitments may be signed before the Intention to Float ("ITF") press release that makes the IPO public, or they may be delivered before the setting of the initial filing range. Allocations may be guaranteed or discretionary. Post-IPO lock-up agreements for investors range from zero to 360 days. The number of cornerstone investors in a single IPO ranges from one to sixteen in our sample. Finally, the portion of the IPO placed with cornerstone investors ranges from 0% to 65%.

3.2.2 IPO pricing models

As discussed in the introduction, the bulk of the literature on IPO pricing focuses on the type of bookbuilding observed in US IPOs. There is limited commentary on the pre-bookbuilding process that characterises European IPOs, in which investors are solicited to provide pricing views in order for the initial filing range to be set. Jenkinson et al. (2006) propose a model of European pre-bookbuilding in which informed investors have an incentive to understate their views since they know that positive pricing information will result in a higher initial filing range. Underwriters resolve this incentive problem by making the twin commitment not to exceed the upper pricing bound and to favour uninformed investors in the event of oversubscription. In equilibrium, this twin mechanism induces truthful information revelation since informed investors risk being crowded out of the IPO if they deliberately understate their views and such pricing information is exogenously revealed to uninformed investors prior to the IPO being completed. The empirical manifestations of this model should be that very few European IPOs price above the initial filing range, and heavily oversubscribed IPOs are disproportionately allocated to uninformed investors.

Busaba et al. (2019) propose a model based on US bookbuilding in which underwriters overprice certain IPOs in order to meet issuers' reservation prices and hence salvage deals that would otherwise be withdrawn. In equilibrium, underwriters compensate investors for their

losses on these IPOs in two ways: first, by the value of aftermarket price support in the IPO shares; and second, by the present value of the profit investors expect from participating in future IPOs. As the model is conditioned on the underwriter not losing money, the level of overpricing the underwriter can manage is limited. Issuers that require larger overpricing to meet their reservation prices will not have their IPOs salvaged by the underwriter. The empirical manifestation of this model should be that IPOs priced at the lower bound should contain some offerings that might otherwise have been withdrawn.

James and Valenzuela (2019) propose a model in which IPO failure is costly and issuers choose underwriters primarily on the promise of deal certainty.[33] The underwriter does not know the issuer's true value at the time of pitching its services and must predict future levels of demand. Pricing information is valuable and requires costly effort to acquire, but informed investors prefer to lemon-dodge. Our setting is equivalent, except that issuers are unwilling to pay higher gross spreads (to cover the extra costs to the underwriter of his information acquisition), or lengthen the at-risk period between IPO launch and pricing in order for informational cascades to develop. Instead, issuers choose to exert private costly effort in soliciting demand commitments from early investors ahead of launching their IPOs.

3.2.3 Hypothesis development

We develop our hypothesis by introducing early investors into the framework of the three IPO models just described. Early investors are a sub-sample of informed investors who not only provide pricing information but also agree to satisfy the issuer's reservation price and not to sell shares for up to one year after the IPO, subject to the final IPO price not exceeding their own maximum price. In return, early investors require a guaranteed allocation, whether contractually or verbally from the underwriter. The underwriter is therefore not able to threaten under-allocation to induce truthful information revelation, as required by Jenkinson et al. (2006).

[33] Soft (or 'overnight') underwriting is the norm in bookbuilt IPOs. In the case of insufficient demand for the shares, underwriters are not obliged to guarantee IPO completion for the issuer. Instead, the IPO is withdrawn or restructured (e.g. smaller size, lower price, extended time period).

However, the underwriter should be able to count on early investors to salvage weakly demanded IPOs (Busaba et al., 2019) and to lower the likelihood of deal failure (James and Valenzuela, 2019).

Figure 3.2 depicts the relationship between pre-market demand and the underwriter's pricing intention that we expect to observe in equilibrium. As in Busaba et al. (2019), the vertical axis represents Share Value with the Issuer's Reservation Price depicted as V_R. We add Early Investors' Maximum Price as V_M. The horizontal axis represents Pre-Market Demand for all f in the range $[0, 1]$. Pre-Market Demand below the Issuer's Reservation Price R is indicated as 'Insufficient', between R and f^* as 'Neutral', between $f^*$and f^{**} as 'Strong', and above f^{**} as 'Very Strong'. IPOs are withdrawn if $f < \underline{f}$, and priced above the filing range if $f > f^{**}$. Completed offerings are overpriced at V_R for $f \in [\underline{f}, R]$, fully priced for $f \in [R, f^*]$, and underpriced if $f > f^*$. Full pricing is indicated as leaving zero expected profit to investors. The two shaded areas represent IPOs that are 'priced for issuers' (i.e. salvaged from being withdrawn by the presence of early investors) and 'priced for early investors' (i.e. offered with a higher amount of underpricing than would be required absent early investors). In equilibrium, the two triangular shaded areas should be economically equivalent.

3.3 Research design and data

Identifying whether underwriters underprice or overprice IPOs to satisfy early investors or issuers presents a number of empirical challenges. An underwriter's pricing intention is not observable. IPOs in which either early investors' or issuers' price limits are binding are equally unobservable. Hence, we require both a measure that reflects the underwriter's pricing intention, and a research design that identifies situations in which price limits are likely to have been binding. In order to test our hypothesis, we must estimate counterfactual outcomes for a control group of IPOs that were not underpriced or overpriced by the underwriter to satisfy

limit prices. Finally, in order to test equilibrium explanations, we must also identify causal effects of early investors on gross spreads and IPO withdrawals.

3.3.1 Identification strategy

First, we identify the underwriter's pricing intention. We consider that the underwriter is perfectly informed of the fair market value of the IPO firm upon completion of bookbuilding. His pricing intention is revealed by where the IPO price is set relative to this 'fair market value' ("FMV") price. In order to proxy for FMV, we take the closing stock price one month after the first trading day of the IPO. The price stabilisation period and associated restriction on the publication of research reports in European IPOs typically lasts for 30 days after the IPO trade date. Hence, the one-month price is rid of the confounding effect of stabilisation activities but not yet impacted by new information disseminated in analysts' reports. The underwriter's pricing intention relative to FMV is then manifest in the STOXX600-adjusted percentage change from the IPO price to the FMV price (or "FMV return"). We would expect underpricing (overpricing) by underwriters seeking to satisfy early investors (issuers) to increase (decrease) FMV excess return relative to IPOs that generated the same degree of strong (weak) bookbuilding demand but were not constrained by price limits.

Second, we identify situations in which upper and lower price limits are likely to have been binding. We use seven 'pricing bracket' indicator variables (ABOVE, TOP, HIGH, MID, LOW, BOTTOM, BELOW) to indicate the position of the IPO price relative to the initial filing range. Our empirical approach exploits two empirical characteristics of European IPOs: first, filing ranges are rarely revised once set (there are only 6 such instances, or 0.8% of our sample IPOs); second, IPOs rarely price outside the filing range (Figure 3.3 depicts there are only 45 such instances, or 6.1% of our sample IPOs). We therefore consider that the upper and lower bounds of the filing range are likely to represent early investors' and issuers' limit prices respectively, in most cases.

Third, we identify a control group of IPOs. We do this by exploiting the discontinuity in IPO prices at the TOP and BOTTOM of the pricing range. Figure 3.4 depicts that there are 32 times more IPOs pricing at the TOP of the filing range than within a 5% band above it, and 34 times more IPOs pricing at the BOTTOM than within a 5% band below it. While our pricing bracket variables reflect the strength of realized versus expected demand for the IPO, the final offer price is also influenced by whether early investors' or issuers' limit prices bind. Hence, the cluster of offerings pricing at the TOP (BOTTOM) of the range are of particular interest since they contain a disproportionate number of strongly (weakly) demanded offerings that might have been priced differently but for limit prices binding. Our testing strategy focuses on the relation between early investors and under- and over-pricing, first by examining IPOs in the TOP and BOTTOM price bracket categories (our 'treatment' group), and then by examining the difference between IPOs in these two categories and those in the HIGH and BELOW brackets respectively (our 'control' group). The rationale is that offerings in the adjacent pricing brackets can be expected to be similar in many observable and unobservable characteristics that are reflected in the strength of bookbuilding demand. Our research design therefore helps to identify closer estimates of unobserved counterfactual outcomes for the underpricing (overpricing) of strongly (weakly) demanded offerings.

Finally, we identify the casual effects of early investors on gross spreads and IPO withdrawals. As the research design described above applies only to completed IPOs, and there is no discontinuity in gross spreads at the boundaries of the filing range, we instead employ a difference in difference estimation. Our empirical approach focuses on cornerstone IPOs only, and exploits a change that occurred in such IPOs during our sample period. We consider the IPO of Aena, a $4.8 billion Spanish privatisation completed in February 2015, as a treatment dummy. In the Aena IPO, three cornerstone investors (Ferrovial, Alba Corporacion and the Children's Investment Fund) made fixed price bids ahead of the IPO but received zero allocations; this is because the IPO met with stronger than expected demand and was priced

above their price limits. In the period before Aena, there are no IPOs in which cornerstone investors are 'priced out' in this way. Following the Aena IPO, cornerstone investors switch to making strike price bids rather than fixed price bids; hence, cornerstone investors no longer face the risk of being priced out after the Aena deal. Given this change, we would expect cornerstone IPOs in the post-Aena period to experience higher execution certainty and require lower marketing effort. This is because cornerstone investors are providing a tranche of early price-insensitive demand that substantially covers the IPO deal size. If cornerstone investors are rewarded for providing this service with underpriced shares, we might expect to find such underpricing to be offset by equilibrium effects, namely reductions in adjusted gross spread and withdrawn rate.

3.3.2 Econometric approach

In order to implement our testing strategy, we being by estimating the following OLS regression specification for IPOs within our Pricing Brackets:

$$FMV\ Return = \beta_0 + \beta_1 Pricing\ Bracket + \beta_2 Pricing\ Bracket\ x\ Early\ Investor + Controls + \varepsilon_i \quad (1)$$

The Pricing Bracket indicator variables are included in the regression as standalone variables and then interacted with the Early Investor dummy. We omit MID for reasons of collinearity and ABOVE x Early Investor as there are no observations in this category. The specification allows us to estimate the slope coefficient on Early Investor for each Pricing Bracket. We focus in particular on the coefficient of the interaction term for IPOs priced at the TOP and BOTTOM of the price range (treatment group), and the differential effect with the interaction term for IPOs in the HIGH and BELOW brackets (control group). Controls are variables commonly used in the literature and correlated with IPO initial returns (described in Table 3.2 and discussed below).

If underpricing or overpricing by the underwriter causes a rightward or leftward shift in FMV Return, this would manifest itself in increased or reduced average returns as captured by

Equation (1), but also in an increased or reduced incidence of positive returns. To capture this narrower possible manifestation of underwriter pricing intention, we create a dummy variable POS FMV Return that takes the value one when FMV Return is positive and zero otherwise. We then estimate the marginal effects of the following probit specification:

$$\Pr(POS\ FMV\ Return = 1) = \Phi(\beta_0 + \beta_1 Pricing\ Bracket + \beta_2 Pricing\ Bracket\ x\ Early\ Investor + Controls) \quad (2)$$

As in Equation (1), we are especially interested in the sign and significance of the interaction term for IPOs pricing at the TOP and BOTTOM of the price range, and the differential effect with the interaction term for IPOs in the HIGH and BELOW brackets.

In order to test whether early investors salvage weakly-demanded IPOs, we estimate a regression specification that identifies the relative effect of early investors across adjacent pricing brackets. We focus on the BOTTOM bracket and estimate the following regression, in both OLS and probit specifications:

$$y_i = \beta_0 + \beta_1 DY\_BOTTOM + \beta_2 Early\ Investor + \beta_3 DY\_BOTTOM\ x\ Early\ Investor + Controls + \varepsilon_i \quad (3)$$

The dependent variable is FMV Return and POS FMV Return and for OLS and probit specifications respectively. DY_BOTTOM is a dummy variable that takes the value of one for IPOs pricing at the BOTTOM and zero for IPOs pricing BELOW the range. By focusing on the interaction term, the specification tests whether overpricing is more pronounced with the presence of early investors at the lower bound relative to the group of IPOs priced below the lower bound.

Finally, in order to test the equilibrium effect of early investors on gross spreads and IPO withdrawals, we exploit the post-Aena change in cornerstone investors' bidding behaviour to perform the following OLS estimation:

$$y_i = \beta_0 + \beta_1 Post\ Aena + \beta_2 Cornerstone + \beta_3 Post\ Aena\ x\ Cornerstone + Controls + \varepsilon_i \quad (4)$$

The dependent variables in turn are FMV return, adjusted gross spread and withdrawn rate. Post Aena is a dummy variable that equals one for IPOs pricing after the Aena IPO on 10th February 2015 and zero for observations pricing before it. Cornerstone is a dummy variable that equals one for IPOs involving cornerstone investors (i.e. those investors whose pre-IPO commitments are disclosed in the IPO prospectus). By focusing on the interaction term, the specification tests whether underpricing impacts are mirrored with equilibrium effects on gross spreads or IPO withdrawals, for example if higher underpricing is offset by lower gross spreads and/or reduced withdrawn rate.

3.3.3 Sample and variables

We test our predictions using a sample of European completed and withdrawn IPOs above $30 million between January 1st 2010 and June 30th 2017. IPO data are obtained from Dealogic and verified against prospectuses and company announcements. For European IPOs, Dealogic contains greater information than databases such as SDC, in particular providing gross spreads that are not otherwise available. Post-IPO trading volume, VIX Index, Bloomberg IPO Index and STOXX600 Index data are obtained from Bloomberg. Data on early investors are hand-collected from prospectuses, company announcements and International Financing Review ("IFR") reports.[34] Following the literature, we exclude fixed price IPOs, funds and preferred shares, special purpose entities, blind capital pools and acquisition vehicles. Although our focus on bookbuilt IPOs means the sample is skewed towards larger deals, bookbuilding is the dominant approach in European IPOs (Ljungqvist, Jenkinson and Wilhelm 2003) and it allows us to compare our findings with US studies. Table 3.1 provides descriptive statistics for our sample. Overall, there are 739 IPOs raising $248 billion with a median size of $268 million[35] of which 231 (31%) were withdrawn and 99 (13%) involved early investors. The prevalence of early

[34] We provide excerpts of IFR reports identifying early investors in the Appendix.
[35] Dealogic reports 1,151 US IPOs larger than $30 million for our sample period, raising total proceeds of $356 billion with a median size of $132 million.

investor IPOs increases from 3% of IPOs in 2011 to 24% in 2017. The three most frequent issuance countries (sectors) account for 39% (40%) of Early Investor IPOs.

Table 3.2 provides descriptive statistics for the variables used in our analysis, separately for Early Investor and Other IPOs. Our dependent variables comprise the two measures of underpricing previously described: FMV Return and POS FMV Return. We also measure withdrawn rate (a binary variable for IPOs that are withdrawn after announcement, except when the withdrawal is due to an M&A bid being preferred) and adjusted gross spread (which we calculate by applying a 50% haircut to any discretionary incentive component of gross spread).[36] In two-sample tests of mean and median difference of our dependent variables, early investors are associated with significantly higher levels of FMV returns, greater instances of positive FMV returns, and lower levels of IPO withdrawals (*t*-statistics and z-statistics ranging from -3.71 to 6.31), but have no prima facie relation with adjusted gross spreads. Turning to our pricing bracket variables, early investors are associated with significantly higher levels of IPOs pricing at the TOP of the range (*t*-statistic -4.43; z-statistic -5.77) and significantly lower levels of IPOs pricing at the LOW or BOTTOM of the range (*t*-statistics and z-statistics ranging from 2.79 to 4.31). This suggests early investors may not be salvaging IPOs that are overpriced for issuers in equilibrium. Turning to our control variables, early investors are associated with IPOs that involve larger issuing firms, higher proceeds, a greater degree of insider selling, a higher proportion of growth and Nordic firms, fewer emerging market listings, a greater number of bookrunners and higher market-share banks, and are launched in periods of lower market risks and stronger IPO market conditions. Once again, this suggests early investors may not be salvaging weakly demanded IPOs that are overpriced for issuers.

[36] Jenkinson et al. (2018) describe discretionary fees in European IPOs and report that incentive fees are paid in full in around half of their sample IPOs.

3.4 Main results

3.4.1 Preliminary statistics

As a preliminary test of our hypothesis, we examine the cross-sectional effect of early investors on FMV returns (Figure 3.5, Panel A) and the incidence of positive FMV returns (Figure 3.5, Panel B) within each of our pricing brackets. We would expect to find that FMV returns (and the incidence of positive FMV returns) are higher among early investor IPOs in the TOP bracket, and in equilibrium that they are lower in the BOTTOM bracket. Consistent with these predictions, we find in Panel A that the difference between early investor and other IPOs is largest (16.1% and 8.4% respectively) and most statistically significant in the TOP and HIGH brackets. However, we find no association between early investor IPOs and lower FMV returns in the BOTTOM bracket. Turning to Panel B, the pattern is confirmed. Early investor IPOs exhibit a higher proportion of positive FMV returns than other IPOs in every pricing bracket except the MID point. The differences are economically large (25.4% and 23.6% respectively) and statistically significant only in the TOP and HIGH brackets. Once again, the BOTTOM bracket does not support our equilibrium hypothesis. Instead, it is other IPOs that are associated with a lower (39.1%) chance of experiencing positive FMV returns.

3.4.2 The impact of early investors on underpricing

We now test our hypothesis using the multivariate regression specification corresponding to Equation (1). Table 3.3 reports coefficient estimates. Columns (1) to (3) regress the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (4) to (6) include the interaction of pricing bracket variables and the Early Investor indicator variable, omitting ABOVE x Early Investor as there are no observations in this bracket. Columns (2) and (4) add control variables. Columns (3) and (6) add time (year) fixed effects. In columns (1) to (3) we find that IPOs pricing in the TOP bracket have a significant positive relation with FMV returns. The magnitude is economically large and robust to controls and time fixed effects. The association is repeated in the HIGH bracket with approximately half the economic magnitude

and statistical significance, again robust to controls and time fixed effects. Consistent with our expectations, IPOs pricing in the ABOVE bracket are not associated with higher returns. Contrary to expectations, IPOs in the BOTTOM and BELOW brackets do not have a significant negative relation with FMV returns (i.e. overpricing).

Turning to columns (4) to (6), consistent with our hypothesis, we find a significant positive relation between FMV returns and the interaction term TOP x Early Investor (our treatment group). The magnitude is economically large and robust to controls and time fixed effects. Based on the coefficient in column (6), conditional on an IPO being in this pricing bracket, the presence of early investors is associated with an increase of 102-percentage points in FMV return. Comparing the coefficients on TOP x Early Investor (treatment group) versus HIGH x Early Investor (control group), we find a differential effect of 52-percentage points (coefficients of 1.02 minus 0.50) that is attributable to the conservative setting of the filing range and the consequent binding of early investors' price limits. However, contrary to our salvaging hypothesis, there is no significant (or indeed negative) relation between FMV returns and the interaction term BOTTOM x Early Investor. This suggests early investors are not associated with purchasing overpriced IPOs at the bottom of the filing range.

3.4.3 The impact of early investors on the likelihood of positive returns

Next, we test our hypothesis using the multivariate probit regression specification corresponding to Equation (2). Table 3.4 reports estimates of marginal effects. Compared to Table 3.3, this specification tests for a narrower manifestation of underpricing and overpricing, namely the strict incidence of positive returns. As before, Columns (1) to (3) regress the pricing bracket indicator variables, omitting ABOVE due to 100% positive outcomes and LOW that acts as the base case. Columns (4) to (6) include the interaction of pricing bracket variables and the Early Investor indicator variable, omitting ABOVE x Early Investor as there are no observations in this bracket. In columns (1) to (3) we find a significant positive association between IPOs pricing in the TOP bracket and the likelihood of positive returns, as was the case

in Table 3.3. However, we also find a significant negative association in the BOTTOM bracket, consistent with our equilibrium or salvaging hypothesis. Both positive and negative associations are similar in economic magnitude and statistical significance and are robust to controls and time fixed effects.

Turning to columns (4) to (6), we find the interacted terms TOP x Early Investor (treatment group) and HIGH x Early Investor (control group) have significant positive associations that are robust to controls and time fixed effects. However, we find no differential effect between treatment and control groups (marginal effects of 0.26 each) in our fullest specification in column (6). Contrary to our predictions, there is no negative association with the interaction term BOTTOM x Early Investor. This suggests that the negative relation between FMV return and IPOs pricing at the BOTTOM is not explained by the presence of early investors. As the relation exists, it may be explained by IPOs involving retail investors or other institutional investors.

3.4.4 The impact of early investors on salvaging IPOs

In order to examine the mixed evidence surrounding overpricing of IPOs at the BOTTOM of the range, we use the more focused regression specification corresponding to Equation (3). Table 3.5 reports OLS coefficient estimates in columns (1) to (3), and probit marginal effects in columns (4) to (6). Compared to Tables 3.3 and 3.4, this specification allows us to identify the effect of early investors within the sample of IPOs priced at the BOTTOM relative to the effect within the sample pricing BELOW. IPOs pricing BELOW provide a close counterfactual for what pricing at the BOTTOM might have been, absent limit prices binding. As before, Columns (1) and (4) report the baseline regressions, controls are added in columns (2) and (5), and time fixed effects in columns (3) and (6). We are interested in the coefficient and marginal effect on the interaction term DY_BOTTOM x Early Investor. If our hypothesis were true, and early investors were purchasing overpriced IPOs from underwriters seeking to satisfy issuer's reservation prices, we would expect to find a significant negative coefficient and marginal

effect. Instead, although the signs are mostly negative, we find no statistically significant effects. There is therefore no evidence to suggest a negative relation between early investors and FMV return in the BOTTOM bracket, or that such a relation becomes more pronounced when comparing the BOTTOM group relative to the BELOW group of IPOs.

3.4.5 The impact of early investors on gross spreads and IPO withdrawals

If early investors are not salvaging weakly-demanded IPOs at the bottom of the price range, they may nevertheless be contributing value by reducing gross spreads or IPO withdrawals. We examine this hypothesis using the difference in difference specification corresponding to Equation (4). Table 3.6 reports OLS coefficient estimates for the treatment dummy (Post Aena), the indicator variable (Cornerstone) and the interaction term (Post Aena x Cornerstone). Consistent with our results in Table 3.3, we find significant positive and economically large coefficients (1.18 and 1.21) on the interaction term when examining FMV return in columns (1) and (2). However, we find no significant coefficients when examining adjusted gross spread in columns (3) and (4), or withdrawn rate in columns (5) and (6). This confirms the relation between early investors and underpricing, and at the same time suggests early investors are not associated with reduced gross spreads or reduced IPO withdrawals.

3.4.6 Do early investors provide value-added services?

If early investors are not salvaging weakly-demand IPOs, or reducing gross spreads or withdrawals, they may nevertheless be providing value-added services to issuers (e.g. Stoughton and Zechner, 1998). We face the challenge that such services (e.g. industry or political contacts, M&A or debt refinancing expertise, etc.) are not observable. To address this, we exploit the fact that cornerstone investors take part in privileged communications with the IPO issuer ahead of launch and market 'soft' factors (such as their value-added services) along with 'hard' factors (such as their demand and price indications) when competing against each other for guaranteed allocations. In Panel A of Table 3.7, we use data on the number of cornerstone investors (*NoCorner*) and the percentage of the cornerstone tranche (*%Corner*) to repeat the analysis of

Brown and Kovbasyuk (2016) who study key investors in US IPOs. If cornerstone investors were providing value-added services, pricing theories (e.g. Sherman and Titman (2002)) would suggest a positive non-linear relation between the number of cornerstone investors and FMV return. Hence, we would expect *NoCorner* and $NoCorner^2$ to be positively related to underpricing. However, in a regression of underpricing in columns (1) to (3), we find no statistical significance. In Columns (4) to (6), when regressing FMV return on *NoCorner* and *%Corner*, we again find no significance. These findings, although derived from a small sample of European cornerstone IPOs, are generally negative for value-added explanations. The findings are also contrary to the main results of Brown and Kovbasyuk (2016) who find a positive non-linear relation between the number of key investors and underpricing in US IPOs.

3.4.7 Do early investors provide informational services?

Early investors may be providing informational services to issuers (e.g. Benveniste and Spindt, (1989), Cornelli and Goldreich (2001)) in return for receiving underpriced IPO shares. In Table 3.7 Panel B, we repeat the analysis of Table 3.3 column (6) but report only the interaction terms TOP x Early Investor (treatment group) and HIGH x Early Investor (control group). We perform this regression across various sub-samples designed to capture informational theories of IPO pricing. In columns (1) and (2), we create samples of *Technology* and *Life Sciences* issuers. These IPOs can be thought of as 'hard to value' since a large degree of firm valuation derives from growth options rather than assets in place (Benvensite et al., 2003). If early investors are providing information, it seems likely they would do so in industries in which they specialize (Kacperczyk et al., 2005). In column (3), we create a sample of *Risk market* IPOs, combining deals from Junior and Emerging Market exchanges. These deals can be thought of as 'hard to examine' since the information content of prospectuses is lower, and the years of financial track record are smaller compared to other exchanges (Hanley and Hoberg, 2010). In column (4), we create a *Sole managed* sample. These IPOs involve only one underwriter and are hence more risky for the issuer and underwriter. In column (5), we create a sample of

<$500m market caps. This sample is an alternative risk measure not based on industry, exchange or country. Smaller deals present inherent execution difficulties for underwriters (Leleux and Muzyka, 1997). Finally, in column (6) we create a sample of *>50% Float* IPOs. These deals can be thought of as 'hard to place' since the firm is switching from private ownership to minority insider control. If early investors provide early demand momentum, it seems likely underwriters in such deals would seek them out by offering underpriced shares (McGuiness, 2012). When examining the interaction term TOP x Early Investor, we find no statistically significant coefficients in any of the six columns. These findings are generally negative for informational explanations.

3.4.8 Do early investors receive underpriced shares for agency-based reasons?

Many studies find agency-based explanations for the underpricing of IPOs (e.g. Reuter (2006), Ritter and Zhang (2007), Jenkinson et al. (2018)). In Table 3.7 Panel C, we repeat the methodology of Panel B and perform our regression in sub-samples designed to capture agency-based theories of IPO pricing. In column (1) we create a sample of *OVL High* IPOs, grouping together deals in the top quartile of dollar amount of overallotment exercise. Ellis et al. (2000) report a positive association between 20-day post-IPO returns and overallotment option exercise. To the extent early investor lock-up commitments reduce stabilization costs for underwriters, early investors may be receiving kickbacks for such lock-up commitments. In column (2), we create a sample of *Illiquid 6-month* IPOs grouping together deals in the bottom half of 6-month post-IPO trading volume. Consistent with arguments made by Booth and Chua (1996) and Ellul and Pagano (2006), investors expecting an illiquid post-IPO aftermarket may require a higher 1st day return by way of compensation. By this reasoning, early investors would suffer more than other investors due to the size of their allocations. Underwriters may therefore be offering rents in exchange for their participation in this sample. Finally, in columns (3) to (6), we create samples based on the financial intermediaries involved in IPOs, namely *Top 4 Bank, Top 8 Bank*, *Adviser* and *Top Exchange*. In these samples, we group together IPOs where the

possibility for repeat-game coalitions between intermediaries and early investors is high. When examining the interaction term TOP x Early Investor, we find significant and economically large positive coefficients in all six columns. In each case, the magnitude of the treatment group (Top x Early Investor) coefficients significantly exceeds those of the control group (HIGH x Early Investor). The differential effects range from 30-percentage points (column 2) to 143-percentage points (column 6) with an average differential of 105-percentage points. This is more than twice the baseline 52-perentage point differential reported in Table 3.3.

3.4.9 Robustness

As discussed by Busaba et al. (2019), many IPO studies use raw price returns to measure underpricing. We therefore estimate our main results (Table 3.3) using one-day and one-month raw returns post-IPO in the Appendix. In both cases we find our results are largely invariant.

We argue that the Aena IPO gives rise to a change in the way cornerstone investors bid for IPOs. We therefore estimate our main results (Table 3.3) out of sample for pre- and post-Aena periods to test our identifying assumption in the Appendix. As expected, we find a stronger association between early investors and underpriced IPOs in the pre-Aena period. We control for this two-period effect in our main results with year fixed effects.

Following Ellis et al. (2000), we argue that there is a positive association between FMV return and overallotment option exercise that might explain underpricing rents for early investors that enter into lock-up commitments. We follow the prior study and examine two measures of overallotment exercise, namely the proportion of shares exercised relative to the size of the total overallotment option (OVL Exercise %), and a dummy variable that captures situations in which this ratio is strictly 100% (Full OVL Exercise Y/N). We present means and medians for these two variables per Pricing Bracket in the Appendix. IPOs pricing at the TOP and HIGH point of the filing range have the highest mean and median values for both variables, while those pricing at the BOTTOM and BELOW have the lowest.

3.5 Conclusions

IPOs are increasingly launched with the prior backing of early investors. Such investors make firm commitments to buy shares (or give verbal indications of interest that substantially cover the IPO) before launch, in return for guaranteed allocations and the promise to hold the shares in the aftermarket. If bookbuilding demand turns out to be stronger than anticipated, the underwriter has the incentive to price the IPO below where he might otherwise set it, in order to satisfy the limit prices of early investors and ensure their participation in future IPOs. If bookbuilding demand is weaker than anticipated, the underwriter has the incentive to price the IPO above where he might otherwise set it, in order to salvage the IPO for the issuer, but requires investors to accept buying overpriced shares.

We examine whether early investors buy weakly-demanded IPOs in return for receiving strongly-demanded ones in equilibrium. Our identification strategy exploits a discontinuity in the distribution of IPO prices around the upper and lower boundaries of the filing range. IPOs pricing at the upper (lower) boundary are likely to contain offerings that have been priced down (up) to meet early investors' (issuers') limit prices. We compare the one-month market-adjusted returns of these IPOs with the aftermarket returns of other strongly (weakly) demanded offerings in which limit prices were likely not to have been binding. We find early investor IPOs pricing at the top of the range are associated with a 52-percentage point increase in underpricing when measured against a control group of IPOs pricing immediately below the upper boundary. However, we find no evidence that early investors salvage weakly-demanded IPOs at the bottom of the filing range, and no evidence that they contribute to reducing gross spreads or IPO withdrawals for issuers. When examining other explanations for the favourable treatment of early investors, we find no support for value-added and informational-based explanations and strong support for agency-based explanations for the underpricing.

Our findings point to possible quid pro quos between early investors and underwriters, and if so, raise important welfare questions for IPO issuers. Whilst it is outside the scope of our

paper to test agency-based explanations, such behavior is predicted in theoretical models of bookbuilding (e.g. Kenney and Klein (1983), Gondat Larralde and James (2008)) and in equilibrium would allow coalitions of early investors and underwriters to compete more aggressively for highly-prized IPO mandates. Since underpricing in our sample is low by historic standards and compared to other markets, it seems likely that issuers benefitted from a competitive equilibrium in which potential quid pro quos between banks and early investors were benign. Independently, since early investor IPOs in our sample tend to involve large or sophisticated (i.e. Government- or PE/VC-backed) issuers, the scope for welfare-destroying quid pro quos also seems remote.

Several questions arise from our study. First, whether regulators should dial back existing rules governing the early marketing of IPOs in order that offerings are marketed to a broad range of investors on equal terms (as suggested by FCA (2017)). Second, whether policy-makers should review recent regulations (e.g. Markets in Financial Instruments Directive II) that may be contributing to IPOs being marketed to a clique of investors with 'social network' ties with the lead underwriters (as proposed by Grullon et al. (2014)). Third, whether underwriters should provide transparency on the IPO allocations made to their largest clients (as suggested by the European Securities and Markets Authority). Fourth, whether firms that IPO in currently de-risked market conditions are of lower quality to prior periods (as evidenced by De Fontenay (2017), Ewens and Farre-Mensa (2019), and Divakurani and Jones (2020)).

Overall, our paper sheds light on the debate surrounding informational and agency-based theories of IPO pricing. In particular, we add to the understanding of the role of the underwriter and the pricing power of early investors. Our findings suggest underwriters take an active role, setting offer prices to accommodate early investors' limit prices in order to protect future business from such investors. Finally, our findings highlight a distinct role for the upper boundary of the price range in European IPOs that appears to set a maximum level for the offer price in a disproportionate number of offerings.

Figure 3.1: Early investors in European IPOs

The figure depicts the number of completed and withdrawn IPOs larger than $30 million on European exchanges (LHS) together with the percentage of withdrawn IPOs, the percentage of Early Investor IPOs and the mean VIX Index level (multiplied by 2 for scaling purposes) per year between January 1st 2005 and June 30th 2017. The sample comprises 1,080 IPOs of which 663 were completed raising $452 billion, 417 were withdrawn and 99 involved Early Investors. IPO data are from Dealogic, prospectuses and International Financing Review reports, and VIX data are from Bloomberg.

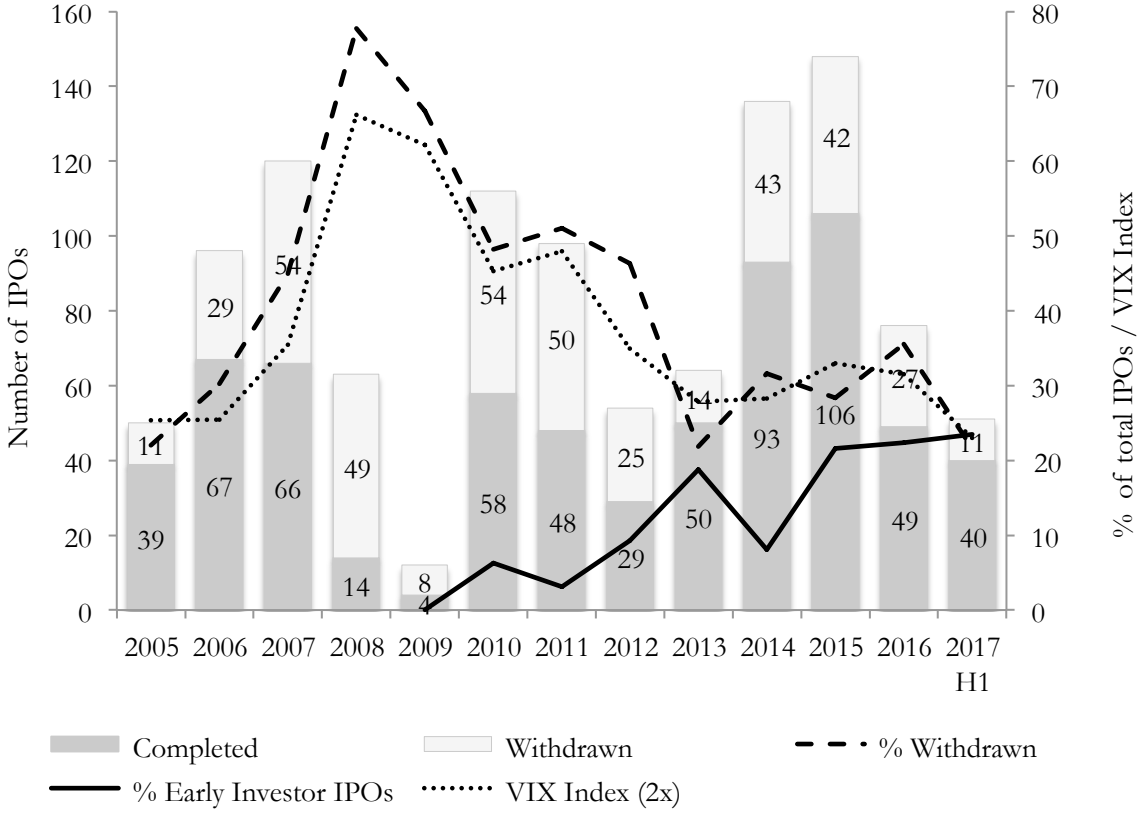


Figure 3.2: Underwriters' demand-contingent pricing intention

The horizontal axis in both figures represents Pre-Market Demand $f, f \in [0,1]$. Pre-Market Demand below the Issuer's Reservation Price R is indicated as 'Insufficient', between R and f^* as 'Neutral', between $f^*$and f^{**} as 'Strong', and above f^{**} as 'Very Strong'. The dashed grey line at 45^0 represents the Expected Share Value conditional on Pre-Market Demand, V_f. The solid black line represents the Conditional Offer Price, P_f. IPOs are withdrawn if $f < \underline{f}$, and priced above the filing range if $f > f^{**}$. Completed offerings are overpriced at V_R for $f \in [\underline{f}, R]$, fully priced for $f \in [R, f^*]$, and underpriced if $f > f^*$. Full pricing is indicated as leaving zero expected profit to investors. The distance between the solid black line (Conditional Offer Price) and the dashed grey line (Expected Share Value) is indicated as overpricing (if negative) and underpricing (if positive) in the lower figure.

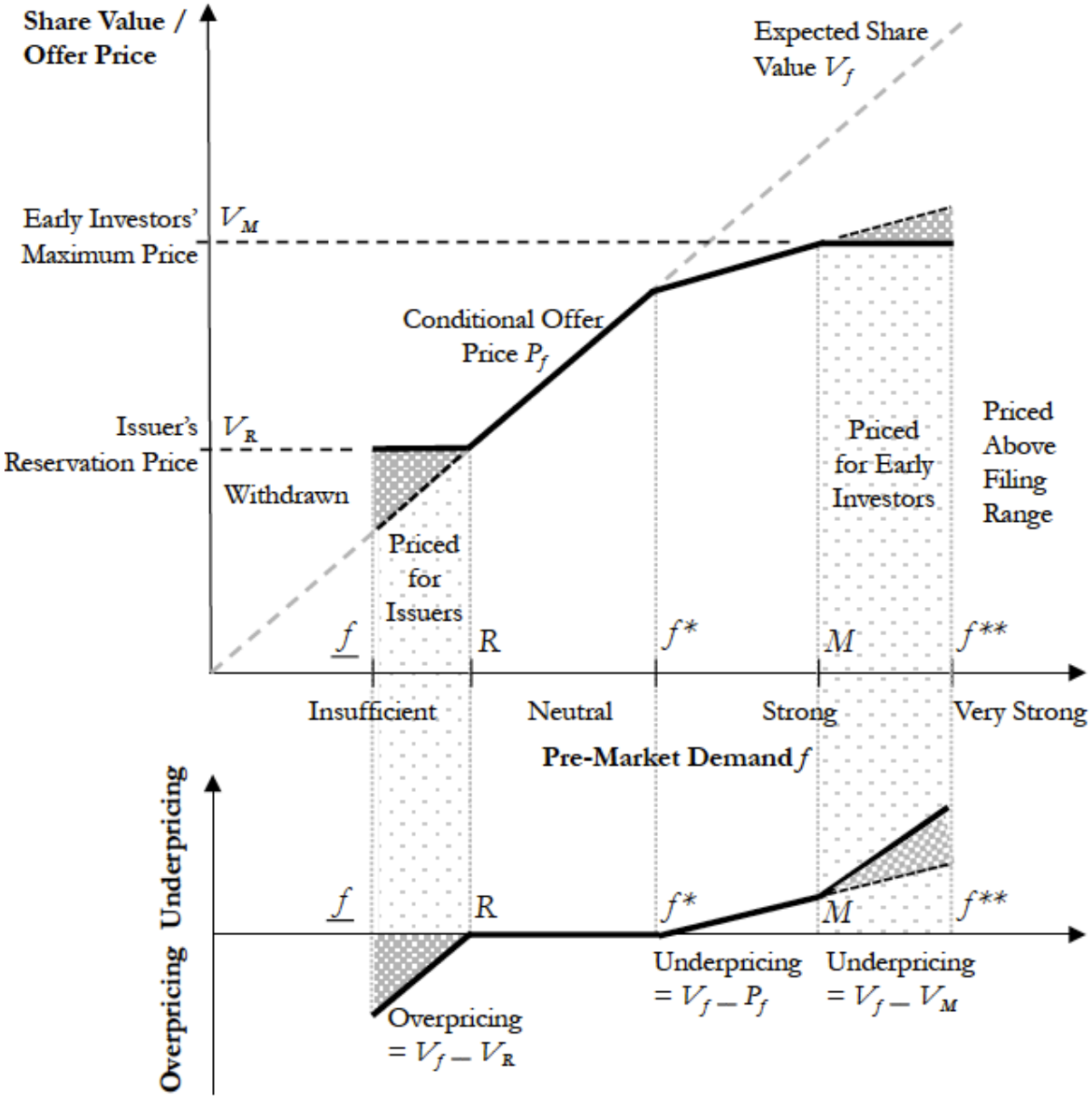


Figure 3.3: Distribution of IPOs by pricing brackets and early investors

The figure shows completed IPOs with and without early investors grouped into pricing brackets according to whether they are priced *BELOW* the filing range, priced at the *BOTTOM* (i.e. low boundary) of the filing range, priced between the *LOW* boundary and the mid-point of the filing range, priced at the *MID* point of the filing range, priced between the mid- and the *HIGH* point of the filing range, priced at the *TOP* (i.e. upper boundary) of the filing range, and priced *ABOVE* the filing range. There are no observations of Early Investor IPOs pricing above the filing range. The dashed line represents the proportion of Early Investor IPOs in each pricing bracket.

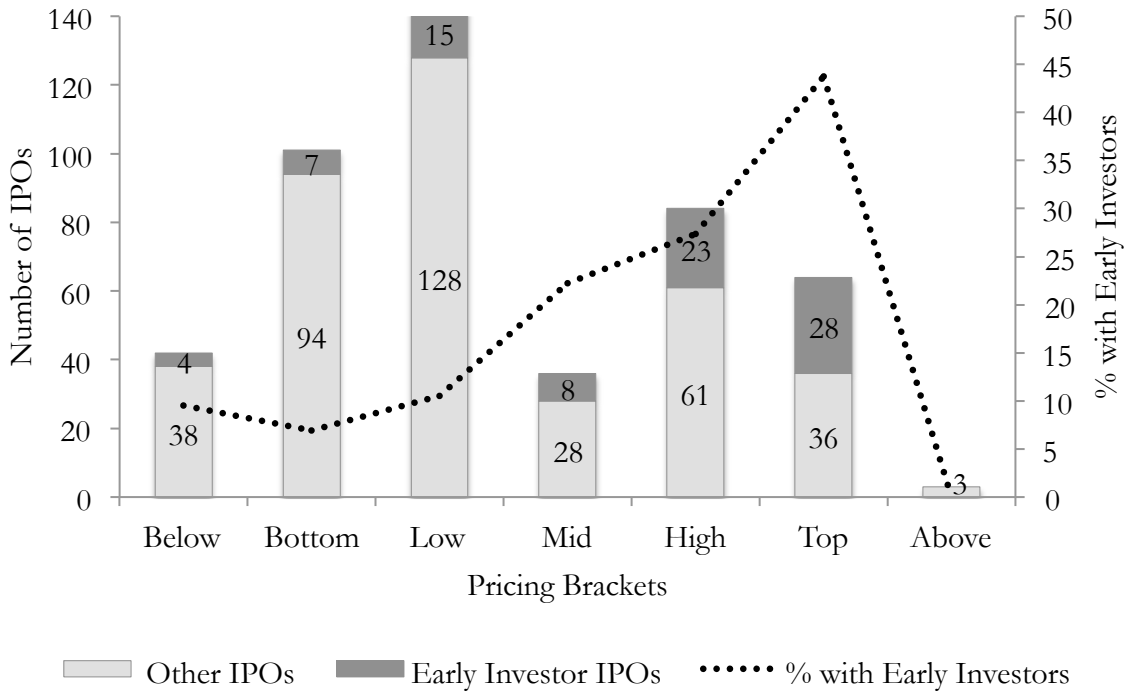
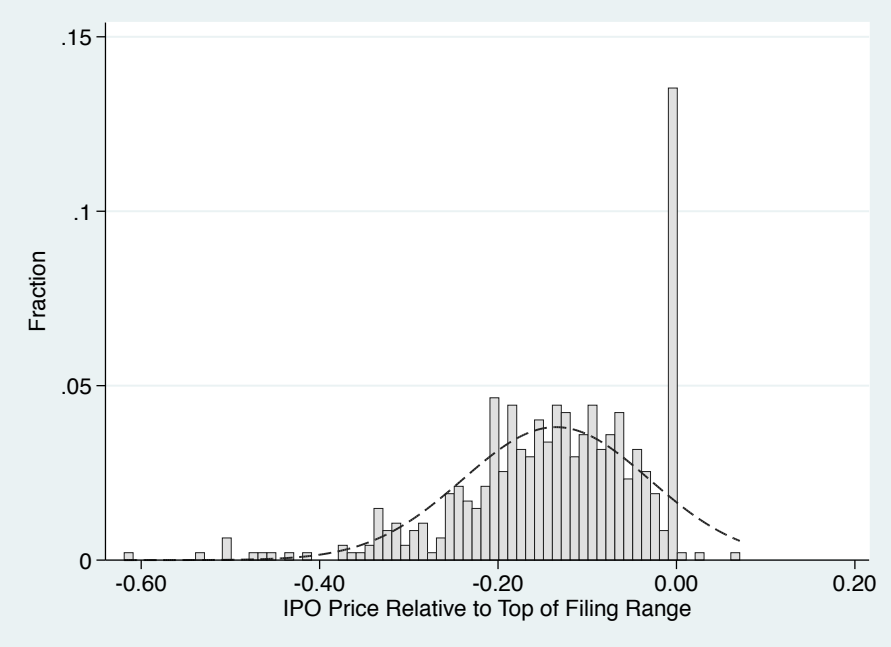


Figure 3.4: IPO prices relative to the top and bottom of the filing range

Panel A shows the frequency distribution of IPO prices relative to the top of the filing range, namely *(IPO Price – Top of Filing Range)/Top of Filing Range*. Panel B shows the same analysis based on the bottom of the range, namely *(IPO Price – Bottom of Filing Range)/Bottom of Filing Range*. Partitions have a width of 0.01. The bin beginning at zero and ending +/- 0.01 contains observations where the IPO price is exactly equal to the boundary, as well as observations within +/-1% of this level. The dashed line fits a normal density to the observed distributions.

Panel A: Frequency Distribution of IPO Prices Relative to Top of Filing Range



Panel B: Frequency Distribution of IPO Prices Relative to Bottom of Filing Range

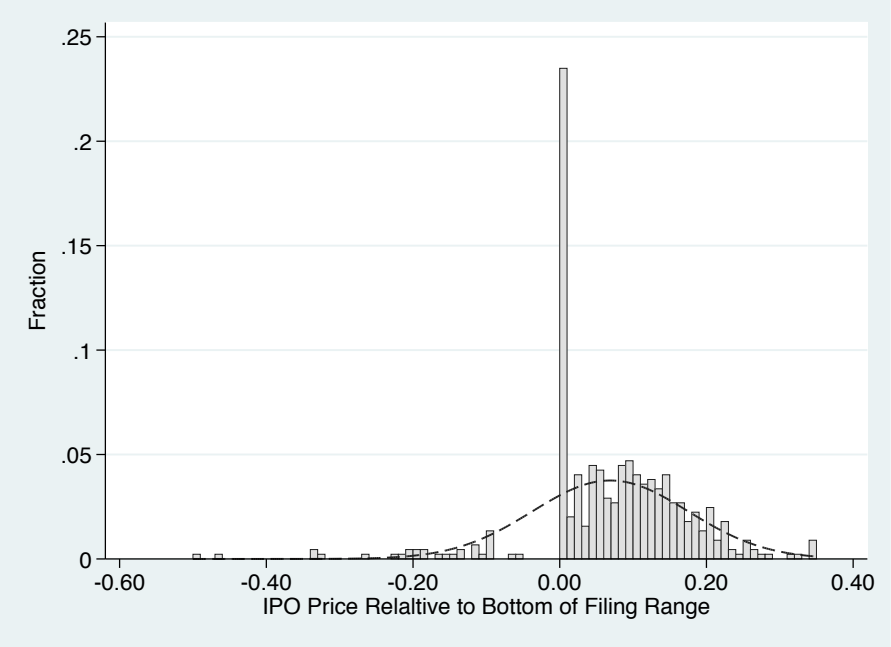
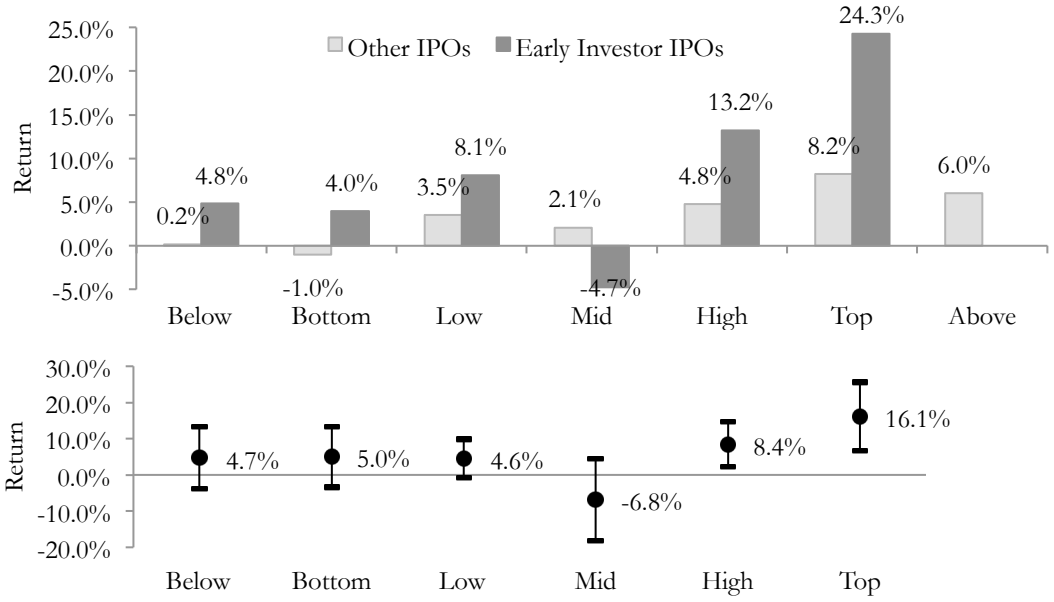


Figure 3.5: Aftermarket return by pricing brackets and early investors

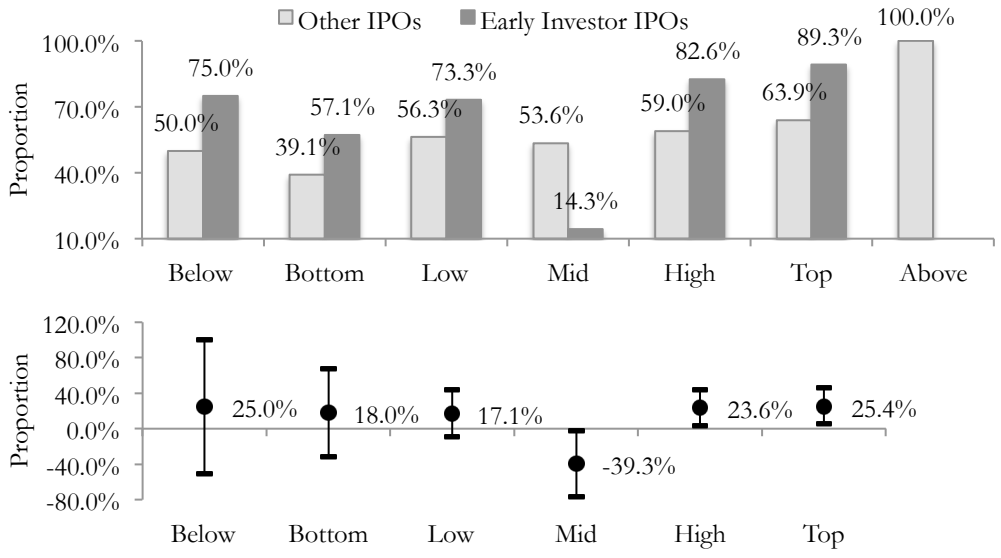
Panel A (B) reports the mean (proportion of positive) FMV return for Early Investor IPOs and Other IPOs in each pricing bracket. The black dots report differences in means and the bars around each dot denote the 95% confidence interval from a *t*-test with Satterthwaite approximation. There are no observations of Early Investor IPOs pricing above the filing range.

Panel A: Mean FMV Return



Difference (Early Investor IPOs - Other IPOs) and 95% conf. interval

Panel B: Proportion of Positive FMV Return



Difference (Early Investor IPOs - Other IPOs) and 95% conf. interval

Table 3.1: Descriptive statistics

The table summarizes our sample by year, by top five countries of primary exchange and by top five industry sectors as reported by Dealogic. We lack proceeds data for 176 withdrawn deals. Variables are defined in the Appendix.

	No. of IPOs			Proceeds		IPO outcomes		
	Total	Early Investor IPOs		Median	Total	FMV return	Withdrawn	Adj. Gross Spread
	No.	No.	%	($m)	($m)	(%)	(%)	(%)
Full sample	739	99	13.4	268	247,818	4.58	31.3	2.50
2010	112	7	6.3	265	32,906	2.37	46.4	2.36
2011	98	3	3.1	137	27,842	1.67	44.9	2.34
2012	54	5	9.3	206	13,313	5.33	42.6	2.06
2013	64	12	18.8	389	27,098	7.67	20.3	2.62
2014	136	11	8.1	351	47,690	1.73	24.3	2.58
2015	148	32	21.6	251	57,755	8.09	22.3	2.52
2016	76	17	22.4	259	27,335	2.50	31.6	2.58
2017 H1	51	12	23.5	220	13,879	6.91	17.6	2.64
UK	180	24	13.3	394	64,992	6.29	41.1	2.65
Germany	77	13	16.9	292	29,704	1.04	27.3	2.37
Poland	69	2	2.9	79	10,813	5.25	42.0	2.08
France	61	8	13.1	63	18,022	3.42	18.0	4.83
Sweden	56	26	46.4	165	11,824	10.06	8.9	2.73
Financials	72	11	15.3	407	36,085	4.00	25.0	2.33
Healthcare	66	10	15.2	66	9,844	3.23	21.2	2.95
Electronics	66	19	28.8	273	25,937	8.18	24.2	2.62
Transport	66	9	13.6	227	23,756	5.68	36.4	2.37
Real Estate	58	4	6.9	258	11,406	2.89	43.1	2.16

Table 3.2: Variables

The table presents summary statistics for variables used in the paper separately for early investor IPOs and other IPOs. We report *t*-statistics with Satterthwaite approximation (χ-statistics, Wilcoxon rank sum test) for differences in mean (median). ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

	Other IPOs				Early Investor IPOs				Tests for diff.	
	Obs.	Mean	Med.	SD	Obs.	Mean	Med.	SD	*t*-stat	χ-stat
Dependent Variables										
FMV return	386	2.67	0.94	13.5	84	13.33	11.51	17.0	-5.39***	-5.67***
POS FMV return	386	0.53	1.00	0.50	84	0.75	1.00	0.44	-4.11***	-3.71***
Withdrawn	640	0.34	0.0	0.47	99	0.11	0.00	0.32	6.31***	4.64***
Adj. Gross Spread	167	2.54	2.50	0.95	38	2.29	2.25	0.92	1.52	1.63
Pricing Bracket Variables										
ABOVE	388	0.01	0.00	0.09	85	0.00	0.00	0.00	1.74*	0.81
TOP	388	0.09	0.00	0.29	85	0.33	0.00	0.47	-4.43***	-5.77***
HIGH	388	0.16	0.00	0.36	85	0.27	0.00	0.45	-2.19**	-2.47**
MID	388	0.07	0.00	0.26	85	0.09	0.00	0.29	-0.64	-0.69
LOW	388	0.33	0.00	0.47	85	0.18	0.00	0.38	3.20***	2.79***
BOTTOM	388	0.24	0.00	0.43	85	0.08	0.00	0.28	4.31***	3.26***
BELOW	388	0.10	0.00	0.30	85	0.05	0.00	0.21	1.84*	1.49
Control Variables										
Ln (Market Value)	449	6.46	6.44	1.17	92	6.95	6.76	1.43	-3.06***	-2.79***
Ln (Proceeds)	472	5.43	5.52	1.16	92	5.95	5.87	1.29	-3.59***	-3.41***
Float	387	38.6	36.2	16.4	85	40.3	37.8	16.9	-0.85	-0.89
Secondary	498	48.2	47.1	41.2	92	58.3	72.1	41.0	-2.16**	-2.14**
Growth Industry	640	0.14	0.00	0.35	99	0.30	0.00	0.46	-3.32***	-4.02***
Nordic	640	0.18	0.00	0.38	99	0.34	0.00	0.48	-3.35***	-3.91***
Top Exchange	640	0.52	1.00	0.50	99	0.56	1.00	0.50	-0.62	-0.62
Emerging Market	640	0.13	0.00	0.33	99	0.04	0.00	0.20	3.67***	2.53**
Junior Market	640	0.07	0.00	0.26	99	0.12	0.00	0.33	-1.38	-1.63
PE/VC	640	0.33	0.00	0.47	99	0.41	0.00	0.50	-1.53	-1.59
No. of Bookrunners	633	2.78	2.00	1.81	99	3.47	3.00	1.87	-3.44***	-3.98***
Top 8 Bank	640	0.53	1.00	0.50	99	0.68	1.00	0.47	-2.81***	-2.68***
Adviser	640	0.32	0.00	0.47	99	0.41	0.00	0.50	-1.80*	-1.88*
BIPO	640	-0.05	0.01	1.00	99	0.30	0.50	0.92	-3.47***	-3.24***
VIX	640	17.2	16.0	5.56	99	15.7	14.7	4.32	3.18***	2.94***
STOXX2mRet	633	1.39	1.90	5.27	99	1.46	2.11	5.71	-0.11	-0.66

Table 3.3: The impact of early investors on underpricing

The dependent variable is FMV Return standardized. The regression specification corresponds to Equation (1).

$$FMVReturn = \beta_0 + \beta_1 PricingBracket + \beta_2 PricingBracket\ x\ EarlyInvestor + Controls$$

Columns (1) to (3) regress the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (4) to (6) include the interaction of pricing bracket variables and the Early Investor indicator variable, omitting ABOVE x Early Investor as there are no observations. Controls are the control variables described in Table 3.2. Time (Year) fixed effects are included in columns (3) and (6). We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

DepVar: FMV Return	(1)	(2)	(3)	(4)	(5)	(6)
ABOVE	0.36*	0.46	0.39	0.27	0.34	0.28
	(1.70)	(1.48)	(0.69)	(1.18)	(0.99)	(0.50)
TOP	0.99***	0.92***	0.95***	0.42*	0.36	0.41*
	(4.43)	(4.07)	(4.67)	(1.66)	(1.37)	(1.71)
HIGH	0.43**	0.41**	0.43**	0.18	0.19	0.23
	(2.50)	(2.39)	(2.24)	(0.94)	(0.97)	(1.07)
LOW	0.22	0.24	0.27	0.10	0.12	0.16
	(1.38)	(1.43)	(1.48)	(0.54)	(0.63)	(0.79)
BOTTOM	-0.09	-0.00	0.03	-0.21	-0.16	-0.12
	(-0.55)	(-0.02)	(0.15)	(-1.12)	(-0.82)	(-0.60)
BELOW	-0.01	0.10	0.10	-0.13	-0.09	-0.07
	(-0.04)	(0.46)	(0.45)	(-0.57)	(-0.37)	(-0.28)
TOP x Early Investor				1.09***	1.07***	1.02***
				(3.42)	(3.20)	(4.16)
HIGH x Early Investor				0.57***	0.56***	0.50**
				(2.77)	(2.78)	(2.15)
MID x Early Investor				-0.46	-0.45	-0.43
				(-1.40)	(-1.42)	(-1.06)
LOW x Early Investor				0.31*	0.26	0.19
				(1.80)	(1.35)	(0.76)
BOTTOM x Early Investor				0.34	0.32	0.29
				(1.44)	(1.53)	(0.79)
BELOW x Early Investor				0.32	0.56**	0.41
				(1.35)	(2.13)	(0.83)
Controls	NO	YES	YES	NO	YES	YES
Time Fixed Effects (Year)	NO	NO	YES	NO	NO	YES
R-squared (within)	0.12	0.16	0.16	0.17	0.21	0.20
Obs.	469	469	469	469	469	469

Table 3.4: The impact of early investors on positive aftermarket return

The dependent variable POS FMV Return takes the value one (zero) when FMV Return is positive (negative). The Probit regression specification corresponds to Equation (2).

$$\Pr(POSFMVReturn = 1) = \Phi(\beta_0 + \beta_1 PricingBracket + \beta_2 PricingBracket\ x\ EarlyInvestor + Controls)$$

Columns (1) to (3) regress the pricing bracket indicator variables, omitting ABOVE due to 100% positive outcomes, and LOW that acts as the base case. Columns (4) to (6) include the interaction of pricing bracket variables and the Early Investor indicator variable. Controls are the control variables described in Table 3.2. Time (Year) fixed effects are included in columns (3) and (6). We report the marginal effect of the discrete change in POS FMV Return from zero to one for each pricing bracket with *t*-statistics based on delta-method standard errors in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

DepVar: POS FMV Return	(1)	(2)	(3)	(4)	(5)	(6)
TOP	0.17**	0.16**	0.18**	0.06	0.07	0.09
	(2.28)	(2.13)	(2.38)	(0.72)	(0.79)	(1.03)
HIGH	0.07	0.06	0.07	0.02	0.01	0.01
	(0.99)	(0.89)	(0.95)	(0.23)	(0.12)	(0.19)
MID	-0.13	-0.11	-0.11	-0.03	-0.04	-0.04
	(-1.41)	(-1.24)	(-1.20)	(-0.36)	(-0.39)	(-0.44)
BOTTOM	-0.18***	-0.13**	-0.12**	-0.17***	-0.13**	-0.13**
	(-2.92)	(-2.10)	(-1.97)	(-2.73)	(-2.13)	(-2.03)
BELOW	-0.06	0.02	0.03	-0.07	-0.01	0.00
	(-0.75)	(0.24)	(0.30)	(-0.79)	(-0.10)	(0.03)
TOP x Early Investor				0.32**	0.28*	0.26*
				(2.35)	(1.97)	(1.82)
HIGH x Early Investor				0.26**	0.28**	0.26**
				(2.07)	(2.22)	(2.10)
MID x Early Investor				-0.42*	-0.36	-0.31
				(-1.85)	(-1.61)	(-1.35)
LOW x Early Investor				0.16	0.13	0.11
				(1.21)	(0.97)	(0.84)
BOTTOM x Early Investor				0.17	0.14	0.14
				(0.92)	(0.85)	(0.79)
BELOW x Early Investor				0.25	0.33	0.26
				(0.95)	(1.23)	(1.03)
Controls	NO	YES	YES	NO	YES	YES
Time Fixed Effects (Year)	NO	NO	YES	NO	NO	YES
Pseudo R-squared	0.04	0.08	0.08	0.07	0.10	0.10
Obs.	469	469	469	469	469	469

Table 3.5: The impact of early investors on salvaging IPOs

The dependent variable is FMV Return standardized in columns (1) to (3) and POS FMV Return in columns (4) to (6). The regression specification corresponds to Equation (3).

$$y_i = \beta_0 + \beta_1 DY\_BOTTOM + \beta_2 EarlyInvestor + \beta_3 DY\_BOTTOM \; x \; EarlyInvestor + Controls$$

DY_BOTTOM is a dummy variable that equals one for observations pricing at the BOTTOM and zero for observations pricing BELOW the range. Controls are the control variables described in Table 3.2. Time (Year) fixed effects are included in columns (3) and (6). We report OLS coefficient estimates with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses in columns (1) to (3), and marginal effects from Probit regressions with delta method standard errors in parentheses in columns (4) to (6). ***, ** and * denote significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Dependent Variable:	FMV Return			POS FMV Return		
	(1)	(2)	(3)	(4)	(5)	(6)
DY_BOTTOM	-0.08	-0.13	-0.11	-0.11	-0.12	-0.13
	(-0.43)	(-0.69)	(-0.55)	(-1.15)	(-1.25)	(-1.28)
Early Investor	0.32	0.58**	0.55	0.26	0.36	0.46*
	(1.35)	(2.05)	(1.03)	(0.95)	(1.39)	(1.77)
DY_BOTTOM x Early Investor	0.02	-0.26	-0.29	-0.08	-0.22	-0.27
	(0.07)	(-0.70)	(-0.44)	(-0.25)	(-0.71)	(-0.82)
Controls	NO	YES	YES	NO	YES	YES
Time Fixed Effects (Year)	NO	NO	YES	NO	NO	YES
R-squared (within) / Pseudo	0.01	0.12	0.12	0.02	0.12	0.12
Obs.	141	141	141	141	141	141

Table 3.6: The impact of early investors on fees and withdrawals

The dependent variable is FMV Return standardized in columns (1) and (2), Adjusted gross spread in columns (3) and (4), and Withdrawn rate in columns (5) and (6). The regression specification corresponds to Equation (4).

$$y_i = \beta_0 + \beta_1 PostAena + \beta_2 Cornerstone + \beta_3 PostAena\ x\ Cornerstone + Controls$$

PostAena is a dummy variable that equals one for IPOs pricing after the Aena IPO on 10th February 2015 and zero for observations pricing before it. Cornerstone is a dummy variable that equals one for IPOs involving cornerstone investors (i.e. those investors whose pre-IPO commitments are disclosed in the IPO prospectus). Controls are the control variables described in Table 3.2. Time (Year) fixed effects are included in columns (2), (4) and (6). We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Dependent Variable:	FMV Return		Adj. gross spread		Withdrawn rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Post Aena	0.04	-0.60*	-0.02	0.22	-0.01	0.12
	(0.32)	(-1.90)	(-0.20)	(0.65)	(-0.40)	(1.24)
Cornerstone	-0.59**	-0.60*	0.27	0.17	-0.13***	-0.11
	(-2.13)	(-1.71)	(0.87)	(0.50)	(-2.91)	(-0.99)
Post Aena x Cornerstone	1.21***	1.18***	-0.48	-0.42	0.13*	0.12
	(3.38)	(2.94)	(-1.24)	(-0.89)	(1.76)	(0.93)
Controls	YES	YES	YES	YES	YES	YES
Time Fixed Effects (Year)	NO	YES	NO	YES	NO	YES
R-squared (within)	0.12	0.11	0.51	0.53	0.07	0.07
Obs.	469	469	205	205	534	534

Table 3.7: Value-added, informational and agency-based explanations

The dependent variable is FMV Return standardized. The specification in Panel A is a linear OLS regression. The regression specification in Panels B and C corresponds to Equation (1).

$$FMVReturn = \beta_0 + \beta_1 PricingBracket + \beta_2 PricingBracket\ x\ KeyInvestor + Controls$$

Panel A regresses NoCorner and NoCorner^2 in Columns (1) to (3), and NoCorner and %Corner in Columns (4) to (6). Panels B and C regress Pricing Bracket and Early Investor variables in various sub-samples. Controls are the control variables described in Table 3.2. Time (Year) fixed effects are included in each column. We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Panel A: Value-added explanations						
DepVar: FMV Return	(1)	(2)	(3)	(4)	(5)	(6)
NoCorner	0.08	-0.23	0.06	-0.06	-0.03	-0.13
	(0.49)	(-0.77)	(0.14)	(-0.94)	(-0.26)	(-0.57)
NoCorner^2	-0.01	0.01	-0.02			
	(-1.16)	(0.29)	(-0.64)			
%Corner				0.01	-0.03	-0.01
				(0.75)	(-1.46)	(-0.47)
Controls	NO	YES	YES	NO	YES	YES
Time Fixed Effects (Year)	NO	NO	YES	NO	NO	YES
R-squared (within)	0.02	0.44	0.53	0.02	0.48	0.53
Obs.	42	42	42	42	42	42
Panel B: Informational explanations						
DepVar: FMV Return	Tech-nology	Life Sciences	Risk market	Sole managed	<$500m market cap	>50% Float
	(1)	(2)	(3)	(4)	(5)	(6)
TOP x Early Investor	0.71	2.81	-0.66	-0.30	0.68	0.89*
	(0.84)	(1.56)	(-0.75)	(-0.22)	(1.45)	(1.75)
HIGH x Early Investor	0.14	1.07	0.42	0.71	0.74	0.71*
	(0.19)	(0.64)	(0.68)	(1.13)	(1.61)	(1.69)
Controls	YES	YES	YES	YES	YES	YES
Time Fixed Effects (Year)	YES	YES	YES	YES	YES	YES
R-squared (within)	0.59	0.50	0.55	0.28	0.23	0.36
Obs.	60	49	73	89	196	110
Panel C: Agency-based explanations						
DepVar: FMV Return	OVL high	Illiquid 6-month	Top 4 Bank	Top 8 Bank	Adviser	Top Exchange
	(1)	(2)	(3)	(4)	(5)	(6)
TOP x Early Investor	0.97***	0.97***	1.42***	1.48***	1.43***	1.43***
	(2.82)	(2.91)	(3.71)	(4.26)	(3.31)	(3.78)
HIGH x Early Investor	0.07	0.67**	0.17	0.10	0.39	-0.00
	(0.24)	(2.24)	(0.60)	(0.38)	(1.14)	(-0.01)
Controls	YES	YES	YES	YES	YES	YES
Time Fixed Effects (Year)	YES	YES	YES	YES	YES	YES
R-squared (within)	0.34	0.21	0.23	0.26	0.31	0.24
Obs.	190	266	219	268	184	246

Appendix 3.1: Variable definitions

%Corner. The share of an IPO that is allocated to cornerstone investors including any overallotment, as disclosed in the prospectus.

1st day return. The first day closing price divided by the IPO price, minus one.

1st day volume. Number of shares traded on the first of trading day (source: Bloomberg) divided by the number of IPO shares excluding overallotment multiplied by 100.

6-month volume. Average daily trading volume (source: Bloomberg) in the 6-month period following the IPO (excluding the first trading day) divided by the number of IPO shares excluding overallotment multiplied by 100.

ABOVE. Indicator variable equal to one for IPOs pricing above the initial filing range.

Adjusted gross spread. *Gross spread* with a 50% haircut applied to any *Incentive fee* component.

Adviser. Indicator variable equal to one for IPOs that had a pure advisory firm overseeing the IPO process.

Anchor. Indicator variable equal to one if an IPO has disclosed anchor orders, or where the institutional book is covered on the first day of bookbuilding following extensive early look and pilot fishing meetings and the final allocation is heavily skewed to the top investors, as reported by the International Financing Review ("IFR").

BELOW. Indicator variable equal to one for IPOs pricing below the initial filing range.

BIPO. The closing level of the Bloomberg IPO Index on the day of announcement.

BOTTOM. Indicator variable equal to one for IPOs pricing at the bottom of the initial filing range.

Cornerstone. Indicator variable equal to one if an IPO has a cornerstone tranche with investor names and participation amounts disclosed in the prospectus.

DY_BOTTOM. Indicator variable equal to one for IPOs pricing in the BOTTOM pricing bracket and zero for IPOs pricing in the BELOW bracket.

Emerging market. Indicator variable equal to one for IPOs listed (or dual-listed) on stock exchanges in the following cities: Almaty, Athens, Bahrain, Belgrade, Bratislava, Bucharest, Budapest, Cairo, Hong Kong, Istanbul, Ljubljana, Moscow, Lagos, Prague, Reykjavik, Riga, Sao Paolo, Sofia, Tallinn Tunis, Vilnius and Zagreb.

Float. The percentage of the company that is listed in the IPO.

FMV return. STOXX Europe 600 Index adjusted percentage change from the IPO price to the closing price one-month following the IPO date.

Full OVL Exercise Y/N. Indicator variable for IPOs where *OVL Exercise* % is 100%

Gross spread. The gross underwriting spread, totaling base and incentive components (if any).

HIGH. Indicator variable equal to one for IPOs pricing between the mid-point at the top of the initial filing range.

Incentive fee. The percentage of IPO proceeds that are payable at the discretion of the issuer.

Junior market. Indicator variable equal to one for IPOs listing on London AIM, Frankfurt General, Frankfurt Scale, Paris Alternext, NASDAQ OMX, Norwegian Fund Broker Association, Oslo Axess, Russian Trading System or Warsaw NewConnect.

Early investor. Indicator variable equal to one for IPOs involving a pre-launch approach to investors securing early demand commitments, whether from *Cornerstone* or *Anchor* investors.

Ln (Market Value). Natural logarithm of the firm's total shares outstanding times the IPO price for completed deals, or the mid-point of the price range for withdrawn deals.

Ln (Proceeds). Natural logarithm of the offer price times the number of shares sold including overallotment (completed IPOs only).

LOW. Indicator variable equal to one for IPOs pricing between the mid-point and the bottom of the initial filing range.

MID. Indicator variable equal to one for IPOs pricing at the mid-point of the initial filing range.

No. of bookrunners. The number of bookrunning banks in an IPO syndicate.

NoCorner. The number of Cornerstone investors disclosed in the IPO prospectus.

NoCorner^2. *NoCorner* multiplied by *NoCorner*.

Nordic. Indicator variable equal to one for IPOs listed on stock exchanges in Denmark, Norway, Sweden, Finland or Iceland.

OVL Exercise %. Overallotment shares exercised divided by overallotment shares available.

OVL final. The final number of overallotment shares exercised divided by the base number of IPO shares, all multiplied by *Proceeds*

PE/VC. Indicator variable equal to one if the issuer is backed a private equity/venture capital firm prior to IPO whether or not such PE/VC firm sells shares in the IPO.

POS FMV return. Indicator variable that equals one for when FMV Return is strictly positive.

Post Aena. Indicator variable equal to one for IPOs pricing after the Aena IPO in February 2015.

Risk market. Indicator variable equal to one for IPOs in *Junior Market* or *Emerging Market* categories.

Secondary. The number of shares sold by pre-IPO owners divided by the total number of IPO shares.

Sole managed. Indicator variable equal to one for IPOs involving only one underwriter.

STOXX2mRet. The return on the STOXX Europe 600 Index in the 2 months prior to the IPO announcement.

Top 4 bank. Indicator variable equal to one for IPOs bookrun by by one of the leading 4 banks by bookrun volume per year for the sample period (namely, Goldman Sachs, Morgan Stanley, Deutsche Bank, JPMorgan).

Top 8 bank. Indicator variable equal to one for IPOs bookrun by by one of the leading 8 banks by bookrun volume per year for the sample period (namely, Goldman Sachs, Morgan Stanley, Deutsche Bank, JPMorgan, BofA Merrill Lynch, Credit Suisse, Citigroup, Union Bank of Switzerland).

Top exchange. Indicator variable equal to one for IPOs listed on London Stock Exchange (Main Market and Borsa Italiana), Euronext (Paris, Brussels, Amsterdam, Lisbon) or Deutsche Boerse (Frankfurt Prime).

TOP. Indicator variable equal to one for IPOs pricing at the top of the initial filing range.

VIX. The closing level of the Chicago Board Options Exchange VIX Index on the day of pricing/withdrawal.

Withdrawn. Indicator variable equal to one if an IPO is withdrawn, except if such withdrawal is due to an issuer accepting an M&A bid after the IPO has been launched (35 of 266 cases).

Appendix 3.2: Early marketing and price range setting – Europe vs. US

The table sets out differences in European and US institutional practice with respect to the early marketing of IPOs and the setting of the initial filing range.

	European approach	US approach (post-JOBS Act)[37]
Early marketing	Pre-IPO marketing including valuation discussions is allowed and encouraged via so-called 'early look' and 'pilot fish' meetings well in advance of the IPO becoming public. Educate a group of 40-50 thought leaders that help to shape the equity story and create early demand visibility ahead of the launch. Pre-IPO marketing documents with details of valuation shared but typically not left with investors. Management participates in meetings, with follow-up done by syndicate, sales and research.	Pre-filing 'quiet period' with no offers, sales or IPO-related communications. Pre-IPO marketing for Emerging Growth Companies ("EGCs") allowed under US Securities laws. Non-deal roadshows and pre-IPO 'testing the waters' ("TTW") activities permitted under the JOBS Act with Qualified Institutional Buyers ("QIBs") and Institutional Accredited Investors ("IAIs"), subject to Regulation FD. No pre-deal documentation and no discussion of valuation in TTW meetings. Management participates in meetings, with follow-up done by syndicate, sales and research.
Research analysts participation in setting the filing range	Analysts publish report 2-3 weeks in advance of the roadshow. Analysts spend ca. 2 weeks on the road educating ca. 200 investors prior to the roadshow in the so-called Pre-Deal Investor Education ("PDIE") period. Analyst research is a pivotal part of the IPO marketing process, helps shape investor sentiment, and provides valuation guidance prior to setting Initial Filing Range. Pre-IPO research typically has no recommendation (BUY/SELL, etc.) or target price, but includes valuation model (e.g. DCF) and peer-group benchmarking.	Research can be published before, during and post-IPO for EGCs, however convention for bookrunners has been to publish 25 days post-IPO. Research analysts provide a teach-in on positioning and valuation to the underwriters' salesforces. Research analysts engage in discussion with investors during the roadshow, assisting with the building of valuation models that are incorporated in the post-IPO report.
When does the IPO go live?	IPO becomes public at the moment of the Intention to Float ("ITF") press release that takes place ca. 4 weeks prior to IPO pricing.	For an EGC, the F-1 filing (including company's financials and business model) is filed confidentially until the public filing at latest 15 days prior to the roadshow launch.
Review process / ability to change filing range	All filings are confidential. Local regulator conducts the reviews. Filing range typically cannot be changed without triggering prospectus amendment, investors' withdrawal rights and new minimum marketing period.	Ability to file F-1 confidentially, both initially and on each subsequent amendment, up until 15 days prior to launch. SEC conducts the reviews. Filing range can be changed without triggering investors' withdrawal rights.

[37] Prior to September 2019, when the SEC adopted Rule163B under the Securities Act 1933 allowing all issuers to engage in TTW activities.

Appendix 3.3: Categorizations of early investors

The table reports three types of pre-IPO commitment in European IPOs, with the timing and number of investors running from left to right

	Strategic (or crossover) investor [38]	Cornerstone investor	Anchor investor [39]
Timing	3-18 months before IPO	1-3 months before IPO	4-8 weeks before IPO
Description	Investor buys shares in the company prior to IPO. Investor name, size and valuation are usually published in a press release. Typically 1 investor only.	Investor subscribes for guaranteed allocation in the IPO. Tight process usually targeted at a small group of investors (e.g. 1-10 investors).	Pre-sounding of major institutional investors who verbally commit to place large orders when bookbuilding starts. IPO not definitively announced when sounding occurs. Typically 1-25 investors.
Mechanism	Investment closed pre-IPO. Meaningful discount expected or structured security (e.g. warrants). Lock-up: 6M-1YR. Fully disclosed at IPO.	Upfront binding commitment to invest in IPO, disclosed in prospectus, with full allocation. Lock-up: 6M-1YR. Incorporated within the IPO process, so constrained by its parameters (e.g. timing, IPO documents, etc.).	Not contractually committed; aim is for investors to be ready to provide early demand momentum. Based on publicly available information. No lock-up. No disclosure in prospectus.
Advantages	Signals support for IPO. May help company refinance debt or provide exit for insiders.	Acts as validation capital. Underpins valuation at price range announcement. Creates perception of scarcity during bookbuilding.	IPO can be launched with strong demand visibility and momentum. Well-understood process. Pricing purely determined by the bookbuilding.
Drawbacks	Sets a reference valuation that may be too low or too high, especially if proximate to the IPO. May delay company if too close to the IPO launch date.	Reduces allocable shares for other institutions. May set upper limit on valuation. More complex to execute. Works best with large ticket sizes in large IPOs (i.e. investors do not suffer illiquidity on lock-up expiry).	No firm commitment from investors prior to ITF or price range setting. No reduction in demand 'ask' from the market. Some room for investors to game the process.

[38] In the US, so-called 'crossover financings' refer to investments made close in time but before the filing of a registration statement.

[39] In the US, 'gun jumping' refers to situations where an issuer sells IPO shares to investors with whom it discussed a private crossover financing, potentially giving that IPO investor an advantageous position with respect to company information.

Appendix 3.4: Details of early investor IPOs

The table reports different examples of early investor processes in European IPOs with the timing, price flexibility and lock-up commitments running from left to right.

	Public Cornerstone process at fixed price (Orders before ITF)	Private Cornerstone process at IPO strike price (Orders before Price Range)	Public Anchor process with guaranteed allocation (Orders before Price Range)	Private Anchor process with discretionary allocation (Orders at Price Range)
IPO firm	Aena	Amundi	Zalando	Innogy
Country	Spain	France	Germany	Germany
IPO date	February 2015	November 2015	September 2014	October 2015
IPO size	$4,817m	$1,798m	$668m	$5,204m
Mechanics	Public advertised process. Due diligence and management meetings.	Private process, only strategic counterparties involved. Due diligence and management meetings.	Due diligence and management meetings. Investors named in prospectus.	Private process, following anchor pre-sounding. NDA and draft IPO documents.
Timing	Initial contact 4 months pre-IPO. Delivery of orders before IPO launch.	Initial contact 2 months pre-IPO. Order between ITF and price range.	Initial contact 3 months pre-IPO. Delivery of orders at price range setting.	Initial contact via early look meetings. Delivery of order at price range setting.
Order type	Orders at fixed price. No guaranteed allocations. Could be 'priced-out' by bookbuild demand. 1-year lock-up.	Firm order with guaranteed allocation. Order size: lower of EUR150m or 10% of IPO size at strike price. Undisclosed lock-up.	Orders at strike. EUR126.5m demand from 8 investors. 21% of final offering. No lock-up.	EUR940M at strike. Approx. 20% of offering. No lock-up.
Investors	Ferrovial, Alba Corporacion, Children's Investment Fund	Agricultural Bank of China	Al Huda Holdings, FAR, Makshaff Trading, Pentland, Baillie Gifford, Verlinvest, Wharton	BlackRock
Outcome	IPO priced at the top of a revised range meaning the 3 cornerstones were priced out and did not receive shares.	IPO priced at low end of the range. Volatile IPO market environment: half of post 2015 summer IPOs withdrawn.	IPO 21x oversubscribed and priced just below top of price range.	IPO priced at top of price range.

Appendix 3.5: IFR excerpts identifying early investor IPOs

Merlin Entertainments (UK)

Early coverage for LSE listings (IFR, 2nd November 2013):

"Early orders included a number of investors seen during pilot fishing, with just over half of the 30 met during pilot fishing having been taken to visit some of the parks."

Merlin magic as stock rides sweet spot (IFR, 9th November 2013):

"Covered after one day of bookbuilding… Building on that was a 9-month long pilot fishing route involving a core group of about 30 early investors. Of those, 17 accounts were invited to visit some of Merlin's attractions… Madame Tussauds, Sea Life, Alton Towers, Chessington World of Adventures, Legoland… The top 25 orders captured two-thirds of a book of nearly 400 lines."

ISS A/S (Denmark)

ISS covered in hours (IFR, 8th March 2014):

"Books were covered within hours of opening on Wednesday morning…"

First day pop for tightly allocated ISS (15th March 2014):

"ISS allocated about half of its IPO to the top 20 accounts last week, culling more than 200 orders from a book of more than 500 lines in the process."

Aena (Spain)

Aena closes up 20% on debut (IFR, 14th February 2015):

"The top ten orders, minus the TCI stake of 9.75m shares, took more than 40% of the transaction and included a couple of sovereign wealth funds and very high quality long-only funds. TCI's stake was not disclosed but the company said that it gains a board seat. The top 20 orders accounted for approximately 60% of a book of more than 500 lines."

Aena blowout sets the pace (IFR, 20th February 2015):

"Ultimately, all three quasi-cornerstones were priced out of the deal, though TCI adopted to buy at a much higher level than its commitment through the institutional bookbuild… and is no longer subject to a lock-up on its stake."

Moncler (Italy)

Well padded book for Moncler (IFR, 14th December 2014):

"Having been covered within hours of opening the book, the deal was considered a must-have by most investors - hence demand from more than 700 accounts… The top 20 orders getting more than half of the deal."

Tele Columbus (Germany)

Holdovers from 2014 defy volatility and set positive tone for European ECM (IFR, 24th January 2015):

"The tough fourth quarter of last year saw several deals pushed into 2015, so investors are now very familiar with names such as Tele Columbus which completed pre-marketing in both 2014 and this year, a factor that helped offset the volatility in equity markets. [Tele Columbus] was de-risked in advance… through a process allowing its many existing shareholders to gain preferential allocations to avoid dilution."

Appendix 3.6: The impact of early investors on raw first-day return

The dependent variable is first-day return. The regression specification corresponds to Equation (1). Columns (1) to (3) regress the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (4) to (6) include the interaction of pricing bracket variables and the Early Investor indicator variable, omitting ABOVE x Early Investor as there are no observations. Controls are the control variables described in Table 3.2. Time (Year) fixed effects are included in Columns (3) and (6). We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

DepVar: 1st day return	(1)	(2)	(3)	(4)	(5)	(6)
ABOVE	5.70	6.33	5.65	5.26	5.74	5.07
	(1.31)	(1.21)	(1.13)	(1.18)	(1.05)	(1.03)
TOP	12.46***	11.79***	11.97***	7.89***	7.26***	7.48***
	(5.79)	(5.31)	(6.81)	(3.34)	(2.94)	(3.58)
HIGH	3.35**	2.97*	3.30**	1.04**	1.12	1.42
	(2.14)	(1.87)	(1.97)	(0.59)	(0.61)	(0.76)
LOW	-0.22	-0.45	-0.10	-0.88	-0.96	-0.70
	(-0.16)	(-0.30)	(-0.06)	(-0.53)	(-0.56)	(-0.41)
BOTTOM	-3.94***	-3.42**	-3.22*	-4.52***	-4.21**	-4.12**
	(-2.71)	(-2.24)	(-1.95)	(-2.70)	(-2.45)	(-2.32)
BELOW	-1.79	-1.16	-1.12	-2.64	-2.34	-2.34
	(-1.06)	(-0.66)	(-0.57)	(-1.39)	(-1.21)	(-1.13)
TOP x Early Investor				9.29***	9.62***	9.30***
				(2.76)	(2.88)	(4.37)
HIGH x Early Investor				6.81***	6.60***	6.26***
				(3.66)	(3.49)	(3.14)
MID x Early Investor				-1.98	-0.99	-1.28
				(-0.68)	(-0.34)	(-0.39)
LOW x Early Investor				2.10	2.02	1.57
				(1.65)	(1.39)	(0.71)
BOTTOM x Early Investor				2.06	2.10	1.94
				(0.80)	(0.83)	(0.61)
BELOW x Early Investor				4.40*	6.12**	5.30
				(1.71)	(2.12)	(1.24)
Controls	NO	YES	YES	NO	YES	YES
Time Fixed Effects (Year)	NO	NO	YES	NO	NO	YES
R-squared (within)	0.28	0.30	0.30	0.33	0.35	0.34
Obs.	471	471	471	471	471	471

Appendix 3.7: The impact of early investors on raw first-month return

The dependent variable is raw first-month return. The regression specification corresponds to Equation (1). Columns (1) to (3) regress the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (4) to (6) include the interaction of pricing bracket variables and the Early Investor indicator variable, omitting ABOVE x Early Investor as there are no observations. Controls are the control variables described in Table 3.2. Time (Year) fixed effects are included in Columns (3) and (6). We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

DepVar: 1st month return	(1)	(2)	(3)	(4)	(5)	(6)
ABOVE	6.18	6.40	5.83	4.89	4.60	4.29
	(1.53)	(1.31)	(0.69)	(1.16)	(0.86)	(0.51)
TOP	14.86***	13.80***	14.19***	6.37*	5.26	6.33*
	(4.48)	(4.15)	(4.74)	(1.74)	(1.38)	(1.79)
HIGH	7.21***	6.27**	6.65**	3.22	2.74	3.45
	(2.74)	(2.14)	(2.33)	(1.10)	(0.95)	(1.09)
LOW	3.68	3.33	4.07	1.97	1.66	2.55
	(1.50)	(1.36)	(1.50)	(0.73)	(0.61)	(0.88)
BOTTOM	-0.53	0.15	0.85	-2.19	-2.17	-1.31
	(-0.21)	(0.06)	(0.30)	(-0.77)	(-0.76)	(-0.43)
BELOW	-0.21	0.92	1.28	-2.18	-1.90	-1.18
	(-0.07)	(0.29)	(0.38)	(-0.65)	(-0.56)	(-0.34)
TOP x Early Investor				16.46***	16.50***	15.07***
				(3.51)	(3.39)	(4.18)
HIGH x Early Investor				9.88***	9.51***	8.30**
				(3.31)	(3.26)	(2.45)
MID x Early Investor				-6.43	-6.28	-5.82
				(-1.21)	(-1.30)	(-0.98)
LOW x Early Investor				4.09	3.40	1.83
				(1.40)	(1.13)	(0.49)
BOTTOM x Early Investor				5.24*	5.50**	3.96
				(1.76)	(2.02)	(0.74)
BELOW x Early Investor				7.17	10.00**	7.00
				(1.53)	(2.05)	(0.96)
Controls	NO	YES	YES	NO	YES	YES
Time Fixed Effects (Year)	NO	NO	YES	NO	NO	YES
R-squared (within)	0.11	0.15	0.15	0.18	0.21	0.19
Obs.	469	469	469	469	469	469

Appendix 3.8: The impact of early investors on FMV return pre-Aena

The dependent variable is FMV Return. The sample period is 2010 to 10th February 2015. The regression specification corresponds to Equation (1). Columns (1) to (3) regress the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (4) to (6) include the interaction of pricing bracket variables and the Early Investor indicator variable, omitting ABOVE x Early Investor as there are no observations. Controls are the control variables described in Table 3.2. Time (Year) fixed effects are included in Columns (3) and (6). We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

DepVar: FMV Return	(1)	(2)	(3)	(4)	(5)	(6)
ABOVE	11.65***	15.66***	15.61	10.96***	15.29***	15.06
	(5.26)	(3.37)	(1.04)	(5.54)	(3.53)	(1.02)
TOP	14.36***	14.25***	15.50***	6.22	5.93	7.00
	(3.65)	(3.50)	(3.83)	(1.59)	(1.46)	(1.57)
HIGH	7.90***	8.42***	8.57**	5.84**	6.13**	5.83
	(2.83)	(2.94)	(2.22)	(2.22)	(2.32)	(1.45)
LOW	4.49*	5.19*	6.47*	3.58	3.96	4.60
	(1.73)	(1.87)	(1.77)	(1.48)	(1.57)	(1.24)
BOTTOM	1.09	4.36	5.81	0.28	2.39	3.15
	(0.37)	(1.31)	(1.50)	(0.10)	(0.81)	(0.80)
BELOW	1.55	2.85	4.14	0.69	0.66	1.41
	(0.45)	(0.82)	(0.97)	(0.20)	(0.20)	(0.32)
TOP x Early Investor				21.18***	19.80***	19.24***
				(3.50)	(3.39)	(3.79)
HIGH x Early Investor				7.70	7.43*	6.63
				(1.52)	(1.73)	(1.31)
MID x Early Investor				-4.88	-8.68	-12.88
				(-0.48)	(-0.70)	(-1.28)
LOW x Early Investor				6.16	-0.11	0.53
				(1.11)	(-0.02)	(0.06)
BOTTOM x Early Investor				3.20	6.50**	7.86
				(0.84)	(2.37)	(0.78)
BELOW x Early Investor				5.05*	14.24***	15.29
				(1.86)	(3.27)	(1.07)
Controls	NO	YES	YES	NO	YES	YES
Time Fixed Effects (Year)	NO	NO	YES	NO	NO	YES
R-squared (within)	0.09	0.17	0.17	0.16	0.22	0.23
Obs.	288	288	288	288	288	288

Appendix 3.9: The impact of early investors on FMV return post-Aena

The dependent variable is FMV Return. The sample period is 11th February 2015 to 30th June 2017. The regression specification corresponds to Equation (1). Columns (1) to (3) regress the pricing bracket indicator variables, omitting MID that acts as the base case. Columns (4) to (6) include the interaction of pricing bracket variables and the Early Investor indicator variable, omitting ABOVE x Early Investor as there are no observations. Controls are the control variables described in Table 3.2. Time (Year) fixed effects are included in Columns (3) and (6). We report OLS coefficients with *t*-statistics based on heteroscedasticity-consistent standard errors in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

DepVar: FMV Return	(1)	(2)	(3)	(4)	(5)	(6)
ABOVE	-0.11	0.84	0.55	-3.34	-3.78	-3.29
	(-0.02)	(0.17)	(0.05)	(-0.56)	(-0.62)	(-0.31)
TOP	14.46**	14.05**	13.99***	6.49	7.04	7.94
	(2.58)	(2.46)	(3.03)	(0.90)	(0.89)	(1.29)
HIGH	4.10	3.10	3.84	-3.09	-4.43	-2.78
	(0.87)	(0.62)	(0.86)	(-0.49)	(-0.70)	(-0.50)
LOW	1.64	2.09	2.37	-2.23	-1.79	-0.80
	(0.37)	(0.44)	(0.55)	(-0.38)	(-0.29)	(-0.16)
BOTTOM	-5.09	-4.75	-4.54	-9.12	-9.60	-8.84*
	(-1.16)	(-0.98)	(-1.01)	(-1.59)	(-1.54)	(-1.72)
BELOW	-1.94	-0.37	-1.28	-6.17	-7.11	-6.69
	(-0.35)	(-0.06)	(-0.22)	(-0.83)	(-0.91)	(-0.98)
TOP x Early Investor				8.53	7.00	6.34
				(1.16)	(0.79)	(1.06)
HIGH x Early Investor				9.33**	10.54**	9.41*
				(2.10)	(2.25)	(1.83)
MID x Early Investor				-11.31**	-10.95**	-8.97
				(-2.04)	(-1.83)	(-1.08)
LOW x Early Investor				2.86	1.50	0.89
				(0.88)	(0.43)	(0.20)
BOTTOM x Early Investor				6.37	5.58	6.13
				(1.36)	(1.15)	(0.91)
BELOW x Early Investor				3.68	9.77	7.81
				(0.61)	(1.31)	(0.79)
Controls	NO	YES	YES	NO	YES	YES
Time Fixed Effects (Year)	NO	NO	YES	NO	NO	YES
R-squared (within)	0.17	0.23	0.24	0.22	0.27	0.23
Obs.	181	181	181	181	181	181

Appendix 3.10: Underpricing and overallotment exercise

Panel A presents summary statistics for Overallotment Exercise variables. There are no observations in the ABOVE bracket. Panel B reports *t*-statistics with Satterthwaite approximation (z-statistics, Wilcoxon rank sum test) for differences in mean (median) between the pricing bracket in each row and the rest of the sample. ***, ** and * denotes significance at the 1%, 5% and 10% level. Variables are defined in the Appendix.

Panel A: Descriptive Statistics

	OVL Exercise %				Full OVL Exercise YN			
	Obs.	Mean	Median	SD	Obs.	Mean	Median	SD
Full Sample	386	56.91	69.94	43.98	386	0.41	0.00	0.49
ABOVE	-	-	-	-	-	-	-	-
TOP	51	73.70	100.0	42.90	51	0.69	1.00	0.47
HIGH	75	77.98	100.0	35.55	75	0.61	1.00	0.49
MID	32	50.02	42.21	45.68	32	0.41	0.00	0.50
LOW	118	58.40	72.50	43.17	118	0.41	0.00	0.49
BOTTOM	85	37.27	15.46	40.04	85	0.15	0.00	0.36
BELOW	25	28.06	1.34	40.24	25	0.05	0.00	0.37

Panel B: Two-Sample Tests

	OVL Exercise %		Full OVL Exercise YN	
	t-stat	z-stat	*t*-stat	z-stat
ABOVE	-	-	-	-
TOP	-2.99***	-3.32***	-4.47***	-4.27***
HIGH	-5.43***	-4.66***	-3.98***	-3.94***
MID	0.89	0.65	0.07	0.95
LOW	-0.44	-0.40	0.14	0.89
BOTTOM	5.02***	5.18***	6.81***	5.49***
BELOW	3.69***	3.37***	3.40***	2.64***

References

Abadie, A., and G. W. Imbens, 2006. Large sample properties of matching estimators for average treatment effects. Econometrica 74: 235–267.

Abadie, A., and G. W. Imbens, 2011. Bias-corrected matching estimators for average treatment effects. Journal of Business and Economic Statistics 29: 1–11.

Abrahamson, Mark, Tim Jenkinson and Howard Jones, 2011, Why don't U.S. issuers demand European fees for IPOs? Journal of Finance 66, 2055-2082.

Admati, Anat, and Paul Pfleiderer, 2009, "The "Wall Street Walk" and shareholder activism: exit as a form of voice," *Review of Financial Studies* 22, 2245-85.

Appel, Ian, Todd Gormley, and Donald Keim, 2019, "Standing on the Shoulders of Giants: The Effect of Passive Investors on Activism," *Review of Financial Studies* 32, 2720-74.

Bebchuk, Lucian, Alon Brav, and Wei Jiang, 2015, "The Long-Term Effects of Hedge Fund Activism," *Columbia Law Review* 115, 1085-1156.

Becht, Marco, Julian Franks, Colin Mayer, and Stefano Rossi, 2009, "Returns to shareholder activism: evidence from a clinical study of the Hermes UK focus fund," *Review of Financial Studies* 22, 3093–129.

Becht, Marco, Julian Franks, Jeremy Grant, and Hannes Wagner, 2017, "Returns to Hedge Fund Activism: An International Study," *The Review of Financial Studies* 30, 2933–71.

Becker, Bo, Henrik Cronqvist, and Rudi Fahlenbrach, 2011, "Estimating the effects of large shareholders using a geographic instrument," *Journal of Financial and Quantitative Analysis* 46, 907–42.

Benveniste, L. and W. Wilhelm (1990). A comparative analysis of IPO proceeds under alternative regulatory environments. Journal of Financial Economics 28, 173–207.

Benveniste, L.M., Ljungqvist, A., Wilhelm, W.J., Yu, X., 2003. Evidence of information spillovers in the production of investment banking services. Journal of Finance 58, 577-608.

Benveniste, Lawrence M., and Paul A. Spindt, 1989, How investment banks determine the offer price and allocation of new issues, Journal of Financial Economics 24, 213-232.

Bergstresser, Daniel, John M. R. Chalmers, and Peter Tufano, 2009, Assessing the Costs and Benefits of Brokers in the Mutual Fund Industry, *Review of Financial Studies* 22, 4129-4156.

Bernstein, Shai, 2015, Does going public affect innovation?", The Journal of Finance, 70(4), 1365-1403.

Booth, James R. and Lena Chua. 1996. "Ownership Dispersion, Costly Information, and IPO Underpricing." Journal of Financial Economics 41(2):291–310.

Brav Alon, Wei Jiang, and Hyunseob Kim, 2015, "The real effects of hedge fund activism: productivity, asset allocation, and labor outcomes," *Review of Financial Studies* 28, 2723–69.

Brav, Alon, Wei Jiang, Frank Partnoy, and Randall Thomas, 2008, "Hedge fund activism, corporate governance, and firm performance," *Journal of Finance* 63, 1729-75.

Brown, D. and S. Kovbasyuk (2016). Key investors in IPOs. Paris December 2015 Finance Meeting EUROFIDAI - AFFI.

Busaba, W. Y., and Restrepo, F. (2020). The 7% Solution and IPO (Under)pricing: Evidence from a Regression Kink Design. FIRS 2020 Conference Paper.

Busaba, W., Benveniste, L.M., Guo, R.-J., 2001. The withdrawal of initial public offerings during the premarket. Journal of Financial Economics 60, 73-102.

Busaba, W., Liu, Z., Restrepo, F., 2019. Do Underwriters Price-UP IPOs to Prevent Withdrawal? Journal of Financial and Quantitative Analysis, forthcoming.

Butler, A. W., M. Keefe, and R. Kieschnick (2014). Robust determinants of IPO underpricing and their implications for IPO research. Journal of Corporate Finance 27 (C), 367–383.

Carleton, Willard, James Nelson, and Michael Weisbach, 1998, "The influence of institutions on corporate governance through private negotiations: evidence from TIAA–CREF," *Journal of Finance* 53, 1335–62.

Chambers, David and Elroy Dimson, 2009, IPO Underpricing over the Very Long Run, Journal of Finance 64, 1407-1443.

Chava, Sudheer, Soohun Kim, and Daniel Weagley, 2018, Revealed Heuristics: Evidence from Investment Consultants' Search Behavior. Working paper available at SSRN 3277424.

Chemmanur, T. J. (1993). The pricing of initial public offerings: A dynamic model with information production. *The Journal of Finance*, *48*(1), 285-304.

Chen, H.-C., Ritter, J.R., 2000. The seven percent solution. Journal of Finance 55, 1105-1131.

Clifford, Christopher, 2008, "Value creation or destruction? Hedge funds as shareholder activists," *Journal of Corporate Finance* 14, 323–36.

Clifford, Christopher, and Laura Lindsey, 2016, "Blockholder monitoring, CEO compensation, and firm performance," *Journal of Financial and Quantitative Analysis* 51, 1491-520.

Cornelli, F. and D. Goldreich (2001). Bookbuilding and strategic allocation. Journal of Finance 56, 2337–2369.

Dasgupta, Anil, and Giorgia Piacentino, 2015, "The Wall Street Walk when blockholders compete for flows," *Journal of Finance* 70, 2853–96.

De Fontenay, E., 2017. The Deregulation of Private Capital and the Decline of the Public Company. Hastings LJ 68, 445

Dimson, Elroy, Oguzhan Karakas, and Xi Li, 2015, "Active ownership," *Review of Financial Studies* 28, 3225–68.

Divakurani, A., and Jones, H. 2020. "Can Lowering the Bar Revive Public Markets? Evidence from the JOBS Act." Working paper.

Edmans, Alex, and Clifford Holderness, 2017, "Blockholders: A Survey of Theory and Evidence," The Handbook of the Economics of Corproate Governance, Vol 1, 541-636

Ellis, K., Michaely, R., O'Hara, M., 2000. When the underwriter is the market maker: An examination of trading in the IPO aftermarket. Journal of Finance 55, 1039-1074.

Ellul, Andrew and Marco Pagano. 2006. "IPO Underpricing and After-Market Liquidity." The Review of Financial Studies 19(2):381–421.

Espenlaub, Susanne, Khurshed, Arif and Mohamed, Abdulkadir, 2012, IPO survival in a reputational market. Journal of Business Finance and Accounting 39, 427-463.

Ewens, M., Farre-Mensa, J., 2019. The deregulation of the private equity markets and the decline in IPOs. National Bureau of Economic Research

FCA, 2016. Investment and corporate banking market study Interim report, April 2016, https://www.fca.org.uk/publication/market-studies/ms15-1-2-interim-report.pdf

FCA, 2017. Reforming the availability of the information in the UK equity IPO process. https://www.fca.org.uk/publication/policy/ps17-23.pdf

Fich, Eliezer, Jarrad Harford, and Anh Tran, 2015, "Motivated monitors: the importance of institutional investors' portfolio weights," *Journal of Financial Economics* 118, 21–48.

Frey, B. S., 1993. Does monitoring increase work effort? The rivalry with trust and loyalty. Economic Inquiry, 31: 663–670.

Gantchev, Nickolay, and Chotibhak Jotikasthira, 2018, "Institutional trading and hedge fund activism," *Management Science* 64, 2930-50.

Gantchev, Nickolay, Oleg Gredil, and Chotibhak Jotikasthira, 2019, "Governance under the gun: Spillover effects of hedge fund activism," *Review of Finance* 23, 1031-68.

Gennaioli, Nicola, Andrei Shleifer and Robert Vishny, 2013, Money Doctors. The Journal of Finance 70(1), 91-114.

George, Bill, and Jay Lorsch, 2014, "How to outsmart activist investors," *Harvard Business Review* 92, 88-95.

Gerakos, J. J., Lang, M. H., Maffett, M. G., 2012. Listing Choices and Self-Regulation: The Experience of the AIM. Chicago Booth Research Paper No. 11-04.

Goldman, Kimberly, 2018, "Theories and Solutions on Wolf Pack Activism," *Michigan Business & Entrepreneurial Law Review* 7, 341-62.

Goldstein, M., Irvine, P., & Puckett, A. 2011. Purchasing IPOs with Commissions. The Journal of Financial and Quantitative Analysis, 46(5), 1193-1225.

Gondat-Larralde, Celine and James, Kevin R., 2008, IPO Pricing and Share Allocation: The Importance of Being Ignorant, Journal of Finance 63(1), 449-478.

Goyal, Amit, and Sunil Wahal, 2008, The selection and termination of investment management firms by plan sponsors. *The Journal of Finance* 63, 1805-1847.

Green, Clifton, Russell Jame, Stanimir Markov, and Musa Subasi, 2014, "Access to management and the informativeness of analyst research," *Journal of Financial Economics* 114, 239–55.

Greenwood, Robin, and Michael Schor, 2009, "Investor activism and takeovers," *Journal of Financial Economics* 92, 362-75.

Grullon, G., S. Underwood, and J. Weston (2014). Comovement and investment banking networks. Journal of Financial Economics 113, 1–73.

Hanley, K. W. and Hoberg, G. (2010) 'The information content of IPO prospectuses', Review of Financial Studies, 23(7), 2821-2864.

Hatfield, J. W., Kominers, S. D., Lowery, R., & Barry, J. M. (2017). Collusion in markets with syndication.

Hellmann, T. 2006. IPOs, Acquisitions and the Use of Convertible Securities in Venture Capital, Journal of Financial Economics 81, 649–679.

Iliev, Peter, Jonathan Kalodimos, and Michelle Lowry, 2020, "Investors' Attention to Corporate Governance," *Review of Financial Studies*, forthcoming.

Inderst, Roman and Marco Ottaviani, 2012, Financial Advice, *Journal of Economic Literature* 50(2), 494-512.

James, Kevin, R. and Valenzuela, Marcela. The Efficient IPO Market Hypothesis: Theory and Evidence (2019). Journal of Financial and Quantitative Analysis (JFQA), forthcoming.

Jenkinson, T., Jones, H., 2004. Bids and allocations in European IPO bookbuilding. Journal of Finance 59, 2309–2338.

Jenkinson, T., Morrison, A., and Wilhelm, W., 2006, Why are European IPOs so rarely priced outside the indicative price range? Journal of Financial Economics 80(1), 185-209.

Jenkinson, Tim and Howard Jones, 2009, IPO pricing and allocation: a survey of the views of institutional investors, Review of Financial Studies 22, 1477-1504.

Jenkinson, Tim and Jones, Howard and Suntheim, Felix. Quid Pro Quo? What Factors Influence IPO Allocations to Investors? 2018. Journal of Finance vol 73 issue 5, 2303-2341.

Jenkinson, Tim, Howard Jones, and Jose Vicente Martinez, 2016, Picking winners? Investment consultants' recommendations of fund managers. *The Journal of Finance* 71, 2333-2370.

Kacperczyk, Marcin, Clemens Sialm and Lu Zheng. 2005. "On the Industry Concentration of Actively Managed Equity Mutual Funds." The Journal of Finance 60(4):1983–2011.

Kahan, Marcel, and Edward Rock, 2007, "Hedge Funds in Corporate Governance and Corporate Control," *University of Pennsylvania Law Review* 155, 1021–93.

Kang, A. and R. Lowery, 2014. The pricing of IPO services and issues: Theory and estimation. Review of Corporate Finance Studies 2, 188–234.

Kaplan, S. and Strömberg, P. 2004. Characteristics, Contracts, and Actions: Evidence from Venture Capital Analyses, Journal of Finance 59, 2177–2210.

Kenney, R. and B. Klein (1983). The economics of block booking. Journal of Law and Economics 26, 497–540.

Klein, April, and Emanuel Zur, 2009, "Entrepreneurial shareholder activism: hedge funds and other private investors," *Journal of Finance* 64, 187–229.

Klein, April, and Emanuel Zur, 2011, "The impact of hedge fund activism on the target firm's existing bondholders," *Review of Financial Studies* 24, 1735–71.

Krigman, L. and W. Jeffus (2016). IPO pricing as a function of your investment banks' past mistakes: The case of Facebook. Journal of Corporate Finance 38, 335–334.

Lakonishok, Josef, Andrei Shleifer, and Robert Vishny, 1992, The structure and performance of the money management industry, Brookings Papers: Microeconomics, 339–391.

Leleux, B.F. and D.F. Muzyka (1997) "European IPO Markets: The Post-Issue Performance Imperative." Entrepreneurship: Theory and Practice, 21:4 pp. 111-118

Li, Sophia Zhengzi, Ernst Maug, and Miriam Schwartz-Ziv, 2019, "When Shareholders Disagree: Trading After Shareholder Meetings," ECGI - Finance Working Paper 594.

Liu, Lauro Xiaolei, Ruichang Lu, Ann E. Sherman and Yong Zhang. 2015. "An Attention Model of IPO Underpricing, With Evidence on Media Coverage." Working Paper.

Liu, X., and Ritter, J.R., 2011, Local Underwriter Oligopolies and IPO Underpricing. Journal of Financial Economics, 102(3), 579-601.

Ljungqvist, Alexander, Tim Jenkinson and William Wilhelm, 2003, Global integration in primary equity markets: the role of U.S. banks and U.S. investors, Review of Financial Studies 16, 63-99.

Loughran, T., J. R. Ritter, 2004, Why has IPO underpricing changed over time? Financial Management 33, 5–37.

Lowry, M., Michaely, R., Volkova, E., Initial Public Offerings: A Synthesis of the Literature and Directions for Future Research, 2017. Forthcoming Foundations and Trends in Finance.

Lowry, M., Officer, M. S., & Schwert, G. W., 2010. The Variability of IPO Initial Returns. The Journal of Finance, 65(2), 425-465.

McCahery, Joseph, Zacharias Sautner, and Laura Starks, 2016, "Behind the Scenes: The Corporate Governance Preferences of Institutional Investors," *Journal of Finance* 71, 2905-32.

McGuinness, Paul, 2012, The role of 'cornerstone' investors and the Chinese state in the relative underpricing of state- and privately controlled IPO firms, Applied Financial Economics 22, 1529–1551.

McGuinness, Paul, 2014, IPO firm value and its connection with cornerstone and wider signaling effects, Pacific-Basin Finance Journal 27, 138-162.

Mietzner, Mark, and Denis Schweizer, 2014, "Hedge funds versus private equity funds as shareholder activists in Germany — differences in value creation.," *Journal of Financial Economics* 38, 181–208.

Myners, Challen, Cornelli, Gadhia, Jones, 2014. An Independent Review for the Secretary of State for Business, Innovation and Skills: IPOs and bookbuilding in future HM government primary share disposals.

Nielsson, U., 2012. Do Less Regulated Markets Attract Lower Quality Firms? Evidence from the London AIM Market. Journal of Financial Intermediation.

Nimalendran, M., J. R. Ritter, and D. Zhang (2007). Do today's trades affect tomorrow's IPO allocations? Journal of Financial Economics 84 (1), 87–109.

Pagano, M., Röell, A., 1998. The Choice of Stock Ownership Structure: Agency Costs, Monitoring, and the Decision to Go Public. The Quarterly Journal of Economics, Volume 113, Issue 1, 1 February 1998, Pages 187–225.

Reuter, J. (2006). Are IPO allocations for sale? evidence from mutual funds. Journal of Finance 61 (5), 2289–2324.

Ritter, Jay R. and Donghang Zhang. 2007. "Affiliated Mutual Funds and the Allocation of Initial Public Offerings." Journal of Financial Economics 86(2):337–368.

Rock, K. (1986). Why new issues are underpriced. Journal of financial economics, 15(1-2), 187-212.

Sherman, A.E., Titman, S., 2002. Building the IPO order book: underpricing and participation limits with costly information. Journal of Financial Economics 65, 3-29

Shleifer, Andrei, and Robert Vishny, 1986, "Large shareholders and corporate control," *Journal of Political Economy* 94, 461–88.

Smith, Michael, 1996, "Shareholder activism by institutional investors: Evidence from CalPERS," *Journal of Finance* 51, 227-252.

Staiger, Douglas, and James H. Stock, 1997, Instrumental variables regression with weak instruments, Econometrica 65, 557-586.

Stock, James H. and Motohiro Yogo (2005). Testing for weak instruments in linear IV regression. In D. W. K. Andrews and J. H. Stock (Eds.), Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg, pp. 80-108. Cambridge University Press.

Stoughton, Neal M. and Josef Zechner. 1998. "IPO-mechanisms, Monitoring and Ownership Structure." Journal of Financial Economics 49(1): 45–77.

Wooldridge, Jeffrey, Econometric Analysis of Cross-Section and Panel Data (Cambridge, MA: MIT Press, 2002).