MORAL HAZARDS IN LIMITED PARTNERSHIP MODELS? THE FUNDRAISING DILEMMA IN VENTURE CAPITAL

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ABSTRACT

Limited partnership agreements are the predominant form of intermediation in the Private Equity industry. Given it's closed end nature, an inherent part of a VC's business model is to repeatedly close new agreements every three to five years. We conjecture and provide large-scale empirical evidence for the existence of an active exit timing behavior to match fundraising cycles of fund managers – this means, GPs actively time exits of successful deals to periods prior to closing of a subsequent fund. This pattern is especially prevalent for non-reputable VC firms. In an approach to send signals of quality to potential LPs, GPs pre-maturely exit companies and accept valuation discounts. This results in significant real wealth losses. We conclude that the current form of governance is of questionable benefit in a maturing VC industry.

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1. INTRODUCTION

Over the last decade the Private Equity industry has matured significantly and is continuingly experiencing record levels of fund-raising. Undoubtfully, the importance of Private Equity as an asset class has increased dramatically. This success is largely attributed to it's superior governance structures enabling well aligned of interests between all involved parties (Jensen & Meckling, 1976). Those parties include the limited partners (LPs), the general partners (GPs) and the portfolio companies. As the dominant form of financial intermediation between LPs and GPs, limited partnership agreements have prevailed. Recently, however, a growing body of literature has questioned whether these agreements are necessarily the right way of governance.

Limited partnership agreements (LP agreements) are special purpose vehicles, which are set up at the inception of a fund. In these agreements LPs primarily participate via committing capital. GPs on the other side, actively administrating the fund, decide upon the respective investments made into potential targets as well as upon the respective exits. LP agreements mostly have a defined lifetime of around ten to twelve years, during which capital commitments are tied up. A new fund is typically raised every three to five years. This allows the GP to permanently invest into promising targets. During such fundraising activities GPs have a recurring interest in demonstrating their quality as an investor to potential LPs in order to collect capital commitments. LPs on the other side face the difficult task to evaluate a GP based on the information they possess. A substantial part of this information is the performance of previous funds, with a special emphasize on the most recent track record of deals (Kaplan & Schoar, 2005). This performance evaluation, however, can be difficult, given the high level of information asymmetry, especially with regards to valuation of not yet fully exited portfolio companies (Barber & Yasuda, 2017). In

this regard, potential LP will most certainly prefer externally validated performance (that is exited deals) over book values of yet unrealized portfolio companies, since these valuations are valid only to a limited extent (Brown et al 2013, Jenkinson et al 2013). This seems particularly true for Venture Capital (VC) given the comparably low maturity of portfolio companies. To us, the process of raising a new fund seems highly critical, because the utility functions of LP and GP largely differ. Whereas existing LPs are interested in maximizing the performance of the current fund, GPs reportedly maximize lifetime income over several funds (Chung et al., 2012; Metrick & Yasuda, 2010). GPs thus have an incentive to window-dress or exaggerate previous performance. Existing studies have identified two conceptual tools, which GPs use to do so.

Firstly, Jenkinson et al. (2013) provide initial empirical evidence for an inflation of net asset values (NAVs), this is the accounted book-value of not yet exited portfolio companies, during the process of fundraising. Later studies find this pattern to be specifically prevalent for low reputation fund managers (Barber & Yasuda, 2017; Brown et al., 2019). Similarly, Chakraborty and Ewens (2017) document a delay in the reveal of negative information (e.g. a write-off or write-down) to times after fundraising. These measures mainly influence the valuation of not yet exited portfolio companies.

The second tool of concern is the active timing of the fundraising process. Barber and Yasuda (2017) find that fundraising coincides with periods of peak realized investment performance. They conclude, that GPs are well at timing their fundraising process to fit times of peak performance (e.g. after a highly successful exit).

To us, there is an alternative interpretation of the peak performance timing – this is, GPs actively game the timing of their most successful deals prior to a subsequent fund's closing. If this behavior exists and exit decisions would not be timed according to their suitability for an exit but

with regards to fundraising, GPs would willingly accept performance discounts on behalf of subsequent fund closings. This would certainly represent a major concern in the current form of financial intermediation and result in real wealth losses.

The goal of this study is thus to shed light on the existence of active divestment decisions to support fundraising activities. From an LP perspective, the current form of governance would be ideal, if every invested dollar would be optimally put to work by the GP. If, however, GPs leave money on the table in an approach to support future fundraising, they do not act in the LPs best interest.

We try to study these issues via looking at a sample of portfolio companies that were exited via an IPO and measure the level of underpricing. The underpricing variable seems very practical to us, as it reflects the relative difference between what the company has been sold for and what is the market value of an asset (i.e. it reflects what the company could have been exited for, if the GP would have kept it longer). The degree of underpricing should, beyond what can be explained by the market environment, not vary over the lifetime of a fund. If it does, however, it would suggest that a moral hazard exists between GP and LP and question the suitability of the current form of financial intermediation. Kaplan and Schoar (2005) have documented the outstanding importance of current investment performance, especially for GPs without a longstanding track record[2]. We thus conjecture that especially GPs with a lack of reputation are prone such moral hazard issues. We further conjecture that especially GPs in the process of fundraising underprice their IPOs higher as they do have significant interest to send signals of quality to potential LPs.

[2] Conceptually similar results with regards to the role of reputation are found in a study from Chung et al. (2012), in which they document the effect from indirect pay for performance from future fundraising to disappear with larger fund generations.

For this study, we establish a novel sample of 5,122 IPO fund-involvements between 1990 and 2019. For all fund-involvements we have information at the deal level (such as the industry, location, asset class and age of the respective company), the fund-level (such as the vintage of a fund, fund-size or fund manager) and the IPO level (offer price, underpricing, bookrunners, lead underwriter and date of an IPO).

Our first main finding is that underpricing varies substantially over the lifetime of a fund. More specifically we find a structural pattern of underpricing over the lifetime of a fund, with the highest level of underpricing early in the fund and lowest at late stages in the fund. Underpricing seems to be almost linearly decreasing over the fund's lifetime. In an approach to dissect the drivers, we find that this patterns seem to be especially prevalent for low reputation GPs. The results are consistent with earlier findings from Gompers (1996) in a VC market, which has substantially gained maturity since then. In an approach to further explore these findings, we find significantly higher levels of underpricing during fundraising – i.e. those GPs in the process of raising a fund, tend to underprice their portfolio companies higher. To us, results strongly indicate the existence of active exit timing decisions in accordance with fundraising periods including real wealth losses. In economic terms, the marginal effect of fundraising is an increase in underpricing of 5 to 8 percentage points. This seems surprisingly high, given the return distribution in VC towards very few but highly money generating winner deals (e.g. those few deals that are largely responsible for the overall fund performance) (Sahlman, 1990). Overall, our results indicate exit-timing decisions of GPs, which are at the detriment of existing LPs exists. Particularly the magnitude of this effect seem highly concerning and questions the suitability of the current form of governance in a matured VC industry.

Overall our study contributes to a small but growing body of literature discussing the existence of various agency conflicts in GP-LP settings, primarily during fundraising. These studies mainly include (Barber & Yasuda, 2017; Braun & Schmidt, 2014; Brown et al., 2019; Chakraborty & Ewens, 2017; Jenkinson et al., 2013). To the best of our knowledge this is the first empirical attempt to evaluate the existence of exit timing decisions at the detriment of existing LPs. Our work also adds to existing literature on the grandstanding phenomenon (Gompers, 1996) via adding the important moderating role of fundraising to the analysis. This study is an extension of previous work in Braun and Schmidt (2014). The study is complemented along two important dimensions: (1) We increase our sample size significantly from 475 to 5,122. This allows us to rule out effects from small sample size and test the robustness of our findings in various ways. Also, (2) we include GP reputation as a moderating factor.

The remainder of this study is structured as follows. Section 2 describes the construction of our dataset and the relevant variables. Section 3 introduces the variation of underpricing over the lifetime of a fund and presents results for moral hazard behavior in the context of the LP agreement. In section 4 we discuss several alternative explanations for our results and present robustness tests. We conclude in section 5.

2. DATA AND METHODOLOGY

2.1. Data collection

We construct our fund involvement dataset matching two different data sources. The first is the Venture Capital deal data by Preqin, which provides one of the largest and most comprehensive lists of investments made by VC funds (Harris et al., 2014). The second is Thomson Reuters Datastream, which provides us with global IPOs conducted between 1990 and 2019. We obtain a sample of 5,122 VC fund's, which invested in a company that later went public via an IPO. In

Venture Capital, investments are frequently syndicated (i.e. more than one investor is invested in a VC backed company). This also applies to our sample. For 5,122 fund-involvements we identify a total of 1,724 unique IPOs.

2.2 Variable construction

The appendix provides a summary of the variables and it's data sources used in this study. We briefly introduce the most important variables here. Our underpricing variable measures the first day return of an IPO, thus the difference between the offer price and the first day closing price. We retrieve the data for this variable from Thomson Reuters Datastream. We also validate the underpricing variable with data from Bloomberg and delete those, which seem implausible.

To put our reputation (or grandstanding[3]) hypothesis to test, we build a dummy variable based on the generation of a fund. To us, the fund generation seems very well suited to reflect the underlying dynamics during fund-raising and is consistent with industry wisdom. An established VC firm with long track record will certainly raise funds with less effort, compared to a VC firm raising a first or second generation fund, yet with no or only little historic returns to demonstrate. In this context, several studies have found that especially VCs lacking a long history of investments from previous fund generations have higher incentive to window-dress their performance (Chung et al., 2012; Kaplan & Schoar, 2005). Consistent with Chung et al. (2012) we thus code top quartile fund-generations as one and zero otherwise. We later test alternative cut-off points to evaluate the robustness of our findings.

The put our fundraising hypothesis to test, we establish a further dummy variable, which is coded one if the fund manager has been in the process of raising a fund during the time of the IPO.

[3] Gompers (1996) document the occurrence of actions that "signal their ability to potential investors" for young VC fund managers and refer to this phenomenon as grandstanding.

To build this variable we define a time-window of 2 years before the vintage of a later fund. A time window of two years seems well suited to us, since it represents a realistic time frame from pre-marketing of a fund to vintage of a fund. We later test the robustness of our results using alternative time-windows.

In an approach to capture the effect of fund lifetime on underpricing levels, we establish the *fund age at IPO* variable. *Fund age at IPO* is a measure for the timing of an IPO since the establishment of a fund – it represents the time difference in years between the vintage of a fund (through which the investment was made) and the IPO.

As control variables for our underpricing regressions we include IPO size, company age, number of bookrunners, underwriter reputation as well as indicators on the market cyclicality. To account for the size of an IPO we measure the amount of gross proceeds of an IPO. As this number is highly right skewed, we include the logarithm in gross proceeds in our models. To account for the age of a company, we integrate the logarithm of the years since establishment of the company going public. To measure the quality of an underwriter, we use Jay Ritter's updated measure based on Carter-Manaster (1990). For each IPO, we measure the cyclicality of the market (whether the market was hot or cold) in two ways. First, we include the average number of IPOs (IPO frequency) and second, we include the average level of underpricing (IPO returns) during the month of the IPO at hand.

In our models we also include industry, region and IPO year fixed effects. We base our classification into industries on Thomson Reuters Business Classification logic and cluster the sample into four major regions (North America, Asia, Europe and Rest).

2.3. Sample characteristics and descriptive statistics

In Table 1, we provide descriptive statistics for our sample of 5,122 fund involvements. We acknowledge the large distribution of our deals across the different geographical regions as well as across different industries. As a reflection of the dominance of the US VC industry, a substantial share of our sample (66% of fund-involvements) is originated in North America. The remaining 35% of fund-involvements are contributed by regions outside North America. We further note a substantial share of observations from Asia (22%), the second biggest region in our sample. We consider this as an attractive feature of our sample since a significant share of VC deals globally are conducted outside of North America.

The distribution of our sample across the different industries exhibits that Healthcare and Technology are dominant industries in our sample with an aggregate share of 75% of observations. Overall these relative shares of both regions and industries are in line with previous studies conducted on VC backed IPOs.

We further observe fewer observations in early IPO years, especially before 2000. We mainly attribute this to a selection bias due to an increased likelihood of matching a deal to more recent IPOs (e.g. as the likelihood of changing a company's name decreases the shorter the period since IPO). Braun and Schmidt (2014) have reported the existence of window-dressing behavior especially since 1999. Our sample includes only 226 (or 3.2% of the total sample) fund-involvements in IPOs prior to 1999 and is thus undoubtfully biased towards more recent IPOs. We later test the robustness of our findings to the exclusion of deals made in the first part of our sample period – that is the period in which the likelihood of unmatched deals is highest. Overall, our sample seems thus a good representation for a universe of VC investments in a maturing industry.

In Table 2, we provide descriptive statistics for the main variables used in this study. We document a mean (median) underpricing of 32% (18%), which seems in line with previous studies dealing with VC underpricing (Braun & Schmidt, 2014; Buchner et al., 2019; Lee & Wahal, 2004). We further observe a large distribution of the underpricing variable with a standard deviation of 58% (or 3.2 times median), driven by extreme positive outliers. We therefore winsorize our underpricing variable at the 99th percentile.

3. ANALYSIS

3.1. Underpricing over a fund's lifetime

Table I presents the level of underpricing over a fund's life, grouped by years since the establishment of a fund. Panel A reveals a clear structural pattern of high levels of underpricing within the first three to five years of a fund with underpricing above 30% in the first three years. Towards the end of a fund's lifetime, we observe the lowest levels of underpricing with mean underpricing of 22% in year nine and below 20% in year ten. Between both ends, mean underpricing is almost linearly decreasing. This picture seems to be confirmed by the median levels of underpricing, which are between 15% and 17% in the first five years and drop to 9% and 11% in the last two years of the fund.

[Include Table III here]

The picture becomes even more obvious when looking at the relative levels of underpricing in Figure I (e.g. a relative underpricing of 10 means, that the underpricing was 10% higher compared to the general average of underpricing across the entire sample). In year two we observe underpricing levels, which are more than 30% higher versus the total average across all years and

25% lower within the last year of a fund. In between the mean levels of underpricing are almost linearly declining.

[Include Figure I here]

Before we set out to explore what drives this pattern, we also test whether this pattern holds in a multivariate regression setting. Table 4 exhibits an OLS regression on underpricing including fund age as an independent variable. In Model 1 we observe a highly significant influence of fund age at IPO with a *t*-value of almost 7. In Model 2, we include various controls such as the log of IPO size (measured in gross proceeds), the log of company age, the number of bookrunners, the lead underwriter reputation, IPO frequency and IPO returns. The negative coefficient and significance largely remain intact. In Model 3 we further include region, industry and IPO year fixed effects in our regression. Similarly, the coefficient remains negative and significant (even though the level of significance drops from 1% to 5% after including all fixed effects and control variables). Economically, the negative coefficient of around -0.5 reflects a reduction of expected levels of underpricing by 0.5 percentage points with every additional year of fund lifetime (or 5% over the entire fund lifetime). Overall these regressions confirm our finding of decreasing levels of underpricing over a VC fund's life. In further robustness tests we exclude single years, use alternative standard errors or alternative winsorization levels. Our results remain unchanged. In further analysis, we now focus on explaining what drives this particular pattern of decreasing levels of underpricing over a fund's life.

[Include Table IV here]

3.2. The role of reputation

We have discovered a structural pattern of decreasing underpricing over a fund's life. The question now is why this occurs. Given the outstanding role of reputation for Venture Capital firms, especially in the process of fundraising, previous research has shown that young VC firms take companies public earlier and underprice their IPOs higher in order to establish reputation (Gompers, 1996). To test whether the decrease in underpricing is driven by VC firms with a lack of reputation, we split our sample into two groups clustered by fund generation. We group together those VC firms with high reputation, which we measure as top-quartile fund generation. The remaining VC firms are then grouped to the lack of reputation cluster. We note that Chung et al. (2012) find the influence of lifetime income maximization to disappear between the 4^{th} and the 5^{th} generation of a fund. We thus test the robustness of our findings at alternative cutoffs. Overall results remain identical at fund generation cutoffs between 5 and 7 (i.e. only funds with the 5^{th} or the 7^{th} generation and above are considered reputable). Figure II exhibits the levels of relative underpricing split into our reputation groups. Results seem surprisingly clear to us. Whereas the patter of underpricing largely disappears for high reputation funds, the pattern is even more pronounced for low reputation funds. Overall we observe higher average levels of underpricing for low reputation funds with a mean underpricing of 27.4% compared to 25.1% for high reputation funds. The difference, however, seems particularly driven by higher underpricing levels in year one to five with a peak in year two at mean relative underpricing 44% higher compared to mean underpricing level of the entire sample. Also in absolute numbers, the level of underpricing for low reputation funds varies substantially from 39% in year two to 18% in year 10.

[Include Figure II here]

We then also test these results in a multivariate regression setting (that is identical to the setting described in table 4), for which we include a dummy variable, which we code as one, if a VC fund is characterized as a low reputation fund and zero otherwise. In our regression we include the reputation dummy variable as well as an interaction between fund age at IPO and our reputation variable. This way, we firstly aim to test how general levels of underpricing differ between reputable and non-reputable VC firms in a multivariate setting. Secondly, we aim to test how much of the particular structural pattern of underpricing is explained by low versus high reputation funds. We oppose models with the dummy variable and the interaction term (Model 2, Model 4 and Model 6) with models without these variables (Model 1, Model 3 and Model 5) in various settings. After naive regressions in Model 1 and Model 2, we include our control variables in Model 3 and Model 4. In Model 5 and Model 6 we also include IPO year, region and industry fixed effects. Overall, we observe a positive and significant impact of the low reputation variable on the level of underpricing, with a significance a 1% in Model 2 and 5% in remaining Models (4 and 6) after inclusion of controls and fixed effects.

Further, and similarly to results mentioned above, after the inclusion of the interaction term, the fund-age variable almost entirely looses its explanatory power. As the effect for low reputation funds is captured within the interaction term, fund-age seems to have almost no effect for high reputation funds. Despite the negative coefficient, the variable has lost almost the entire effect with a negative coefficient of only -0.041 and a *t*-value of -0.104 in Model 6. This pattern holds true in almost all different models. We note, though, that in Model 2 fund-age at IPO is significant on a 10% level. The effect is lost after integration of various control variables or fixed effects. We also note, that low reputation is significant of a 1% level in Model 2 and 4 and still significant on a 5% level in Model 6. The fund age at IPO variable is of higher significance and has a larger negative coefficient for low reputation funds compared to high reputation funds in all Models. Despite the

loss in significance in Model 6, the coefficient remains negative and almost significant with a *t*-value of 1.480.

[Include Table V here]

What do these results tell us? First, and in line with our first hypothesis, underpricing of low reputation funds seem significantly higher compared to reputable funds. These differences seem quite high, given the coefficient of 5.510 (in Model 6) up to 10.256 (in Model 2), which in economic terms reflects an increase of 5 (to 10) percentage points of underpricing above underpricing levels of reputable funds. This finding to some extent validates our initial concerns, as one could argue that based on a certain certification effect from established fund managers, results should point in the opposite direction[4]. The results thus indicate that especially low reputational VCs pre-maturely exit portfolio companies. This seems particularly true within the first years of a fund. Second, the pattern of decreasing underpricing over a fund's lifetime largely still exists (despite the loss in significance in Model 6, but given the size and direction of the coefficient) and seems almost entirely driven by funds with low reputation. The effect largely disappears for reputable funds. In an approach to further question why this pattern occurs for low reputation funds, we further set out to explore the role of fundraising.

3.3. Underpricing during fundraising

A possible explanation for the explained pattern of underpricing, especially for those with a lack of reputation, could well be that GPs pre-maturely exit their successful portfolio companies to signal quality to potential LPs, as hypothesized in hypothesis two. Fund managers could arguably

[4] In a similar context Megginson & Weiss (1991)) provide evidence for the existence of a certification effect, stating that VC backed IPOs are significantly lower underpriced compared to a matched non-VC backed sample, based on the positive certifying role, which VC possess during an IPOs.

support fundraising activities by demonstrating their ability to successfully realize their investments (Gompers, Lerner 1999). If this is the case then underpricing levels should coincide with fundraising activities. If this is the case, it would indicate an optimization of lifetime income of GPs at the detriment of current LPs. This would represent a concerning moral hazard issue in the GP-LP relationship.

To put this hypothesis to a test we split our sample into those VCs, which are in the process of raising a fund during an IPO and those which are not. To identify those funds, we build a time window of two years before all future fund vintages of the VC firm at hand. We note that the regression results are robust to changes in our time window to one or three years. Figure III represents the relative underpricing levels, clustered by fundraising activities. During fund-raising activities underpricing seems significantly higher, especially in years one to five. We note a mean of 33.2% underpricing for IPOs exited during fundraising activities compared to 23.2% for IPOs not exited during fundraising activities.

[Include Figure III here]

We further establish a multivariate regression setting for the subsample of low reputation funds, in which we include a fundraising dummy variable. We code those VCs, which are in the process in fundraising as one and zero otherwise. Table VI presents the estimation results. In Model 1 we naively regress our fund-age as well as the fundraising variable on the level of underpricing. In Model 2 we add various controls. In Model 3 we further add IPO year, region and industry fixed effects. Throughout the different Models the effect of fundraising remains positive and highly significant at a 1% level. In economic terms, the (mean) difference between two VCs – one in the process of fundraising and the other not in the process of fundraising is between 5 and 8 percentage points.

[Include Table VI here]

Overall the presented results indicate the existence of pre-mature IPO exit decisions made by the VC in an approach to send signals of quality to potential LPs. We thus also confirm our second hypothesis of higher underpricing for VCs in the process of raising a fund.

4. ALTERNATIVE INTERPRETATIONS AND ROBUSTNESS

In this section we aim to discuss several robustness tests. For brevity reasons we only include the most relevant tables in this study. Other results are available upon request.

4.1 Time sensitivity of results

The observed pattern of IPO underpricing could a result of clustered IPO timing decisions. In order to offer additional robustness checks, we therefore test whether our results are sensitive to the exclusion of single years or similarly to different time periods. Results are depicted in Table VII. In model 1 and 2 we restrict our sample to IPOs conducted prior to 2010. We observe a highly significant and negative impact of fund age in model 1. After an integration of all fixed effects significance is largely lost, however, the coefficient remains negative. In model 3 and 4 we only include IPOs conducted after 2009. We observe a highly significant and negative coefficient in model 3. In model 4 we similarly observe a negative coefficient, which is significant at a 5% level. In model 5 and 6 we exclude those years with high levels of underpricing. Similarly, the fund age variable remains highly significant in model 5 and significant on a 5% level in model 6. The coefficient remains negative in both models. We therefore conclude that our results are not sensitive to IPO timing.

4.2 Matching accuracy

Our sample is generated via matching fund investments from Preqin to a list of global IPOs from Thomson Reuters. We note that Preqin provides us with investments of VC firms into a certain portfolio company. However, it does not provide us with the respective exit event. Therefore we can only assume that a fund is still invested at the time of the IPO. To account for this and avoid potential mismatches we apply a rather strict matching procedure – this is, we match only those IPOs for to an investment if it happened in a time frame of up to ten years since the fund vintage (e.g. for a fund with vintage in 2000 we did include a matched IPO when the issue date was in 2010, however, we did not match the IPO when it happened in 2011). We choose the relatively short time period, since it represents the usual, but lower end of the fund-lifetime (Metrick & Yasuda, 2010; Sahlman, 1990). However, we cannot guarantee that a fund has not exited a company prior to an IPO. Although we are not aware of any way in which this would affect our regression results (other than increasing noise and thus reducing significance) we test the robustness of our findings in eliminating those fund-involvements with the highest holding period – this is those deals with the highest probability of a wrong match. Table VIII displays an OLS regression excluding those deals with holding periods larger 8 and 9 years. We document a slight reduction in significance along with a more restricted sample. The fund age variable remains significant at a 1% level in both model 1 and model 3. In model 4 significance we observe a reduction of significance from a 5% to a 10% level. However, the negative coefficient as well as its loading largely remains intact. We overall do not regard these findings as critical to our analysis.

4.3 The impact of lockups

One might argue that the described pattern of underpricing might be a result of different lockups over the lifetime of a fund (i.e. a fund in early years of it's lifetime might be willing to

accept longer lockups, whereas a fund close to it's maturity might be interested to accept only minimum lockup days). Longer lockup periods by pre-IPO owners (e.g. the PE fund) as a reflection of their willingness to invest in their own project, could be interpreted as a powerful signal of value (Leland & Pyle, 1977). As a robustness check we therefore include the lockup period as a further control variable. The results are exhibited in Table IX. The lockup variable does not affect our regression outcomes significantly. Significance and coefficient loading remain largely unchanged. We therefore conclude that lockups do not affect our results critically.

4.4 Alternative fund generation cut-offs (reputation)

In the course of our analysis we have identified a significant impact of reputation on the level of underpricing. We have defined reputation as top quartile fund generation as it quite well reflects the underlying dynamics during fundraising (Chung et al., 2012; Kaplan & Schoar, 2005). In order to further validate our reputation measure, we test alternative fund generation cutoffs. Table X exhibits the results. We find that our fund age at IPO variable largely remains significant at lower fund generation cutoffs (we exemplary display a fund generation cutoff at 5 in model 1 to 4). Similarly, the coefficient remains negative throughout model 1 to 4. The lack of reputation further seems to consistently be linked to higher levels of underpricing as depicted by the positive coefficient as well as it's significance on a 10% level. In models 5 to 8 we observe a sharp reduction of significance after integration our interaction variable. We document a negative coefficient in both model 6 and model 8 and a 10% significance in model 6. In further unreported tests we observe similar results. Throughout all alternative fund generation cutoffs (until median fund generation) we document a higher underpricing for low reputation funds as the coefficient remains positive in all regression models. Significance, however, largely disappears. We further observe a shift in significance of our fund age variable towards low reputation funds at higher fund generation

cutoffs. The interaction terms remains negative for all alternative fund generation cutoffs above the top quartile, however, significance largely disappears. We thus do not regard these findings as critical to our analysis.

4.5 Alternative time-windows (fundraising)

We have further identified a significant impact of fundraising on the level of underpricing. Those PE firms, which are in the process of raising a follow-on fund, seem to underprice their IPO higher compared to funds, which are not raising a fund. In this section we aim to offer additional robustness tests on the chosen fundraising measure. In our initial analysis we regard a time-window of 2 years before the vintage of a follow-on fund as the appropriate measure as it reflects a realistic time period of raising a fund. We further want to test whether our results are robust to a time window of 1 and 3 years respectively. The results are exhibited in Table XI. Overall we observe that our findings are not sensitive to the time window choice as relevant variables do not change with respect to sign of coefficient or loading. We observe a slight reduction of significance at a larger time window. We attribute this to the arguably increasing noise (as the likelyhood of wrongly classifying a fund as raising a fund increases).

4.6 Further robustness tests

In further unreported robustness tests we test for alternative standard errors, use different winsorization levels and exclude penny stocks. As standard errors we use clustered standard errors by IPO year, by industry and by region. We find a slight reduction of significance from a 5% to a 10% level after clustering standard errors by IPO year. However, throughout the models we do not find a substantial difference in sign of coefficient or its loadings. Also, throughout all other models significance remains intact. We therefore consider our results as robust to alternative standard errors.

We further use alternative winsorization levels. Not winsorizing our dependent variable yields similar results. However, significance is lost after integration of all fixed effects. We also use a 5% winsorization level which we apply to the upper and the lower end of our dependent variable. Results are very similar. We document negative coefficients of our fund age variable throughout the models. We further observe a highly significant variable, which is slightly reduced to a 5% level after integration of all fixed effects. As a further robustness check we exclude penny stocks with an offering price below 8 US dollar from our sample. The fund age variable remains highly significant and negative throughout almost all models. After integrating all fixed effects and controls significance is largely lost. However, the negative coefficient remains intact. We therefore conclude that our results are robust to alternative model specifications.

5. CONCLUSION

In this study we find that a structural pattern of underpricing over the lifetime of a fund exists. This pattern seems particularly prevalent for non-reputational VCs and during the process of fundraising. Overall our results are consistent with our predictions on reputation and fundraising. Fundraising concerns, especially from non-reputable VC firms seems to affect divestment decisions. The incentive to signal quality to potential LPs seems to cause real wealth losses, a large part of which is carried by existing LPs. To us this apparent fundraising dilemma is highly alarming and questions the suitability of the current form of governance in a matured VC industry.

In addition to a share of fund's profits (usually around 20%), VCs receive a fixed fee compensation (typically around 2% of committed capital). Consequently VCs have incentives to grow their capital commitments by raising large follow-on funds. Chung et al. (2012) demonstrate that incentives from future fundraisings are of equal importance compared to direct performance based pay from carried interest. Our findings complement existing findings on principal agent

conflicts during the process of fundraising. In particular they add empirical evidence suggesting that fund managers actively time their divestment decisions to match with fundraising cycles.

Jensen and Meckling (1976) argue that agency costs are an inherent consequence of agency relationships and the pure occurrence of agency cost dues not imply that contractual agreements are suboptimal. However, given the magnitude of influence in which IPOs are underpriced during fundraising, we wonder if this is without alternatives.

LPs should thus consider rebalancing the amount of fixed versus variable compensation. This particularly holds true in a market of rapid fund size increases. Alternatively, LPs should consider alternative mechanisms of governance such as longer fund lifetimes, LP direct investments or LP investments into GP stakes.

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FIGURES

Figure I

Underpricing over a fund's lifetime

This graph shows the relative level of underpricing of IPOs across a fund's lifetime (e.g. 1 represents the first year since the fund's inception). For example a relative underpricing of 10% means that the underpricing in this years was 10% above the average level of underpricing over the total lifetime.

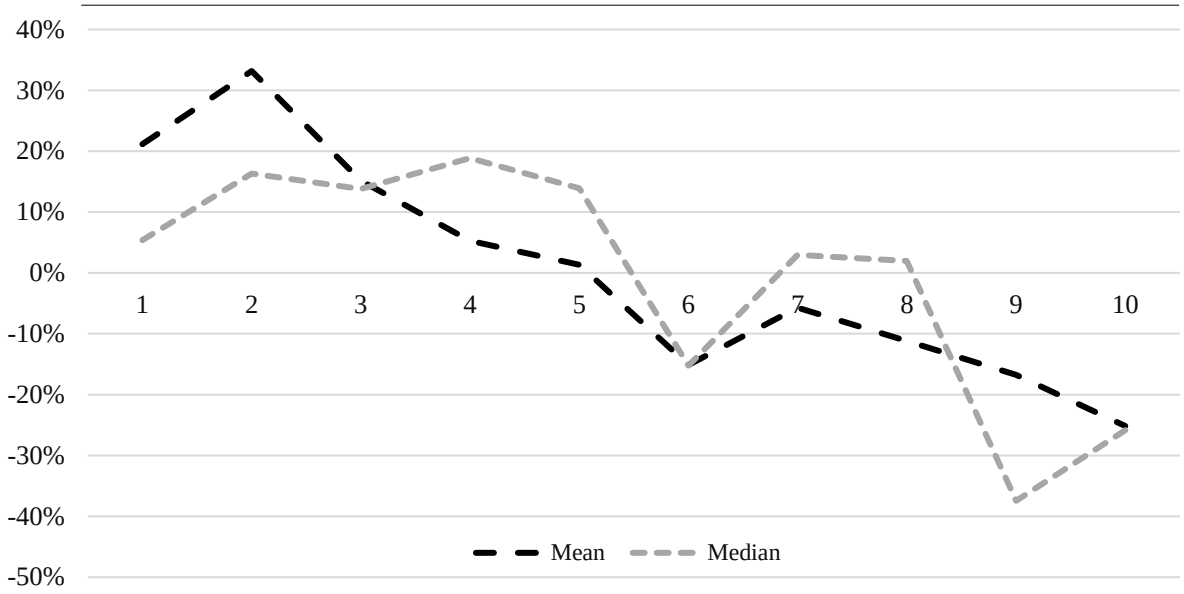


Figure II

The impact of reputation

This graph shows the relative underpricing of IPOs across a fund's lifetime for our sample, group into low vs. high reputation funds. We define high reputation as the top-quartile fund-generation of an IPO. The remaining funds are defined as low reputation funds.

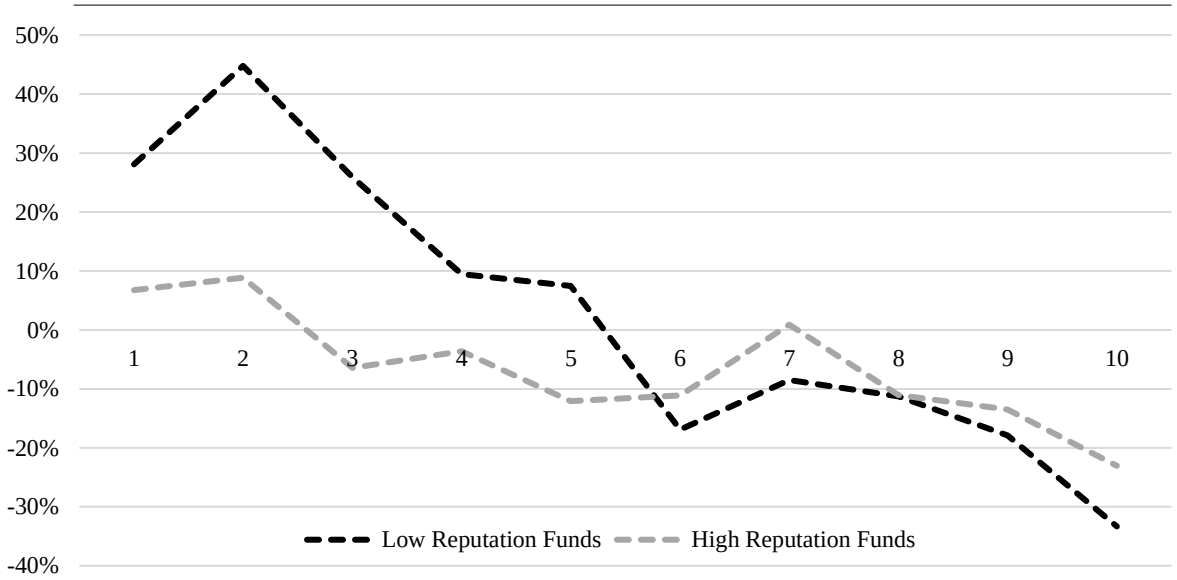
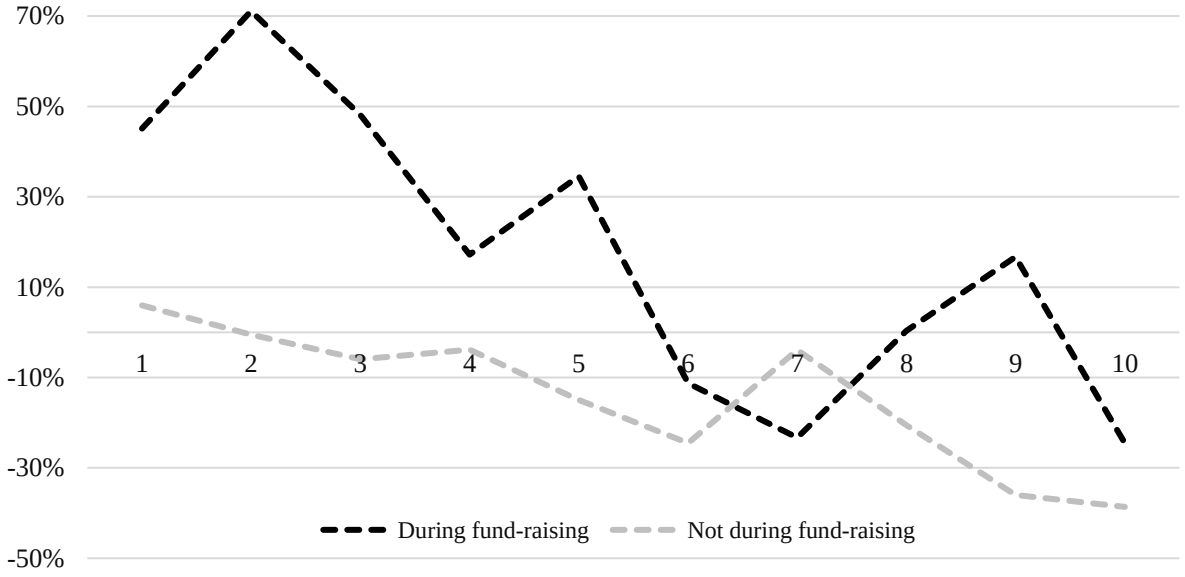


Figure III

Subsample of low reputation funds: The impact of fund-raising

This graph shows the relative underpricing of IPOs across a fund's lifetime for the subsample of low reputation funds. We separate funds in the process of raising a fund from those which are not raising a fund.



TABLES

Table I

Sample characteristics

This table shows the distribution of our sample across the different regions, time periods and industries. Our sample consists of a total of 5,122 fund-involvements and 1,724 IPOs between 1990 and 2019.

	Number	Total Percentage
Region		
Asia	1,103	21.5
Europe	569	11.1
North America	3,360	65.6
Rest	90	1.8
Industry		
Basic Materials	91	1.8
Cyclical Consumer Goods & Services	351	6.9
Energy	34	0.7
Financials	110	2.1
Healthcare	2,286	44.6
Industrials	443	8.6
Non-Cyclical Consumer Goods & Services	89	1.7
Technology	1,571	30.7
Telecommunications Services	121	2.4
Utilities	26	0.5
IPO Year		
1990-1994	16	0.3
1995-1999	244	4.8
2000-2004	516	10.1
2005-2009	956	18.7
2010-2014	1,797	35.1
2015-2019	1,593	31.1
Fund Vintage Year		
1990-1994	33	0.5
1995-1999	359	5.1
2000-2004	704	10.1
2005-2009	1,402	20.0
2010-2014	2,451	35.0
2015-2019	2,045	29.2

Table II

Descriptive statistics

This table summarizes descriptive statistics for the main variables used in this study. Underpricing is measured as the percentage difference between the initial offer price and the closing price on the first day of trading. Underpricing (winsorized) in winsorized on an upper 1% level. IPO size is measured in USDm. Company Age represents the age of the company at IPO. The Underwriter Reputation rank is based on Jay Ritter's updated Carter-Manaster (1990) measure. IPO frequency is the number of IPOs, IPO returns is the average level of underpricing in % during the month of the IPO. The fund generation variable represents the sequence of a fund, managed by the same VC firm. Holding period is calculated as the time difference in years between the date of the investment until the IPO issue date. Fund age at IPO represents the time difference in years between the vintage year of a fund. The vintage years is defined as the year of the first investment by Preqin. This sample consists of a total of 5,122 fund-involvements from 1.724 IPOs.

Variable	Obs.	Mean	25%	Median	75%	SD
Underpricing	5,098	28.0	0.0	14.2	43.6	50.2
Underpricing (winsorized)	5,098	26.7	0.0	14.2	43.6	42.3
IPO size (gross proceeds)	5,122	235.3	52.0	82.8	132.3	1,228.0
Company Age	4,194	8.9	5.7	8.2	10.9	5.5
Number of Bookrunner	5,122	2.0	1.0	2.0	2.0	1.6
Underwriter Reputation	5,062	6.8	5.0	8.0	9.0	2.5
IPO frequency	5,122	148.3	113.0	141.0	178.0	51.0
IPO returns	5,122	31.7	22.3	28.8	36.3	15.5
Fund generation	5,122	5.2	2.0	3.0	6.0	6.1
Holding Period	5,122	3.3	1.5	2.9	4.7	2.2
Fund age at IPO	5,122	4.9	3.0	4.8	6.7	2.5

Table III

Underpricing over a the lifetime of a fund

This table shows underpricing over the lifetime of a fund since it's vintage for our sample of fund-involvements in IPO exits. We group the fund-involvements based on the calendar years between the vintage of a fund and the IPO. The underpricing variable is winsorized on a 99th percentile level.

Variable	All	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Underpricing (mean)	26.7	32.4	35.6	30.8	28.1	27.1	22.7	25.2	23.7	22.2	20.0
Underpricing (median)	14.2	14.9	16.5	16.1	16.8	16.1	12.0	14.6	14.4	8.9	10.5
Underpricing (SD)	42.3	53.6	56.5	46.0	41.6	40.8	35.1	37.6	38.0	41.5	32.2
N	5,098	268	471	557	705	697	713	584	442	353	527

Table IV

OLS regression on IPO underpricing

This table shows the cross-sectional regression of percentage of IPO underpricing. The Fund age at IPO variable is defined as the time (in years) since the fund's vintage at the time of the IPO. Ln IPO size reflects the logarithmized volume of gross proceeds valued as number of shares times offer price. Ln Company Age reflects the logarithmized age of the company at IPO. The number of bookrunners reflects the number of participating bookrunners. The Underwriter Reputation variable is a measure introduced by Carter and Manaster (1990; updated by Jay Ritter) ranging from -9 (low) to 0 (high). Further, in some models we control for fixed effects related to IPO year, region and industry. IPO year represents the year of the IPO, region fixed effects consist of North America, Europe, Asia and other. Industry fixed effects are based on Thomson Reuters Business Classification and differentiate 11 different industries. We winsorize the upper 1% of our dependent variable. Heteroscedasticity-consistent *t*-statistics are reported in parenthesis. We denote statistical significance is as 1%(***), 5%(**) and 10%(*).

Variable	(1)	(2)	(3)
Fund age			
Fund age at IPO	-1.764***	-1.308***	-0.518**
	(-6.973)	(-5.134)	(-2.010)
Controls			
Ln IPO size		2.295*	-0.505
		(1.941)	(-0.427)
Ln Company Age		2.039**	0.217
		(2.051)	(0.258)
Number of Bookrunners		-1.713***	-1.416***
		(-3.423)	(-2.959)
Underwriter Reputation		2.079***	1.877***
		(7.847)	(6.954)
IPO frequency		0.014	0.076***
		(1.044)	(3.814)
IPO returns		0.816***	0.620***
		(13.973)	(9.749)
Fixed effect: IPO year	No	No	Yes
Fixed effect: Region	No	No	Yes
Fixed effect: Industry	No	No	Yes
Observations	5,098	4,123	4,123
Adjusted R-squared	0.010	0.110	0.228

Table V

OLS regression on IPO underpricing - The impact of reputation

The Lack of Reputation Variable is a dummy which equals 1 if the respective fund manager is reputable. We define Low Reputation as 0 if the fund is among the top quartile of fund generations and 1 otherwise. We winsorize the upper 1% of our dependent variable. Heteroscedasticity-consistent t-statistics are reported in parenthesis. We denote statistical significance is as 1%(***), 5%(**) and 10%(*).

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Fund age						
Fund age at IPO	-1.764***	-0.686*	-1.308***	-0.539	-0.518**	-0.041
	(-6.973)	(-1.706)	(-5.134)	(-1.330)	(-2.010)	(-0.104)
Interaction term						
Low Reputation x Fund age at IPO		-1.559***		-1.132**		-0.737
		(-3.038)		(-2.165)		(-1.480)
Low Reputation		10.256***		7.339**		5.510**
		(3.468)		(2.445)		(1.961)
Controls						
Ln IPO size			2.295*	2.324**	-0.505	-0.484
			(1.941)	(1.973)	(-0.427)	(-0.411)
Ln Company Age			2.039**	2.044**	0.217	0.186
			(2.051)	(2.056)	(0.258)	(0.221)
Number of Bookrunners			-1.713***	-1.676***	-1.416***	-1.419***
			(-3.423)	(-3.343)	(-2.959)	(-2.963)
Underwriter Reputation			2.079***	2.078***	1.877***	1.871***
			(7.847)	(7.841)	(6.954)	(6.938)
IPO frequency			0.014	0.011	0.076***	0.075***
			(1.044)	(0.862)	(3.814)	(3.784)
IPO returns			0.816***	0.814***	0.620***	0.620***
			(13.973)	(13.935)	(9.749)	(9.761)
Fixed effect: IPO year	No	No	No	No	Yes	Yes
Fixed effect: Region	No	No	No	No	Yes	Yes
Fixed effect: Industry	No	No	No	No	Yes	Yes
Observations	5,098	5,098	4,123	4,123	4,123	4,123
Adjusted R-squared	0.010	0.013	0.110	0.111	0.228	0.229

Table VI

Subsample of low reputation Funds: OLS regression on IPO underpricing

In this subsample we exclude high reputation funds. The Fundraising variable equals 1 if a fund is in the process of fundraising, e.g. 2 years prior to a funds vintage. We winsorize the upper 1% of our dependent variable. Heteroscedasticity-consistent t-statistics are reported in parenthesis. We denote statistical significance is as 1%(***), 5%(**) and 10%(*).

Variable	(1)	(2)	(3)
Fund age			
Fund age at IPO	-1.960***	-1.500***	-0.651*
	(-6.156)	(-4.556)	(-1.932)
Fundraising			
Fundraising	8.282***	5.296***	4.601***
	(5.229)	(3.133)	(2.798)
Controls			
Ln IPO size		0.381	-2.608*
		(0.256)	(-1.753)
Ln Company Age		1.909	-0.253
		(1.533)	(-0.240)
Number of Bookrunners		-1.293**	-0.962
		(-2.050)	(-1.627)
Underwriter Reputation		2.217***	1.953***
		(6.583)	(5.772)
IPO frequency		0.009	0.065**
		(0.565)	(2.558)
IPO returns		0.840***	0.662***
		(12.455)	(8.567)
Fixed effect: IPO year	No	No	Yes
Fixed effect: Region	No	No	Yes
Fixed effect: Industry	No	No	Yes
Observations	3,544	2,840	2,840
Adjusted R-squared	0.023	0.119	0.238

Table VII

OLS regression on IPO underpricing: Sub-period Results

This table shows a cross-sectional regression of percentage of IPO underpricing for different subsample with respect to timing of IPOs. In model 1 and 2 we restrict our sample to IPOs conducted prior to 2010. In model 3 and 4 we only consider IPOs after 2009. In model 5 and 6 we exclude those years with the highest level of underpricing. We winsorize the upper 1% of our dependent variable. Heteroscedasticity robust t-statistics are reported in parenthesis. We denote statistical significance is as 1%(***), 5%(**) and 10%(*).

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Only IPOs prior to 2010		*Only IPOs after 2009*		*Exclude single years ('99,'00,'01,'08 and '09)*	
Fund age						
Fund age at IPO	-1.672***	-0.111	-1.074***	-0.675**	-0.869***	-0.511**
	(-3.028)	(-0.182)	(-3.797)	(-2.431)	(-3.416)	(-1.978)
Controls						
Ln IPO size	4.390**	3.227	-0.695	-1.744	0.708	-1.399
	(2.173)	(1.503)	(-0.495)	(-1.245)	(0.597)	(-1.155)
Ln Company Age	-6.126**	-2.521	6.175***	2.178**	5.355***	1.397*
	(-2.323)	(-1.350)	(7.298)	(2.519)	(7.444)	(1.921)
Number of Bookrunners	-15.452***	-6.511***	-0.059	-0.682	-0.347	-0.938**
	(-7.715)	(-2.925)	(-0.107)	(-1.279)	(-0.718)	(-1.997)
Underwriter Reputation	0.664	0.756	2.663***	2.312***	2.063***	1.764***
	(1.383)	(1.491)	(8.660)	(7.587)	(7.672)	(6.667)
IPO frequency	-0.040*	-0.001	0.088***	0.093***	0.004	0.070***
	(-1.761)	(-0.026)	(4.299)	(4.106)	(0.295)	(3.544)
IPO returns	1.152***	0.944***	0.284***	0.266***	0.357***	0.420***
	(14.689)	(10.017)	(4.445)	(3.541)	(5.541)	(5.645)
Fixed effect: IPO year	No	Yes	No	Yes	No	Yes
Fixed effect: Region	No	Yes	No	Yes	No	Yes
Fixed effect: Industry	No	Yes	No	Yes	No	Yes
Observations	1,309	1,309	2,814	2,814	3,781	3,781
Adjusted R-squared	0.264	0.377	0.057	0.137	0.038	0.138

Table VIII

Subsample OLS regression on IPO underpricing

This table shows the cross-sectional regression of percentage of IPO underpricing excluding those deals with long holding periods. The Fund age at IPO variable is defined as the time (in years) since the fund's vintage at the time of the IPO. Ln IPO size reflects the logarithmized volume of gross proceeds valued as number of shares times offer price. Ln Company Age reflects the logarithmized age of the company at IPO. The number of bookrunners reflects the number of participating bookrunners. The Underwriter Reputation variable is a measure introduced by Carter and Manaster (1990; updated by Jay Ritter) ranging from -9 (low) to 0 (high). The lockup period represents the number of lockup days. Further, in some models we control for fixed effects related to IPO year, region and industry. IPO year represents the year of the IPO, region fixed effects consist of North America, Europe, Asia and other. Industry fixed effects are based on Thomson Reuters Business Classification and differentiate 11 different industries. We winsorize the upper 1% of our dependent variable. Heteroscedasticity-consistent *t*-statistics are reported in parenthesis. We denote statistical significance is as 1%(***), 5%(**) and 10%(*).

Variable	(1)	(2)	(3)	(4)
	Exclude deals w/ holding period > 9 years		*Exclude deals w/ holding period > 8 years*	
Fund age				
Fund age at IPO	-1.290***	-0.499*	-1.260***	-0.462*
	(-4.956)	(-1.893)	(-4.651)	(-1.687)
Controls				
Ln IPO size	2.287*	-0.538	2.234*	-0.570
	(1.927)	(-0.452)	(1.848)	(-0.472)
Ln Company Age	2.044**	0.199	2.083**	0.244
	(2.052)	(0.236)	(2.077)	(0.287)
Number of Bookrunners	-1.713***	-1.429***	-1.645***	-1.422***
	(-3.413)	(-2.977)	(-3.232)	(-2.925)
Underwriter Reputation	2.088***	1.887***	2.075***	1.832***
	(7.836)	(6.954)	(7.660)	(6.663)
IPO frequency	0.014	0.077***	0.016	0.079***
	(1.080)	(3.856)	(1.200)	(3.904)
IPO returns	0.824***	0.627***	0.828***	0.628***
	(13.986)	(9.743)	(13.880)	(9.637)
Fixed effect: IPO year	No	Yes	No	Yes
Fixed effect: Region	No	Yes	No	Yes
Fixed effect: Industry	No	Yes	No	Yes
Observations	4,084	4,084	3,995	3,995
Adjusted R-squared	0.111	0.229	0.110	0.229

Table IX

OLS regression on IPO underpricing

This table shows the cross-sectional regression of percentage of IPO underpricing. The Fund age at IPO variable is defined as the time (in years) since the fund's vintage at the time of the IPO. Ln IPO size reflects the logarithmized volume of gross proceeds valued as number of shares times offer price. Ln Company Age reflects the logarithmized age of the company at IPO. The number of bookrunners reflects the number of participating bookrunners. The Underwriter Reputation variable is a measure introduced by Carter and Manaster (1990; updated by Jay Ritter) ranging from -9 (low) to 0 (high). The lockup period represents the number of lockup days. Further, in some models we control for fixed effects related to IPO year, region and industry. IPO year represents the year of the IPO, region fixed effects consist of North America, Europe, Asia and other. Industry fixed effects are based on Thomson Reuters Business Classification and differentiate 11 different industries. We winsorize the upper 1% of our dependent variable. Heteroscedasticity-consistent *t*-statistics are reported in parenthesis. We denote statistical significance is as 1%(***), 5%(**) and 10%(*).

Variable	(1)	(2)
Fund age		
Fund age at IPO	-1.399***	-0.569**
	(-5.204)	(-2.088)
Controls		
Ln IPO size	2.853**	-0.201
	(2.253)	(-0.157)
Ln Company Age	1.654	0.310
	(1.549)	(0.348)
Number of Bookrunners	-1.997***	-1.644***
	(-3.705)	(-3.216)
Underwriter Reputation	1.921***	1.677***
	(6.794)	(5.800)
IPO frequency	0.009	0.067***
	(0.631)	(3.158)
IPO returns	0.831***	0.627***
	(13.775)	(9.523)
Lockup period	0.004	-0.003
	(1.428)	(-1.090)
Fixed effect: IPO year	No	Yes
Fixed effect: Region	No	Yes
Fixed effect: Industry	No	Yes
Observations	3,654	3,654
Adjusted R-squared	0.115	0.233

Table X

OLS regression on IPO underpricing - Alternative reputation measures

This table shows a cross-sectional regression of percentage of IPO underpricing. The Lack of Reputation Variable is a dummy which equals 1 if the respective fund manager is reputable. We define Low Reputation as 0 if the fund is in it's 5th or larger generation and 1 otherwise in model 1 to 4. In model 5 to 8 we define reputation as 9th and larger fund generation. We winsorize the upper 1% of our dependent variable. Heteroscedasticity robust t-statistics are reported in parenthesis. We denote statistical significance is as 1%(***), 5%(**) and 10%(*).

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Reputation defined as 5th and larger fund generation				*Reputation defined as 9th and larger fund generation*			
Fund age								
Fund age at IPO	-1.308***	-0.892**	-0.518**	-0.179	-1.308***	-0.294	-0.518**	0.055
	(-5.134)	(-2.486)	(-2.010)	(-0.517)	(-5.134)	(-0.533)	(-2.010)	(0.103)
Interaction term								
Lack of Reputation x Fund age at IPO		-0.702		-0.587		-1.208*		-0.712
		(-1.388)		(-1.238)		(-1.938)		(-1.182)
Lack of Reputation		5.779*		4.596*		5.913*		4.565
		(1.949)		(1.675)		(1.711)		(1.384)
Controls								
Ln IPO size	2.295*	2.314*	-0.505	-0.499	2.295*	2.272*	-0.505	-0.509
	(1.941)	(1.960)	(-0.427)	(-0.423)	(1.941)	(1.922)	(-0.427)	(-0.431)
Ln Company Age	2.039**	2.048**	0.217	0.191	2.039**	2.029**	0.217	0.196
	(2.051)	(2.062)	(0.258)	(0.227)	(2.051)	(2.042)	(0.258)	(0.233)
Number of Bookrunners	-1.713***	-1.653***	-1.416***	-1.400***	-1.713***	-1.689***	-1.416***	-1.413***
	(-3.423)	(-3.291)	(-2.959)	(-2.915)	(-3.423)	(-3.365)	(-2.959)	(-2.947)
Underwriter Reputation	2.079***	2.087***	1.877***	1.877***	2.079***	2.081***	1.877***	1.877***
	(7.847)	(7.875)	(6.954)	(6.958)	(7.847)	(7.856)	(6.954)	(6.955)
IPO frequency	0.014	0.012	0.076***	0.076***	0.014	0.013	0.076***	0.076***
	(1.044)	(0.883)	(3.814)	(3.804)	(1.044)	(0.984)	(3.814)	(3.808)
IPO returns	0.816***	0.812***	0.620***	0.618***	0.816***	0.816***	0.620***	0.620***
	(13.973)	(13.888)	(9.749)	(9.725)	(13.973)	(13.997)	(9.749)	(9.768)
Fixed effect: IPO year	No	No	Yes	Yes	No	No	Yes	Yes
Fixed effect: Region	No	No	Yes	Yes	No	No	Yes	Yes
Fixed effect: Industry	No	No	Yes	Yes	No	No	Yes	Yes
Observations	4,123	4,123	4,123	4,123	4,123	4,123	4,123	4,123
Adjusted R-squared	0.110	0.111	0.228	0.229	0.110	0.110	0.228	0.228

Table XI

Subsample OLS regression on IPO underpricing – Alternative reputation measures

This table shows a cross-sectional regression of percentage of IPO underpricing for our subsample of low reputation funds. The Fundraising variable equals 1 if a fund is in the process of fundraising during an IPO In model 1 and 2 we use a time-window of 1 year prior to later funds vintage. In model 3 and 4 we use a time window of 3 years. We winsorize the upper 1% of our dependent variable. Heteroscedasticity robust t-statistics are reported in parenthesis. We denote statistical significance is as 1%(***), 5%(**) and 10%(*).

Variable	Model 1	Model 2	Model 3	Model 4
	Fundraising defined as time window of 1 year prior to a later fund's vintage		*Fundraising defined as time window of 3 years prior to a later fund's vintage*	
Fund age				
Fund age at IPO	-1.520***	-0.695**	-1.545***	-0.663*
	(-4.617)	(-2.057)	(-4.644)	(-1.959)
Fundraising				
Fundraising	6.818***	4.307**	3.135*	3.252**
	(3.484)	(2.317)	(1.926)	(1.994)
Controls				
Ln IPO size	0.372	-2.563*	0.430	-2.606*
	(0.250)	(-1.725)	(0.287)	(-1.739)
Ln Company Age	1.833	-0.310	1.869	-0.273
	(1.487)	(-0.295)	(1.498)	(-0.258)
Number of Bookrunners	-1.305**	-0.951	-1.355**	-0.962
	(-2.088)	(-1.608)	(-2.139)	(-1.621)
Underwriter Reputation	2.250***	1.980***	2.221***	1.956***
	(6.659)	(5.836)	(6.581)	(5.773)
IPO frequency	0.009	0.063**	0.010	0.064**
	(0.565)	(2.505)	(0.610)	(2.518)
IPO returns	0.832***	0.658***	0.845***	0.661***
	(12.373)	(8.545)	(12.500)	(8.540)
Fixed effect: IPO year	No	Yes	No	Yes
Fixed effect: Region	No	Yes	No	Yes
Fixed effect: Industry	No	Yes	No	Yes
Observations	2,840	2,840	2,840	2,840
Adjusted R-squared	0.120	0.237	0.117	0.236

APPENDIX

Construction of Variables

Variable	Data Source	Description
Underpricing	Thomson Reuters DataStream, Bloomberg	Percentage return from offer price to closing price at first day of trading
Low Reputation	Preqin	Dummy variable coded as 1 if the invested fund is not among the top quartile of fund generations (i.e. fund generation of six or higher)
Fundraising	Preqin	Dummy variable coded as 1 if the IPO happened in a time window of two years prior to a fund manager's next fund
IPO size (gross proceeds)	Thomson Reuters DataStream	Offer proceeds converted into million USD
Company Age	Thomson Reuters DataStream	The age of the company going public in years at the time of the IPO
Number of Bookrunner	Thomson Reuters DataStream	The absolute number of participating bookrunners in the IPO
Underwriter Reputation	Ritter	Rank of lead underwriter reputation from 1 (worst) to 9 (highest)
IPO frequency	Thomson Reuters DataStream	The absolute number of IPOs in the month of issue
IPO returns	Thomson Reuters DataStream	The mean level of underpricing in the month of issue
Fund age at IPO	Preqin, Thomson Reuters DataStream	The time difference in years between fund vintage and issue
Region	Thomson Reuters DataStream	Region of company headquarter clustered into North America, Europa, Asia and Rest
Industry	Thomson Reuters DataStream	Industry classification into 10 different industries based on Thomson Reuters Business Classification