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Do stressed PE firms misbehave?

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For private equity (PE) firms, follow-on funds provide additional streams of management fees for a considerable time. When prospective limited partners (LPs) evaluate the performance of a PE firm's latest funds, they have to rely on valuations reported by PE firms. The link between PE firms' fundraising and performance evaluation is thus an area susceptible to manipulation resulting in potentially high stakes. We examine the relationship between PE firms' fundraising pressure and earnings management in portfolio companies, along with heterogeneity in behaviour by reputation and dry powder. To proxy for the degree of fundraising pressure, we develop an index based on PE firms' affiliations, stage in the fundraising cycle, and fundraising frequency. Results suggest that the fundraising pressure leads to more earnings management in portfolio companies, regardless of PE firm reputation. While the reputational effect remains unchanged under a change in funding pressure, dry powder exhibits a strong moderating effect under extreme funding pressure. The results are robust to alternative proxies for earnings management, alternative fundraising indexes, and various controls for endogeneity concerns.

Key words: *private equity, fundraising, earnings management, IPOs.*

JEL classification: *G24, G34, M41*

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1. Introduction

Consistent with early predictions, the private equity (PE) industry has grown tremendously and become a global phenomenon (see Jensen, 1989; Stromberg, 2008).[1] The 2007-08 financial crisis, however, highlighted the cyclical nature of PE investments and initiated a debate about PE funds' role in the economy and their managerial compensation (see, e.g., Metrick and Yasuda, 2010a; Ivashina and Lerner, 2019). For example, since private investments are not traded on an exchange, PE firms report less frequently, and their valuation is based on a model rather than on market transactions. The valuation is, therefore, marked-to-market and often delayed.[2] This can potentially create incentives for general partners (GPs) to engage in opportunistic behaviour and exaggerate fund performance.[3]

Previous studies provide consistent evidence of the opportunistic behaviour of PE firms. Cumming and Walz (2010), for example, document significant systematic biases in the reporting of fund performance. These biases depend on the accounting and legal environment in a country, and on the degree of information asymmetry between institutional investors and PE fund managers. More recently, studies provide evidence of the opportunistic behaviour of PE firms during fundraising campaigns. For instance, Jenkinson et al. (2013) find that while on average GPs report conservative valuations, they tend to inflate net asset values (NAVs) during the fundraising. Barber and Yasuda (2017) provide evidence that PE firms time fundraising campaigns to coincide with periods when the current performance of their existing funds is at its peak. They attempt this through two strategies: i) exit and fundraising; and ii) NAV management. Chakraborty and Ewens (2018) report that fundraising challenges motivate PE firms to hide bad news from limited partners (LPs) and that the hidden actions often remain undetected. Previous studies also examine whether secondary buyouts are value-maximizing or reflect opportunistic behaviour (see Arcot el al., 2015). The above evidence is predominantly based on fund-level data. There is, however, a paucity of literature utilising portfolio company-level data. This is an important omission, and our paper attempts to fill that gap using a unique hand-collected fund- and company-level dataset from the UK market.[4]

[1] Worldwide, private equity assets under management (AUM) were $4.11 trillion, as of June 2019 (Preqin, 2020).
[2] Some critics of the PE model suggest that markings in private assets are more "mark-to-myth" rather than "mark-to-model". See, for example, Financial Times (2020).
[3] GPs refer to private equity firms who have the responsibility of managing private equity funds.
[4] Over the last four decades, the UK PE market has been the largest single European market, equalling the rest of the European markets put together (see EVCA annual reports, various issues).

We argue that the fund-level approach of the previous studies cannot identify all opportunistic behaviours resulting in conflicts between GPs and investors. Further, some strong time trends in fund investments cannot be controlled for in the fund-level analysis (see Barrot, 2014).[5] As highlighted in Chakraborty and Ewens (2018), this may confound some exogenous characteristics (e.g. fund's age) with manipulation. We conjecture that a PE firm's opportunistic behaviour also includes earnings management in portfolio companies exiting via initial public offerings (IPOs). Earnings management may inflate portfolio valuations, justify an increase in NAVs, and thus boost GP performance. Earnings management is also more difficult to detect by LPs compared to, for instance, the timing of liquidation decisions and strategies to inflate portfolio NAVs (e.g. reinvestments in lower-quality companies). The above is in line with the finding that unobservable opportunistic behaviour at portfolio company-level is less likely to affect a PE firm's reputation (see Chakraborty and Ewens, 2018). LPs might not have sufficient resources to probe deeply into the earnings quality of portfolio companies and to scrutinize their earnings over a longer period of time.[6] Furthermore, PE funds face less rigorous regulation as compared with other financial intermediaries (e.g. mutual and hedge funds), especially regarding their performance disclosure (see Cumming and Walz, 2010; Johan and Zhang, 2020). Importantly, GPs are in a strong position to exert influence on management by their presence on boards, ability to replace executives, and additional control rights from holdings of preferred shares in portfolio companies (see Acharya et al., 2012; Kaplan and Stromberg, 2003).[7]

We examine adverse incentives and pressures related to GPs' fundraising activities. Specifically, we examine the impact of GPs' fundraising pressure on the decision to engage in earnings management, along with the heterogeneity in behaviour by reputation and unspent capital (i.e. dry powder). In line with previous studies, we define earnings management as the exercise of discretion by insiders to manipulate reported earnings.[8] To proxy for fundraising pressure, we develop the fundraising stress index (*FSI*) based on firms' affiliations, stage in the fundraising cycle, and fundraising frequency. First, we expect that PE firms affiliated to banks, or governments, have better and regular access to large funding sources. Second, GPs are

[5] For more on limitations of PE databases, see also Stromberg (2008) and Metrick and Yasuda (2010a).
[6] For example, investors might not have enough staff or access to delve as deeply into manager operations which can create an environment where bad conduct can occur (see SEC, 2015).
[7] Acharya et al. (2012), for example, report that PE firms often replace company executives, call more board meetings, and tend to decrease board size.
[8] Although their wording may vary, most definitions emphasise intention to mislead investors and/or certain stakeholders. See, for example, DuCharme et al. (2001), Nam et al. (2014), and Goergen et al. (2019).

expected to be under more fundraising pressure as they approach the end of scheduled fundraising cycles. Third, frequent fundraisers tend to be under more intense pressure having to frequently raise funds in a timely fashion.

The main contribution of the paper is new evidence on the opportunistic behaviour and conflicts of interest between GPs and LPs. Our findings lend support to the view that the agency conflicts exist, and that GPs' opportunistic behaviour extends to portfolio companies, despite sophisticated PE contracts. In particular, we report a higher degree of (upward) earnings management in portfolio companies with higher *FSI* levels. The effect of funding pressure on earnings management is both statistically and economically significant. For example, a one unit increase in the *FSI* index results in around a 10% increase in the discretionary working capital accruals (*DWCA*). Economically, a significant increase in the funding pressure (e.g. from *FSI=0* to *FSI=3*) can result in a *DWCA* increase of more than 20%. The evidence is robust across different earnings management proxies, alternative *FSI* indexes, and alternative model specifications. Further, we find no evidence for the (direct) effect of PE firm reputation and unspent capital on incentives to manage earnings. The effect of unspent capital, however, is conditional upon the degree of fundraising pressure. For example, when there is no fundraising pressure (*FSI=0*), the effect of unspent capital on earnings management is not statistically significant. With the build-up of pressure, the inverse relationship between unspent capital and earnings management becomes both economically and statistically significant.

Like in other related studies, we address the possibility that unobserved fund or company characteristics may drive our results. By design, our research attempts to reduce the possible impact of unobservable fund and company level characteristics on the relationship of interest. First, we collect data for both small and large PE deals over several decades, thus avoiding a sample selection bias caused by predominantly focusing on large and/or more recent deals. Second, we control for the characteristics of portfolio companies and apply the Heckman model, thus controlling for the possibility that some PE firms might not randomly select investee companies. Third, our *FSI* index is time-varying, and our sample GPs exited companies while exhibiting different levels of fundraising pressure. Fourth, and more importantly, throughout the analysis, we include both time and PE firm fixed effects. These effects pick up endogeneity arising from unobservable firm-level characteristics and time trends. Finally, as an additional robustness check, we employ the propensity score matching (PSM) method to address potential endogeneity issues related to unobservable portfolio companies' and PE firms' characteristics.

Our research design and robustness tests rule out a (strong) possibility that our key results could be explained by hidden unobservables.

By providing an in-depth analysis of the association between PE firms' fundraising activities and earnings management, we contribute to the literature on PE firms' behaviour, as well as to the literature on the quality of financial disclosure. We demonstrate that fundraising ability and incentives have an impact on the financial disclosure of portfolio companies. The results inform the debate around PE fund performance and their managerial compensation. Our findings also highlight potential agency conflicts between GPs and investors and contribute to the debate regarding regulatory measures aiming to increase transparency and prevent financial misconduct in the PE industry (see AIFMD, 2011; SEC, 2011; Borrell, 2004). Given the size and importance of the PE industry, such agency conflicts can have significant costs for all stakeholders.

This study proceeds as follows. Section 2 reviews the related literature and develops hypotheses. Section 3 provides details about the data and methodology. In Section 4, we present descriptive statistics and results of principal component and univariate analysis. We discuss the empirical evidence for the relationship between fundraising activities and earnings management in section 5. Section 6 discusses the endogeneity issues. Section 7 provides the results of additional robustness tests. Section 8 concludes the paper.

2. Related literature and hypotheses

2.1. PE backing and earnings management

Previous studies document pre-IPO earnings management and find evidence of window-dressing contributing to higher offer prices. For instance, Teoh et al. (1998a) report that earnings management in the pre-IPO year results in higher offer prices and better (short-term) IPO performance. The empirical evidence on the involvement of both PE and venture capital (VC) firms in earnings management is not conclusive. In line with VCs' certification and monitoring roles (Megginson and Weiss, 1991), some studies report that VC firms reduce earnings management in IPOs (Morfield and Tan, 2006). Similarly, Katz (2009) report (weak) evidence suggesting that PE-backed IPOs manage earnings less than their non-PE backed counterparts. On the other hand, several studies suggest that reported earnings of PE (and VC) backed companies tend to be less informative than reported earnings of their non backed

counterparts (see Degeorge and Zeckhauser, 1993; Chahine et al., 2012; Chou et al., 2006; Cohen and Langberg, 2005).[9] Degeorge and Zeckhauser (1993), for example, report that managers in PE backed firms have a strong incentive to manipulate earnings even if it is both costly and expected by investors (and even if they do not sell their own shares). Goktan and Muslu (2018) report a significant positive relationship between PE firms' age (and experience) and earnings management. To the extent that age and experience proxy for PE reputation, the above results are not in line with the certification hypothesis.[10]

The above mixed evidence should also be looked at in the context of differences between VC and PE firms, which may affect their respective incentives. While VC firms sponsor younger companies, often without profit, PE firms sponsor more mature companies with a track record of making a profit. Earnings management in PE-backed IPOs might, therefore occur more than for VC-backed firms. Furthermore, PE managers typically come from a financial or management consulting background whilst VC managers are often successful entrepreneurs. Because of the different backgrounds, PE sponsors' compensation is more sensitive to value creation (Wright and Robbie, 1998). They are also less likely than VCs to assume operational control and pay more attention to profit levels (Katz, 2009).

Another important consideration in this context are incentives of incumbent managers and their relationship with PE sponsors. Importantly, IPOs are the preferred exit route for managers. For example, in trade sales exits, managers often lose their jobs. With IPOs, the managers (normally) remain in their jobs with expectations of enhancing their remuneration (and reputation) in line with the remunerations in other public companies. Managers are, therefore, very much part of the IPO process and work closely with PE firms in preparations for IPOs.[11] After investing in a portfolio company, PE firms tend to assume full control of the board of directors. PE (and VC) firms regularly assess the progress of the companies, maintain informal contacts with managers, and require structured interim information between board meetings (Kaplan and Stromberg, 2001; Sapienza et al., 1996; Beuselinck et al., 2006). GPs also act as a source of professional and industry contacts for the managers (Sapienza et al., 1996). There is also evidence that managers who feel more compelled to meet the earnings goals of the PE

[9] Chou et al. (2006) report only weak evidence for upward earnings management due to their small sample size.
[10] Megginson and Weiss (1991) suggest that, for third-party certification to be believable, the certifying agent must have reputational capital at stake.
[11] The relationship between PE firms and management team starts even before they make an investment in the portfolio company. For example, PE firms and management conduct due diligence before signing the contract.

sponsors for whom they work might have greater motivation to manage earnings (Cornett et al. 2006). Furthermore, managers in portfolio companies hold stakes in the companies, and the stakes' value depends on the valuation of IPOs (which in turns depends on earnings). All the above-mentioned factors suggest that managers' and GPs' incentives (and compensation) are closely aligned and that GPs can, effectively, choose how aggressively they want to manage earnings.

2.2. PE fundraising and earnings management

A typical PE fund has a fund life of around ten years, with an investment period of five or six years. As PE funds' investment period elapses, GPs seek to raise new funds. When prospective LPs evaluate the performance of GPs' latest funds, they have to rely on GPs' valuations (Brown et al., 2018). GPs' valuation methods, however, are relatively subjective (Cumming and Dai, 2010; Cumming et al., 2013; Cumming and Johan, 2013). For example, payments to GPs running PE funds consist of fees (management, transaction, and monitoring) and carried interest.[12] The fee component is fixed based on the fund size and costs. The amount of carried interest, however, varies and depends on the timing and exit values of portfolio companies. The performance is mainly reported as cumulative distributions (to LPs, up to a specific date) of realized investments and NAVs of unrealized investments. Typically, the current fund has unrealized investments and hence reports estimated NAVs. Higher reported performance can be achieved by increasing cumulative distributions to LPs through higher exit returns and/or by exaggerating estimated NAVs of unrealized investments. The latter is achieved through manipulation such as inflating current portfolio NAVs or delaying news that would lower the portfolio value (see Brown et al., 2018; Chakraborty and Ewens, 2018; Barber and Yasuda, 2017).

Prospective investors, however, scrutinize the past and current fund performance of GPs by examining both realized and unrealized investment performance (Hochberg et al., 2014; Kaplan and Schoar, 2005). Investors penalize poorly performing GPs by not investing in their new funds. Past and interim performance is, therefore, of paramount importance for the success of fundraising, and positively affects the ability to raise follow-on funds. The pressure to attract more LPs tends to encourage GPs to take "shortcuts" such as inflating the reported fund

[12] The overwhelming majority of funds use 2% for management fees and 20% as their carry level (i.e. the "2 and 20" model) (see Metrick and Yasuda, 2010b).

performance and timing fundraising campaigns (Austin, 2001).[13] Similarly, Chakraborty and Ewens (2018) report that firms with an established reputation, through multiple fund closings, still delay bad news on fund performance until after a new fund is raised. The authors suggest that this is encouraged by LPs' inability to detect such behaviour. Furthermore, a component of the lifetime compensation and career prospects of GPs is determined by expected income from subsequent funds (Chung et al., 2012; Hochberg et al., 2014; Crain, 2018). GPs, therefore, have considerable motivation to exaggerate their performance during fundraising campaigns.

Previous literature also highlights the potential negative consequences of earnings management for PE firms and portfolio companies. Examples include litigation costs, loss of future flexibility, and negative long-term returns (see DuCharme et al., 2001; Teoh et al., 1998a). As long as PE firms distance themselves from their portfolio companies soon after IPO, the above costs do not concern GPs in the short run. However, litigation cases and poor after-market performance may affect a PE firm's reputation in the long run. Most studies confirm that manipulations (other than earnings management) tend to be confined to a set of less reputed VC firms (measured by size or age). Barber and Yasuda (2017), for example, report that active fund-level NAV inflation is confined to less reputed VCs. Chakraborty and Ewens (2018) confirm that observable actions to enhance fund valuations are rarely used by VCs with a strong reputation, except during fundraising. Given that the potential costs of earnings management may be more substantial for highly reputable PEs, they are expected to have less incentive to engage in earnings management. The expected negative association between reputation and earnings management would also be in line with previous studies reporting that highly reputed PE (and VC) firms tend to engage less in earnings management compared to their lesser-known counterparts (see Katz, 2009; Lee and Masulis, 2011; Hochberg, 2011). Alternatively, the immediate pressure to raise large follow-on funds by reputable PE firms may supersede their long-term reputational concerns as fundraising is critical to the immediate survival of PE firms. In this scenario, more reputable firms may also be prone to engaging in earnings management in order to facilitate the fundraising campaign. This would be in line with Brown et al. (2018), who report that poorly performing managers are more likely to overstate their performance when raising funds due to survival concerns, irrespective of their reputation. We will, therefore, also consider how the effect of reputation changes with an increase in funding pressure.

[13] Shortcuts' are decisions motivated by a desire to stay on schedule but may not be in the best interests of the company (Austin, 2001).

2.3. Determinants of fundraising pressure

Typically, PE firms try to raise a new fund every three to five years. Failure to raise new funds within a regular time period may lead to reputational damage and risk to a firm's survival. Anecdotal evidence suggests that fundraising delays can be caused by various reasons, such as the departure of key partners or succession issues (Ivashina and Lerner, 2019).[14] Any delays in fundraising put considerable pressure on GPs. Fundraising frequency was considered in previous literature as a factor affecting investment pressure. Arcot et al. (2015), for example, suggest that infrequent fundraisers are under more investment pressure and more tempted to window dress their current performance. When it comes to the fundraising pressure, we argue that a high frequency of fundraising puts additional pressure on PE firms. For example, the fundraising process normally lasts between 12 and 24 months and requires a substantial effort in terms of time, monetary outlays, and management attention. Although the above extra efforts and costs apply to all PE firms regardless of their reputation, they are particularly significant for smaller, less reputable firms. They are also keen to expand their usually small pool of LPs by frequent fundraising. Consequently, they may attempt to raise funds more frequently to create a track record and establish their reputation.[15] The above behaviour may not be scrutinized by LPs for two reasons. First, less reputable PE firms normally have a small number of LPs, often with relatively small investments. The individual LPs, therefore, do not have strong incentives to scrutinise the GPs. Second, unlike PE fund managers who are skilled at negotiating terms of investment, LPs may not necessarily be incentivized to seek open and frequent interactions with their investee funds (Johan and Zhang, 2020). On the other hand, a better reputation may improve the fundraising ability of PE firms. More reputable PE firms, therefore, tend to raise larger funds and are less pressured to organise frequent campaigns. They can also cope better with additional activities and pressures of fundraising. Based on the above, we suggest that fundraising pressure increases with an increase in the frequency of fundraising.[16]

PE firms affiliated with large financial institutions or public organisations can raise funds relatively easily compared to the non-affiliated firms which have to rely on third parties (see

[14] Weston Presidio and Castle Harlan, well-established US PE firms, are some of the most recent examples of firms delaying, and ultimately suspending, their fundraising (see Ivashina and Lerner, 2019).
[15] The behaviour is similar to the well-documented grandstanding hypothesis whereby VC firms try to enhance their reputation through more frequent, often rushed, IPO exits (see Gompers, 1996).
[16] Our hypothesis is also in line with findings that less reputable PE firms time their fundraising activities and experience more frequent markdowns after fundraising (Barber and Yasuda, 2017).

Cressy et al., 2007). Furthermore, compared to non-affiliated PE firms, affiliated firms tend to have lower investment and return requirements (Jelic et al., 2005). For instance, government and/or public organisation affiliated PE firms may not prioritise the achievement of high returns (see Cumming and MacIntoch, 2003; Johan and Cumming, 2008). In line with the above, Cumming et al. (2017) report that (private) independent VC-backed companies exhibit better exit performance than government-backed companies. Thus, we expect a higher level of funding stress in non-affiliated PE firms.

Previous literature also examines the impact of dry powder on GPs' opportunistic investment behaviour (Arcot et al., 2015; Axelson et al., 2009).[17] For example, Axelson et al. (2009) find that a combination of fund age and dry powder creates incentives for opportunistic investment behaviour. The authors show that partnership agreements are not sufficient to alleviate the above adverse incentives. On the contrary, the agreements tend to exacerbate the distortions for GPs (with dry powder) who were not able to invest early. For instance, for funds in the later stages of the investment period and with substantial dry powder, PE contracts create adverse incentives to window dress. Substantial dry powder will more likely force GPs into suboptimal investments in order to use up capital (see Dow and Gorton, 1997; Arcot et al., 2015). During the harvesting period, GPs without many exits may be tempted to engage in suboptimal exits to improve their record. In line with the above findings, it is plausible that GPs may resort to earnings management in an attempt to inflate fund performance and compensate for the underperformance caused by the unspent capital. Thus, in this scenario, a positive relationship between dry powder and earnings management is expected.

In the presence of significant fundraising pressures, the link between dry powder and earnings management is less clear. It may appear that GPs with unused capital might be under less pressure to raise even more capital. However, Chakraborty and Ewens (2018) report that VC firms tend to invest more in the first part of a fund's life. With fewer investments over time, dry powder continues to accumulate as the fund matures. GPs, therefore, often tend to start fundraising at the time when the levels of dry powder are rather high. It is, therefore, plausible

[17] Dry powder has been on the increase in the PE industry during the last decade reaching a record high of $1.7 trillion in December 2017. The influx of investable capital and intense competition contributed to a spectre of large-scale insolvencies, lower returns, and buyer-seller valuation gaps during the last decade (Bain, 2018; CalPERS, 2019)

that some PE firms may be under fundraising pressure and show high levels of dry powder at the same time.

3. Data and methodology

3.1. Data sources and sample construction

The data on PE firms, their fundraising (before and after IPOs), and portfolio companies is collected from: the Thomson One database, PE firms' websites, the Perfect Information Navigation database, IPO prospectuses, the London Stock Exchange (LSE) website, and the Zephyr database. We begin by examining the fundraising activities of 72 PE firms during the 1977-2017 period. We then identify the funds' IPO exits.[18] As a first filter, we exclude IPO exits from the Alternative Investment Market (AIM) and focus only on the main market of the LSE, during 1990-2014. Reasons for not including AIM IPOs are related to poor quality of reporting and a different regulatory environment, which makes any sound comparison with IPOs from the main market very difficult. For example, AIM IPOs are smaller (often without reported earnings) and have less strict listing requirements than companies seeking a listing on the main market (Buchner et al., 2017; Khurshed et al., 2018). They are not subject to the UK Listing Authority listing rules, not required to follow the UK Corporate Governance Code, and fall outside the scope of the International Accounting Standards (IAS) Regulation.[19] AIM companies are frequently plagued with significant accounting problems, and their annual reports contain basic reporting errors (see FRC, 2015; p.17).[20] Finally, AIM IPOs are supported by nominated financial advisers (so-called Nomads) that in many ways replace the role of PE firms (Jelic and Wright., 2011).

We then apply a second set of filters by excluding all IPOs of financial firms (including investment trusts and venture capital trusts), utility firms, readmissions, and IPOs without the required discretionary accruals data. Our final, matched sample contains fundraising data for

[18] In the case of syndicated deals, we trace fundraising activities and exits of the lead PE firm.

[19] For example, around 50% of AIM companies failed to meet key corporate governance indicators (see FRC, 2015; p.18).

[20] There are also numerous reporting options given to AIM companies. For example, an AIM company incorporated in a non-EEA country must prepare and present these accounts in accordance with either: International Accounting Standards (IFRS); US Generally Accepted Accounting Principles; Canadian Generally Accepted Accounting Principles; Australian International Financial Reporting Standards by the Australian Accounting Standards Board; or Japanese Generally Accepted Accounting Principles. Where, at the end of the relevant financial period, a company is not a parent company, it may prepare accounts either in accordance with international accounting standards or in accordance with the accounting regulations applicable to that company due to its country of incorporation (FRC, 2015).

72 PE firms and detailed accounting and other company-level data for 226 IPOs.[21] We also collect accounting and other company-level data for a population of 554 UK IPOs and 2,996 UK listed (non-financial) companies during the sample period.[22] These are our control samples used for detection of earnings management and for various robustness checks.

3.2. Methodology

3.2.1. Funding stress index (*FSI*)

An important issue with the construction of any index is the selection of a certain number of key constituents. To address this issue, we use Principal Component Analysis (PCA). PCA analysis helps us to determine constituents that capture the most relevant information on the level of fundraising pressure. We start with five potential constituents *(Affiliation, Frequency of fundraising, Late fundraiser, PE reputation,* and *Dry powder),* as discussed in Section 2.3. *Affiliation* is equal to 1 if the leading PE firm is not affiliated to the government or a financial organisation (e.g. banks and insurance firms), and 0 otherwise; ii) *Frequent fundraiser* is equal to 1 if the leading PE firm's average time between fundraisings is less than four years, and 0 otherwise. We use four years as a cut-off point since it corresponds to the mid-point between three and five years, as most GPs aim to raise new funds during this interval; iii) *Late fundraiser* is equal to 1 if the number of years from the latest fund's vintage year to the IPO year is greater than their adjusted average fundraising cycle. The adjustment is made by subtracting one year from the average to allow for a possibility that a PE firm has not completed its current fundraising campaign. For example, if the average fundraising cycle (*Length of fundraising cycle*) is four years, the fundraising campaign needs to start not later than in year three in order to stay on the schedule. Otherwise, the PE firm would be classified as a late fundraiser and therefore expected to be under more pressure; iv) Following previous literature, we use the Private Equity International (PEI) rank as a criterion to define highly reputed PE firms.[23] We define a categorical variable (*PEI_50*) that is equal to 1 if the PE firm is among the PEI media Top 50 PE firms, and 0 otherwise; v) In line with previous studies (Arcot et al., 2015; Chakraborty et al., 2018), we track PE firms' invested and raised capital for estimation of *Dry powder*. For each PE firm and year, we calculate the ratio (r) of the total amount invested (in the three-year period prior to the IPO) to the capital raised in the last round of fundraising

[21] Notably, the sample period for fundraising covers activities both before and after the IPOs.
[22] Detailed accounting and other company-level data for our control samples is collected from the WorldScope, Compustat, and IPO prospectuses. IPOs are identified from the new issues list available from the LSE website.
[23] Private Equity International (PEI) Media ranks the PE firms globally by AUM. The same ranking was used in Wang (2012) and Arcot et al. (2015).

before the IPO year (*Last fund size*). The categorical variable is equal to 1 if (1-r) >50%, and 0 otherwise.

We conduct polychronic correlation analysis first, and use it as an input in the PCA. We follow the method of polychoric and polyserial correlations, developed by Pearson and Pearson (1922) and Olsson (1979).[24] After we determine the number of constituents, the *FSI* index will be constructed as a sum of the constituents (i.e. categorical variables). We apply equal weighting and implicitly assume that the constituents of fundraising pressure act jointly. The equal weighting is consistent with the approach used in most finance (Cumming et al., 2011; La Porta et al., 2006), corporate governance (Gompers et al., 2003; Bebchuk et al., 2009; Straska and Waller, 2014), and private equity (Arcot et al., 2015) studies.

3.2.2. Earnings management

Discretionary accruals are a component of the total accruals that managers can choose subject to the flexibility of accounting regulations in adjusting a company's cash flows. Discretionary accruals, therefore, provide managers with opportunities to manipulate earnings. Several discretionary accruals models have been used in the literature.[25] The validity of models based on working capital accruals has been consistently demonstrated by a number of studies in the areas of accounting and finance (Teoh et al., 1998a; DuCharme et al., 2001), and especially in PE-related studies (Chou et al., 2006; Chahine et al., 2012; Nam et al., 2014). The goal of the model is to allow separation of working capital accruals into non-discretionary (i.e. expected or normal) and discretionary (i.e. abnormal) components. The cross-sectional modified Jones model is considered to apply the highest power of testing for earnings management.[26] We, therefore, estimate the following cross-sectional model:

$$\frac{WCA_{i,t}}{TA_{i,t-1}} = \alpha_0 \left(\frac{1}{TA_{i,t-1}}\right) + \alpha_1 \left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \qquad (1)$$

[24] Polychoric (and polyserial correlation) adapts the maximum likelihood estimates of the underlying correlation between the unobserved normally distributed continuous variables from their discretized versions. Polychoric is one of the most advanced concepts developed to make PCA possible for the categorical variables (see Kolenikov and Angeles, 2004).

[25] See Dechow et al. (2010) for an excellent literature review.

[26] Peasnell et al. (2005), for example, find that power to detect earnings management by this model appears to be higher compared to alternative models.

where $WCA_{i,t}$ is working capital accruals measured as the (annual) change in non-cash current assets minus the change in current liabilities, TA_{t-1} is lagged total assets, and $\Delta REV_{i,t}$ is (annual) change in revenues.

The model is estimated separately for each year and each two-digit SIC industry category in a control sample.[27] The control sample consists of 2,966 UK listed (non-financial) companies during the 1989-2014 period. This provides 33,459 firm-year observations. Using the estimated coefficients from Eq. (1), the non-discretionary (i.e. normal) working capital accruals ($NDWCA_{i,t}$) for a sample portfolio company *i*, in the IPO year *t*, is estimated as follows:[28]

$$NDWCA_{i,t} = \hat{\alpha}_0 \left(\frac{1}{TA_{i,t-1}}\right) + \hat{\alpha}_1 \left(\frac{\Delta REV_{it} - \Delta REC_{it}}{TA_{i,t-1}}\right) \quad (2)$$

$\Delta REC_{i,t}$ is the change in receivables during the year and is included to control for credit sales manipulation (see Dechow et al., 1995). $\hat{\alpha}_0$ and $\hat{\alpha}_1$ are estimates of α_0 and α_1 obtained from Eq. (1). Discretionary working capital accruals $(DWCA_{i,t})$ are measured as the difference between working capital accruals and non-discretionary working capital accruals:

$$DWCA_{i,t} = \frac{WCA_{it}}{TA_{i,t-1}} - NDWCA_{i,t} \quad (3)$$

A positive abnormal component of the working capital accruals, *DWCA,* indicates upward earnings management.

[27] By adopting the cross-sectional approach, we control for industry-wide fluctuations in economic conditions that impact accruals (Teoh et al., 1998b). We required at least ten industry-year observations in the two-digit SIC industry for estimation purposes. We also exclude all observations within five years of an IPO from each year and two-digit SIC industry combination (see Armstrong et al., 2016). The variables are scaled by $TA_{i,t-1}$ to reduce potential heteroscedasticity.

[28] IPO (accounting) year, t, includes both pre- and post-IPO information. Accounting year, t-1, ends before the IPO date. Changes in non-cash current assets, current liabilities, and revenues are annual changes from t-1 to t. The data for $TA_{i,t-1}$ is from accounting year, t-1, which ends before the IPO date.

4. PCA and summary statistics

4.1. PCA

PCA allows us to check what percentage of the most relevant information on the fundraising pressure can be captured by our *FSI* index constituents. Results of PCA with our five potential constituents are presented in Table 1 (Panels A and B).

Insert Table 1 about here

The polychoric correlation matrix shows a positive correlation between *Frequent fundraiser, Affiliation, Late fundraiser,* and *PEI_50* (Panel A).[29] The positive correlation is particularly strong among *Frequent fundraiser, Affiliation,* and *Late fundraiser. Dry powder* exhibits a negative correlation with the other four factors. Results in Panel B show that the first principal component (1PC) captures 40% of the most relevant information on fundraising pressure. The principal component loadings on the 1PC are positive for *Frequent fundraiser, Affiliation, Late fundraiser,* and *PEI_50* (0.50, 0.51, 0.52, 0.05, respectively). The loading for *Dry powder* is negative (-0.45). *Frequent fundraiser, Affiliation, and Late fundraiser,* therefore, exhibit the highest loadings. We then continue PCA with three constituents with the highest loadings: *Frequent fundraiser, Affiliation,* and *Late fundraiser* (Table 3 - Panel C). The factors remain highly positively correlated. The principal component loadings on the 1PC are as follows: *Frequent fundraiser,* 0.66; *Affiliation,* 0.49; and *Late fundraisers,* 0.57. Importantly, the 1PC explains 65% of the variation in fundraising pressure. The percentage is considerably higher than the 40% reported in Panel B. This suggests that, although important, *Dry powder* and *PEI_50* capture less relevant information on the fundraising pressure compared to the other three factors. The above analysis lends support for the construction of our *FSI* based on the three constituents.[30]

4.2. Summary statistics

Table 2 presents the main characteristics of the variables related to the sample portfolio companies. The mean (median) sample *DWCA* is 0.193 (0.040) with a standard deviation of

[29] We also conducted Techtronic correlation analysis and obtained very similar results. Unreported results are available from the authors upon request.

[30] We also perform PCA with four factors after including *Dry powder* and *PEI_50*, alternatively. The 1PC with *Dry powder* captures 55% of the most relevant information on the fundraising pressure. The 1PC with *PEI_50* captures 56% of relevant information. In both cases, the percentage is lower than the 65% reported for the PCA with the three factors. Unreported results are available from the authors upon request.

0.539.[31] The evidence, therefore, suggests a very high likelihood of enhancing (i.e. upward) earnings management in our sample. The mean (median) total assets of our sample portfolio companies is £185.929 (50.729) million.[32] The sample companies were, on average, 5 years old at the time of the IPO exit. The mean leverage is 37.20%, while the mean managers' retained ownership is 15.70%. The mean *ROA* for the sample is 3.50%, while the assets' (mean) growth rate is 43.60%. Around 14% of the exits occurred during the "hot" IPO market period from 1999 to 2000.

Insert Table 2 about here

Summary statistics for the sample PE firms and their fundraising activities is presented in Table 3 (Panel A). The mean (median) *FSI* is 2.288 (2.000) with a standard deviation of 0.833.[33]

Insert Table 3 about here

Around 20% of the portfolio companies are backed by highly-reputed PE firms. In around 90% of cases, PE firms are not affiliated with large financial institutions or public organisations. The average (median) length of time between the latest fund's vintage year and the IPO exit is around 2.6 (1) years. In around 60% of cases, funds are raised in the late stages of the fundraising cycle. We also present other characteristics of our sample PE firms. For example, the PE firms, on average (median), raise 12 (6) funds before the IPO exits. Their average (median) fundraising cycle lasts 3.2 (2.3) years. Our proxy for dry powder suggests that PE firms have significant unspent capital at their disposal in 51% of cases. Correlations between key variables are reported in Table 3 (Panel B). As predicted, *DWCA* and *FSI* are positively and significantly correlated. Both *Dry powder* and *PEI_50* are negatively correlated with *DWCA*, at a 5% and 10% level, respectively. Frequent fundraisers are positively correlated with the number of funds raised before IPO and exhibit a shorter length of fundraising cycles. Non-affiliated PE firms tend to raise funds more frequently and tend to have less dry powder. In line with our predictions, highly reputable PE firms tend to raise funds less frequently but raise

[31] Both the mean and median values are different from zero at a 1% level. Unreported results are available from the authors upon request.
[32] This is similar to the average reported in previous studies on the main UK IPO market (see Buchner et al., 2017).
[33] Unreported results show a statistically significant negative correlation between our *FSI* and Arcot et al. (2015)'s buy and sell pressure indexes, respectively. Unreported results are available from the authors upon request.

larger funds.[34] *PEI_50* is positively, but not significantly, correlated with *FSI. Dry powder* is negatively, and significantly correlated with *FSI.* As expected, our *FSI* constituents (*Frequent fundraiser; Affiliation; Late fundraiser*) are positively and highly correlated with *FSI.*

4.3 Univariate analysis

In this section we compare earnings management across key PE firms' characteristics in the context of our study: i) *FSI;* ii) levels of unspent capital; and iii) PE firm reputation. We start with (mean and median) differences in *DWCA* in subsamples with *FSI* above (*FSI_high=1*) and *FSI* below the median (*FSI_high=0*) (Table 4 – Panel A). As conjectured, earnings management tend to be higher in IPOs sponsored by PE firms with high funding pressure. Average *DWCA* between two subsamples is statistically significant at a 1% level.

Insert Table 4 about here

We then compare *DWCA* in subsamples with more and less reputable PE firms (Panel B). Average *DWCA* in companies sponsored by less reputable PE firms tend to be higher than in more reputable PE firms. The difference is, however, statistically significant only at a 10% level. In Panel C, we compare earnings management in subsamples with and without *Dry powder*. Average (mean) *DWCA* is lower in the subsample of PE firms with *Dry powder* (the difference is statistically significant at a 5% level). Overall, the results of descriptive statistics and univariate analysis are in line with our predictions.

5. *FSI* and earnings management

5.1. Baseline model

To test the hypothesis of a positive relationship between earnings management in portfolio companies (proxied by *DWCA*) and PE fundraising pressure (proxied by *FSI*), we run the following cross-sectional model, with time and PE firm fixed effects:

$$DWCA_i = \alpha_0 + \beta_1 FSI_i + \beta_2 PEI\_50_i + \beta_3 Dry\ powder_i + \beta_4 LNTA_i + \beta_5 Retained_i + \beta_6 Leverage_i + \beta_7 ROA_i + \beta_8 UW\_Reputation_i + \beta_9 TA\_growth_i + \beta_{10} LNAge_i + \beta_{11} Bubble_i + \varepsilon_i \quad (4)$$

[34] Unreported correlation between *PEI_50* and size of PE firms' funds (*Last fund size*) is 0.240 (statistically significant at a 1% level).

Our regression model controls for a number of factors identified in previous literature. Larger and older firms, for example, are less likely to be involved in aggressive accruals management due to scrutiny by stock analysts and established management and accounting systems (Lee and Masulis, 2011). We, therefore, include the natural logarithm of total assets (*LNTA*) and age (*LNAge*) to control for the size and age of the portfolio company. Leland and Pyle (1977) show that managerial retained ownership represents an effective signal that reduces information asymmetries between insiders and investors. This was extended to an IPO setting showing that retained ownership could be an effective signal of either company's value or costs related to disclosure of other signals (e.g. Hughes, 1986; Grinblatt and Hwang, 1989). We, therefore, control for management retained ownership measured as the percentage of ownership retained by managers after IPOs (*Retained*). We also control for the influence of firm performance on earnings management by adding return on assets (*ROA*) to the model. Highly levered firms may resort to aggressive earnings management when they are close to a violation of debt covenants (DeFond and Jiambalvo, 1994). We control for leverage by including the long-term debt to assets ratio (*Leverage*) as a proxy for leverage in our model. Previous research also suggests that reputed underwriters effectively reduce earnings management in equity issuing firms (Chen et al., 2013; Lee and Masulis, 2011). Thus, we control for the effect of underwriter reputation by including the *UW_Reputation* variable. *UW_Reputation* is measured as the ratio of all UK IPOs underwritten by the underwriter in the year before the IPO to the total number of UK IPOs in the year before the IPO.[35] Faster-growing companies face more information asymmetry and are more likely to manage earnings (Bruton et al., 2010). We, therefore, control for company growth in total assets (*TA_growth*). Nam et al. (2014) report a positive association between VC backing and earnings management in US IPOs during the dot-com bubble period. We control for the effect of the "hot" IPO period during the dot-com bubble years with a categorical variable, *Bubble.* All variables are defined, and described in more detail, in Appendix 1.

Table 5 presents the baseline regression results. The positive and highly significant (at a 5% level) coefficient of the *FSI* suggests a strong relationship between a PE firm's fundraising stress level and earnings management in portfolio companies. On average, a one unit increase in the *FSI* index results in a 9.80% increase in the *DWCA* (*Models_3* and *_4*). Economically, an increase of one standard deviation in the *FSI* represents an increase of about 8.2% in the

[35] The same proxy was used in previous papers on UK IPOs (see Espenlaub et al., 2012).

DWCA.[36] A significant change in the funding pressure (e.g. from *FSI=0* to *FSI=3*) can, therefore, result in a *DWCA* increase of more than 20%. The above results are consistent with our prediction of a significant impact of fundraising pressure on earnings management.

Insert Table 5 about here

Regarding control variables, *LNTA, UW_Reputation,* and *Retained* are all negatively and significantly associated with *DWCA.* Our categorical variable for the dot-com bubble is not statistically significant, suggesting that PE firms' incentives to manage earnings extend beyond the "hot" IPO periods. We report a negative relationship of PE reputation and discretionally accruals. The coefficient for *PEI_50*, however, is statistically significant (at a 10% level) only in *Model_1*. The overall effect of *Dry powder* is negative but statistically significant only at a 10% level (*Models_1 and _3*). In the next section, we examine how reputation effects and effects of dry powder change with an increase in funding pressure.

5.2. Conditional effects of *PEI_50* and *Dry powder*

5.2.1 Reputational effect

To examine the conditional effect of reputation, we interact *PEI_50* with *FSI (FSI*PEI_50).* Thus, we run the following model:

$$DWCA_i = \alpha_0 + \beta_1 FSI_i + \beta_2 PEI\_50_i + \beta_3 FSI*PEI\_50_i + \beta_4 Dry\ powder_i + \beta_5 LNTA_i + \beta_6 Retained_i + \beta_7 Leverage_i + \beta_8 ROA_i + \beta_9 UW\_Reputation_i + \beta_{10} TA\_growth_i + \beta_{11} LNAge_i + \beta_{12} Bubble_i + \varepsilon_i \quad (5)$$

The coefficient for *FSI*PEI_50* shows how the effect of reputation changes with an increase in *FSI.* With the introduction of the interaction term, the interpretation of the coefficients for *PEI_50* and *FSI* changes. The coefficient for *PEI_50*, for example, now shows the effect of reputation when *FSI* is zero. Given our focus on fundraising pressure and earnings management, the more meaningful question is whether the model suggests that there is a significant difference between reputable and less reputable PE firms in the presence of fundraising stress. We therefore centre the *FSI* at mean (*FSI=2.288*) and maximum (*FSI=3*) values, respectively.[37] Following the centering, only the coefficients for *PEI_50* and intercept

[36] Calculated as $Coefficient_{FSI}$*$Standard\ deviation_{FSI}$ (0.098*0.833=0.0816).
[37] The centering is achieved by subtracting the mean and the maximum values from each *FSI* observation.

change. The coefficients for *PEI_50* now show the reputational effect for PE firms under average and extremely high funding pressure, respectively.

Results for the conditional effect of reputation are presented in Table 6. Here, the key coefficients of interest are those for *PEI_50* and the interaction term (*FSI*PEI_50*). The coefficient for *PEI_50* in, *Model_1,* shows the effect of reputation when there is no funding pressure. The coefficient is positive but not statistically significant. The negative interaction term (in *Model_ 1*) suggest that reputational effect on earnings management weakens with an increase in fundraising pressure. However, the coefficient for the interaction term is significant at a 10% level, thus providing only weak support for the conditional effect of PE firms' reputation.

By centering the *FSI* at its mean and maximum values, we examine the effect of reputation at average (*Model_2*) and at extreme levels of fundraising pressure (*Model_3*). We observe a change in sign for the *PEI_50*'s coefficients from positive (*Model_1*) to negative (*Models_2 and _3*). However, none of the *PEI_50*'s coefficients are statistically significant. We, therefore, find no evidence for the conditional effect of reputation on earnings management. Overall, in line with the results reported in our baseline model, the results suggest that PE firms try to manipulate their performance, regardless of their reputation.

Insert Table 6 about here

5.2.2. Dry powder

We now examine the conditional effect of unspent capital (*Dry powder*) by interacting the *FSI* and *Dry power* (*FSI*Dry powder*)*:*

$$DWCA_i = \alpha_0 + \beta_1 FSI_i + \beta_2 PEI\_50_i + \beta_3 Dry\ powder_i + \beta_4 FSI*Dry\ powder_i + \beta_5 LNTA_i + \beta_6 Retained_i + \beta_7 Leverage_i + \beta_8 ROA_i + \beta_9 UW\_Reputation_i + \beta_{10} TA\_growth_i + \beta_{11} LNAge_i \beta_{12} Bubble_i + \varepsilon_i \quad (6)$$

The coefficient for *FSI*Dry powder* shows how the effect of unspent capital changes with one unit increase in the *FSI*. The coefficient for *Dry powder* shows the difference between PE firms with and without unspent capital, when there is no fundraising pressure. By centering the *FSI*

at its mean and maximum values, we examine *Dry powder's* impact under average and extreme funding pressures, respectively.

Results are presented in Table 7. *Model_1* shows results under no funding pressure. *Model_2* and *Model_3* show results under average and maximum funding pressure, respectively. The negative and statistically significant, coefficient for the interaction term (*Model_1*) implies that the effect of dry powder weakens with an increase in funding pressure. The coefficient for *Dry powder* changes from positive and insignificant (0.233) in *Model_1,* to negative (-0.109) in *Model_2,* and negative (-0.215) and statistically significant (at a 5% level) in *Model_3*. The results suggest that *Dry powder* exhibits a significant (moderating) effect on earnings management only under extreme funding pressure (*Model_3*). The above results, therefore, lend strong support to the conditional effect of *Dry powder* on earnings management.

Insert Table 7 about here

6. Endogeneity issues

6.1. Heckman's model

Previous related studies on the behaviour of PE firms typically examine the possibility that econometric associations might be driven by hidden variables. For example, a potential concern is that some PE firms might not select investee companies randomly. Their choice, for example, might be motivated by those characteristics that drive earnings management. In this case, the link between a PE firm's involvement and earnings management would not be causal but would reflect unobserved PE firm or company characteristics. To address this concern, we employ a Heckman (1979) two-step model (in line with Katz, 2009; Nam et al., 2014; Goktan and Muslu, 2018). In the first step, we estimate a probit regression with a robust variance estimate for the probability of a PE firm's involvement in a sample portfolio company. The probit model is run for the control sample of 554, PE backed and non-PE backed, UK IPOs during the 1990-2014 period. The dependent variable is a categorical variable equal to 1 if the company received PE backing, and 0 otherwise. We use the following variables that are identified in the previous literature as important determinants of a PE firm's investment in a portfolio company and include them in the first step probit model: industry clusters, size *(LNTA),* age *(LNAge),* profitability *(ROA),* and location *(London)* (see, e.g., Chahine et al., 2012). The estimated probability of a PE firm's investment in the company (*Lambda*) is then included in the second

step OLS models to correct for potential endogeneity. The results, presented in Table 8, show that the instrumental variable (*Lambda*) is statistically significant (at a 5% level). Importantly, the coefficients for all variables remain economically and statistically consistent with those reported in Table 5.

Insert Table 8 about here

6.2. PSM analysis

To further address potential endogeneity issues, we also employ PSM. We start by splitting our sample PE firms into two groups*: High FSI* and *Low FSI*. The distinction between high and low *FSI* is based on the median value, in line with Cardillo et al. (2020) and Liu (2018). Using this method, firms from *High FSI* are matched with firms from *Low FSI,* but with no significant differences in terms of all other variables. PSM analysis then proceeds in two steps.[38] First, we measure the propensity score, which is the conditional probability of having a high *FSI* (treatment group) given a firm's pre-treatment characteristics. In particular, we use a logit model with *FSI_high* as the dependent variable (*Model 1* in Table 9-Panel A). *FSI_high* is a categorical variable equal to 1 if *FSI* is higher than the sample median, and 0 otherwise. We use the same controls as those included in our baseline model (Eq.4).

Insert Table 9 about here

Second, we match each observation in the treatment group (*High FSI*) with the control group (*Low FSI*) using the nearest neighbour (with replacement) approach based on its propensity score obtained from the predicted probability taken from the above first stage logit regression. To ensure that firms from the *High FSI* sample are sufficiently similar to the firms in the *Low FSI* sample, we restrict observations to be on a common support and require that the maximum difference (caliper) between propensity score of treated and control firms does not exceed 0.01 in absolute value.

We conduct two diagnostic tests to verify that the treatment and control firms are virtually indistinguishable in terms of observable characteristics (consistent with Chen et al., 2017). For the first test, we re-estimate the logit model using the post-match sample. The results, presented in Column (2) of Panel A, suggest a lack of significant differences between the two groups.

[38] We use PSMATCH2 package in STATA by Leuven and Sianesi (2004).

The pseudo R^2 declines from 0.18 (*Model_1*) to 0.025 (*Model_2*), suggesting that the PSM removes all observable differences except for the difference in the level of *FSI.* The second test examines the mean differences of the matching characteristics between treatment and control firms. Results, presented in Panel B, show no statistically significant differences in observable characteristics between treatment and control firms. In *Figure 1,* we present the kernel density estimates of the estimated propensity score for the treatment and control firms before and after the matching.

Insert Figure 1 about here

Kernel densities clearly show that the matching improves the degree of similarity between the treatment and control subsamples. The results suggest that the treatment group does not differ from the control group in terms of observable characteristics, thus increasing the likelihood that any differences in earnings management between two groups are due to *FSI* differences. Finally, we rerun the baseline regression model (Eq.4) using the matched sample (Column 3, Panel A of Table 9). Consistent with our earlier findings, the coefficient of *FSI* is positive and highly significant. Overall, the results presented in this section suggest a very low likelihood that the underlying unobservable firm-level characteristic jointly drives the relations examined in this paper.

7. Robustness

In this section, we present additional checks to provide further confidence in our results. First, we check the robustness of our results by using alternative proxies for earnings management. Second, we repeat our estimates using alternative definitions and weights for the *FSI* constituents. Finally, we provide further analysis and checks regarding PE firms' reputation, unspent capital, and retained ownership.

7.1. Alternative earnings management proxies[39]

We conducted robustness checks using several alternative earnings management proxies. For example, in our baseline model, we already control for a possible effect of company performance on discretionary accruals. In addition, we now estimate the performance adjusted

[39] A detailed explanation of the calculation of performance adjusted working capital accruals and total accruals is provided in Appendix 2.

working capital accruals (*DWCA_R*) by adding *ROA* directly to the accruals measure (*Model_1* in Table 10). *DWCA_R* addresses concerns that our model for discretionary working capital accruals (*DWCA*) may be more likely to detect upward earnings management for more profitable companies and downward earnings management for less profitable companies (see Kothari et al., 2005; Kasznik, 1999). We also try total accruals (*DTAC*) as an alternative proxy for earnings management (*Model_2* in Table 10) (see Hribar and Collins, 2002; Gounopoulos and Pham, 2017). The estimates (presented in Table 10) remain statistically and economically consistent with our main findings on the relationship between fundraising stress and earnings management.

Insert Table 10 about here

7.2. Alternative *FSI* indexes

We create, and test, four additional indexes. First, we calculate a new *FSI_pca*, as a value-weighted index, using factor loadings from our PCA. Specifically, we use the 1PC loadings presented in Table 1 (Panel C).[40] Second, we create *FSI_2* and *FSI_3* with different *Frequent fundraiser* variables. *FSI_2* uses *Frequent fundraiser_2* (with a three-year threshold for the average length of the fundraising cycle) while *FSI_3* uses *Frequent fundraiser_3* (with a five-year threshold for the average length of the fundraising cycle). Finally, *FSI_4* uses an alternative, more rigorous, criterion for the *Late fundraiser* variable (*Late fundraiser_2*).

The estimates of our baseline model, with all alternative indexes, are presented in Table 11. Coefficients for all additional indexes remain economically and statistically consistent with the coefficients presented in Table 5. The results are therefore robust to the alternative definitions and weighting for *FSI's* constituents.

Insert Table 11 about here

7.3. Other robustness checks[41]

7.3.1. Reputational proxies

Our choice of reputational proxy, *PEI_50*, is in line with previous related studies (Wang 2012; Arcot et al., 2015). However, we acknowledge the lack of universal agreement regarding the

[40] In order to be able to apply weights and create the value weighted index we transformed our categorical variables by adding 1 to each observation.

[41] All unreported results presented in this section are available upon request from the authors. All mentioned variables are defined in Appendix 1.

merits of different reputational proxies. For example, several alternative reputational proxies were also used in the related literature (see Jelic et al., 2005; Katz, 2009; Cao and Lerner, 2009; Jelic, 2011; Gotkin and Muslu, 2018). We, therefore, conduct further robustness checks using alternative proxies for reputation. Specifically, we use: i) the natural logarithm of the age of PE firms (*LNPE_age*) (in line with Gotkin and Muslu, 2018); ii) the natural logarithm of the number of IPO exits (*LNPE_IPOs*) (in line with Jelic et al., 2005); and iii) a combination of *PEI_50, LNPE_age, and LNPE_IPOs* (*PE_combined*) (in line with Jelic, 2011). The results of the baseline model with alternative reputational proxies remain robust. For example, coefficients for *FSI* are positive and statistically significant, while coefficients for reputational proxies remain insignificant. The results for the conditional effect of the reputation on earnings management are not statistically significant. Overall, the results of our multivariate analysis with the alternative proxies are in line with previously reported results.

7.3.2. Dry powder

Our method for detection of dry powder is in line with the approach used in Chakraborty and Ewens (2016). We recognise that some of the related studies use different methods for detection of dry powder. Arcot et al. (2015), for example, compares funds aggregate amounts of raised and invested capital with respective sample medians. If a fund is above the median in terms of fundraising but below the median in terms of investment then the fund has significant unspent capital. We, therefore, estimate dry powder using Arcot et al. (2015)'s median based criteria (*Dry powder_2*).

We also examine sensitivity of our *Dry powder* variable to different thresholds. For example, we estimate *Dry powder* using a 40% threshold (*Dry powder_3*). Use of 40% is a less rigorous criterion compared to our original 50% threshold, based on the sample median. Third, we calculate *Dry powder* using a five-year (instead of three-year) investment period (*Dry powder_4*). Use of the longer investment period is in line with findings that funds tend to invest more during earlier years of their lives (Chakraborty and Ewens, 2016). Unreported results for estimates of our baseline model with the above proxies are economically and statistically consistent with the results reported in Table 5.

7.3.3. Retained ownership

Fan (2007) developed a model in which both reported earnings and ownership retention are endogenously chosen to convey the IPO issuer's private information. The ownership retention

was defined as the combined ownership of managers and other private investors such as VC firms. We therefore consider a similar variable that combines management and PE retained ownership (*Total_retained*). We repeat our estimates after replacing *Retained* with *Total_retained.* Our key results remain robust to the use of *Total_Retained.* For example, coefficients for *FSI* remain unchanged. The coefficient for *Total_retained* is not statistically significant. Previous studies also report a lower quality of accounting in portfolio companies when PE firms hold higher stakes (Degeorge and Zeckhauser, 1993; Beuselinck and Manigart, 2007; Katz, 2009). In line with Beuselinck and Manigart (2007), we consider *High_PE ownership,* a categorical variable equal to 1 if PE retained ownership is higher than the median, and 0 otherwise. We rerun our baseline model augmented with *High_PE ownership.* The coefficient for *High_PE ownership* is positive but not statistically significant. Coefficients for other variables remain economically and statistically consistent with previously reported results.[42]

8. Conclusion

Payments to GPs running PE funds consist of management fees, other fees and carried interest. The carried interest depends on the timing and exit values of portfolio companies and is thus subject to manipulation. Using a unique sample of PE funds and their portfolio companies, we examine whether GPs engage in earnings management in order to enhance a fund's reported performance. Specifically, we test hypotheses on the relationship between earnings management and PE fundraising pressure, along with heterogeneity in behaviour by reputation and dry powder. To proxy for fundraising pressure, we develop an index based on a PE firm's affiliations, stage in fundraising cycle, and fundraising frequency. In line with previous literature, we document a significant upward earnings management in PE-backed IPOs. Our key results suggest that GPs under fundraising pressure engage more in upward earnings management. We document no significant differences in earnings management in companies backed by reputable and less reputable PE firms. PE firms' unspent capital significantly alleviates incentives to manage earnings only when funding pressure is very high. The evidence sheds more light on the effects of financial intermediaries on the quality of financial reporting in portfolio companies. Our results are also important for public policy and regulatory attempts

[42] Same applies when we augment the baseline model with a continuous variable for PE retained ownership, and a categorical variable indicating existence of a PE lockup.

to increase transparency and prevent bad conduct amongst PE firms. Given the evidence provided in this study, it is not clear why PE firms are under lighter regulations compared with other financial intermediaries.

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Table 1: Principal component analysis (PCA)
Panel A, presents the polychoric correlation matrix for five *FSI* constituents. Panel B, presents the PCA loadings (*1PC, 2PC, 3PC, 4PC,* and *5 PC*) and cumulative percentages explained by five *FSI* constituents. Panel C, presents the PCA loadings (*1PC, 2PC,* and *3PC*) and cumulative percentages explained by three *FSI* constituents.

Panel A: Polychoric correlation matrix for five *FSI* constituents

	F. fundraiser	***Affiliation***	***L. fundraiser***	***Dry powder***	***PEI_50***
Frequent fundraiser	1				
Affiliation	0.368	1			
Late fundraiser	0.476	0.239	1		
Dry powder	-0.167	-0.396	-0.306	1	
PEI_50	-0.359	0.270	0.207	0.036	1

Panel B: PCA loadings for five *FSI* constituents

	1PC	***2PC***	***3PC***	***4PC***	***5PC***
Frequent fundraiser	0.5047	-0.4854	0.2889	0.2965	-0.5816
Affiliation	0.5135	0.2711	-0.2755	0.6460	0.4118
Late fundraiser	0.5222	0.0718	0.5577	-0.4790	0.4261
Dry powder	-0.4543	-0.0596	0.6794	0.5134	0.2547
PEI_50	0.0499	0.8259	0.2607	0.0408	-0.4957
Cumulative % explained	0.3962	0.6593	0.8297	0.9685	1.0000

Panel C: PCA loadings for three *FSI* constituents

	1PC	***2PC***	***3PC***
Frequent fundraiser	0.6615	-0.0682	-0.7468
Affiliation	0.4885	0.7947	0.3602
Late fundraiser	0.5689	-0.6031	0.5591
Cumulative % explained	0.6469	0.9122	1.0000

Table 2: Summary statistics: portfolio companies
This table presents the descriptive statistics of variables related to the sample portfolio companies. N is the number of observations. All variables are defined in Appendix 1.

	N	***Mean***	***Median***	***St. deviation***
DWCA	226	0.193	0.040	0.539
TA (£million)	226	185.929	50.729	386.390
LNTA	226	4.133	3.926	1.387
Age (years)	226	5.174	3.751	6.058
LNAge	226	1.544	1.558	0.711
Retained	226	0.157	0.115	0.133
Leverage	226	0.372	0.224	0.474
ROA	226	0.035	0.065	0.183
TA_growth	226	0.436	0.301	0.513
UW_Reputation	226	0.039	0.019	0.053
Bubble	226	0.137	0.000	0.345

Table 3: Summary statistics: PE firms
Summary statistics of sample PE firms and their fundraising activities are presented in Panel A. Correlation matrix of respective variables is presented in Panel B. N is the number of observations. All variables are defined in Appendix 1. * p< 10%, ** p<5%, *** p<1%.

Panel A: PE firms' characteristics and fundraising

	N	***Mean***	***Median***	***St. deviation***
FSI	226	2.288	2.000	0.833
Frequent fundraiser	226	0.633	1.000	0.483
Affiliation	226	0.898	1.000	0.303
Late fundraiser	226	0.602	1.000	0.491
Funds before IPOs	226	12.162	6.000	13.286
Length of fundraising cycle	226	3.220	2.317	3.505
Latest fund to IPO	226	2.597	1.000	3.886
Dry powder	226	0.513	1.000	0.501
PEI_50	226	0.199	0.000	0.400

Panel B: Correlation matrix

	DWCA	***FSI***	***F. fundraiser***	***Affiliation***	***L. fundraiser***	***Funds b. IPO***	***Length of f. cycle***	***L. fund to IPO***	***Dry powder***	***PEI_50***
DWCA	1.000									
FSI	0.148**	1.000								
Frequent fundraiser	0.113*	0.726***	1.000							
Affiliation	0.083	0.521***	0.183***	1.000						
Late fundraiser	0.106	0.770***	0.285***	0.115*	1.000					
Funds before IPO	0.072	0.453***	0.358***	0.136**	0.387***	1.000				
Length of fundraising	-0.122*	-0.538***	-0.775***	-0.087	-0.213***	-0.458***	1.000			
Latest fund to IPO	-0.069	-0.160**	-0.556***	0.025	0.177***	-0.345***	0.817***	1.000		
Dry powder	-0.145**	-0.227***	-0.094	-0.181***	-0.195***	-0.335***	0.070	0.068	1.000	
PEI_50	-0.120*	0.001	-0.202***	0.095	0.111*	-0.030	0.283***	0.363***	0.020	1.000

Table 4: Univariate analysis

Panel A, presents average (mean and median) *DWCA* in subsamples with high and low *FSI* values. *FSI_high* is a categorical variable equal to 1 if *FSI* is higher than the median, and 0 otherwise. Panel B, presents average (mean and median) *DWCA* across PE firms' reputation (*PEI_50*). Panel C, presents average (mean and median) *DWCA* by PE firms' *Dry powder*. All variables are defined in Appendix 1. N is the number of observations. Reported test statistics are t-statistics for two sample T-test for the equality of means; and z-statistics for two sample Wilcoxon rank-sum (Mann-Whitney) test for the equality of medians.

Panel A: Earnings management and *FSI*

	FSI_high=1	***FSI_high=0***	***Test statistics***
DWCA (mean)	0.297	0.094	-2.875***
DWCA (median)	0.033	0.044	-0.557
N	111	115	

Panel B: Earnings management and *PEI_50*

	PEI_50=1	***PEI_50=0***	***Test statistics***
DWCA (mean)	0.065	0.226	1.805*
DWCA (median)	0.026	0.045	1.599
N	45	181	

Panel C: Earnings management and *Dry powder*

	Dry powder=1	***Dry powder=0***	***Test statistics***
DWCA (mean)	0.118	0.274	2.191**
DWCA (median)	0.043	0.037	0.434
N	116	110	

Table 5: Fundraising pressure and earnings management

This table presents the results of our baseline regression model (Eq.4). The dependent variable is our main earnings management proxy, *DWCA*, estimated by Eq. (3). *Model_1* does not control for fixed effects. *Model_2* controls for time fixed effect (*Time FE*). *Model_3* controls for PE firm fixed effect (*PE FE*). *Model_4* controls for both time and PE firm fixed effects. All variables are defined in Appendix 1. N is the number of observations. Reported results are based on 99% winsorized data. All estimates are with robust standard errors reported in parentheses. * p< 10%, ** p<5%, *** p<1%.

	Model_1	***Model_2***	***Model_3***	***Model_4***
	DWCA	***DWCA***	***DWCA***	***DWCA***
FSI	0.092**	0.093**	0.098**	0.098**
	(0.036)	(0.037)	(0.044)	(0.044)
PEI_50	-0.104*	-0.099	-0.101	-0.095
	(0.060)	(0.063)	(0.101)	(0.105)
Dry powder	-0.114*	-0.110	-0.112*	-0.107
	(0.066)	(0.067)	(0.068)	(0.069)
LNAge	0.033	0.034	0.036	0.036
	(0.042)	(0.051)	(0.043)	(0.052)
LNTA	-0.071***	-0.078**	-0.074***	-0.080**
	(0.026)	(0.032)	(0.028)	(0.033)
Retained	-0.896***	-0.886***	-0.920***	-0.910***
	(0.288)	(0.295)	(0.296)	(0.301)
Leverage	-0.076	-0.077	-0.078	-0.079
	(0.106)	(0.110)	(0.108)	(0.113)
ROA	0.203	0.203	0.218	0.218
	(0.299)	(0.299)	(0.305)	(0.305)
TA_growth	0.001	0.001	0.001	0.001
	(0.023)	(0.023)	(0.023)	(0.024)
UW_Reputation	-1.099**	-1.122**	-1.083*	-1.102**
	(0.540)	(0.527)	(0.566)	(0.552)
Bubble	0.272	0.265	0.266	0.258
	(0.196)	(0.194)	(0.203)	(0.200)
Intercept	0.471***	0.480***	0.455**	0.466**
	(0.169)	(0.173)	(0.188)	(0.193)
Time FE	No	Yes	No	Yes
PE FE	No	No	Yes	Yes
Adjusted R^2	0.092	0.084	0.069	0.061
N	226	226	226	226

Table 6: Conditional effect of PE reputation

This table presents results on the conditional effect of *PEI_50*. The dependent variable is *DWCA*, estimated by Eq. (3). *Model_1* is our baseline model augmented with an interaction term, *FSI*PEI_50* (Eq.5). In *Model_1*, the coefficient for *PEI_50* shows the reputational effect under no funding pressure (*FSI=0*). *Model_2* uses *FSI_m* (instead of *FSI*) which is obtained by centering the *FSI* at the mean. *Model_3* uses *FSI_m3* (instead of *FSI*) which is obtained by centering the *FSI* at the maximum. Following the centering, only coefficients for *PEI_50* and intercept change. The coefficients for *PEI_50* now show the reputational effect for PE firms under average and extremely high funding pressure, respectively. Coefficients for all other variables, in *Model_2* and *Model_3*, remain identical to respective coefficients in *Model_1* and are marked with, =. All variables are defined in Appendix 1. *Time FE* refers to time fixed effect. *PE FE* refers to PE firm fixed effect. N is the number of observations. Reported results are based on 99% winsorized data. All estimates are with robust standard errors reported in parentheses. * p< 10%, ** p<5%, *** p<1%.

	Model_1	***Model_2***	***Model_3***
	DWCA	***DWCA***	***DWCA***
FSI	0.121**		
	(0.050)		
FSI_m		=	
		=	
FSI_m3			=
			=
*FSI*PEI_50*	-0.163*		
	(0.097)		
*FSI_m*PEI_50*		=	
		=	
*FSI_m3*PEI_50*			=
			=
PEI_50	0.299	-0.073	-0.188
	(0.241)	(0.103)	(0.126)
Dry powder	-0.110	=	=
	(0.069)	=	=
LNAge	0.040	=	=
	(0.052)	=	=
LNTA	-0.084**	=	=
	(0.033)	=	=
Retained	-0.871***	=	=
	(0.303)	=	=
Leverage	-0.087	=	=
	(0.113)	=	=
ROA	0.205	=	=
	(0.318)	=	=
TA_growth	0.001	=	=
	(0.024)	=	=
UW_Reputation	-1.126**	=	=
	(0.544)	=	=
Bubble	0.238	=	=
	(0.202)	=	=
Intercept	0.417**	0.693***	0.779***
	(0.200)	(0.194)	(0.205)
Time FE	Yes	Yes	Yes
PE FE	Yes	Yes	Yes
Adjusted R^2	0.062	0.062	0.062
N	226	226	226

Table 7: Conditional effect of *Dry powder*

This table presents results on the conditional effect of *Dry powder*. The dependent variable is *DWCA*, estimated by Eq. (3). *Model_1* is our baseline model augmented with an interaction term, *FSI*Dry powder* (Eq.6). In *Model_1*, the coefficient for *Dry powder* shows the effect of unspent capital under no funding pressure (*FSI=0*). *Model_2* uses *FSI_m* (instead of *FSI*) which is obtained by centering the *FSI* at the mean. *Model_3* uses *FSI_m3* (instead of *FSI*) which is obtained by centering the *FSI* at the maximum. Following the centering, only coefficients for *Dry powder* and intercept change. The coefficients for *Dry powder* now show the effect of *Dry powder* under average and extremely high funding pressure, respectively. Coefficients for all other variables, in *Model_2* and *Model_3*, remain identical to respective coefficients in *Model_1* and are marked with, =. All variables are defined in Appendix 1. *Time FE* refers to time fixed effect. *PE FE* refers to PE firm fixed effect. N is the number of observations. Reported results are based on 99% winsorized data. All estimates are with robust standard errors reported in parentheses. * p< 10%, ** p<5%, *** p<1%.

	Model_1	***Model_2***	***Model_3***
	DWCA	***DWCA***	***DWCA***
FSI	0.178***		
	(0.062)		
FSI_m		=	
		=	
FSI_m3			=
			=
*FSI*Dry powder*	-0.150**		
	(0.074)		
*FSI_m*Dry powder*		=	
		=	
*FSI_m3*Dry powder*			=
			=
Dry powder	0.233	-0.109	-0.215**
	(0.163)	(0.069)	(0.098)
PEI_50	-0.107	=	=
	(0.105)	=	=
LNAge	0.019	=	=
	(0.051)	=	=
LNTA	-0.081**	=	=
	(0.033)	=	=
Retained	-0.933***	=	=
	(0.297)	=	=
Leverage	-0.079	=	=
	(0.111)	=	=
ROA	0.200	=	=
	(0.318)	=	=
TA_growth	-0.001	=	=
	(0.024)	=	=
UW_Reputation	-1.102**	=	=
	(0.551)	=	=
Bubble	0.261	=	=
	(0.200)	=	=
Intercept	0.298	0.704***	0.831***
	(0.195)	(0.192)	(0.211)
Time FE	Yes	Yes	Yes
PE FE	Yes	Yes	Yes
Adjusted R^2	0.068	0.068	0.068
N	226	226	226

Table 8: Heckman model

This table presents the results of the two-stage Heckman regression model for the impact of fundraising pressure on earnings management. In Panel A, the first-stage probit model is a robust variance regression for the probability of receiving PE backing (*PE backing*) by the sample portfolio companies. Standard errors (in parentheses) are for the Wald Chi-squared test. N reports the total number of PE backed and non-PE backed UK IPOs. In Panel B, we present the second stage (baseline) model that is a regression for the influence of fundraising pressure on earnings management. *Lambda* is the fitted probability of receiving PE backing, estimated from the first stage probit regression model. All parameters of the OLS regression are estimated with robust standard errors, reported in parentheses. *Time FE* refers to time fixed effect. *PE FE* refers to PE firm fixed effect. N reports the number of sample IPOs. All variables are defined in Appendix 1. Reported results are based on 99% winsorized data. * p< 10%, ** p<5%, *** p<1%.

Panel A: 1st stage		***Panel B: 2nd stage***	
Probit model		***Baseline model***	
	PE backing		*DWCA*
London	-0.468***	*FSI*	0.115**
	(0.128)		(0.046)
LNTA	0.053	*PEI_50*	-0.136
	(0.036)		(0.112)
LNAge	-0.121*	*Dry powder*	-0.087
	(0.062)		(0.069)
ROA	-0.015	*LNAge*	0.051
	(0.332)		(0.052)
Intercept	-0.468	*LNTA*	-0.087***
	(0.295)		(0.032)
		Retained	-0.802***
			(0.298)
		Leverage	-0.088
			(0.112)
		ROA	0.196
			(0.281)
		TA_growth	0.003
			(0.022)
		UW_Reputation	-1.057**
			(0.533)
		Bubble	0.233
			(0.197)
		Lambda	-0.450**
			(0.185)
		Intercept	0.721***
			(0.221)
Industry included	Yes	*Time FE*	Yes
Log pseudo.	-361.387	*PE FE*	Yes
Pseudo R^2	0.056	*Adjusted R^2*	0.080
N	554	*N*	226

Table 9: Propensity score matching (PSM)

This table presents the propensity score matching estimation results. Panel A shows the logit regression results used to estimate the propensity scores for the pre- (*Model_1*) and post-match (*Model_2*) sample, and the matched sample regression results (*Model_3*). The dependent variable for logit regressions, in *Model_1* and *Model_2,* is *FSI_high. FSI_high* is a categorical variable equal to 1 if *FSI* is higher than median, and 0 otherwise. The dependent variable in *Model_3* is *DWCA.* Panel B reports the comparison of treated (*High FSI*) and control (*Low FSI*) groups. Reported values are group means. Reported t-statistics is for equality of means in the two groups. *Time FE* refers to time fixed effect. *PE FE* refers to PE firm fixed effect. N reports the number of sample IPOs. All variables are defined in Appendix 1. Reported results are based on 99% winsorized data. * p< 10%, ** p<5%, *** p<1%.

Panel A: Matched sample regression

	Pre-match sample	***Post-match sample***	***Matched sample***
	Model_1	***Model_2***	***Model_3***
	FSI_high	***FSI_high***	***DWCA***
FSI	-	-	0.101***
			(0.032)
PEI_50	-0.136	-0.384	-0.101
	(0.385)	(0.410)	(0.063)
Dry powder	-1.096***	-0.313	0.034
	(0.324)	(0.356)	(0.070)
LNAge	0.301	-0.032	0.009
	(0.245)	(0.253)	(0.045)
LNTA	0.336**	0.168	0.005
	(0.158)	(0.178)	(0.029)
Retained	1.644	0.725	-0.717**
	(1.336)	(1.597)	(0.282)
Leverage	1.345***	-0.127	-0.232**
	(0.458)	(0.561)	(0.093)
ROA	-0.697	-0.157	0.688***
	(0.933)	(0.859)	(0.145)
TA_growth	0.245**	-0.102	0.125***
	(0.117)	(0.118)	(0.042)
UW_Reputation	-0.209	-2.008	-0.170
	(3.049)	(3.092)	(0.445)
Bubble	-0.019	0-.231	-0.212
	(0.579)	(0.600)	(0.199)
Intercept	-2.261***	-0.146	0.045
	(0.823)	(0.917)	(0.159)
Time FE	Yes	Yes	Yes
PE FE	Yes	Yes	Yes
Pseudo R^2	0.180	0.025	-
Adjusted R^2	-	-	0.270
N	226	168	168

Panel B: Differences between treatment and control groups

	Treatment group	***Control group***	***Difference***	***t-statistics***
PEI_50	0.214	0.250	-0.036	-0.550
Dry powder	0.417	0.476	-0.059	-0.770
LNAge	1.569	1.536	0.033	0.290
LNTA	4.311	4.315	-0.004	-0.020
Retained	0.147	0.134	0.013	0.680
Leverage	0.355	0.391	-0.036	-0.600
ROA	0.034	0.039	-0.005	-0.180
TA_growth	0.880	1.044	-0.164	-0.610
UW_Reputation	0.041	0.052	-0.011	-1.090
Bubble	0.107	0.119	-0.012	-0.240

Figure1. PSM: balancing test
This figure reports the performance of the balancing test between *High FSI* (treated group) and *Low FSI* (control group) for the sample before matching (Panel A) and after matching (Panel B).

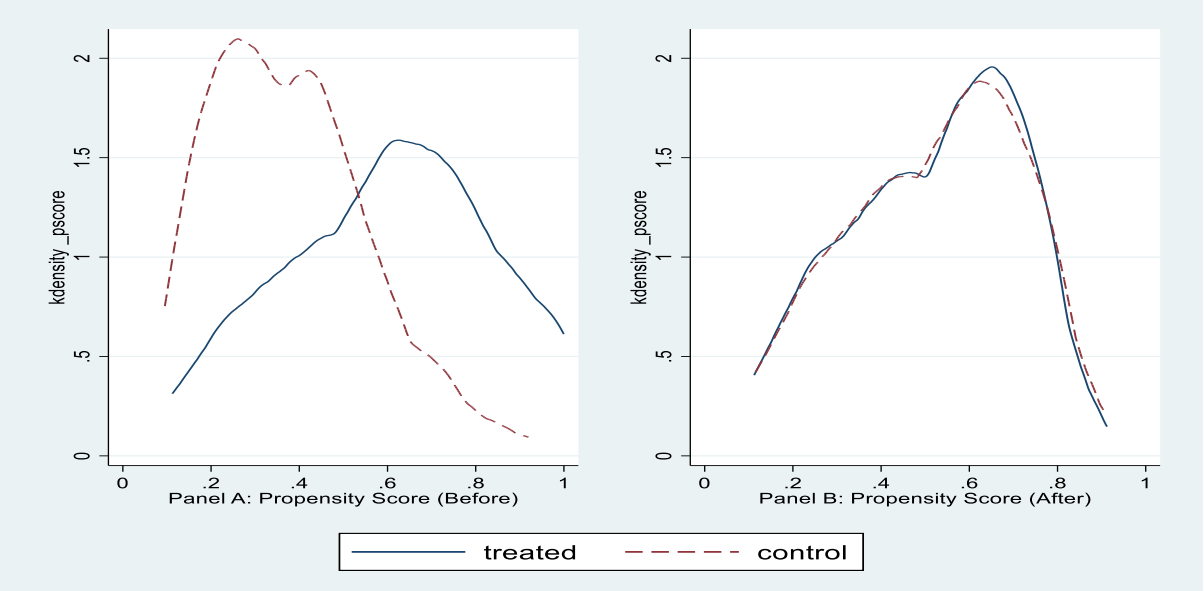

Table 10: Alternative earnings management proxies

This table presents OLS regression results of the influence of fundraising pressure on earnings management, using alternative earnings management proxies (*DWCA_R* and *DTAC*). The dependent variable in *Model_1* is *ROA* performance-adjusted *DWCA* (*DWCA_R*), estimated by Eq. (A3) from Appendix 2. The dependent variable in *Model_2* is total accruals (*DTAC*), estimated by Eq. (A6) from Appendix 2. All variables are defined in Appendix 1. *Time FE* refers to time fixed effect. *PE FE* refers to PE firm fixed effect. N reports the number of observations. Reported results are based on 99% winsorized data. All estimates are with robust standard errors reported in parentheses. * p< 10%, ** p<5%, *** p<1%.

	Model_1	***Model_2***
	DWCA_R	***DTAC***
FSI	0.159***	0.080**
	(0.047)	(0.040)
PEI_50	-0.106	0.055
	(0.109)	(0.104)
Dry powder	-0.069	0.032
	(0.076)	(0.052)
LNAge	-0.039	0.021
	(0.060)	(0.036)
LNTA	-0.076**	0.013
	(0.031)	(0.021)
Retained	-0.420	-0.143
	(0.327)	(0.249)
Leverage	-0.030	0.113
	(0.094)	(0.103)
ROA	-0.880***	0.391*
	(0.299)	(0.215)
TA_growth	-0.030**	0.003
	(0.014)	(0.016)
UW_Reputation	-0.458	-0.283***
	(0.543)	(0.081)
Bubble	0.195	0.226
	(0.171)	(0.142)
Intercept	0.402**	-0.279**
	(0.199)	(0.132)
Time FE	Yes	Yes
PE FE	Yes	Yes
Adjusted R^2	0.105	0.082
N	218	216

Table 11: Alternative *FSI* indexes

This table presents the results of our baseline regression model (Eq.4), using alternative funding stress indexes (*FSI_pca*, *FSI_2*, *FSI_3*, and *FSI_4*). The dependent variable is our main earnings management proxy *DWCA*, estimated by Eq. (3). *FSI_pca* is calculated as a value-weighted *FSI* using the 1PC factor loadings for *Affiliation*, *Frequent fundraiser*, and *Late fundraiser* as weights. *FSI_2* is the sum of *Affiliation*, *Frequent fundraiser_2*, and *Late fundraiser*. *FSI_3* is the sum of *Affiliation*, *Frequent fundraiser_3*, and *Late fundraiser*. *FSI_4* is the sum of *Affiliation*, *Frequent fundraiser*, and *Late fundraiser_2*. All variables are defined in Appendix 1. *Time FE* refers to time fixed effect. *PE FE* refers to PE firm fixed effect. N is the number of observations. Reported results are based on 99% winsorized data. All parameters of regressions are estimated by a model with robust standard errors reported in parentheses. * p< 10%, ** p<5%, *** p<1%.

	Model_1	***Model_2***	***Model_3***	***Model_4***
	DWCA	***DWCA***	***DWCA***	***DWCA***
FSI_pca	0.167**			
	(0.075)			
FSI_2		0.082**		
		(0.040)		
FSI_3			0.101**	
			(0.045)	
FSI_4				0.109**
				(0.049)
PEI_50	-0.094	-0.089	-0.098	-0.101
	(0.105)	(0.102)	(0.105)	(0.104)
Dry powder	-0.109	-0.112	-0.106	-0.113*
	(0.069)	(0.069)	(0.069)	(0.068)
LNAge	0.036	0.041	0.040	0.035
	(0.052)	(0.052)	(0.052)	(0.052)
LNTA	-0.081**	-0.081**	-0.079**	-0.080**
	(0.033)	(0.033)	(0.033)	(0.032)
Retained	-0.911***	-0.936***	-0.913***	-0.909***
	(0.301)	(0.304)	(0.301)	(0.300)
Leverage	-0.079	-0.069	-0.078	-0.068
	(0.112)	(0.115)	(0.112)	(0.107)
ROA	0.216	0.222	0.220	0.224
	(0.306)	(0.307)	(0.304)	(0.285)
TA_growth	0.001	0.001	0.001	0.004
	(0.024)	(0.024)	(0.024)	(0.024)
UW_Reputation	-1.097**	-1.031*	-1.127**	-1.103**
	(0.553)	(0.544)	(0.549)	(0.555)
Bubble	0.257	0.272	0.253	0.242
	(0.200)	(0.205)	(0.201)	(0.199)
Intercept	0.185	0.522***	0.451**	0.467**
	(0.257)	(0.184)	(0.195)	(0.196)
Time FE	Yes	Yes	Yes	Yes
PE FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.060	0.057	0.060	0.063
N	226	226	226	226

Appendix 1: Definition of variables

Variable	*Definition*
Earnings management	
DWCA	The difference between working capital accruals and non-discretionary working capital accruals (Eq. 3).
DWCA_R	The difference between *ROA* adjusted working capital accruals and *ROA* adjusted non-discretionary working capital accruals. Estimation model is presented in Appendix 2 (Eq. A3).
DTAC	The difference between total accruals and non-discretionary total accruals. Estimation model is presented in Appendix 2 (Eq. A6).
Portfolio companies and control variables	
LNTA	The natural logarithm of Total Assets in the IPO year (t).
LNAge	The natural logarithm of a portfolio company's age. Company's age is measured in years from the founding date to the date of the IPO.
ROA	Net income divided by Total Assets in the IPO year (t).
Leverage	Long term debt divided by Total Assets in the IPO year (t).
TA_growth	Growth in Total Assets from year t-1 to year t.
Retained	The percentage of ownership retained by managers following the IPO, as stated in the IPO prospectus.
High_PE ownership	A categorical variable equal to 1 if PE retained ownership following the IPO (as stated in the IPO prospectus) is higher than the median, and 0 otherwise.
Total_retained	Combined retained ownership of managers and PE firms following the IPO, as stated in the IPO prospectus.
UW_Reputation	The number of UK IPOs underwritten by the underwriter in a year before the IPO (t-1), divided by total number of UK IPOs in the same year.
Bubble	A categorical variable equal to 1if the IPO year is 1999 or 2000, and 0 otherwise.
PE backing	A categorical variable equal to 1if the IPO received PE backing, and 0 otherwise.
London	A categorical variable equal to 1 if the IPO's headquarter is located in London, and 0 otherwise.
Lambda	Fitted probability of receiving PE backing, estimated by the probit model in Panel A of Table 8.
PE firms: characteristics and fundraising activities	
Affiliation	A categorical variable equal to 1if the PE firm is not affiliated to government or financial organizations, and 0 otherwise.
Length of fundraising cycle	Average fundraising cycle computed by dividing the age of the PE firm by the number of funds raised by the PE firm before IPO. Age of the PE firm is the number of years from the firm's first investment deal to the follow-on fund vintage year (after the IPO).
Frequent fundraiser	A categorical variable equal to 1 if the PE firm's average length of the fundraising cycle is less than four years, and 0 otherwise.
Frequent fundraiser_2	A categorical variable equal to 1 if the PE firm's average length of the fundraising cycle is less than three years, and 0 otherwise.
Frequent fundraiser_3	A categorical variable equal to 1 if the PE firm's average length of the fundraising cycle is less than five years, and 0 otherwise.
Late fundraiser	A categorical variable equal to 1 if the number of years from the PE firm's last fund vintage year to the IPO is greater than their average fundraising cycle minus 1 year, and 0 otherwise.
Late fundraiser_2	A categorical variable equal to 1 if the number of years from the PE firm's last fund vintage year to the IPO is greater than their average fundraising cycle, and 0 otherwise.

Funds before IPO	The number of funds raised by the PE firm before the IPO.
Latest fund to IPO	The number of years from the PE firm's last fund vintage year to the IPO.
Last fund size	Amount of money (in million £) raised by the PE firm in the last round of fundraising before the IPO year.
Dry powder	A categorical variable equal to 1 if (1-r) >50%, and 0 otherwise. Where r is a ratio of total amount invested by the PE firm in the three-year period before the IPO and *Last fund size.*
Dry powder_2	A categorical variable equal to 1 if the PE's amount raised (*Last fund size*) is above and PE's total amount invested (in the three-year period before the IPO) is below respective sample medians, and 0 otherwise.
Dry powder_3	A categorical variable equal to 1 if (1-r) >40%, and 0 otherwise. Where r is a ratio of total amount invested by the PE firm in the three-year period before the IPO and *Last fund size*.
Dry powder_4	A categorical variable equal to 1 if (1-r) >50%, and 0 otherwise. Where r is a ratio of total amount invested by the PE firm in the five-year period before the IPO and *Last fund size.*
PEI_50	A categorical variable equal to 1 if the buyer is among the PEI Media Top 50 PE firms, and 0 otherwise.
LNPE_age	The natural logarithm of a sample PE firm's age.
LNPE_IPOs	The natural logarithm of a sample PE firm's total number of IPO exits.
PE_combined	Equally weighted average of *PEI_50, LNPE_age,* and *LNPE_IPOs.*
Fundraising stress indexes	
FSI	The sum of categorical variables: *Affiliation, Frequent fundraiser* and *Late fundraiser*.
FSI_pca	Value-weighted *FSI* calculated using the 1PC loadings for *Affiliation, Frequent fundraiser,* and *Late fundraiser* as weights.
FSI_2	The sum of categorical variables: *Affiliation, Frequent fundraiser_2,* and *Late fundraiser*.
FSI_3	The sum of categorical variables: *Affiliation, Frequent fundraiser_3,* and *Late fundraiser*.
FSI_4	The sum of categorical variables: *Affiliation, Frequent fundraiser,* and *Late fundraiser_2.*
FSI_high	A categorical variable equal to 1 if *FSI* is higher than the median, and 0 otherwise.

Appendix 2: Alternative accruals estimation models[43]

For the performance adjusted working capital accruals, we run the following cross-sectional OLS regression:

$$\frac{WCA_{i,t}}{TA_{i,t-1}} = \alpha_0 \left(\frac{1}{TA_{i,t-1}}\right) + \alpha_1 \left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \alpha_2 (ROA_{i,t}) + \varepsilon_{i,t} \quad \text{(A1)}$$

where $WCA_{i,t}$ is working capital accruals measured as change in non-cash current assets minus the change in current liabilities, TA_{t-1} is lagged total assets, $\Delta REV_{i,t}$ is change in revenue, $ROA_{i,t} = \frac{NI_{i,t}}{TA_{i,t-1}}$, and $NI_{i,t}$ is net income.

The model is estimated separately for each year and each two-digit SIC industry category, for each of 2,966 UK listed (non-financial), non-IPO, companies during the 1989-2014 period. The variables are scaled by lagged *TA* to reduce potential heteroscedasticity. We require at least ten industry-year observations in a two-digit SIC industry for estimation purposes.

Using the estimated coefficients from Eq. (A1), the non-discretionary (i.e. normal) working capital accruals ($NDWCA\_R_{i,t}$) for a sample portfolio company *i*, in the IPO year *t*, is estimated as follows:

$$NDWCA\_R_{i,t} = \hat{\alpha}_0 \left(\frac{1}{TA_{i,t-1}}\right) + \hat{\alpha}_1 \left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{TA_{i,t-1}}\right) + \hat{\alpha}_2 \left(\frac{NI_{i,t}}{TA_{i,t-1}}\right) \quad \text{(A2)}$$

$\Delta REC_{i,t}$ is change in receivables during the year. $\hat{\alpha}_0$, $\hat{\alpha}_1$ and are$\hat{\alpha}_2$ estimates of α_0 and α_1 obtained from Eq. (A1). Performance adjusted discretionary working capital accruals ($DWCA\_R_{i,t}$) are measured as the difference between performance adjusted working capital accruals and non-discretionary performance adjusted working capital accruals:

$$DWCA\_R_{i,t} = \frac{WCA_{i,t}}{TA_{i,t-1}} - NDWCA\_R_{i,t} \quad \text{(A3)}$$

For total accruals ($TAC_{i,t}$), the following model is estimated separately for each year and each two-digit SIC industry category, for each of 2,966 UK listed (non-financial), non-IPO, companies during the 1989-2014 period:

$$\frac{TAC_{i,t}}{TA_{i,t-1}} = \alpha_0 \left(\frac{1}{TA_{i,t-1}}\right) + \alpha_1 \left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}}\right) + \alpha_2 \left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right) + \varepsilon_{i,t} \quad \text{(A4)}$$

where $TAC_{i,t}$ is the difference between net income and cash flow from operation, TA_{t-1} is lagged total assets, $\Delta REV_{i,t}$ is change in revenue, and $PPE_{i,t}$ is gross property, plant and equipment.

The model is estimated separately for each year and each two-digit SIC industry category, for each of 2,966 UK listed (non-financial), non-IPO, companies during the 1989-2014 period. The variables are scaled by lagged *TA*

[43] The models are adapted from Kothari et al. (2005) and Hribar and Collins (2002), respectively.

to reduce potential heteroscedasticity. We require at least ten industry-year observations in a two-digit SIC industry for estimation purposes.

The coefficient estimates from Eq.A4 are used to estimate non-discretionary (i.e. normal) total accruals ($NDTAC_{i,t}$) for a sample portfolio company i, in the IPO year t, as follow:

$$NDTAC_{i,t} = \hat{\alpha}_0 \left(\frac{1}{TA_{i,t-1}}\right) + \hat{\alpha}_1 \left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{TA_{i,t-1}}\right) + \hat{\alpha}_2 \left(\frac{PPE_{i,t}}{TA_{i,t-1}}\right) \quad \text{(A5)}$$

$\Delta REC_{i,t}$ is change in receivables during the year. $\hat{\alpha}_0$, $\hat{\alpha}_1$ and are$\hat{\alpha}_2$ estimates of α_0 and α_1 obtained from Eq. (A4). Discretionary total accruals ($DTAC_{i,t}$) are measured as the difference between total accruals and non-discretionally total accruals:

$$DTAC_{i,t} = \frac{TAC_{i,t}}{TA_{i,t-1}} - NDTAC_{i,t} \quad \text{(A6)}$$