Inside SMBOs' Boards

Zhou, D.*

*University of Birmingham, Birmingham, B15 2TT, DXZ920@bham.ac.uk;

Abstract

We examine important changes in the size and composition of boards in a unique hand collected sample of UK private equity (PE) backed and non-PE-backed secondary management buyouts (SMBOs). Non-PE-backed SMBOs tend to reduce whilst PE-backed SMBOs tend to increase board size. Moreover, PE-backed SMBOs tend to increase the representation of board directors affiliated to PE firms and are more likely to replace top managers. We find evidence that more PE-related directors and appointing skilled inside directors tend to improve post-SMBO performance in terms of profitability, productivity, employment growth, and sales growth. However, the replacements of top managers only positively affect sales growth. Contrary to previous evidence reported in corporate governance literature, board size is not related to post-SMBO performance. Overall, our results suggest the importance of the board of directors for performance of SMBOs thus providing evidence that governance benefits of the buyout model tend not to be exhausted in the primary buyout stage. The results are robust to sample selection bias and use of different industry adjusted performance measures.

Key words: *Secondary management buyouts, boards of directors, operating performance, private equity.*
JEL classification: *G24, G32, G34*
EFM classification: *150, 380, 810*

1. Introduction

The literature suggests that buyouts enhance corporate governance via changes to the boards of directors and management (Cumming et al., 2007; Acharya et al. 2013) and via leverage and alignment of managerial and shareholder incentives (Jensen, 1989; Kaplan, 1989a). In a SMBO, the initial (primary) buyout is acquired by a new set of PE financiers and/or management, together with new borrowings. In 2012, the PE market experienced an increase in SMBOs, accounting for upwards of 18 per cent of deal volume and 47 per cent of deal value in Europe (e.g. Wang, 2012). By 2011, one in four PE deals in Europe was an SMBO (Smit and Volosovych, 2013). Despite their increasing popularity, and the different managerial and governance processes in SMBOs compared to traditional buyouts (Siegel et al., 2011), there is paucity of research on SMBO corporate governance and the role of boards in particular.

Studying SMBOs as a distinct group has potential to advance understanding of several issues related to corporate boards. As SMBOs represent both an exit route from primary buyout structures and a new buyout form, they shed new light on the debate about buyouts as a long term organizational form (Wright et al., 1995; Strömberg, 2008; Jelic, 2011). SMBOs suggest that the nature of the buyout form may need to change to ensure longevity and along with it the board expertise to deliver future performance (Cumming et al., 2007). For example, SMBOs typically involve the replacement of existing CEOs/CFOs, and changes to board membership, yet companies remain in private ownership (i.e. in a buyout form) instead of going public (i.e. IPO). SMBOs therefore provide a novel context to examine CEO and boardroom succession since they do not involve transition to a public ownership form.

Previous studies report mixed evidence on the performance of SMBOs (Jelic and Wright, 2011; Bonini, 2013; Jenkinson and Sousa, 2013; Achleitner and Figge, 2014; Zhou et al., 2014).[1] They also tend to focus only on PE-backed buyouts (with exception of Jelic

[1] For instance, according to worldwide data, Achleitner and Figge (2014) show that SMBOs still yield operational performance improvements, relative to primary buyouts. According to the authors, SMBOs obtain more leverage than primary buyouts. Bonini (2013) finds no significant improvements in performance of European SMBOs. Jenkinson and Sousa (2013) report underperformance of SMBOs relative to IPOs. Wang (2012) reports that UK SMBOs perform better in generating cash flows but worse in generating earnings than primary buyouts. Jelic and Wright (2011) find a significant improvement in sales growth and dividends, accompanied by significant reductions in gearing and profitability for the UK SMBOs. Zhou et al., (2014) find strong evidence of long-run operating underperformance following UK SMBO deals. SMBOs, for example, perform worse than primary buyouts in terms of profitability, labor productivity, and growth. Authors also find no evidence for superior performance of PE-backed SMBOs, compared to their non-PE backed counterparts.

and Wright, 2011; and Zhou et al., 2014). Together with financial, governance engineering is the most important part of buyout mechanism (Kaplan and Stromberg, 2009). Without examination of the governance changes in general and PE's involvement in particular it is difficult to fully understand the determinants of SMBOs' performance. For example, the evidence on SMBO underperformance, irrespective of PE involvement, would be consistent with the hypothesis that agency and other benefits associated with the buyout model tend to be exhausted in the primary buyout stage (Wright et al., 2009). The underperformance, in PE-backed SMBOs, would also be in line with Axelson et al., (2009) view that general partners with unused funds at the end of investment horizon 'go for broke' and take bad deals.[2] Alternatively, improvements in SMBOs performance are still possible and may be associated with the strategic entrepreneurship perspective (rather than agency perspective) that emphasizes managers' and PE firms' strong motivation to employ their idiosyncratic knowledge, skills, experience, and capabilities to exploit growth opportunities (Wright et al., 2000b; Meuleman et al., 2009; Cumming et al., 2008). PE backing and/or changes in corporate governance are crucial elements in the strategic entrepreneurship perspective framework. In this study, we examine the importance of the board of directors for the performance of SMBOs.

Other than the core role of boards in company operational processes, the dual function of boards consists in monitoring and advisory (or enterprising and service) functions, which also offer the possibility of success in SMBOs. The monitoring function aims to eliminate agency problems while advisory functions affiliate the operational strategies. The "traditional" buyout literature emphasizes the importance of agency problems (e.g. Jensen's (1989) free cash flow hypothesis) and bypasses other possible entrepreneurial advantages of buyouts (based on the strategic entrepreneurship perspective). Given the nature of SMBOs, existing agency costs have already been reduced. This is the reason why these traditional value creation mechanisms become invalid. Under such circumstances, the entrepreneurial advantages of buyouts should emerge. In particular, the advisory function of the board dominates the monitoring function, as along with the ownership transition new blood is injected into the board of directors. For instance, an existing CEO/CFO may be replaced to introduce more entrepreneurial managers. New and more PE is represented on the board to advise the entrepreneurial activities. Hence, it is

[2] The agency conflict and PE sponsors' incentive to overinvest in SMBOs was also documented in recent studies (See Degeorge et al., 2013 and Arcot et al., 2013).

plausible to investigate the role of the board of directors in SMBOs, especially its relationship with post-SMBO growth performance.

This study represents one of the first studies to investigate the impact of the board of directors on post-SMBO performance. We employ the same variables as suggested in the board literature to proxy for the quality of boards (monitoring and advisory functions). Although some of these variables treat the effects of the monitoring and advisory functions as a whole, in a private company scenario the monitoring function may fade away. On the other hand, from the strategic entrepreneurship perspective, we use growth performance to measure the entrepreneurial activities. A high quality advisory function may promote the opportunity- and advantage-seeking abilities of the companies. As a consequence, improvements in performance may not be reflected initially in profitability, but still create company value through growth improvement.

We firstly document the changes in board size, changes to the top management (CEO/CFO), the appointment of independent outside directors and PE directors, and insider directors' skills before and after SMBO transactions. Then we investigate whether these changes exert an influence on post-SMBO performance. We manually collect data for 262 UK SMBOs from 2000 to 2010. To the best of our knowledge, this dataset is the most comprehensive dataset on SMBOs' boards.

The univariate analysis of the comparison of the board composition before and after SMBO transactions evidences that SMBOs on average have a higher fraction of PE-related directors and a lower fraction of independent outside directors than their primary stage counterparts. Furthermore, PE-backed SMBOs on average experience significant increases in board size and the fraction of PE-related directors, while the fraction of inside directors after transactions decreases. In contrast, non-PE-backed SMBOs on average experience significant decreases in board size, the fraction of PE-related directors, and the fraction of independent outside directors, but significant increase in the fraction of inside directors after transactions. In other words, compared to non-PE-backed SMBOs, PE-backed SMBOs tend to increase the board size, nominate fewer inside directors, and be more likely to replace top managers (CEO/CFO) and have skilled insiders on the board in the secondary stage. These findings show a significant transformation of board composition of the target companies after SMBO transactions and the PE-backed SMBOs in particular are actively injected with fresh and diverse blood.

Our main multivariate results in this study show strong evidence that the more PE-related directors on the board, the better SMBO perform in profitability, productivity, and sales growth, suggesting that PE firms taking seats on the board is still an important mechanism of performance improvement. This is because new PE-related directors possess various idiosyncratic skills, experience, and capabilities to exploit the growth opportunities and boost the operating performance. More PE-related directors mean more resources available. Alternatively, some SMBOs of our sample were non-PE-backed in the primary round, so the high fraction of PE-related directors in the secondary round contributes to the elimination of agency problems. As a consequence, SMBOs with more PE-related directors perform better, especially in terms of profitability. This finding is consistent with previous studies (e.g. Cornelli and Karakas, 2013). Moreover, recruiting skilled inside directors is also one of the main mechanisms to improve post-SMBO performance, especially regarding employment growth and sales growth. Unlike PE-related directors, skilled inside directors not only possess idiosyncratic knowledge, skills, and networks, but they also have comprehensive information about the target companies and are motivated to utilize their competitive advantages to exploit growth opportunities. In addition, changing top managers only improves the post-SMBO operating performance in sales growth. Nevertheless, we do not observe consistent evidence on the significant influence of board size and the fraction of independent outside directors. On the whole, the results imply that appointing PE-related directors and/or skilled inside directors are efficient ways to enhance target company performance in SMBOs, in comparison with other ways, for example, changing top managements and appointing independent outside directors.

To more deeply understand the influence of board compositions, we conducted some further analyses concerning some special circumstances. Our results reveal some evidence that the high reputation of PE firms alleviates the relationship between the fraction of PE-related directors and post-SMBO performance, indicating that highly-reputed PE firms tend not to use taking seats as a way to create value and might choose a good deal to invest in instead. We also find that changing top managers, recruiting independent outside directors, and having skilled insiders improve post-SMBOs performance in the subsample of SMBOs exited early by primary PE firms/ managers. In contrast, increasing the number of PE-related directors is the only way to improve post-SMBO performance in the subsample of SMBOs exited late by primary PE firms/ managers. When the SMBOs still have potential

to improve performance, PE firms prefer to adopt alternative ways to enhance the boards' efficiency, rather than taking seats on the board with their own people, in attempt to control the costs. Oppositely, when there is little room for SMBOs to obtain improvement, PE firms will take more seats on the boards to avoid the failure of their investments.

Our study extends the current literature in several areas. First, previous studies on corporate governance in buyouts almost exclusively examine large PE-backed or PTP buyouts (e.g. Acharya et al., 2013; Cornelli and Karakas, 2013). However, these buyouts tend to only account for a small proportion of overall buyout transactions (Cumming et al., 2007; Strömberg 2008; Jelic and Wright, 2011). Furthermore, the role and focus of boards in PTP buyouts tends to be different from those in smaller private-to-private transactions. We contribute the literature by examining boards in private-to-private buyouts (e.g. SMBOs) that has hitherto been neglected. Second, we examine both PE-backed and non-PE-backed SMBOs. Without PE backing, the management teams in non-PE-backed buyouts lose the advice (and monitoring) offered by PE firms. It is, therefore, important to compare the importance of boards in PE-backed and non-PE-backed buyouts. Third, given that SMBOs typically change boards and top management, while remaining in private ownership (i.e. in a buyout structure), we are able to examine the direct effects of changes in board characteristics (e.g. director skills) on performance. Fourth, we make more general contributions to the corporate governance literature by extending the understanding of the heterogeneity of boards in private companies, in contrast to the great body of existing research that focuses on boards in publicly listed corporations. Grounded in strategic entrepreneurship theory and the theory of the board of directors, we argue for the importance of the advisory function of the board of directors on generating strategies to create wealth in SMBOs. In this study, we found that the board composition in SMBOs, PE-backed SMBOs in particular, tends to enhance its advisory function. And the respective new board composition mainly contributes to the post-SMBO operating performance in growth which we use for strategic entrepreneurship theory. This study, therefore, provides new insights on the board of directors, even the corporate governance, in buyouts and private companies. Fifth, portfolio company level performance data provides richer performance metrics compared to PE fund/firm level data (e.g. IRR and multiples). Furthermore, whilst previous studies examine only profitability (Yermack, 1996; Eisenberg et al., 1998; Wintoki et al., 2012), our sample allows examination of the links between

board characteristics and the different aspects of the performance (e.g. sales growth, profitability, productivity, employment growth). Finally, we shed more light on the current debate regarding the reasons for the recent popularity of SMBOs and their benefits for investors (i.e. general and limited partners) and portfolio companies (i.e. managers and shareholders).

The remainder of this chapter is structured as follows. Section 2 provides the theory background and specifies the tested hypotheses, followed by section 3 that presents sample selection and data description. Section 4 analyses the main empirical results. Section 5 checks the robustness and presents further analysis. Section 6 concludes this study.

2. Theory background and hypotheses development

It is recognized that corporate governance is about both monitoring managers to minimize downside risks to shareholders and enabling managers to use their expertise to achieve the benefits of upside potential of companies for shareholders (Uhlaner et al., 2007; Filatochev and Wright, 2005; Zahra et al., 2009). Correspondingly, the corporate governance literature advocates monitoring and advising as two most important functions of the board of directors (e.g. Guest, 2009; Raheja, 2005). The monitoring function stems from agency theory that suggests that companies and shareholders endow directors, especially outsiders, with the right and responsibility to monitor, discipline, and remove ineffective managers, to assure the wealth maximization of shareholders (Jensen and Meckling, 1976; Fama, 1980). The advisory function (or enterprising and service function as discussed in Uhlaner et al. (2007)) involves the directors (both inside directors and outside directors) bringing in valuable expertise and resources (Fama and Jensen, 1983; Guest, 2009) to identify new growth opportunities.

However, in the previous corporate governance literature, the discussion on the quality of board functions narrowly emphasizes the monitoring function from outsider shareholders because of the manifest agency issues between principal and agent in public companies.[3] Due to data limitations, there are much fewer studies on private companies. Indeed, on the one hand, while private companies may have agency issues, the focus of the boards should be shifted to its advisory function. In their theoretical discussion paper,

[3] There is a huge literature discussing the board of directors in public companies, due to the focus of this thesis, we do not review these studies in detail.

Uhlaner et al. (2007) argue that the scope of corporate governance in privately held companies should go beyond the traditional agency theory focusing on large publicly listed companies. Rather, other theoretical perspectives (e.g. the strategic entrepreneurial perspective) that are relevant to the advisory function are more in demand to explain the more dynamic governance mechanisms in private companies. In their literature review work, Daily et al. (2002) also suggest the significant importance of the boards in entrepreneurial companies providing their companies with information, resources, or networks to promote the entrepreneurial companies' growth. One the other hand, private companies may have distinctive issues, such as principal-principal problem, relative to public companies and hence may have unique monitoring function. For instance, Garg (2013) argues that venture boards should have a distinctive monitoring function. In his theoretical framework, he argues that the monitoring function of venture boards depends on the characteristics of the ventures (e.g. the venture development stage) and the characteristics of directors (e.g. having founder as directors). As per the framework, especially, the personal characteristics of venture capitalist directors, such as professional obligation and personal ability/experience, executive considerable influence the board's monitoring function.

According to agency theory, the superiority of buyout organization, to a great extent, is rooted in high leverage, enhanced managerial incentive and the PE firm's governance monitoring and intervention (e.g. Acharya et al., 2013; Gong and Wu, 2011; Cornelli and Karakas, 2013; Jensen, 1989; Kaplan, 1989; Guo et al., 2009). Via the primary buyout phase, the benefits from eliminating agency issues have already been achieved by the first round investors (Wright et al., 2009b). SMBOs continue the buyout organizational form, implying that eliminating agency issues should not be the main way in which the investors can achieve performance improvement. The improved monitoring function of the board in the secondary phase, albeit demanded by shareholders, may not be as important as in the primary phase. Moreover, the management entrenchment issues and loosened PE firms control caused by increasing managerial ownership may lead to worse post-SMBO performance. However, the current mixed evidence on post-SMBO performance, especially the outperformance evidence (Wang, 2012; Achleitner and Figge, 2014), reveals the drawbacks of agency theory.

The strategic entrepreneurship perspective, may be a more useful approach in

SMBOs, which can also support the advisory function of the board. The strategic entrepreneurship perspective, involves opportunity- and advantage-seeking behaviors (Ireland et al., 2003). This perspective assumes that opportunity- and advantage-seeking behaviors based on resource heterogeneity and immobility create a competitive advantage (Priem and Butler, 2001), so that they can lead to performance generation by exploiting growth opportunities (Ireland et al., 2003). As argued by Meuleman et al. (2009), in the buyout context, the heterogeneity and immobility of resources are related to the idiosyncratic knowledge, skills, experience, and capabilities of existing managers, PE firms, and the specialist expertise of PE firms. Not only do buyouts use strong governance to motivate the management to utilize these resources (Wright et al., 2009), they also employ heterogeneous resources from PE firms and their experts.

Given the achievement of the optimal monitoring function of the board and management incentive in the primary buyout, the breakthrough for SMBOs may be the enhancement of the advisory function of the board. There are two reasons. First, most of SMBOs are small-medium-sized companies which may be in the expansion phases. The role of the board, thus, may be changed as SMBOs develop over their life-cycle, as suggested by Filatotchev and Wright (2005). Second, as is the nature of SMBOs, the main difference between SMBOs and primary buyouts in corporate governance could be the board of directors. The transition in ownership could result in substantial changes in board composition. According to the strategic entrepreneurship perspective, there is heterogeneity of directors' knowledge, skills, experience, capabilities, and resources. The investors could replace inefficient directors with directors who possess knowledge, skills, experience, and capabilities that are more suitable to the SMBO phase to facilitate performance improvement through pursuit of growth opportunities. The resources and capabilities required by SMBOs may be from PE directors (Dimov and Shepherd, 2005; Meuleman et al, 2009), new top management, and/or motivated inside employees, especially influential inside directors (Meuleman et al, 2009).

The literature usually treats the board of directors as a whole by measuring the board of directors as, for example, inside directors / outside directors ratio or board size. Although there is one drawback of these measures, in that they encompass the quality of both monitoring and advisory functions, we still use these common measures in this thesis, not only because it is very difficult to collect data on directors' behavior, but also because the

quality of the monitoring and advisory functions could be reflected in various elements of company's effectiveness (Uhlaner et al., 2007) in the forms of different performance measures.

2.1. Board size

Board size attracts much attention when investigating the efficiency of the board of directors. Although more outsiders can improve the monitoring and advisory functions of the boards, Jensen (1993) and Lipton and Lorsch (1992) suggest that small boards could be more effective than large boards. They argue that large boards could cause agency problems such as director free-riding within the board and the board becoming more symbolic and less a part of the management processes. Consistent with this view, the existing empirical evidence demonstrates a negative relationship between board size and companies' performance (Yermack, 1996; Eisenberg et al., 1998; O'Connell and Cramer, 2010). Jensen (1993) and Lipton and Lorsch (1992) even suggest an optimal board size of seven to nine directors. However, O'Connell and Cramer (2010) find that the negative relationship between board size and company performance is significantly less for smaller companies. Although buyouts tend to have smaller boards both when firms go private (Cotter and Peck, 2001; Cornelli and Karakas, 2013) or when they revert to public (Gertner and Kaplan, 1996), consistent with a move towards better corporate governance, the decreases are at the expense of replacing outsiders with insiders or reducing them to zero, especially in MBOs (Cornelli and Karakas, 2013). As a consequence, the monitoring and advisory functions may be weakened, due to the positive relationship between company performance and percentage of outsiders (e.g. Cadbury, 1992; O'Connell and Cramer, 2010). Buyout deals do not usually receive the optimal board size of seven to nine directors as recommended by Jensen (1993) and Lipton and Lorsch (1992).

Hence, we argue here that SMBOs may adjust the board size to some extent to achieve the optimal board size to improve company performance. Especially when the company is in an expansion phase, the investors (e.g. PE firms) could employ more outsider directors and/or inside directors to help growth, so the board size will increase and post-SMBO performance will be better. Thus, we expect,

Hypothesis 1: Board size of SMBO is positively associated to post-SMBO performance.

2.2. PE specialists on board

PE firms taking seats on the board is always viewed as a typical and high efficient mechanism of buyout organization to create value for both ultimate investors and target companies. Studies of boards in PE-backed buyouts have indicated that PE firms would appoint specialists to sit on the board (PE directors) (Rosenstein, 1988; Lerner, 1995; Fried et al, 1998; Gabrielsson and Huse, 2005; Cotter and Peck, 2001; Acharya et al., 2013; Cornelli and Karakas, 2013). The presence of PE specialists on the board may effectively monitor the company's executives to focus their efforts (e.g. Fried et al, 1998; Jenter and Kanaan, 2011) or provide valuable resources from their previous experience and network to complement the lack of inside managers (e.g. Politis and Landstrom, 2002). When the target companies have greater need for their expertise, the number of PE specialists on board will increase (Lerner, 1995; Rauch and Umber, 2012; Cornelli and Karakas, 2013). Via the impact of PE specialists, the board is more efficient and the company's performance can obtain improvement (Cornelli and Karakas, 2013).

Empirical evidence supports the importance of PE specialists as directors. For instance, Cotter and Peck (2001) analyzed a sample of 64 LBOs from 1984 to 1989 and found that buyout specialists (PE specialists) take more seats on the boards than other outside investors, suggesting the active monitoring of buyout specialists. Cornelli and Karakas (2013) find an increase in the fraction of PE specialists on the board when companies go private, by investigating 88 UK LBOs between 1998 and 2003. In addition, they find that PE specialists taking seats on the board can improve operating performance.

Incoming PE firms in SMBOs are likely to appoint their representatives specialized in monitoring (Jenter and Kanaan, 2011) and advising (Politis and Landstrom, 2002**)** as board members. New PE specialists are particularly important when buyouts performed poorly during the primary stage (Cumming and MacIntosh, 2003). For example, Chahine and Goergen (2011) report that venture capital firms are more likely to be on the board of IPOs with reported losses in the year prior to the IPO. The monitoring and advisory expertise of PE specialists will likely focus on turning around firms that under-performed as primary buyouts through active board involvement focused on identifying and closing poorly performing areas, improving the efficiency of operations, and reinvigorating areas with growth potential. Hence,

Hypothesis 2: The fraction of PE-related directors is positively related to post-SMBO performance.

2.3. Independent outside directors

According to corporate governance recommendations and regulations, the independence of the board is essential for the effectiveness of the monitoring function of the board of directors. Independence should be measured by the fraction of independent outside directors, as suggested by Baysinger and Butler (1985). Empirical research provides support for the notion that boards dominated by independent outside directors are more effective than others (Byrd and Hickman, 1992).

Nevertheless, outside directors still could add more value to the enterprises by using their knowledge and wisdom from their previous experience (Keasey and Wright, 1993). [4] The function of outside directors, who offer advice to help decision-making strategy and ultimately improve performance, is more important in private companies than the monitoring function (e.g. Zarah et al. 2007; Lynall et al. 2003; Filatotchev and Wright, 2005). As Lerner (1995) states, independent outside directors are typically experts in the industry, academics, or entrepreneurs. The reason why they can take seats on the board in private companies is that their unique knowledge, expertise, and network resources are necessary for the companies. Furthermore, independent outside directors, per se, are motivated to offer advice in the area of their expertise to CEOs who will help enhance their status and reputation (Garg, 2013).

Independent outside directors do not share the same role in private companies as in public companies. For example, the advisory function of independent outside directors is more important in private (i.e. SMBO) than in public companies. Due to PE involvement, monitoring executive managers is not the focus of independent outside directors in private companies.[5] This is because independent outside directors are usually nominated by the outside shareholders (usually the minority shareholders). However, there are few/no outside shareholders other than PE firms in SMBOs. Obviously, PE firms do not need to recruit additional independent outside directors to improve monitoring. Second, the monitoring function of boards in private companies is not as important as that in public companies. Therefore, we argue that the nomination of independent outside directors is undertaken with

[4] Obviously, PE-related directors are also one special component of outside directors.
[5] Unlike public companies, nominating independent outside director is not compulsory in SMBOs.

the aim of obtaining professional advice from these experts, academics, or entrepreneurs. This advice might improve SMBOs' performance.

Hypothesis 3: The fraction of independent outside directors is positively related to post-SMBO performance.

2.4. Changing top managers (CEO/CFO)

One of the most important tasks of the board is to monitor and choose an appropriate CEO (e.g., Mace, 1986). This is because the CEO's ability, preferences, and decisions impact company performance (Bertrand, 2009; Bertrand and Schoar, 2003). If a CEO performs poorly, for instance by entrenching himself in his positions, the company would underperform (Bebchuk et al., 2009). Studies find companies with poor performance tend to replace their CEO (Hermalin and Weisback, 2001). After changing CEO, performance generally improves because of the strategic changes and right decisions (e.g. Weisbach, 1995; Denis and Denis, 1995).

The buyout literature also highlights the importance of replacing the top management (e.g. Kaplan, 1989a; Smith, 1990; Acharya et al., 2013; Gong and Wu, 2011; Cornelli and Karakas, 2013). For instance, Acharya et al. (2013) find that over one third of deals change CEOs/CFOs within 100 days after the transactions, and PE firms have intensive interaction with CEOs/ CFOs through formal and informal channels. These intensive engagements of PE firms are associated with performance improvement. Gong and Wu (2011) use 126 US LBO deals from 1990 to 2006 to investigate CEO turnover in PE-backed LBOs. Their findings demonstrate that 51 per cent CEOs are replaced within two years of buyout announcements. CEO replacement is positively related to high agency costs, measured as high level of undistributed free cash flow and low leverage, and low pre-buyout operating performance, measured as return on assets. Cornelli and Karakas (2013) find that the board representation of PE specialists reduces the probability of CEO replacement and the relationship between CEO turnover and pre-buyout performance is weak. These two findings suggest the rationality of PE sponsors when they make a decision to change a CEO. They also find that CEO turnover can improve operating performance, in accordance with the hypothesis that buyouts have superior corporate governance. In their working paper, Rauch and Umber (2012) use 211 German PE investments from 1997 to 2009 to investigate the variety of activism of PE firms. They classify PE holding control shares and/or taking seats on the boards and/or changing

CEO/CFO as active behavior, and other forms of behaviors as passive behavior. They find 50% of buyout deals are active; equal to the number of passive buyouts. Notably, the buyouts backed by active PE firms have better operating and financial performance that those backed by passive PE firms. Although they do not mainly focus on the impact of corporate governance on operating performance, Guo et al. (2011) provide evidence that operating performance is higher for buyouts where the CEO was replaced.

Changing the top managers (CEO and/or CFO) is also a crucial tool often used by PE firms (Wright, et al., 2009a). New boards are in better position to change the CEO and/or CFO especially if buyouts are facing difficulties (e.g. Cornelli and Karakas, 2013; Acharya et al., 2013; Gong and Wu, 2011; Kaplan and Minton, 2012; Guo et al., 2011).

The majority of SMBOs are still PE owned so that the same PE model may continuously be applied. When companies underperform before SMBO transactions, the ineffective CEO and/or CFO may be replaced with a more experienced CEO and/or CFO capable of executing the performance improvement plan. With respect to the non-PE-backed SMBOs, changing the CEO and/or CFO may still happen when the previous CEO and/or CFO retire or leave the position for other reasons. The newly nominated CEO and/or CFO might bring in new expertise to help improve the companies' performance. Therefore,

Hypothesis 4: Changing CEO/CFO is positively related to post-SMBO performance.

2.5. Inside directors' skills[6]

Fama and Jensen (1983) argue that because of their valuable internal information on the companies, inside directors are the most significant and irreplaceable directors on boards. This view is supported by recent theoretical and empirical studies (e.g. Raheja, 2005; Harris and Raviv, 2008; Adam and Ferreira, 2007; Masulis and Mobbs, 2011). They suggest or demonstrate that inside directors are valuable in improving the quality of boards' monitoring and advisory functions. In particular, high-quality or skilled inside directors are equipped with advanced board knowledge and skills, operational expertise, or broader resources and networks. Meanwhile, they are motivated to reveal internal information to the board and use their influential expertise to improve the boards' decision making.

Following Masulis and Mobbs (2011), we use inside directors' independent outside directorships as a proxy for skilled inside directors for two reasons. First, recent research

[6] Inside directors are defined as full time employees of the company.

finds evidence that supports the importance of the labor market for directors in identifying highly skilled managers (Brickley et al., 1999; Fich, 2005; Fish and Shivdasani, 2007; Masulis and Mobbs, 2011). To retain their competitive advantage on the labor market, directors with outside appointments must continue to demonstrate their strong decision management skills, thereby increasing their attractiveness to their own board (Fama, 1980; Yermack, 2004; Masulis and Mobbs, 2011). The effort will result in company performance improvement. For instance, Masulis and Mobbs (2011) find that boards with inside directors that have outside directorships are more effective, resulting in better firm operating performance. Second, the outside directorship of these inside directors enhances their experience of the operating company and enables them to access more resources via expanding their network (Walsh, 1995). Outside directorship provides inside directors with a vehicle for learning both from their experience and from other directors (Useem, 1982; Carpenter and Westphal, 2001). Their enhanced skills help to enhance the effectiveness of boards' monitoring and advisory functions. As a consequence, it is more likely to increase the company's performance and the possibility of exploiting growth opportunity of their home companies.

Given the importance of the advisory function of the board, it is important to examine the impact of inside directors' skills on post-SMBO performance. We use independent outside directorships as a proxy for inside directors' skills to identify potential crucial variety amid inside directors.[7] Hence,

Hypotheses 5: SMBO with insider directors with independent outside directorship is positively associated to the post-SMBO performance.

3. Sample selection and data description

3.1. Data collection

Using CMBOR, Thomson One Banker, and Zephyr databases, we identify 612 UK SMBOs from 2000 to 2010. The same databases are used to identify entry and exit dates and PE backing. For the performance analysis, we limit the sample to deals made up to 2007 in order to have enough years to observe performance after the event of the SMBO (up to 2010). The accounting information for the sample SMBOs was collected from the Fame database. We exclude companies from the finance sector due to their different

[7] The same variable was used in previous literature, e.g. Masulis and Mobbs (2011).

accounting reporting.

Buyout organizations have a complex ownership structure, with several layers of companies. For instance, in some cases, the target company in both primary and secondary buyouts is wholly owned by a new company which is usually created as 'empty shell' company at the time of the buyout(s). The management team and PE firms therefore hold the shares of the 'empty shell' company. In other cases, there are several layers of new created companies at the transaction time or in the following years, which cause the ownership structures to change over time. The management team and PE firms therefore also hold the shares of the ultimate holding company. Therefore, we establish the ownership structure of target companies from 3 years before to 5 years after SMBO transactions using the approach from Cornelli and Karakas (2013), by using FAME and annual returns.[8]

We manually collected data of the boards, according to the ownership structure, from https://www.duedil.com/, annual returns, annual accounts, Amadeus, and Nexis UK. [9] We compared the boards of the target companies and the boards of their holding companies. The board of the target company may be very small (1 or 2 directors as a symbolic board), while all the important decisions are made by the relevant board in the holding company or the ultimate holding company. Indeed, there is an overlap between these boards. Specially, in some cases all the directors of target companies take seats in the board of the holding company on which PE specialists and other affiliated outside directors (e.g. lawyer and consultant) also sit. If the board of the holding company includes outside directors or directors related to PE sponsors, we identify this board as the relevant board. In other cases, the boards of target companies are larger than boards of holding company and include all the directors of them. For these cases, we identify the board of the target company as the relevant board.

Private companies do not provide full information about their directors' functions. In order to obtain the directors' functions, we use the names of directors' name and companies' name to search for director's information by using deal announcements, Bloomberg business week website http://investing.businessweek.com/, Linkedin, and zoom information http://www.zoominfo.com/.[10] We believe that this is the most comprehensive

[8] UK companies are required to offer the name lists of board of directors and shareholders in annual returns every year.

[9] Amadeus offers current and previous directors, management, and staff information. Nexis UK provides part biography information of directors and individuals.

[10] Zoom information is a B2B data front-runner that provides detailed profiles of 95 million businesspeople all

dataset on SMBO boards used in the literature so far.

We followed the following process to clarify the board's composition. First, we identified the directors whose function in the board is venture capitalists or private equity specialists, or who are also directors or employees of PE firms or directors (function as fund manager, investment banker, or consultant) of companies backed by the same PE firms as PE-related directors. Directors nominated by PE firms are also classified as PE-related directors. Second, we classified the directors whose function in the board is non-PE related, i.e. investment banker, chartered accountant, solicitor, lawyers, businessman, university professor, consultant, retired insiders, non-executive director, and non-executive chairman, director of an investing companies, advisor, and directors who are executive directors of other affiliated companies as outside directors. Independent outside directors do not hold ownerships of the target companies and are not employees of affiliated companies. Third, we define inside directors as the CEO, executive chairman, president, vice president, CFO, COO, managing director, finance director, sales director, operating director, manager, marketing director, general managers, company secretary, executive directors of subsidiaries, and other executive directors. We extract data on the independent outside directorship of insiders from Keynotes, https://www.duedil.com/ and http://company-director-check.co.uk/. Independent outside directorship is defined as holding a seat in the board of unaffiliated companies. Unaffiliated companies are classified as companies of which none of block holders is the director of inside director's home board, which are not in the same corporate group as an inside director's home company, and which do not have other observable relationship with the directors or the home company. Finally, we collected information on changes in the top management. In most deal announcements of SMBOs, the demission of top managers, such CEO, CFO, and/or managing directors, will be announced.[11] In cases without a CEO, CFO and managing director, we consider the executive chairman as top management. After combining these different data sources, we obtained a sample of 262 UK SMBOs.

Panel A in Table 1 presents the distributions of the sample SMBOs from 2000 to 2010, by entry, exit, and PE backing. This panel demonstrates that although there was a small decrease from 2002 to 2003, the number of entry SMBOs increased from 2000

over the world.

[11] In cases where we were not able to obtain this information from deal announcements, we turn to board's composition to check the changes in top management.

(except non-PE-backed SMBOs), consistent with other worldwide (e.g. Jenkinson and Sousa, 2014; Bonini, 2013) and UK (Jelic, 2011; Zhou et al., 2014) studies. This panel also demonstrates an increasing trend in the number of exits from SMBOs from 2003 to 2007. During 2007 to 2009, the number of exits from SMBOs decreased sharply but returned to pre-crisis levels more recently. There are 172 PE-backed and 90 non-PE-backed SMBOs.

Insert Table 1 about here

The results of our sample industry distribution by PE backing are reported in Panel B of Table 1. We classified our sample buyouts into 9 broad industries: Internet and Computers, Communications and Electronics, Business and Industrial, Consumer, Energy, Biotech and Healthcare, Financial Services, Business Services, and all others.[12] Similar to Zhou et al. (2014), Business Services (38.93%) is the largest industry group in our sample, followed by Consumer (24.05%) and Business and Industrial (22.90%). PE-backed SMBOs tend to be more popular in Consumer sector while less popular in Business and Industrial sector. The result of a Kolmogorov-Smirnov (K-S) test, however, suggest same industry distributions of PE-backed and non-PE-backed SMBOs.

3.2. Descriptive statistics[13]

Panel A of Table 2 presents descriptive statistics of the total sample and subsamples by PE-backing. Notably, the managerial ownership (*MGTSHARE*) accounts for 61.4% on average (60% in median) in full sample, suggesting high managerial ownership in SMBOs. Moreover, the median value of it in the non-PE-backed subsample is 100%. Second, we observe significant differences between PE-backed and non-PE-backed subsamples for all variables. PE-backed SMBOs have lower managerial ownership while higher leverage than non-PE-backed SMBOs. Also, PE-backed SMBOs exhibit better previous performance than non-PE-backed SMBOs. PE-backed SMBOs seem to be larger than non-PE-backed SMBOs. But non-PE-backed SMBOs spend longer in the secondary stage, compared to PE-backed SMBOs.

Insert Table 2 about here

Panel B presents the Pearson correlation for all variables used in our main regressions. The significant correlation coefficients between *MGTSHARE* and *LNSIZE* and

[12] For more details, see Zhou et al. (2013).
[13] Definitions of all variables are presented in Appendix 1.

MGTSHARE and *PE* are -0.60 and -0.71, respectively, suggesting potential multicollinearity problem in regressions.[14]

4. Empirical results

4.1. Changes and characteristics of SMBO boards: Post- vs. Pre- SMBOs

Table 3 presents our univariate analysis of board changes and characteristics in the sample SMBOs and differences between PE-backed and non-PE-backed SMBOs subsamples**.** The average board size (*BS*) of the full SMBO sample after SMBO transactions is 5.148 (Panel A). As expected, the average board size is lower than in large publicly owned companies in the UK.[15] The average board size of the full sample does not change significantly between the pre- and post- SMBO periods.

We find that the average board size of PE-backed SMBOs is larger than in non-PE-backed SMBOs, regardless of the pre-and post-SMBO phases. Furthermore, PE-backed SMBOs significantly increase the board size by 0.222, on average, after SMBO transactions. In contrast, in the non-PE-backed subsample the board size decreases significantly by 0.402, on average. We also observed significant changes in the configuration of the boards in sample SMBOs. For example, the fraction of inside directors on the board (*Insiders*) decreases significantly (by 4.219% on average) in PE-backed subsample while increases significantly (by 10.523% on average) in non-PE-backed subsample. There are more directors on average related to (i.e. appointed or employed by) PE firms (*PED*) in the post-SMBO phase (3.381% increase in full sample and 7.944% in PE-backed subsample) compared to the pre-SMBO phase. By contrast, the average fraction of independent outside directors on the boards (*Independent outsiders*) decreases significantly in both the full sample and the non-PE-backed subsample (1.100% and 2.321% on average, respectively). Similarly, we observed a significant decrease in other outsiders (*Others*). Overall, PE-backed SMBOs tend to replace insiders and non-PE-related outsiders with PE-related directors. Taking seats on boards, therefore, is still an important corporate governance mechanism in PE-backed SMBOs. Notably, the demand for hiring non-PE-related outsiders is weakened, because PE-related directors, per se, are experienced and

[14] To resolve this issue, we replace the managerial ownership with a dummy variable that equals 1 if the management participates in the SMBO transaction and zero otherwise. The regression results (See Appendix 2) are qualitatively similar as our main results. Hence, we still use the original variable definition for managerial ownership.

[15] Guest (2009) for example reports an average board size of 7.18 of his sample of large UK firms from 1981 to 2002.

professional experts who can satisfy the monitoring and advising demands. As expected, in non-PE-backed SMBOs more mangers (e.g. insiders) are taking seats on the board. Outsiders are more likely to be fired by non-PE-backed SMBOs, as outsiders are usually the representatives of the outside shareholders who exit through SMBOs.

Insert Table 3 about here

Panel B shows the characteristics of skilled insiders (*OD*) and their other engagements (*MOD*). In the five year period after the SMBOs, 17.669% of firm-year observable SMBOs have skilled insiders with independent outside directorships. The percentage of firm-year observable SMBO boards with skilled insiders in the PE-backed subsample (19.766%) is significantly greater than that of non-PE-backed subsample (13.911%). PE-backed SMBOs are therefore more likely to recruit skilled insiders onto the boards. However, we do not observe statistically significant differences between both subsamples with respect to the busy insiders (*MOD*).

Panel C demonstrates that 47.641% of SMBOs of the full sample SMBOs replace top managers such as CEOs and CFOs (*MGTCHAN*) after transactions. More specifically, 51.416% of SMBOs of the PE-backed subsample change top managers, which is significantly greater than in the non-PE-backed subsample (40.909%). Replacing top managers is therefore an important corporate governance mechanism adopted by PE firms. In addition, our results show that 21.189% of non-PE-backed SMBOs remove PE-related directors from their boards after SMBO transactions, along with the exit of selling PE firms.

4.2. Post-SMBO performance

We adopt the same measurements of post-SMBO abnormal performance as Barber and Lyon (1996). We measure abnormal performance (APit) as the difference between actual (Pit) and expected (E(Pit)) post-SMBO performance (i.e. profitability, productivity, employment growth, and sales growth):

$$APit = Pit - E(Pit) \qquad \textit{(equation 1)}$$

For expected performance, both the ‘level’ and ‘change’ models are applied (see Barber and Lyon, 1996). The ‘level’ model uses a company’s 3-year median pre-SMBO performance (P

it-1) as expected performance (E(Pit)):[16]

$$E(Pit) = P\ it\text{-}1 \qquad \textit{(equation 2)}$$

The 'change' model adjusts Pit-1 with the difference of industry control group's performance in period t and the industry's median pre-SMBO performance (ΔPI it):

$$E(Pit) = P\ it\text{-}1 + \Delta PI\ it \qquad \textit{(equation 3)}$$

Table 4 shows the abnormal performance of the sample SMBOs up to five years after SMBO transactions. Panel A presents the results of the sample. The results from the 'level' model demonstrate significant decreases in (unadjusted) performance, except for productivity which increases significantly. However, when we control for industry performance benchmark (i.e. industry adjusted performance), the results show a significant deterioration in performance, except for the sales growth. Underperformance is particularly evident in the forms of profitability (*AROA*), productivity (*ASALEMP*) and employment growth (*AEMPG*). This is the case both in the terms of the statistical significance and the number of companies with negative performance. Panel B presents the results stratified by PE backing. The results of the PE-backed subsample are similar to the results in Panel A. Other than the industry adjusted abnormal performance in productivity, the results of the non-PE-backed subsample do not demonstrate strong evidence of underperformance after SMBO transactions. When we use industry adjusted measurements, we do not observe significant and negative results of employment growth and sales growth.

Insert Table 4 about here

4.3. Characteristics of SMBO boards and post-SMBO performance-univariate analysis

Table 5 presents the univariate analysis of post-SMBO abnormal performance and key corporate governance variables. In Panel A, column (1) presents the differences in the median values of post-SMBO abnormal performance of SMBOs with and without skilled insiders (*OD*). SMBOs with skilled insiders on the boards perform better than their

[16] The median performance in the 3 years before the transaction was used in previous studies on operating performance (See Jain and Kini, 1994 and Jelic and Wright, 2011).

counterparts. For instance, the median values of abnormal performances of SMBOs that have skilled insiders on the boards are significantly greater than those of SMBOs that do not have skilled insiders on the boards in terms of productivity, employment growth, and sales growth (unadjusted difference: 0.020, 0.026, and 0.072, respectively; industry adjusted difference: 0.017, 0.029, and 0.073, respectively).[17]

Column (2) shows the difference in post-SMBO abnormal performance of SMBOs with and without replaced top managers (*MGTCHAN*). We do not observe strong evidence that SMBOs which replace top managers have a better post-SMBO abnormal performance than SMBOs not replacing top managers, except with regard to employment growth and unadjusted *AROA*. For example, the industry adjusted employment growth of SMBOs with replacing top managers is significantly smaller compared to their counterparts which did not replace top managers.

Column (3) focuses on the importance of removing PE-related directors from the board (*removed PED*). We tested the difference in abnormal performance between non-PE-backed SMBOs that used to have PE-related directors before transaction and non-PE-backed SMBOs that did not have PE-related directors either before or after SMBOs. We found that the former performs significantly worse than the latter in terms of employment growth (unadjusted difference: -0.063; industry adjusted difference: -0.076) and sales growth (industry adjusted difference: -0.084). These results suggest the importance of PE-related directors in improving the target companies' performance.

Insert Table 5 about here

In Panel B, we compare the median values of post-SMBO abnormal performance of SMBOs with and without skilled insiders and changing top managers in terms of PE backing. With respect to the PE-backed subsample, SMBOs with skilled insiders on the boards perform better than their counterparts in employment growth (industry adjusted) and sales growth (both unadjusted and industry adjusted). SMBOs with top managers' replacement outperform their counterparts in industry adjusted productivity while underperforming in industry adjusted employment growth. As to the non-PE-backed subsample, compared to SMBOs without skilled insiders on the boards, SMBOs with

[17] The difference in median values of industry adjusted *AROS* is 0.010, indicating that SMBOs with skilled insiders only weakly outperform those without skilled insiders in terms of industry adjusted *AROS* measured profitability.

skilled insiders on the boards perform better in *ROS* measured profitability (both unadjusted and industry adjusted), productivity (unadjusted), employment growth (industry adjusted), and sales growth (both unadjusted and industry adjusted). SMBOs which replace top managers perform better than others in unadjusted profitability (measured by both *ROA* and *ROS*). Overall, skilled insiders tend to play a more important role in the non-PE-backed subsample.

4.4. Characteristics of SMBO boards and post-SMBO performance-multivariate analysis

To test our hypotheses on the influence of board structure on post-SMBO performance, we use random-effects GLS regression. Our preference for the panel method over standard OLS is due to the fact that the panel method utilizes data from the entire post SMBO period while OLS relies on data from only one post SMBO year. In addition, the panel data method takes into account the effects of estimation error due to the correlation of the residuals across firms (Fama and French, 2001). [18]

$$AP_{it}=\alpha+\beta_1 LNBS_{it}+\beta_2\, PED_{it}+\beta_3 Independent\ outsiders_{it}+\beta_4 MGTCHAN_i+\beta_5 OD_{it}+\beta_6 MOD_{it}+\beta_7 MGTSHAR_{it}$$
$$+\beta_8 GEAR_{it}++\beta_9 LNDURATION_i+\beta_{10} LNSIZE_i+\beta_{11} Crisis_{it}+\beta_{12} ROAt\text{-}1_i+\beta_{13} PE_i+\varepsilon_{it} \qquad \textit{(Equation 4)}$$

Where, dependent variables (*APit*) are abnormal performance ratios of profitability (*AROA, AROS*), productivity (*ASALEMP*), employment growth (*AEMPG*), and sales growth (*ASALG*). According to Achleitner et al. (2012), SMBOs may reinforce management incentives via increased managerial ownership. This increased incentive may lead to a search for more growth opportunities. However, it may also induce greater entrenchment behavior especially if greater bargaining power of management is associated with reduced monitoring by PE investors in an SMBO (Raheja, 2005). For example, management may have greater discretion to search for and pursue riskier growth opportunities, especially if hubris leads them to enter areas beyond their existing expertise, with adverse implications for performance. We, therefore, control for management ownership (MGTSHAR). We also control for busy directors (MOD), as too many independent outside directorships (more than three) may decrease the individual's ability to

[18] In order to correct for heteroskedasticity of standard errors, z-statistics are based on robust standard errors. We also omit variables that cause multicollinearity problems.

focus on their own board (Fich and Shivdasani, 2006). Larger companies may be more profitable than smaller ones, while smaller ones may have more opportunities to grow. We therefore control for size (LNSIZE). Our period for performance includes the recent financial crisis. To take this into account, we include a dummy variable for crisis period from 2008 to 2010 (Crisis). Finally, we control for profitability prior to the SMBO (ROA_{t-1}), time to exit SMBOs (LNDURATION), PE backing (PE), and gearing (GEAR). [19] Definitions of all variables are presented in Appendix 1. The regression includes entry year dummies and industry dummies to control for time factor and industry factor.

The results of our regression models for the full sample are presented in Table 6. Panel A uses unadjusted abnormal performances while Panel B uses industry adjusted abnormal performance as a robustness test. In Panel A, the R-squared of the models varies from 5.71% (estimates for *ASALEMP*) to 14.10% (estimates for *AROA*). In Panel B, the R-squared of the models varies from 6.37% (estimates for *ASALG*) to 12.25% (estimates for *AROA*). Wald Chi2 is statistically significant in the models of all performance measures in both panels.

Insert Table 6 about here

We expected the board size (*LNBS*) to have a positive relationship with post-SMBO performance (H1). In Panel A, the coefficients on board size are not statistically significant, except for the model with the abnormal performance in employment growth (*AEMPG*). In *AEMPG* regression the coefficient on board size is negative and marginally significant (coefficient: -0.100, z-stat: -1.891). When we control for industry benchmark (Panel B), the coefficients for board size remain not statistically significant in all models. These do not lend support to H1. A possible reason could be related to our earlier findings that the average board size of the full sample does not change significantly after SMBO transactions.

We predicted a positive effect of the fraction of PE-related directors on the board (*PED*) on post-SMBO performance (H2). In Panel A, the effect of the fraction of PE-related directors on the board is positive and significant in the model for *AROA* (coefficient: 0.233, z-stat: 2.501), marginally significant in the model for *ASALEMP* (coefficient: 0.103, z-stat: 1.781), marginally significant in the model for *ASALG* (coefficient: 0.396, z-stat: 1.826), and insignificant in the other two models. The variation in the magnitude of the coefficient

[19] High gearing can multiple effects of good/bad performance. Duration is important since some of the improvements require longer period. Finally previous profitability was controlled for in previous related studies (Yermack, 1996; Wintoki et al., 2012).

suggests that the fraction of PE-related directors on the board matters most for profitability (*AROA*) and sales growth (*ASALG*). For example, a one point increase in the fraction of PE-related directors on the board leads to 23.3% and 39.6% increases in *AROA* and *ASALG*, while only 10.3% increases in *ASALEMP*. These findings are consistent with our prediction. When we use industry adjusted abnormal performance as the dependent variables, we find that the magnitude of the coefficient increases, compared to those from regressions using unadjusted abnormal performance (Panel B). For instance, a one point increase in the fraction of PE-related directors on the board leads to 24.8% (z-stat: 2.492), 11.4% (z-stat: 1.722), and 42.2% (z-stat: 2.009) increases in *AROA*, *ASALEMP*, and *ASALG*, respectively.

The coefficients for independent outsiders (*Independent outsiders*) are not statistically significant (models in both Panel A and Panel B), except in the model for *AEMPG* (Panel A). The positive impact of the fraction of independent outsiders on unadjusted abnormal performance in employment growth is economically and statistically significant (coefficient: 0.493, z-stat: 1.995), suggesting that a one point increase in the fraction of independent outsiders on the board will increase the unadjusted abnormal performance in employment growth by 49.3%. Thus, we find little evidence to support our H3. One interpretation of the above results is that PE-related directors already possess the necessary skills, experience, and knowledge, causing independent outsiders to be less important.

We also predicted that replacing top managers on the boards (*MGTCHAN*), especially CEOs, will improve post-SMBO performance (H4). Nevertheless, we only demonstrate a positive and significant relationship between replacing top managers and post-SMBO performance in both unadjusted (coefficient: 0.124, z-stat: 2.573) and industry adjusted (coefficient: 0.123, z-stat: 2.35) *ASALG*. This result is consistent with those in Cornelli and Karakar's paper (2013) that CEO turnover is not sensitive to previous performance and does not improve post-buyout operating performance.

Finally, we expected that skilled inside directors will enhance post-SMBO performance (H5). In other words, SMBOs with skilled insiders (*OD*) perform better than others.[20] The coefficients for skilled insiders are not statistically significant in regressions for unadjusted and industry adjusted abnormal performance in profitability (measured by

[20] We re-estimate the regressions with an alternative measure for skilled insiders by using the fraction of insiders (those we can identify the functions) with independent outside directorships on the board. The results are qualitatively similar, expect from the *OD* loses its significance in the model of *ASALEMP*.

both *AROA* and *AROS*). In Panel A, the coefficients for SMBOs with skilled insiders are positive and marginally significant in the model for *ASALEMP* (coefficient: 0.028, z-stat: 1.651), significant in the model for *AEMPG* (coefficient: 0.080, z-stat: 2.309), marginally significant in the model for *ASALG* (coefficient: 0.085, z-stat: 1.688). The SMBOs with skilled insiders on the boards (*OD*) exhibit higher positive changes in unadjusted productivity, employment growth, and sales growth. When using industry adjusted abnormal performance as the dependent variables in these three models (Panel B), the magnitude of the coefficients increases and the absolute values of t statistics become greater, suggesting even more influence on the post-SMBO performance. These results are consistent with our univariate analysis and our H5. Overall, skilled insiders (*OD*) are an important driver of post-SMBO performance.

Among the control variables, the busy directors dummy (*MOD*) does not impact post-SMBO performance. Higher leverage (*GEAR*) is associated with lower profitability (unadjusted: *AROA* and *AROS*; industry adjusted: *AROS*) in the post-SMBO phase.[21] As expected, the recent financial crisis is negatively associated with profitability (unadjusted *AROS*), productivity (industry adjusted *ASALEMP*), employment growth (unadjusted and industry adjusted *AEMPG*), and sales growth (unadjusted *ASALG*). Previous performance is negatively related to post-SMBO performance in profitability (unadjusted and industry adjusted *AROA* and *AROS*). Notably, PE backing (*PE*) does not seem to be an important factor of post-SMBOs performance.

5. Robustness checks and further analysis

5.1. Potential selection biases

5.1.1. PE investment

Recently, Wintoki et al. (2012) highlighted endogeneity issues related to dynamic relation between boards' characteristics and performance. The assertion about the dynamic relation is based on the Hermalin and Weisbach's (1998) model showing that board structure is partly a function of the bargaining between the board and the chief executive officer (CEO). If the company is performing well, the CEO's bargaining position is expected to be stronger. The authors also discuss where it may be appropriate to consider the dynamic panel GMM estimator in corporate governance research. We argue that in

[21] This result is in line with the evidence that SMBOs are cutting investments in order to meet their debt payments (Jenkinson and Sousa, 2014).

(primary) buyouts, in general, and in SMBOs, in particular, the above source of endogeneity may be of less importance. An arrival of PE investors and subsequent changes they make are less likely to be a consequence of negotiation process between CEO and board members as it is normally the case in large publicly owned companies. Instead, they are rather abrupt changes imposed by the PE firms.[22] The abrupt changes are part of the PE's tool kit for performance improvement. PE firms tend to have (almost) all power to make changes irrespective of the previous performance. In non-PE-backed (primary and even more secondary) buyouts ownership is concentrated in hands of managers/owners so bargaining position of the boards is again very limited.

In SMBO context, we conjecture that PE firms do not randomly choose buyouts in which to invest but conduct due diligence to select companies with certain characteristics leading to a greater probability of success in SMBO phase. SMBOs, therefore, it is the issue of sample selection rather than endogeneity that could lead to biased parameter estimates. The conjecture is in line with our sample descriptive statistics (Table 2) suggesting that PE-backed SMBOs tend to be different from non-PE-backed SMBOs in terms of size and pre-SMBO performance.

To address issues related to the potential selection bias, we employed a Heckman (1979) two-step model as a robustness test. The two step regressions are as follows:

$$PE_i=\alpha+\beta_1 BSERVICES_i+\beta_2 LNSIZE_i+\beta_3 ROAt\text{-}1_i+\varepsilon_i \qquad \textit{(Equation 5)}$$

$$AP_{it}=\alpha+\beta_1 LNBS_{it}+\beta_2\, PED_{it}+\beta_3 Independent\ outsiders_{it}+\beta_4 MGTCHAN_i+\beta_5 OD_{it}+\beta_6 MOD_{it}+\beta_7 MGTSHAR_{it}$$
$$+\beta_8 GEAR_{it}++\beta_9 LNDURATION_i+\beta_{10} LNSIZE_i+\beta_{11} Crisis_{it}+\beta_{12} ROAt\text{-}1_i+\beta_{13} PE_i+\beta_{14} Lambda1_i+\varepsilon_{it} \qquad \textit{(Equation 6)}$$

In the first step, we estimated a Probit regression with a robust variance estimate for the probability of a new PE firm's involvement in a sample SMBO. The dependent variable (*PE*) is a categorical variable equal to 1 if the SMBO is PE-backed and 0 otherwise (equation 3).[23] We hypothesize that the choice of a PE firm to invest in an SMBO is associated with size of the SMBO (*LNSIZE*), pre-SMBO performance (*ROAt-1*), and the target company's industry (*BSERVICES*).[24] *Lambda1* is the estimated probability of a PE firm's investment in an SMBO. In the second step, we include *Lambda1* as an additional

[22] Using Wintoki et al., (2012) terminology they tend to be much closer to 'natural experiment'.
[23] The Hosmer-Lemeshow suggests that the Probit model fits our data while the Logit model does not.
[24] The selected variables were identified as important variables for PE's investments in the existing literature. See Brau et al., (2003) and Strömberg, (2008) for size; Bienz, (2004) for pre-event performance; and Berger et al., (1999) and Bayar and Chemmanur, (2006) for industry.

explanatory variable to estimate the probability of a PE firm's investment in a SMBO.

The results of the Probit model and new panel regressions are presented in Table 7. Notably, the coefficient on the previous profitability in the Probit model is not statistically significant. Larger companies are more likely to become targets for SMBOs than smaller ones. The panel regression results are economically and statistically consistent with those reported in Table 6, except from the model for *AEMPG*. In the model for *AEMPG*, the fraction of PE-related directors on the boards (*PED*) is significantly and positively related to the changes in employment growth (coefficient: 0.371, z-stat: 1.718). Furthermore, *Lambda1* is significant, indicating the existence of a sample selection bias in the *AEMPG* model. Other main results are qualitatively similar to those in Table 3.6. Our main results in Table 6 are, therefore, qualitatively robust to the potential sample selection bias.

Insert Table 7 about here

5.1.2. PE-related directors

Another potential selection bias could be caused by the decision of PE firms to appoint PE-related directors onto the board. This decision may be driven by the target companies' quality and PE firms' ability to identify good deals (Chahine and Georgen, 2011). For instance, syndicated PE firms are more likely to take more seats on the board than others. Highly reputed PE firms are also more likely to identify good deals, hence, less likely to take seats on the boards than others. Similarly, high leverage could cause target companies under banks' close scrutiny, so PE firms may be less likely to take seats than deals with low leverage. Changing the top managers also reduces the probability of appointing PE-related directors. To address this issue, we still employed a Heckman (1979) two-step model again with the PE-backed SMBO subsample. The two step regressions are as follows:

$$PED\ dummy_{it}=\alpha+\beta_1 Club\ deals_i+\beta_2 Top10_i+\beta_3 LNSIZE_i+\beta_4 PE_i+\beta_5 GEAR_{it}+\beta_6 MGTCHAN_i+\beta_7 Crisis_{it}+\beta_8 ROAt\text{-}1_i+\varepsilon_{it} \quad \textit{(Equation 7)}$$

$$AP_{it}=\alpha+\beta_1 LNBS_{it}+\beta_2\ PED_{it}+\beta_3 Independent\ outsiders_{it}+\beta_4 MGTCHAN_i+\beta_5 OD_{it}+\beta_6 MOD_{it}+\beta_7 MGTSHAR_{it}+\beta_8 GEAR_{it}++\beta_9 LNDURATION_i+\beta_{10} LNSIZE_i+\beta_{11} Crisis_{it}+\beta_{12} ROAt\text{-}1_i+\beta_{13} PE_i+\beta_{14} Lambda2_i+\varepsilon_{it} \quad \textit{(Equation 8)}$$

In the first step, we estimated a Logit regression with a robust variance estimate for the probability of PE firms holding seats on the board of the sample SMBO. The dependent

variable (*PED dummy*) is a categorical variable that equals 1 if the SMBO board has PE-related directors and 0 otherwise (equation 5).[25] We hypothesized that the decision of a PE firm to appoint its own people onto the board is associated with the following: whether the deal is syndicated or not (*Club deals*); the high reputation of the leading PE firms (*Top10*); the size of the SMBO (*LNSIZE*); whether the SMBO is PE backed (*PE*); leverage (*GEAR*); whether the board replaces top managers (*MGTCHAN*); financial crisis (*Crisis*); and pre-SMBO performance (*ROAt-1*).[26] *Lambda2* is the estimated probability of PE-related directors on the boards. In the second step, we include *Lambda2* as an additional explanatory variable. All results are presented in Table 8. The results are consistent with our main results presented in Table 6 and *Lambda2* is insignificant in all models. The self-selection bias related to PE-related directors is, therefore, not important in our dataset.

Insert Table 8 about here

5.2. Replacement of top managers and previous performance

Companies with poor performance tend to replace CEOs (Hermalin and Weisback, 2003). Thus, the impact of replacing top managers will depend on companies' previous performance. And companies that perform poorly would be more likely replace top managers (e.g. Christian and Marc, 2011). We, therefore, include an interactive variable (*ROAt-1* MGTCHAN*) between the dummy variable for the replacement of top managers (*MGTCHAN*) and the (continuous) variable for previous performance (*ROAt-1*). If the decision to replace top managers depends on previous performance, the coefficient on this interactive variable should be significant.

The coefficients for the interactive variable represented in Table 9 are not statistically significant. The relationship between the decision to replace top managers and post-SMBO performance is not statistically affected by the previous performance.

Insert Table 9 about here

5.3. PE-related directors and PE firm's reputation

Highly-reputed PE firms often hire better PE specialists and invest in more

[25] The Hosmer-Lemeshow suggests that Logit model fits to our data while Probit model does not.
[26] The selected variables were identified as important variables for PE-related directors in previous literature (see Chahine and Georgen, 2011; Cornelli and Karakas, 2013).

companies.[27] Given that the number of PE specialists is limited, holding multiple board seats will increase the number of portfolio companies per PE specialist. As a consequence, PE specialists will not be able to spend enough time and energy on a single company and probably fail to add value. Alternatively, PE firms could hire more PE specialists to meet the demand for their expertise. We expect that highly-reputed PE firms can attract better specialists and achieve more efficient allocation of PE specialists across portfolio companies. Thus, the reputation of PE firms may affect the relationship between the fraction of PE-related directors and post-SMBO abnormal performance.

We therefore introduce the interaction term (*PED*Top10*) of highly-reputed PE firms (*Top10*) and the fraction of PE-related (*PED*). [28] Hence, we repeated the regressions for the PE-backed subsample. The results are reported in Table 10. The interaction term is negative and statistically significant in the model for *AROS* (coefficient: -0.381, z-stat: -2.691); significant in the model for *AEMPG* (coefficient: -0.860, z-stat: -2.630); marginally significant in the model for *ASALG* (coefficient: -0.723, z-stat: -1.740); and not significant in the other two models. When SMBOs are backed by highly-reputed PE firms, the fraction of PE-related directors has a weaker relationship with post-SMBO performance. Interestingly, the negative effect of the interaction term is greater than the main effect of the fraction of PE-related directors. As a consequence, the total effect of the fraction of PE-related directors will be negative in SMBOs backed by highly reputable PE firms.

Insert Table 10 about here

5.4. Removal of PE-related directors

In the univariate analysis we find that non-PE-backed SMBOs that remove PE-related directors from the board tend to underperform their counterparts. The boards undergoing transition towards operating without having PE-related directors may be badly affected and thus perform worse than those whose boards not undergoing such a transition. Hence, we included a dummy variable for the removal of PE-related directors from the respective board (*Remove PED*) and repeated the regressions for the non-PE-backed subsample.

The results are presented in Table 11. Surprisingly, the coefficients on the dummy variable of removing PE-related directors are not statistically significant in all models.

[27] Here we only discuss the leading PE firms.
[28] We create a dummy variable (*Top10*) for top 10 PE firms.

Moreover, our results show the coefficients for our main explanatory variables (*LNBS*, *Independent outsiders*, *MGTCHAN*, and *OD*) are not statistically significant. The coefficient for replacing top managers (*MGTCHAN*) in model for *AROS* measured profitability (coefficient:-0.115; z-stat: -1.959) is statistically significant at the 10% level. One possible explanation for the insignificant coefficient for having skilled insiders on boards (*OD*) could be that the investors in non-PE-backed SMBOs tend to be senior managers. If they held seats on the boards in the pre-SMBO phase, they would not be able to bring a new expertise to the boards in the post-SMBOs phase. Furthermore, manager-shareholders might not be as good at choosing skilled executives as PE firms.

Insert Table 11 about here

5.6. Early vs. late exits

Primary PE firms may exit early due to the limited life of PE fund or may try to enhance their reputation by creating a track record of exits. When PE firms exit early, especially in the first 2-3 years, the value creation potential may not be exhausted, thus leaving performance improvement potential for the secondary round. Both Arcot et al. (2014) and Degeorge et al. (2013) find that SMBO exits are more likely when sellers are under exiting pressure to exit than those not encountering such pressure. Under this scenario, corporate governance mechanisms (e.g. changing top managers, employing independent outsiders) should improve the operating performance as a result. In SMBOs with long holding periods in the pre-SMBO phase, the relationships between the measures of the mechanisms adopted to improve the monitoring and advisory functions of boards and the post-SMBO performance are therefore expected to be weaker.

Insert Table 12 about here

We stratified the SMBO sample by duration of time spent in the primary stage. We classified SMBOs with a primary holding period of less than 3 years and of equal to or longer than 3 years into the 'early' subsample and the 'late' subsample, respectively.[29] The results are presented in Table 12. Our results of 'early' subsample (Panel A) show that the coefficient for the fraction of PE-related directors (*PED*) is positive and marginally statistically significant in the model for *AEMPG* (coefficient: 0.732, z-stat: 1.798). The fraction of independent outsiders is positively and significantly associated with post-SMBO

[29] We also considered analyzing cases where the holding period was shorter than 2 years. However, there are only 19 SMBOs that meet this criterion, causing the regression to be invalid.

performance in *AEMPG* (coefficient: 2.144, z-stat: 2.309) and *ASALG* (coefficient: 1.898, z-stat: 1.840). It should be noticed that the magnitudes of the coefficients are very high. Independent outsiders tend to play a crucial role in improving post-SMBO growth performance. Moreover, the effect of replacing top managers (*MGTCHAN*) is stronger than the results for the full sample. For instance, the coefficient on replacing top managers is 0.098 (z-stat: 2.105) in the model for *AROA* measured profitability and 0.366 (z-stat: 2.150) in *ASALG*. In addition, we find that having skilled insiders (*OD*) is positively and significantly related to the post-SMBO performance in *AROA* measured profitability (coefficient: 0.093, z-stat: 2.621) and *AEMPG* (coefficient: 0.261, z-stat: 2.319).

In the case of the 'late' subsample (Panel B), we found a stronger impact of the fraction of PE-related directors (*PED*) on the post-SMBO performance compared to the results in 'early' subsample. For instance, the coefficient for the fraction of PE-related directors is positive and marginally significant in the model for *AROA* (coefficient: 0.179, z-stat: 1.778), significant in the model for AEMPG (coefficient: 0.219, z-stat: 2.730), and significant in the model for *ASALG* (coefficient: 0.137, z-stat: 2.161). We also find a significantly positive relationship between skilled insiders (*OD*) and *ASALEMP*, lending some support to the argument that SMBOs exited late in the primary stage are difficult and could have no value creation room left.

The above results demonstrate that the characteristics of the board of directors play an important role in the performance improvement in the 'early' subsample. Furthermore, for more difficult SMBOs (i.e. the 'late' subsample) with a little performance improvement potential left, the special skills of PE-related directors tend to be of crucial importance.

6. Conclusion

Using a unique, hand-collected dataset of 262 UK SMBO deals, we analyzed important changes in the board of directors in SMBOs and their effect on post-SMBO performance. We argue that the new board structures could improve SMBOs' performance. Our univariate results document significant changes in the board of directors in SMBOs. There are also significant differences between our PE-backed and non-PE-backed subsamples. For example, the board size decreases significantly in the non-PE-backed subsample while PE-backed SMBOs tend to increase the size of their boards after SMBO transactions. Non-PE-backed SMBOs are more likely to increase the fraction of insiders.

Boards in the non-PE-backed subsample exhibit a significant decrease in the fraction of independent outsiders. In contrast, PE-backed SMBOs appoint more PE-related directors in the post-SMBO transaction phase than in the pre-SMBO transaction phase. PE-backed SMBOs are also more likely to replace top managers (e.g. CEO/CFOs), and appoint skilled insiders as directors.

The results from the univairate analysis show statistically significant underperformance after SMBOs. Furthermore, SMBOs with skilled insiders outperform SMBOs without skilled insiders especially in terms of productivity and growth. The results are robust to alternative performance measures. We also find that removing PE-related directors leads to worse post-SMBO performance in employment growth and sales growth. However, we find little evidence that SMBOs that replace the top managers perform better than others.

As to the multivariate results, we have documented the lack of a statistically significant influence of board size on performance (i.e. profitability, productivity, sales growth). The results contradict the evidence for samples of larger publicly owned (Yermack, 1996) and smaller closely held (non-buyout) companies (Eisenberg et al., 1998) and are more in line with Wintoki et al. (2012). Furthermore, our results show that the fraction of PE-related directors on the board has a positive and significant impact on post-SMBO performance in profitability (*AROA*), productivity, and sales growth. In addition, appointing skilled insiders onto the board leads to better post-SMBO performance in productivity, employment growth, and sales growth. This is consistent with the results of our univariate analysis. Finally, we find little evidence that the fraction of independent outsiders and replacing top managers improves post-SMBO performance. The fraction of independent outsiders has a positive and significant relationship only with post-SMBO employment growth. Replacing top managers only enhances post-SMBO performance in sales growth. These results are robust to alternative abnormal performance benchmarks and potential selection biases.

Our robustness checks show that previous performance does not significantly affect the relationship between replacing top managers and post-SMBO performance. Secondly, the impact of PE-related directors on improving post-SMBO performance tends to be alleviated by PE reputation. This result suggests the importance of PE firms' experience, knowledge, and /or network on enhancing target company performance. Thirdly, we

examined the influence of the removal of PE-related directors on post-SMBO performance in non-PE-backed subsample. However, we did not obtain any evidence to support the importance of removal of PE-related directors for the performance. Finally, we compared the early and late exits. In the subsample of "difficult" SMBOs ('late' exit), appointing more PE-related directors tends to be the most important driver for the performance improvement. In the 'early' subsample, including independent outsiders, replacing top managers, and having skilled insiders play a more important role in performance improvement.

This study has highlighted the importance of the board of directors for post-SMBO performance. Although SMBOs tend to underperform, there are still ways to improve performance via the impact of the board of directors. This is especially the case for employment and sales growth. This is consistent with the fact that the majority of SMBOs tend to be in an expansion phase which requires idiosyncratic, skills, and capabilities to exploit growth opportunities. In another words, the boards tend to enhance the boards' advisory function of SMBOs.

There are several limitations to our research. First, we were not always able to obtain full information on board composition for our sample, especially concerning the classification of executive and non-executive directors. Second, the reasons for changes in top management were not always clearly disclosed. This issue prevents us from further investigating the reasons for the negative relationship between top management change and post-SMBO performance in employment growth.

Table 1: Sample distribution across years and industries

This table shows SMBOs distribution across years and industries by full sample and PE backing. Panel A shows the number of entry and exited SMBOs across the years. Exit is defined as the SMBO which was exited by 31st, December, 2010. Panel B shows industry distribution of SMBOs. Reported figures are the proportion of SMBOs in industry groups. Reported P-value is two samples Kolmogorov Smirnov (K-S) test for the difference in industry distributions across PE backing. Details of industry grouping are discussed in section 3.1.

Panel A: Sample distribution across years

	Full sample		PE backing			
			PE		Non PE	
Year	Entry	Exit	Entry	Exit	Entry	Exit
2000	6		4		2	
2001	18		12		6	
2002	26		13		13	
2003	16	2	7	2	9	
2004	44	5	28	4	16	1
2005	49	10	28	5	21	5
2006	48	13	37	12	11	1
2007	55	23	43	17	12	6
2008		16		8		8
2009		12		8		4
2010		17		12		5
Total	262	98	172	68	90	30

Panel B: Sample distribution across industries

	Full sample	PE backing	
Industry (%):		PE	Non PE
1. Internet &Computers	2.67	2.91	2.22
2. Communications & Electronics	3.82	3.49	4.44
3. Business & Industrial	22.9	18.02	32.22
4. Consumer	24.05	26.74	18.89
5. Energy	1.15	1.16	1.11
6. Biotech and Healthcare	3.82	5.81	0
7. Business Services	38.93	38.95	38.89
8. All other	2.67	2.91	2.22
Total sample	100	65.65	34.35
P-value of PE vs. Non-PE:			0.133

Table 2: Sample descriptive statistics and Pearson correlation

This table shows sample descriptive statistics and Pearson correlations. Panel A presents descriptive statistics of the full sample (mean, median and standard deviation) and across PE backing (median) for control variables: management share (*MGTSHARE*), leverage (*GEAR*), return on assets in year prior to SMBO(*ROAt-1*), the logarithm of the holding period (*LNDURATION*), the logarithm of the size of SMBOs (*LNSIZE*), financial crisis (*Crisis*), and PE backing (*PE*). N is the number of SMBOs for *ROAt-1, LNDURATION, LNSIZE,* and *PE* and is the number of firm-year observations for *MGTSHARE, GEAR,* and *Crisis*, up to five year after SMBO transactions. Differences are the differences of median values between PE-backed and non-PE-backed SMBOs. The Mann Whitney test is used to test the differences. Panel B presents the Pearson correlations for all variables. ***, **, *, indicate the significance of the test at the 1, 5, and 10 % levels respectively. The variables are defined in Appendix 1.

Panel A: Descriptive statistics

	Full sample				PE backing (median)		
	N	mean	S.D.	median	PE	Non PE	Differences
MGTSHARE	853	0.614	0.341	0.600	0.406	1.000	-0.594***
GEAR	727	1.421	1.850	0.730	0.770	0.640	0.129**
ROAt-1	255	0.115	0.131	0.100	0.115	0.085	0.030***
LNDURATION	262	1.721	0.192	1.732	1.708	1.820	-0.112***
LNSIZE	261	2.735	1.650	2.862	3.588	1.030	2.558***
Crisis	1285	0.596	0.491	1	1	1	0.000***
PE	262	0.653	0.476	1	N/A	N/A	N/A

Panel B: Pearson correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
ARROA(1)	1																
ARROS(2)	0.48***	1															
ARSALEMP(3)	0.16***	0.08*	1														
AREMPG(4)	0.12***	0.13***	0.04	1													
ARSALG(5)	0.20***	0.07	0.38***	0.62***	1												
LNBS(6)	0.05	0.06	-0.05	-0.07*	0.00	1											
PED(7)	-0.02	-0.01	-0.06	0.01	0.03	0.34***	1										
Independent outsiders (8)	-0.05	-0.02	-0.03	0.09**	0.12***	0.08***	-0.05*	1									
MGTCHAN (9)	0.03	0.02	0.02	-0.01	0.10**	-0.05**	0.06**	0	1								
OD (10)	0.02	0.03	0.04	0.09**	0.13***	0.20***	0.01	-0.02	-0.02	1							
MOD(11)	-0.02	0.02	-0.01	0.02	0.07*	0.07**	0.01	-0.02	0	0.48***	1						
MGTSHARE(12)	0.14***	0.02	-0.04	-0.02	-0.05	-0.34***	-0.54***	-0.14***	-0.08**	-0.11***	-0.04	1					
GEAR(13)	-0.03	-0.04	0	-0.06	-0.04	0.09**	0.04	-0.03	-0.05	0.08**	0.03	-0.15***	1				
LNDURATION (14)	-0.09**	0.04	0.15***	0.05	-0.04	-0.25***	-0.25***	0.07**	0.02	-0.07**	-0.02	0.22***	-0.10***	1			
LNSIZE (15)	-0.07**	0.04	-0.04	-0.02	0.01	0.39***	0.48***	0.03	-0.01	0.07	0	-0.60***	0.09**	-0.19***	1		
Crisis(16)	0.01	0.01	-0.10**	-0.02	0.06	0.02	0.14***	-0.07**	-0.03	-0.09	-0.05	-0.07*	-0.06*	-0.23***	0.12***	1	
ROAt-1(17)	-0.22***	-0.17***	-0.01	-0.13***	-0.10**	0.08**	0.05*	0.02	-0.03	-0.01	0.02	-0.04	-0.08**	0.17***	0.12***	0.02	1
PE (18)	-0.09***	-0.01	-0.06	-0.01	-0.02	0.26***	0.57***	0.05**	0.10***	0.14***	0.04**	-0.71***	0.10***	-0.19***	0.55***	0.11***	0.11***

Table 3: Changes and characteristics of SMBO boards- univariate analysis

This table presents changes and characteristics of SMBO boards, up to five years after SMBO transactions. Panel A shows changes in board size and board composition. Presented values are mean values of each variable three years pre- and five years post- SMBO transactions. Difference values are calculated as post-SMBO mean value of each variable minus its pre-SMBO mean value. Panel B reports the percentage of firm-year observations of SMBOs with skilled inside directors (*OD*) and the percentage of firm-year observations of SMBOs with busy inside directors (*MOD*) during SMBO phases, for the full sample and by PE-backing. The difference value is the difference of these values between PE-backed and non-PE-backed subsamples. Panel C presents the percentages of SMBOs that changed the top management in transaction year (*MGTCHAN*), and the percentage of non-PE-backed SMBOs that removed PE directors from the boards in the transaction year (*Remove PED*). We used a two-tailed t-test and two-sample proportion test of the differences in means and proportions, respectively. All variables are defined in Appendix 1. *, **, ***, are significant at the 10%, 5%, and 1% levels respectively.

Panel A:	No. of observations	Full sample			PE backing (mean)					
		Mean			PE			Non- PE		
		Post	Pre	Difference	Post	Pre	Difference	Post	Pre	Difference
BS (N)	1832	5.148	5.154	-0.006	5.509	5.287	0.222**	4.509	4.911	-0.402***
Insiders (%)	1832	78.038	76.871	1.167	69.458	73.677	-4.219***	93.224	82.701	10.523***
PED (%)	1832	12.163	8.782	3.381***	18.828	10.884	7.944***	0.368[30]	4.945	-4.578***
Independent outsiders (%)	1832	3.320	4.420	-1.100***	3.756	4.356	-0.600	2.216	4.537	-2.321***
Others (%)	1832	6.599	9.927	-3.328***	7.958	11.083	-3.125***	4.192	7.817	-3.625***

Panel B:	No. of observations	Full sample	PE backing		
			PE	Non-PE	Difference
OD (%)	1064	17.669	19.766	13.911	5.855**
MOD (%)	1064	5.155	4.978	5.469	-0.491

Panel C:	No. of SMBOs	Full sample	PE backing		
			PE	Non-PE	Difference
MGTCHAN (%)	262	47.641	51.416	40.909	10.507**
Remove PED (%)	91	-	-	21.189	-

[30]Two cases of non-PE-backed SMBOs have PE specialists on the boards.

Table 4: Post-SMBO performance

This table presents the median values of abnormal performance measures for the full sample, up to five post-SMBO years (Y 1-5). Abnormal performance (AP_{it}) is calculated as:$AP_{it} = P_{it} - E(P_{it})$. where, P_{it} is the actual performance in year t after SMBO transactions while $E(P_{it})$ is the expected performance of the target company in year t after SMBO transactions. It is estimated by two models: $E(P_{it}) = P_{i,t-k}$, and $E(P_{it}) = P_{i,t-k} + \Delta PI_{it}$; where, the former is 'level' model using unadjusted benchmark and the latter is 'change' model using industry adjusted benchmark. Panel A presents results for the full sample while Panel B presents results by PE backing. All results used 99% winsorized data. Wilcoxon signed rank test (median=0, vs. median≠0) is adopted to test the significance of abnormal performance. ***, **, *, indicate significance at the 1%, 5%, and 10 % level respectively. All variables are defined in Appendix 1.

Panel A: Full sample

		YI	Y2	Y3	Y4	Y5
Profitability	Benchmarks					
AROA	$E(P_{it}) = P_{it-k}$	-0.009**	-0.015***	-0.025***	-0.033***	-0.046***
		(248:115)	(215:85)	(164:60)	(128:46)	(85:31)
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	-0.007**	-0.031***	-0.038***	-0.057***	-0.009
		(244:115)	(212:77)	(160:55)	(102:32)	(62:30)
AROS	$E(P_{it}) = P_{it-k}$	0.011**	0.002	-0.003	-0.014**	-0.016**
		(195:109)	(169:85)	(131:61)	(103:43)	(74:26)
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.009	-0.003	-0.006*	-0.007	-0.007
		(191:106)	(164:78)	(127:54)	(78:35)	(51:23)
Productivity						
ASALEMP	$E(P_{it}) = P_{it-k}$	0.032***	0.028***	0.017*	0.029	-0.008
		(180:120)	(157:100)	(116:66)	(91:56)	(52:24)
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	-0.024***	-0.042***	-0.068***	-0.071***	-0.086***
		(166:62)	(140:45)	(106:29)	(63:20)	(29:8)
Growth ratios						
AEMPG	$E(P_{it}) = P_{it-k}$	-0.011	-0.037***	-0.051***	-0.061***	-0.056**
		(187:110)	(158:77)	(121:45)	(71:23)	(39:11)
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	-0.021	-0.032*	-0.050**	-0.056*	-0.036
		(160:71)	(133:56)	(99:32)	(55:24)	(27:11)
ASALG	$E(P_{it}) = P_{it-k}$	-0.027**	-0.049***	-0.051***	-0.098***	-0.141***
		(173:78)	(151:58)	(115:41)	(63:20)	(39:9)
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	-0.003	-0.022	-0.04	0.019	-0.031
		(169:84)	(147:70)	(112:50)	(62:36)	(39:16)

Panel B: PE vs. Non-PE-backed

		PE-backed					Non PE-backed				
		YI	Y2	Y3	Y4	Y5	YI	Y2	Y3	Y4	Y5
Profitability	Benchmarks										
AROA	$E(P_{it}) = P_{it-k}$	-0.012**	-0.026***	-0.037***	-0.048***	-0.074***	-0.005	-0.007	-0.009	-0.016*	-0.001
		(161:75)	(144:54)	(106:34)	(76:26)	(45:11)	(87:40)	(71:31)	(58:26)	(52:20)	(40:20)
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	-0.010*	-0.032***	-0.047***	-0.067***	-0.100**	-0.001	-0.031***	-0.021	-0.044**	0.019
		(158:72)	(142:53)	(103:31)	(58:15)	(26:9)	(86:43)	(70:24)	(57:24)	(44:17)	(36:21)
AROS	$E(P_{it}) = P_{it-k}$	0.018**	0.003	-0.002	-0.010	-0.032***	0.004	-0.004	-0.004	-0.016***	-0.004
		(123:71)	(114:59)	(85:41)	(58:27)	(40:12)	(72:38)	(55:26)	(46:20)	(45:16)	(34:14)
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.014	0.004	-0.008	0.002	-0.001	0.004	-0.013	-0.006	-0.015*	-0.014
		(120:68)	(110:57)	(82:35)	(40:21)	(20:10)	(71:38)	(54:21)	(45:19)	(38:14)	(31:13)
Productivity											
ASALEMP	$E(P_{it}) = P_{it-k}$	0.043***	0.034***	0.025**	0.011	-0.133***	0.021**	0.024*	0.005	0.041	0.030
		(115:80)	(104:68)	(74:43)	(52:29)	(27:8)	(65:40)	(53:32)	(42:23)	(39:27)	(25:16)
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	-0.018	-0.035**	-0.057**	-0.024	-0.142*	-0.036***	-0.053***	-0.110***	-0.071***	-0.065*
		(107:48)	(95:34)	(69:21)	(35:15)	(10:8)	(59:14)	(45:11)	(37:8)	(31:5)	(19:6)
Growth ratios											
AEMPG	$E(P_{it}) = P_{it-k}$	-0.001	-0.037*	-0.076***	-0.061**	-0.056	-0.033**	-0.036**	0.004	-0.059	-0.058*
		(120:60)	(107:44)	(84:26)	(41:13)	(17:2)	(67:26)	(51:17)	(37:19)	(30:10)	(22:6)
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	-0.015	-0.033	-0.094***	-0.089*	-0.006	-0.031	-0.029	-0.010	0.015	-0.066
		(103:49)	(90:37)	(69:18)	(31:11)	(10:4)	(57:22)	(43:19)	(30:14)	(24:13)	(17:7)
ASALG	$E(P_{it}) = P_{it-k}$	0.001	-0.07***	-0.067***	-0.138**	-0.201***	-0.042**	-0.028	-0.042	-0.032	-0.091**
		(113:57)	(102:35)	(78:26)	(33:8)	(14:1)	(60:21)	(49:23)	(37:15)	(30:12)	(25:8)
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.011	-0.013	-0.045*	-0.061	-0.051	-0.021	-0.044	0.012	0.067*	-0.031
		(111:58)	(100:48)	(77:32)	(33:15)	(14:6)	(58:26)	(47:22)	(35:18)	(29:21)	(25:10)

Table 5: Changes and characteristics of SMBO boards and post-SMBO performance-univariate results

This table presents the difference of post-SMBO abnormal performance by having skilled insiders (*OD*), changing top management (*MGTCHAN*), and removing PE directors out from the board (*Remove PED*).[31] The difference is calculated as the median value of post-SMBO abnormal performance of SMBOs that have skilled insiders (or, changing the top management, removing PE-related directors) minus the median value of post-SMBO abnormal performance of SMBOs that do not have skilled insiders (or, do not change the top management, do not removing PE-related directors). Abnormal performance (AP_{it}) is calculated as:$AP_{it} = P_{it} - E(P_{it})$. where, P_{it} is the actual performance in year t after SMBO transactions while $E(P_{it})$ is the expected performance of the target company in year t after SMBO transactions. It is estimated by two models: $E(P_{it}) = P_{i,t-k}$, and $E(P_{it}) = P_{i,t-k} + \Delta PI_{it}$; where, the former is 'level' model using unadjusted benchmark and the latter is 'change' model using industry adjusted benchmark. Panel A presents the results for the full sample while Panel B presents the results by PE backing. The Wilcoxon rank-sum test is used to test the null hypothesis of difference in median =0. ***, **, *, indicate significance of the test at the 1, 5, and 10 per cent levels, respectively.

Panel A: Full sample

		(1)	(2)	(3)
		OD	MGTCHAN	Remove PED
Profitability ratios	Benchmarks			
AROA	$E(P_{it}) = P_{it-k}$	0.008	-0.003	-0.012
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.01	0.007	-0.036
AROS	$E(P_{it}) = P_{it-k}$	0.007	0.012**	0.001
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.010*	0.009	0.006
Productivitys				
ASALEMP	$E(P_{it}) = P_{it-k}$	0.020**	0.005	0.006
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.017*	0.004	-0.02
Growth ratios				
AEMPG	$E(P_{it}) = P_{it-k}$	0.026*	-0.023	-0.063***
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.029**	-0.014**	-0.076***
ASALG	$E(P_{it}) = P_{it-k}$	0.072***	0.004	-0.059
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.073***	0.040*	-0.084**

[31] Only for the non-PE-backed SMBO subsample.

Panel B: PE vs. Non-PE-backed

		PE-backed		Non-PE-backed	
		(1)	(2)	(3)	(4)
		OD	MGTCHAN	OD	MGTCHAN
Profitability ratios	Benchmarks				
AROA	$E(P_{it}) = P_{it-k}$	0.010	-0.022	0.005	0.024**
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.004	-0.002	0.029	0.033
AROS	$E(P_{it}) = P_{it-k}$	0.006	0.01	0.007*	0.015**
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.006	0.01	0.015**	0.011
Productivity					
ASALEMP	$E(P_{it}) = P_{it-k}$	0.017	0.016	0.045**	-0.014
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.014	0.023**	0.019	-0.021
Growth ratios					
AEMPG	$E(P_{it}) = P_{it-k}$	0.026	-0.025	0.028	-0.006
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.037*	-0.035***	0.051*	0.023
ASALG	$E(P_{it}) = P_{it-k}$	0.049**	0.014	0.080**	0.011
	$E(P_{it}) = P_{it-k} + \Delta PI_{it}$	0.044**	0.051	0.117*	0.043

Table 6: Changes and characteristics of SMBO boards and post-SMBO performance-regression results

This table reports the results of the panel regression for the influence of board changes and characteristics on post-SMBO performance, up to five years after the SMBO. The dependent variables are abnormal performance in profitability (*AROA* and *AROS*), productivity (*ASALEMP*), employment growth (*AEMPG*), and sales growth (*ASALG*). Panel A uses unadjusted abnormal performance ('level' model), while Panel B uses industry adjusted abnormal performance ('change' model). The models in Panel A include entry year dummies and industry dummies and those in Panel B include entry year dummies.[32] The results are based on 99% winsorized data. All parameters are estimated by a GLS random-effects model with robust standard error and omitted collinear covariates. The coefficients and z-statistics are reported. P-values for the Wald test (Wald Chi ^{2}) are for probability > Chi ^{2}. N reports the number of firm-year observations used in the panel model. ***, **,* are significance at the 1%, 5%, and 10 % levels respectively. The variables are defined in Appendix 1.

Panel A: Unadjusted abnormal performance

	AROA	AROS	ASALEMP	AEMPG	ASALG
LNBS	-0.017	-0.001	-0.034	-0.100*	-0.021
	-0.669	-0.04	-1.337	-1.891	-0.262
PED (%)	0.233**	0.067	0.103*	0.340	0.396*
	2.501	0.739	1.781	1.554	1.826
Independent outsiders (%)	0.125	0.042	0.014	0.493**	0.375
	0.949	0.680	0.150	1.995	1.432
MGTCHAN	0.059	-0.008	0.016	0.003	0.124**
	1.004	-0.230	0.479	0.076	2.573
OD	-0.011	0.023	0.028*	0.080**	0.085*
	-0.479	1.171	1.651	2.309	1.688
MOD	-0.018	-0.030	-0.025	-0.091	0.109
	-0.597	-1.017	-0.346	-1.427	1.216
MGTSHARE	0.014	-0.064*	0.022	-0.087	0.116
	0.418	-1.796	0.673	-0.873	0.946
GEAR	-0.018**	-0.021***	0.003	0.002	0.004
	-2.250	-2.905	0.568	0.147	0.298
LNDURATION	-0.117	0.237**	0.045	0.230	0.101
	-1.032	1.963	0.276	1.329	0.623
LNSIZE	0.007	0.018	0.015	0.003	0.028
	0.564	0.740	0.769	0.156	1.100
Crisis	-0.015	-0.016**	0.006	-0.060**	-0.091***
	-1.058	-2.414	0.540	-2.434	-2.824
ROA t-1	-0.590***	-0.518**	-0.327	-0.160	-0.330
	-3.682	-2.524	-1.229	-0.868	-1.128
PE	-0.099	-0.057	0.044	-0.093	-0.107
	-1.618	-1.310	0.808	-1.342	-1.303
INTERCEPT	-0.908	-0.274	0.003	-0.033	-0.195
	-0.885	-0.884	0.009	-0.099	-0.566
Year dummy	YES	YES	YES	YES	YES
Industry dummy	YES	YES	YES	YES	YES
R-square (%)	14.1	9.44	5.71	7.83	8.55
Wald Chi2	53.491***	43.436**	77.612***	53.018***	57.847***
N	654	541	488	487	466

[32] The results for industry adjusted abnormal performance including both year dummies and industry dummies are very similar to the results without including industry dummies, except for the coefficient on *Independent outsiders* is significant in the model for *AEMPG* in the former model specifications.

Panel B: Industry adjusted abnormal performance

	AROA	AROS	ASALEMP	AEMPG	ASALG
LNBS	0.016	-0.019	-0.024	-0.064	-0.064
	0.384	-0.955	-0.774	-1.322	-0.769
PED (%)	0.248**	0.069	0.114*	0.332	0.422**
	2.492	1.082	1.722	1.427	2.009
Independent outsiders (%)	0.067	0.039	-0.082	0.376	0.295
	0.472	0.681	-0.687	1.381	0.96
MGTCHAN	0.049	0.011	0.011	-0.046	0.123**
	0.89	0.544	0.319	-1.310	2.35
OD	0.019	-0.006	0.037*	0.108***	0.112**
	0.671	-0.275	1.684	2.638	2.115
MOD	-0.047	0.011	-0.048	-0.035	0.120
	-1.251	0.553	-0.645	-0.604	1.425
MGTSHARE	-0.011	-0.028	0.054	-0.091	0.232*
	-0.144	-1.154	1.403	-1.229	1.775
GEAR	-0.015	-0.010***	0.008	-0.009	-0.003
	-1.609	-2.934	1.301	-0.76	-0.242
LNDURATION	-0.131	0.041	-0.093	0.296	0.015
	-1.128	0.634	-0.487	1.516	0.085
LNSIZE	-0.005	0.017	0.018	-0.023	0.030
	-0.479	1.630	0.956	-1.169	1.136
Crisis	0.004	-0.007	-0.022*	-0.089***	-0.049
	0.202	-1.146	-1.771	-3.158	-1.347
ROA t-1	-0.632***	-0.317***	-0.157	-0.159	-0.304
	-3.550	-3.176	-0.649	-1.251	-0.956
PE	-0.104	-0.038	0.017	-0.063	-0.078
	-1.592	-1.635	0.300	-0.972	-0.892
INTERCEPT	-1.005	-0.052	-0.132	-0.235	-0.489
	-0.942	-0.355	-0.383	-0.719	-1.203
Year dummy	YES	YES	YES	YES	YES
R-square (%)	12.25	9.09	7.33	8.75	6.37
Wald Chi2	47.720***	39.541***	285.013***	29.543*	47.191***
N	642	528	437	394	455

Table 7: Changes and characteristics of SMBO boards and post-SMBO performance-corrected for sample selection bias

This table reports the results of the panel regression corrected for sample selection bias for the influence of board changes and characteristics on post-SMBO performance, up to five years after an SMBO. The Probit regression with robust variance estimate is for the probability of receiving PE backing by the sample SMBOs. This model converged after three iterations. The panel regression is for the influence of the board changes and characteristics on post-SMBO performance. The dependent variables (*AROA, AROS, ASALEMP, AEMPG*, and *ASALG*) are estimated as unadjusted abnormal performance measures ('level' model). *Lambda1* is the fitted probability of receiving PE backing, estimated from the Probit regression model. All the results are based on 99% winsorized data. All parameters of panel regressions are estimated by a GLS random-effects model with robust standard error and omitted collinear covariates. Entry year dummies and industry dummies are included. Coefficients and z-statistics are reported. P-values for the Wald test (Wald Chi ^{2}) are for probability > Chi ^{2}. N reports the number of firm-year observations in the Probit regression model and the number of firm-year observations in the panel regression model, respectively. ***, **,* are significance at the 1%, 5%, and 10% levels respectively. The variables are defined in Appendix 1.

1st Step: Probit regression		**2nd Step: Panel regression**					
	PE		AROA	AROS	ASALEMP	AEMPG	ASALG
ROA t-1	0.279	LNBS	-0.017	-0.001	-0.034	-0.101*	-0.022
LNSIZE	0.601***		-0.669	-0.035	-1.32	-1.899	-0.27
BSERVICES	-0.145***	PED (%)	0.236**	0.056	0.102*	0.371*	0.414*
INTERCEPT	-1.061***		2.503	0.615	1.766	1.718	1.894
Log likelihood	-582.482	Independent outsiders (%)	0.13	0.035	0.012	0.552**	0.392
Pseudo R^2 (%)	29.19		0.972	0.574	0.132	2.293	1.506
Wald Chi2	383.80***	MGTCHAN	0.06	-0.014	0.015	0.008	0.128***
N	1270		1.013	-0.365	0.456	0.221	2.628
		OD	-0.01	0.025	0.028*	0.079**	0.084*
			-0.464	1.225	1.661	2.247	1.667
		MOD	-0.019	-0.028	-0.024	-0.091	0.108
			-0.631	-0.93	-0.333	-1.485	1.207
		MGTSHARE	0.016	-0.068*	0.02	-0.079	0.123
			0.46	-1.934	0.601	-0.786	1.002
		GEAR	-0.018**	-0.021***	0.003	0.001	0.003
			-2.269	-2.882	0.576	0.073	0.253
		LNDURATION	-0.137	0.273**	0.05	0.196	0.079
			-1.101	2.187	0.296	1.18	0.476
		LNSIZE	0.074	-0.06	0.015	0.078*	0.066
			1.292	-0.742	0.504	1.75	1.111
		Crisis	-0.015	-0.017**	0.006	-0.059**	-0.090***
			-1.05	-2.45	0.53	-2.409	-2.817
		ROA t-1	-0.495***	-0.630***	-0.317	-0.062	-0.279
			-3.518	-3.313	-1.143	-0.36	-0.95

(Continued)

	PE	-0.091	-0.063	0.053	-0.087	-0.104
		-1.618	-1.431	0.958	-1.248	-1.274
	Lambda1	0.251	-0.289	-0.029	0.283**	0.144
		1.221	-1.176	-0.414	1.965	0.718
	INTERCEPT	-1.207	0.037	-0.035	-0.355	-0.344
		-1.007	0.089	-0.094	-0.841	-0.85
	Year dummy	YES	YES	YES	YES	YES
	Industry dummy	YES	YES	YES	YES	YES
	R-square (%)	14.34	9.35	5.67	8.96	8.86
	Wald Chi2	56.249***	44.134**	75.823***	53.258***	58.905***
	N	654	541	488	487	466

Table 8: Changes and characteristics of SMBO boards and post-SMBO performance -corrected for PE-related directors selection bias

This table reports the results of panel regression for the influence of board changes and characteristics on post-SMBO performance, corrected for sample selection bias from PE-related directors, up to five years after the SMBO transactions. The Logit regression with robust variance estimate is for the probability of appointing PE-related directors onto the board. Panel regression is for the influence of board changes and characteristics on post-SMBO performance. The dependent variables (*AROA, AROS, ASALEMP, AEMPG,* and *ASALG*) are estimated as unadjusted abnormal performance ('level' model). *Lambda2* is the fitted probability of having PE-related directors, estimated from the Logit regression. All the results are based on 99% winsorized data. All parameters of panel regressions are estimated by a GLS random-effects model with a robust standard error and omitted collinear covariates. Entry year dummies and industry dummies are included. Coefficients and z-statistics are reported. P-values for the Wald test (Wald Chi ^{2}) are for probability > Chi ^{2}. N reports the number of firm-year observations in the Logit regression and number of firm-year observations in the panel regression, respectively. ***, **,* are significance at the 1%, 5%, and 10% levels respectively. The variables are defined in Appendix 1.

1st Step: Logit regression		**2nd Step: Panel regression**					
	Presence of PED		AROA	AROS	ASALEMP	AEMPG	ASALG
Club deals	0.301	LNBS	-0.019	-0.002	-0.035	-0.100*	-0.027
	0.840		-0.732	-0.059	-1.399	-1.89	-0.524
Top10	0.091	PED (%)	0.225**	0.062	0.098*	0.341	0.252**
	0.282		2.387	0.68	1.687	1.565	2.08
LNSIZE	0.379***	Independent outsiders (%)	0.121	0.04	0.011	0.503**	0.233
	4.373		0.979	0.666	0.123	2.141	1.269
PE	3.657***	MGTCHAN	0.07	-0.003	0.02	-0.001	0.078**
	8.971		1.21	-0.085	0.596	-0.017	2.127
GEAR	0.093	OD	-0.011	0.024	0.028*	0.079**	0.063*
	1.607		-0.523	1.196	1.688	2.281	1.916
MGTCHAN	-0.119	MOD	-0.019	-0.032	-0.029	-0.09	0.096
	-0.568		-0.659	-1.12	-0.384	-1.356	1.41
Crisis	0.235	MGTSHARE	0.022	-0.061*	0.021	-0.087	0.015
	1.110		0.676	-1.695	0.624	-0.863	0.207
ROA t-1	0.719	GEAR	-0.024**	-0.024**	0	0.003	0.009
	0.640		-2.526	-2.01	-0.003	0.256	1.18
INTERCEPT	-4.398***	LNDURATION	-0.105	0.251**	0.057	0.223	-0.002
	-10.838		-0.905	2.031	0.347	1.377	-0.018
Log likelihood	-278.916	LNSIZE	-0.018	0.005	0.002	0.011	0.024
Pseudo R^2 (%)	41.20		-0.534	0.122	0.09	0.246	0.807
Wald Chi2	186.994***	Crisis	-0.034*	-0.026	-0.003	-0.054	-0.056**
N	694		-1.681	-1.25	-0.211	-1.607	-2.192
		ROA t-1	-0.666***	-0.560***	-0.363	-0.138	-0.074

(Continued)

		-3.902	-2.856	-1.325	-0.708	-0.415
	PE	-0.482	-0.256	-0.151	0.027	0.116
		-1.067	-0.686	-0.596	0.044	0.315
	Lambda2	-0.127	-0.067	-0.065	0.039	0.071
		-0.836	-0.534	-0.835	0.205	0.584
	INTERCEPT	-0.387	-0.018	0.263	-0.191	-0.179
		-0.293	-0.032	0.575	-0.196	-0.353
	Year dummy	YES	YES	YES	YES	YES
	Industry dummy	YES	YES	YES	YES	YES
	R-square (%)	13.55	9.76	5.16	8.01	8.93
	Wald Chi2	72.581***	48.012**	76.231***	52.663***	90.508***
	N	654	541	488	487	466

Table 9: The impact of replacing top managers on post-SMBO performance-interaction with previous performance

This table presents the results of panel regressions (equation 4), after including an interactive variable between changing top managers and previous performance. The dependent variables are estimated as unadjusted abnormal performance ('level' model). *ROAt-1*MGTCHAN* is the interactive variable between changing the top managers (*MGTCHAN*) and previous performance (*ROAt-1*). The results are based on 99% winsorized data. All parameters are estimated by a GLS random-effects model with robust standard error and omitted collinear covariates. Entry year dummies and industry dummies are included. Coefficients and z-statistics are reported. P-values for the Wald test (Wald Chi ^{2}) are for probability > Chi ^{2}. N reports the number of firm-year observations used in the panel regression. ***, **,* are significance at the 1%, 5%, and 10% levels respectively. The variables are defined in Appendix 1.

	AROA	AROS	ASALEMP	AEMPG	ASALG
LNBS	-0.018	-0.001	-0.034	-0.100*	-0.021
	-0.71	-0.045	-1.337	-1.885	-0.263
PED (%)	0.233**	0.067	0.103*	0.341	0.398*
	2.501	0.736	1.786	1.556	1.834
Independent outsiders (%)	0.125	0.043	0.014	0.495**	0.374
	0.947	0.688	0.151	2.001	1.423
MGTCHAN	0.028	-0.012	0.009	-0.008	0.139*
	0.674	-0.162	0.146	-0.159	1.776
ROAt-1*MGTCHAN	0.262	0.028	0.050	0.081	-0.12
	0.693	0.078	0.116	0.266	-0.264
OD	-0.011	0.023	0.028	0.079**	0.087*
	-0.508	1.184	1.640	2.343	1.78
MOD	-0.018	-0.030	-0.025	-0.092	0.110
	-0.585	-1.016	-0.344	-1.428	1.212
MGTSHARE	0.014	-0.064*	0.022	-0.089	0.119
	0.423	-1.806	0.664	-0.874	0.958
GEAR	-0.018**	-0.021***	0.003	0.002	0.003
	-2.239	-2.908	0.573	0.157	0.291
LNDURATION	-0.123	0.237*	0.044	0.227	0.102
	-1.032	1.955	0.277	1.336	0.636
LNSIZE	0.006	0.018	0.014	0.003	0.029
	0.510	0.699	0.798	0.133	1.134
Crisis	-0.015	-0.016**	0.006	-0.060**	-0.091***
	-1.061	-2.414	0.538	-2.434	-2.822
ROA t-1	-0.707**	-0.529**	-0.353	-0.2	-0.277
	-2.306	-2.021	-0.775	-0.689	-0.619
PE	-0.101	-0.057	0.044	-0.093	-0.108
	-1.608	-1.287	0.841	-1.338	-1.320
INTERCEPT	-0.875	-0.272	0.009	-0.019	-0.206
	-0.877	-0.868	0.034	-0.056	-0.601
Year dummy	YES	YES	YES	YES	YES
Industry dummy	YES	YES	YES	YES	YES
R-square (%)	14.03	9.45	5.72	7.80	8.58
Wald Chi2	58.924***	43.486**	83.784***	58.362***	62.161***
N	654	541	488	487	466

Table 10: The impact of PE-related directors on PE-backed SMBOs' performance-interaction with PE firms' reputation

This table presents the results of panel regressions (equation 4) for the PE-backed subsample, after including an interactive variable between the fraction of PE-related directors and highly-reputed PE firms. The dependent variables are estimated as unadjusted abnormal performance ('level' model). *PED*Top10* is the interactive variable between the percentage of PE-related directors on the board (*PED*) and PE firms' reputation (*Top10*). The results are based on 99% winsorized data. All parameters are estimated by a GLS random-effects model with robust standard error and omitted collinear covariates. Entry year dummies and industry dummies are included. Coefficients and z-statistics are reported. P-values for the Wald test (Wald Chi ^{2}) are for probability > Chi ^{2}. N reports the number of firm-year observations used in the panel regression. ***, **,* are significance at the 1%, 5%, and 10% levels, respectively. The variables are defined in Appendix 1.

	AROA	AROS	ASALEMP	AEMPG	ASALG
LNBS	-0.007	0.019	-0.031	-0.091	-0.033
	-0.153	0.744	-1.054	-1.359	-0.438
PED (%)	0.197**	0.069	0.045	0.307	0.404*
	2.015	1.010	0.659	1.489	1.678
PED (%) *Top10	-0.056	-0.381***	0.187	-0.860***	-0.723*
	-0.212	-2.691	1.016	-2.63	-1.74
Independent outsiders (%)	0.218	0.089	-0.109	0.669**	0.332
	1.516	1.402	-0.932	2.251	0.953
MGTCHAN	0.059	0.029	0.048	-0.006	0.130**
	0.847	0.985	1.078	-0.117	2.110
OD	-0.045	0.006	0.036	0.097**	0.150**
	-1.198	0.476	1.425	1.996	2.414
MOD	0.009	-0.051*	0.005	-0.042	0.084
	0.184	-1.936	0.038	-0.603	0.561
MGTSHARE	0.016	-0.045	0.013	0.080	0.060
	0.331	-1.447	0.248	0.902	0.462
GEAR	-0.026***	-0.015***	0.003	-0.018	0.002
	-2.876	-3.041	0.437	-1.398	0.104
LNDURATION	-0.181	0.150*	0.273	0.207	0.075
	-1.299	1.756	1.326	1.043	0.328
LNSIZE	0.034*	0.029**	0.024	0.037	0.029
	1.771	2.159	1.265	1.591	1.034
Crisis	-0.042***	-0.015*	-0.005	-0.125***	-0.141***
	-3.159	-1.737	-0.342	-3.449	-3.523
ROA t-1	-0.884***	-0.490***	-0.742**	-0.321	-0.659
	-3.484	-3.391	-2.368	-1.209	-1.474
Top10	0.130	0.048	-0.125	0.193*	0.068
	0.875	1.262	-1.634	1.929	0.533
INTERCEPT	-1.736	-0.226	-0.314	-0.087	-0.171
	-1.016	-1.080	-0.924	-0.223	-0.383
Year dummy	YES	YES	YES	YES	YES
Industry dummy	YES	YES	YES	YES	YES
R-square (%)	22.22	20.79	16.47	15.47	16.88
Wald Chi2	77.466***	56.662***	49.768***	160.827***	78.296***
N	404	334	300	312	299

Table 11: The impact of removing PE directors on post-SMBO performance

This table presents the results of the impact of removing PE directors on post-SMBO performance for the non-PE-backed subsample, up to five years after SMBO, after including a dummy variable of the removal of the PE-related directors after SMBO transactions (*Remove PED*). The dependent variables are estimated as unadjusted abnormal performance measures ('level' model). The results are based on 99% winsorized data. All parameters are estimated by a GLS random-effects model with robust standard error and omitted collinear covariates. Entry year dummies and industry dummies are included. Coefficients and z-statistics are reported. P-values for the Wald test (Wald Chi ^{2}) are for probability > Chi ^{2}. N reports the number of firm-year observations used in the panel model. ***, **,* are significance at the 1%, 5%, and 10% levels, respectively. The variables are defined in Appendix 1.

	AROA	AROS	ASALEMP	AEMPG	ASALG
LNBS	-0.016	-0.019	-0.061	0.003	0.063
	-0.605	-0.766	-1.139	0.036	0.274
Remove PED	0.038	-0.068	0.007	-0.028	0.056
	1.042	-1.187	0.138	-0.445	0.460
Independent outsiders (%)	-0.214	-0.046	0.286	-0.157	0.395
	-1.586	-0.563	1.608	-0.471	0.678
MGTCHAN	0.009	-0.115*	-0.018	0.083	0.113
	0.294	-1.959	-0.317	1.200	1.383
OD	0.024	0.001	0.010	0.002	-0.110
	1.114	0.049	0.368	0.06	-1.121
MOD	-0.058	0.020	-0.049*	-0.156	0.122
	-1.067	1.553	-1.846	-1.621	0.978
MGTSHARE	0.059	-0.046	0.022	-0.311	0.282
	1.267	-1.615	0.487	-1.383	0.895
GEAR	-0.003	-0.018***	0.002	0.063**	-0.002
	-0.188	-3.45	0.314	2.442	-0.074
LNDURATION	0.057	0.179	-0.387*	0.230	-0.163
	0.502	1.154	-1.685	0.828	-0.746
LNSIZE	-0.017	0.006	0.002	-0.087*	-0.007
	-1.146	0.205	0.046	-1.883	-0.161
Crisis	0.013	-0.020*	0.019	0.035	-0.007
	0.492	-1.926	0.851	1.417	-0.120
ROA t-1	-0.271	-0.569*	0.508	0.044	-0.01
	-1.639	-1.96	1.296	0.202	-0.025
INTERCEPT	-0.176	-0.158	0.780*	-0.182	-0.098
	-0.763	-0.519	1.665	-0.280	-0.136
Year dummy	YES	YES	YES	YES	YES
Industry dummy	NO[33]	YES	YES	NO	YES
R-square (%)	19.35	17.96	11.80	21.23	3.76
Wald Chi2	38.071***	1240.022***	4696.099***	108.387***	52.451***
N	250	207	188	175	167

[33] When we include industry dummies, Stata does not present Wald Chi2. However, with or without industry dummies, the results are qualitatively similar.

Table 12: **Changes and characteristics of SMBO boards and post-SMBO performance - early vs. late exit**

This table presents the results of panel regressions (equation 4) that examine the relations of changes and characteristics of SMBO boards and post-SMBO performance for 'early' and 'late' exit subsamples of SMBOs, up to five years after SMBO transactions. Panel A and Panel B report the results for 'early' and 'late' exit subsamples respectively. The 'early' exit subsample includes SMBOs with a primary holding period of less than three years. The 'late' exit subsample includes SMBOs with a primary holding period equal to or longer than three years. The dependent variables are estimated as unadjusted abnormal performance measures. The results are based on 99% winsorized data. All parameters are estimated by a GLS random-effects model with robust standard error and omitted collinear covariates. P-values for the Wald test (Wald Chi ^{2}) are for probability > Chi ^{2}. N reports the number of firm-year observations used in the panel model. ***, **,* are significant at the 1%, 5%, and 10% levels respectively. The variables are defined in Appendix 1.

Panel A: Early exit

	AROA	AROS	ASALEMP	AEMPG	ASALG
LNBS	-0.051	-0.077	-0.013	0.043	-0.255
	-0.732	-0.803	-0.118	0.333	-1.030
PED (%)	0.153	-0.294	0.303	0.732*	0.210
	0.934	-0.969	0.568	1.798	0.274
Independent outsiders (%)	-0.339	0.069	0.207	2.144**	1.898*
	-0.969	0.149	0.372	2.309	1.840
MGTCHAN	0.098**	-0.061	0.040	0.125	0.366**
	2.105	-0.610	0.303	0.554	2.150
OD	0.093***	0.090	-0.075	0.261**	0.028
	2.621	0.953	-1.217	2.319	0.216
MOD	-0.003	-0.015	-0.299*	0.209	0.822***
	-0.071	-0.120	-1.777	0.556	2.669
MGTSHARE	-0.062	-0.022	0.289	0.489*	0.148
	-0.523	-0.195	1.502	1.782	0.421
GEAR	-0.023	-0.020	0.009	-0.009	0.018
	-1.346	-0.977	1.259	-0.858	0.954
ROA t-1	-0.595***	-1.205***	-0.272	-0.554	-0.603
	-3.151	-3.108	-0.574	-0.713	-0.843
LNDURATION	0.412*	0.689**	0.087	1.002	-0.931
	1.867	2.065	0.205	0.835	-1.435
LNSIZE	-0.032*	0.062*	0.052	0.048	0.069
	-1.838	1.660	0.891	0.476	1.070
Crisis	0.002	0.017	0.005	-0.061*	-0.175
	0.047	0.408	0.119	-1.657	-1.351
PE	0.031	-0.105	-0.034	0.199	0.141
	0.332	-0.866	-0.164	0.451	0.648
INTERCEPT	-0.501	-0.825	-0.364	-2.717	1.380
	-1.028	-1.508	-0.418	-1.252	1.022
R-square (%)	33.56	37.70	19.94	7.27	43.43
Wald Chi2	31.908***	49.389***	11.164	74.778	230.150***
N	87	83	79	73	70

Panel B: Late exit

	AROA	AROS	ASALEMP	AEMPG	ASALG
LNBS	0.009	0.005	-0.021	0.013	0.006
	0.273	0.100	-0.606	0.360	0.149
PED (%)	0.179*	0.051	0.015	0.219***	0.137**
	1.778	0.442	0.254	2.730	2.161
Independent outsiders (%)	0.321	0.001	-0.010	0.117	0.124
	1.247	0.010	-0.064	0.997	0.887
MGTCHAN	0.061	-0.008	0.002	-0.029	-0.021
	0.650	-0.154	0.064	-1.135	-0.817
OD	0.001	-0.008	0.051**	-0.029	0.008
	0.025	-0.455	2.575	-1.000	0.226
MOD	-0.046	-0.025	0.085	0.018	0.099
	-1.341	-0.760	1.481	0.383	1.186
MGTSHARE	-0.024	-0.032	-0.048	-0.053	-0.007
	-0.484	-0.706	-0.845	-1.086	-0.155
GEAR	-0.018	-0.024**	0.002	0.006	0.005
	-1.397	-2.349	0.363	0.871	0.810
ROA t-1	-0.595**	-0.559*	0.101	-0.067	-0.186
	-2.097	-1.869	0.310	-0.592	-1.288
LNDURATION	-0.766	0.068	-0.096	-0.020	-0.016
	-1.303	0.486	-0.625	-0.213	-0.167
LNSIZE	-0.001	-0.009	-0.021	-0.015	-0.018
	-0.077	-0.307	-1.015	-1.540	-1.357
Crisis	-0.010	-0.021**	0.006	-0.026	-0.006
	-0.491	-2.042	0.308	-1.489	-0.300
PE	-0.197*	-0.035	0.086	-0.052	-0.023
	-1.696	-0.543	1.515	-1.303	-0.512
INTERCEPT	1.421	0.100	0.240	0.093	0.055
	1.510	0.388	0.929	0.461	0.283
R-square (%)	6.85	3.89	9.40	4.37	5.54
Wald Chi2	26.200**	20.853*	21.239*	21.647*	24.297**
N	360	284	256	273	256

Appendix 1: Definition of variables

Description	*Variable*	Definition
	Performance measures	
Profitability		
Return on assets	*ROA*	Earnings before interests and taxes (*EBIT*) scaled by total assets. *AROA* is abnormal *ROA*.
Return on sales	*ROS*	Earnings before interests and taxes (*EBIT*) scaled by total sales. *AROS* is abnormal *ROS*.
Productivity		
Sales efficiency	*SALEMP*	Inflation adjusted sales scaled by the number of employees. *ASALEMP* is abnormal *SALEMP.*
Growth		
Employment growth	*EMPG*	The difference between the number of employee in year t and year t-1 scaled by their average value. *AEMPG* is abnormal *EMPG*.
Sales growth	*SALG*	The difference between sales in year t and year t-1, scaled by average sales in year t and t-1. *ASALG* is abnormal *SALG*.
	Board of directors and change in top management	
Board size	*BS*	The number of directors on the relevant board in year t.
	LNBS	The natural logarithm of *BS*.
Change in top management	*MGTCHAN*	A dummy variable which equals 1 if the CEO and/or CFO is replaced within three years after the relevant SMBO transaction year, and 0 otherwise.
The percentage of inside directors	*Insiders*	The number of insider directors divided by board size in year t.
The percentage of PE-related directors on the board	*PED*	The number of outside directors who have an observable relationship with PE firms divided by board size in year t.
The percentage of independent outsiders	*Independent outsiders*	The number of independent outside directors divided by board size in year t.
The percentage of other directors	*Others*	The number of other directors divided by board size in year t.
Inside directors with independent outside directorships (skilled insiders)	*OD*	A dummy variable that equals 1 if the SMBO with inside directors that are employed by at least one unaffiliated companies in year t and 0 otherwise.
Removing PE-related directors from the board.	*Remove PED*	A dummy variable that equals 1 if the non-PE-backed SMBO removes the PE specialists from the boards in SMBO transaction year and 0 otherwise.
	Control variables	
Management share	*MGTSHARE*	The percentage of target company's common equity contributed by the management in year t.
Leverage	*GEAR*	The sum of long term and short term debt divided by the total equity in year t..
Busy directors	*MOD*	A dummy variable that equals 1 if SMBOs with inside directors that are employed by at least three unaffiliated companies in year t and 0 otherwise.
Business service industry	*BSERVICES*	Dummy variable equals 1 for SMBOs from Business Service industry and 0 otherwise.

(Continued)		
PE backing	*PE*	Dummy variable equals 1 if the SMBO received PE backing and 0 otherwise.
Syndicated SMBOs	*Club deals*	Dummy variable that equals 1 if there is more than one PE firm investing in a given SMBO, and 0 otherwise.
Backed by highly-reputed PE firms	*Top10*	A dummy variable which equals 1 if an SMBO is backed by PE firms that are top 10 PE firms in the reputation ranking list and 0 otherwise.
Companies' size	*SIZE*	SMBO value in £million.
	LNSIZE	The logarithm of *SIZE.*
Financial crisis	*Crisis*	A dummy variable which equals 1 for observations from 2008-2010.
Pre-SMBO performance	*ROA t-1*	The performance ratio in the form of *ROA* in year preceding the SMBO.
Longevity of buyouts	*LNDURATION*	The logarithm of the number of months from the SMBO date to the exit date, if the SMBO was exited; or the number of months from the SMBO date to the sample's cut-off date (31/12/2010), if the SMBO was not exited.
Lambda	*Lambda1*	The fitted probability of receiving PE backing, estimated by equation 3.
	Lambda2	The fitted probability of having PE-related directors on the board, estimated by equation 5.

Appendix 2: Changes and characteristics of SMBO boards and post-SMBO performance- using management ownership participant dummy variable

This table reports the results of panel regression for the influence of board changes and characteristics on post-SMBO performance, up to five years after SMBO transactions, with a dummy variable for management ownership participant to proxy for managerial ownership. The dependent variables are unadjusted abnormal performance in profitability (*AROA* and *AROS*), productivity (*ASALEMP*), employment growth (*AEMPG*), and sales growth (*ASALG*). Models include entry year dummies and industry dummies. The results are based on 99% winsorized data. All parameters are estimated by a GLS random-effects model with robust standard error and omitted collinear covariates. Coefficients and z-statistics are reported. P-values for the Wald test (Wald Chi ^{2}) are for probability > Chi ^{2}. N reports the number of firm-year observations used in the panel regression. ***, **,* are significance at the 1%, 5%, and 10 % levels respectively. The variables are defined in Appendix 1.

	AROA	AROS	ASALEMP	AEMPG	ASALG
LNBS	-0.017	-0.004	-0.032	-0.102*	-0.019
	-0.654	-0.129	-1.269	-1.906	-0.234
PED (%)	0.233**	0.065	0.103*	0.353*	0.384*
	2.509	0.727	1.809	1.649	1.758
Independent outsiders (%)	0.126	0.044	0.013	0.503**	0.352
	0.953	0.697	0.135	2.014	1.350
MGTCHAN	0.059	-0.007	0.015	0.003	0.121**
	1.004	-0.188	0.477	0.082	2.552
OD	-0.011	0.021	0.029*	0.077**	0.091*
	-0.493	1.026	1.740	2.142	1.710
MOD	-0.018	-0.028	-0.028	-0.082	0.093
	-0.572	-0.935	-0.391	-1.384	1.054
Management share participant	-0.011	-0.032	0.044	-0.016	0.049
	-0.297	-0.611	0.627	-0.235	0.540
GEAR	-0.018**	-0.020***	0.003	0.003	0.003
	-2.368	-2.775	0.559	0.224	0.215
LNDURATION	-0.116	0.228*	0.050	0.224	0.120
	-1.030	1.919	0.299	1.302	0.748
LNSIZE	0.005	0.020	0.016	0.008	0.023
	0.422	0.874	0.798	0.426	0.935
Crisis	-0.015	-0.016**	0.006	-0.060**	-0.091***
	-1.080	-2.352	0.546	-2.398	-2.815
ROAt-1	-0.586***	-0.512***	-0.342	-0.156	-0.343
	-3.667	-2.607	-1.228	-0.819	-1.147
PE	-0.106	-0.042	0.044	-0.067	-0.131*
	-1.539	-1.012	0.837	-0.989	-1.901
INTERCEPT	-0.889	-0.267	-0.041	-0.072	-0.196
	-0.880	-0.908	-0.126	-0.209	-0.517
Year	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES
R-square (%)	13.96	10.15	6.03	7.72	8.60
Wald Chi2	53.242***	41.754**	74.426***	54.536***	57.129***
N	654	541	488	487	466

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