On post-IPO stock price performance: A comparative analysis of RLBOs and IPOs

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ABSTRACT

This is the first study to examine the post-IPO stock price performance by differentiating between IPOs and three types of RLBOs (i.e. public-to-private (or re-IPOs), division-to-private, and private-to-private deals). We document that *public-to-private* RLBOs outperform their industry rivals, IPOs, mature firms in comparable industries, and a propensity-score matched control group for up to five years post-offering. Further, we document that, within RLBOs, *public-to-private* RLBOs, outperform *private-to-private* and *division-to-private* RLBOs. We also find support for the underwriter signaling effect for public-to-private RLBOs. Our analysis identifies for the first time what private period restructuring activities contribute to superior post-re-IPO stock price performance. Further, the beneficial effects of private period restructurings are enhanced for deals associated with prestigious underwriters. Our findings suggest that first IPOs and re-IPOs differ substantially in term of post-offer performance, the impact of prestigious underwriters on performance, and performance over time.

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1. Introduction

One well-documented anomaly that has intrigued finance researchers is the long-run underperformance of IPOs (see Ritter, 1991; Brav and Gompers, 1997, among others). Several researchers have attempted to understand this phenomenon (e.g. Loughran and Ritter, 1995; Rajan and Servaes, 1997; Schultz, 2003; Teoh et al., 1998, among others), and continue to debate whether this is due to investor irrationality (systematic over-optimism) or institutional constraints (short sale restrictions in the IPO market), or some other factor (see Ritter and Welch (2002) for a summary of research on post-IPO underperformance). Another strand of research attempts to identify factors that are related to long-run IPO performance. This work documents that venture-capital backed IPOs (Brav and Gompers, 1997; Chan et al., 2008), IPOs with prestigious underwriters (Carter et al., 1998; Chan et al., 2008), and

IPOs with conservative accruals (Teoh et al., 1998) outperform the benchmark in the long run.[1]

In this paper, we recognize that first IPOs and RLBOs are fundamentally different, and hence, they are likely to differ in terms of their post-offer stock price performance. Specifically, we argue that because of the heterogeneity of information availability for these two types of going-public firms, the long-run post-offer performance should differ. Reverse leveraged buyouts (RLBOs), which account for one-fifth of all U.S. IPOs (see Cao and Lerner, 2009),[2] are a special form of going-public transactions. Furthermore, even among RLBOs not all represent a re-IPO since some were originally private firms or divisions. Public-to-private RLBOs (or re-IPOs) are of interest because they have distinct

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[1] Recent research documents that IPO underperformance appears to be concentrated in the 1980s and early 1990s, and that, in fact, IPO firms outperform in the 1998–2005 period (see Carter et al., 2011). This outperformance is primarily driven by large firms.

[2] In this study, RLBO proceeds account for 26.33% of all offerings (including first IPOs), while re-IPO offerings account for 14.14% of the total. We note that Cao and Lerner's sample, due to their study's focus, includes only RLBOs that were backed by private equity firms.

idiosyncratic characteristics that distinguish them from first IPOs as well as from division-to-private and private-to-private RLBOs.

Investors are generally expected to have more information about re-IPOs compared to first IPOs or RLBOs of private-to-private or division-to-private buyouts. Hence, in the information availability spectrum of IPO firms, re-IPOs have the most information available to investors because of their prior public track record followed by division-to-private RLBOs. In comparison, first time IPOs and private-to-private RLBOs will obviously have relatively sparse information, if any, available to investors at the time of going public.

This is the first study to examine the post-IPO stock price performance by differentiating between IPOs and three types of RLBOs (i.e. public-to-private, division-to-private, and private-to-private). Our research design allows us the opportunity to shed light on some intriguing, yet unaddressed, questions related to these important going-public transactions. Motivated by factors that are unique to re-IPOs, we provide evidence explaining post-RLBO stock price performance. We specifically address the following questions: How does the post-offer stock price performance of *public-to-private* RLBOs (re-IPOs) compare to that established for IPOs in general? How does the post-offer performance of *public-to-private* RLBOs differ from that of *private-to-private* and *division-to-private* RLBOs? How does underwriter certification influence the post-offer stock price performance of re-IPOs? And what types of private period restructuring activities have a beneficial effect on the post-offer stock price performance of such offerings, if any? Finding answers to these questions through the use of a comparative analysis of distinct IPO samples with different information availability will add important new insights into the post-IPO stock price underperformance anomaly and also enable us to identify the type of private period restructurings that benefit post-IPO stock price performance.

Our analysis contributes to both the IPO and the RLBO literatures in a number of ways. First, we shed new light on post-IPO stock price performance by documenting that re-IPOs perform substantially differently from first IPOs. By using an exhaustive sample spanning 1986–2006 period, we show that, in contrast to IPOs, re-IPOs earn superior long-run stock returns. The superior performance is robust to a number of benchmarks. In addition to raw long-run stock returns, we also compute returns relative to IPOs, mature firms, industry peers, division-to-private RLBOs, private-to-private RLBOs and propensity-score matched control firms. The positive abnormal returns peak at 36 months. Further, by differentiating between the various types of RLBOs, this is also the first study to document that public-to-private RLBOs outperform private-to-private and division-to-private RLBOs over 36 and 60 months following the IPO.

Our findings suggest that post-IPO performance is positively related to the degree of information available to investors, where public-to-private transactions have the highest information availability, followed by division-to-private, and then private-to-private. Specifically, our results imply that investor optimism is inversely related to the degree of information availability associated with each type of IPO, with over-optimism leading to post-IPO underperformance. There are two potential explanations for our findings. The first is the information narrative where more complete information of public buyout targets (vis-à-vis other types of buyouts) leads private equity investors to make better decisions. In other words, the availability of market pricing and greater disclosure and transparency of public targets enables potential buyers to better identify good deals. The second possibility is that the buyout sponsors put more effort into restructuring public targets, perhaps due to the fact that public-to-private firms are much larger than other types of LBOs, and hence, account for a larger

investment on the part of buyout sponsors. Our tests cannot distinguish between these two possibilities.

Second, we show that RLBO firms that employ more prestigious investment banks experience higher positive abnormal post-IPO stock returns relative to offerings by lower ranked underwriters. This strong link is robust to different methodologies used to compute stock returns. Notably, we find that a larger portion of RLBO firms employ higher quality underwriters compared to what previous studies report for first IPOs. Given our research design that separates the IPOs from RLBOs, our analysis provides new insight on the functions of the underwriter by disentangling the information asymmetry reduction effect from the signaling effect. Specifically, for re-IPO firms, the signaling effect is expected to be more prominent than the information asymmetry effect because, as explained earlier, re-IPOs are associated with more information availability. Our results imply that underwriter certification is an important signaling mechanism for such offerings.

Third, this is the first study to link the restructuring activities undertaken during the private period to long-run post-IPO stock price performance. For re-IPOs, we compute metrics that gauge corporate changes from pre-LBO to exit. Our evidence suggests that superior stock price performance is due to restructuring strategies undertaken during the private period that set the firm on a path to long-term profitability. Specifically, we find that higher sales growth experienced during the private period engenders larger positive stock returns in the post-offering period. Further evidence on the benefits of private period restructuring is the significant positive link between improvements in return on assets achieved during the private period and post-offering stock performance of re-IPOs. We document that investment decisions (based on capital expenditures and research and development) undertaken during the private period lead to better future performance, supporting the notion that such decisions are made with the long-term performance in mind. In sum, our findings support the view that to the extent the restructuring leads to efficiencies, there are long-term gains to be reaped from reorganization undertaken during the private period.

The remainder of the paper proceeds as follows. Section 1 discusses the fundamental differences between first IPOs and RLBOs. Section 2 develops the testable hypotheses. Sample formation procedure, data description and empirical methodology are presented in Section 3. Section 4 presents the empirical results. Section 5 concludes.

2. Differences between first IPOs and RLBOs

Prior research on post-RLBO stock price performance uses samples that commingle private-to-private, division-to-private, and public-to-private RLBOs (see Mian and Rosenfield, 1993; Degeorge and Zeckhauser, 1993; Holthausen and Larcker, 1996; and Cao and Lerner, 2009). The commingling of different types of RLBOs may explain why the extant empirical evidence is mixed. For example, Mian and Rosenfield (1993) document that RLBOs have positive abnormal stock returns in the 36 months subsequent to going public. In contrast, Degeorge and Zeckhauser (1993), examining 62 RLBOs between 1983 and 1987 (though most of their results are based on a smaller sample) fail to find evidence of superior stock performance over a two-year period following the offering. Finally, Holthausen and Larcker (1996) examine 90 RLBOs over a similar period and find mixed results for long-run stock performance. They document positive and significant mean abnormal returns for 24 and 36-month periods post-RLBO but negative and insignificant median returns. Employing different excess buy-and-hold metrics, Cao and Lerner (2009) find that the three-year and five-year returns for their sample, mostly composed of private-to-private and division-to-private RLBOs, are larger than

those for IPOs but not statistically different from the value-weighted market index.

While these studies are informative, even post-RLBO performance results may be confounded by the composition of their RLBO samples because they do not distinguish between the various types of RLBOs. Their results, therefore, may not apply to what we refer to as *re-IPOs* (or public-to-private RLBOs). Commingling the different RLBO transactions ignores the fact that private-to-private and division-to-private transactions reflect entirely different attributes and motivations compared to public-to-private RLBO firms. Heterogeneity of leveraged going-private transactions manifests in a number of dimensions. Given that firms that undergo public-to-private transactions were public organizations prior to their buyout, they are also less likely to suffer from adverse selection. In contrast, the information asymmetry of division-to-private and private-to-private LBO entities that go public for the first time, as opposed to re-IPOs, are expected to be greater. RLBOs that originally were either privately held or a division of a corporation before the buyout are similar to first IPOs in terms of size as they tend to be smaller than public-to-private RLBOs.

Because public and private firms are driven by different motivations (Bharath and Dittmar, 2010), divisional and private RLBO offers are more similar to first IPOs than re-IPOs. Further, public-to-private RLBOs tend to be larger, and thereby associated with more restructuring activity. Leverage at the offering is also starkly different for different types of RLBOs. For a sample of mostly divisional and private buyouts, Cao and Lerner (2009) report a post-RLBO mean debt-to-assets ratio of 30.7%. For strictly public-to-private RLBOs in our sample, we find a much higher level of debt with a mean debt-to-asset ratio of 41.8%.

Earlier studies on IPOs, which include re-IPOs in their samples, document two empirical regularities: initial underpricing followed by long-run stock price underperformance, although later research uncovered that underperformance predominantly existed only in the 1980s and 1990s. However, because these studies commingle re-IPOs with first IPOs, re-IPOs are also currently understood to exhibit the same post-IPO stock price performance. Yet, there are key attributes that distinguish re-IPOs from first IPOs. While both types of IPO firms may take advantage of "windows of opportunity" by initiating an offering at the most opportune time, we contend that the degree of information availability differs not only between first IPOs and RLBOs in general, but even between the three types of RLBOs.

Another important factor that distinguishes re-IPOs from other offerings is that they are preceded by a private period of restructurings that are meant to bring greater efficiencies to the firm's operations. IPOs do not typically undertake stock offerings subsequent to a restructuring meant to enhance efficiency, although they may very well engage in "window dressing" prior to the offering. Prior research documents that private period restructuring engenders many value enhancing activities, such as sales growth, reduction in cost structure, and improvement in profitability (Kaplan, 1989; Muscarella and Vetsuypens, 1990; Smith, 1990). Further, a comparison of studies on IPOs with those on RLBOs indicates that the latter are typically larger in size whether that is measured in terms of assets, sales or employees.

3. Testable hypotheses

Information asymmetry based models of IPOs posit that IPO underpricing is due to asymmetric information between investors and owners (Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; Rock, 1986) and reflects compensation to investors for revealing their level of interest in the offer during the marketing process (Benveniste and Spindt, 1989). In comparison, information asymmetry for public-to-private re-IPOs is expected to be smaller relative to first IPOs, due to greater information availability.[3] While there is a large body of literature on the long-run stock performance of IPOs, corresponding research for RLBOs remains sparse. IPO stock returns are characterized by initial underpricing followed by long-run underperformance (Ritter, 1991; Loughran and Ritter, 1995; Brav and Gompers, 1997; Ritter, 1998). Ritter (1991) finds that, although on average IPOs underperform control firms, larger IPOs exhibit normal stock performance. Studying long-run stock returns of IPOs, Loughran and Ritter (1995) find that IPOs underperform against a matched set of control firms. With this background, we propose,

H1. To the extent that re-IPO firms are associated with greater information availability relative to IPO firms, the post-offering stock price performance for such firms will not follow the negative stock price performance generally associated with IPO firms.

We also investigate the role of underwriter certification in determining the long-run returns of RLBO firms. The certification role of underwriters is well established for IPO issues. Beatty and Ritter (1986) and Booth and Smith (1986) model the relation between initial day returns and the degree of information asymmetry between the issuing the firm and investors where underwriter reputation is expected to ameliorate the ex-ante uncertainty associated with the IPO. Investors view offerings as superior when underwritten by prestigious investment banks because their reputational capital is at stake. Prior research shows that transactions managed by prestigious investment banks exhibit less severe first day underpricing (Carter and Manaster, 1990; Johnson and Miller, 1988; Megginson and Weiss, 1991; Carter et al., 1998). These findings imply that leaving money on the table is costly, which high quality firms can avoid by emitting a signal through engaging highly reputable underwriters. Researchers also document a smaller long-run stock underperformance for issues underwritten by reputable bankers (Carter et al., 1998; Michaely and Shaw, 1994). Employing equally-weighted returns, Brav and Gompers (1997) also find that venture-capital backed IPOs outperform non-venture-backed offerings.

Due to the information asymmetry differential between re-IPOs and IPOs, the relevance of the underwriter reputation may not be as critical to re-IPO firms. However, underwriters serve two roles: (a) reducing information asymmetry between investors and the firm, and (b) signaling the quality of the firm. Our analysis of public-to-private RLBOs provides a controlled environment to examine the degree to which underwriter reputation serves as a signal of firm quality. Offerings that garner certification from prestigious underwriters should prove to be more successful due to the signaling effect. Whether reputable underwriters serve the function of certifying that an issuing firm is of higher quality or whether they primarily are intermediaries that reduce information asymmetry is an empirical issue.

H2a. To the extent that underwriters serve as certifiers of the quality of the offering, the post-re-IPO stock price performance for offerings underwritten by prestigious investment banks will be superior than the post-re-IPO performance of offerings underwritten by lower quality investment banks.

H2b. To the extent that underwriters' main function is to reduce information asymmetry, post-offering stock price performance of re-IPOs will not be influenced by the quality of the investment bank that brings the issue to market.

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[3] Examining initial-day and aftermarket price performance for debt IPOs, Datta et al. (1997) argue that information asymmetry between investors and insiders is important to equity IPO price performance vis-à-vis that for debt IPOs.

Next, we propose that the degree of information asymmetry between insiders and outsiders should be associated with the post-re-IPO stock price performance. It has been argued that when firm insiders, who enjoy an informational advantage, offer a larger portion of their own shares for sale at the offering, it signals their lack of confidence in the firms' future performance (Loughran and Ritter, 1995; Brau et al., 2007). Conversely, firm insiders who have greater confidence in their firm's potential are more likely to hold on to their ownership, and hence, the secondary shares offered will be less. Prior studies find evidence that post-IPO operating performance is positively associated with the proportion of shares retained by the original entrepreneurs (Jain and Kini, 1994) and when insiders are secondary share sellers, firms experience long-run underperformance after secondary equity offerings (Lee, 1997; Clarke et al., 2004). In this vein, we propose the following hypothesis on the relationship between secondary shares and long-run performance following the re-IPO.[4]

H3. Re-IPO firms with greater proportion of secondary share sales at the offering are expected to underperform those associated with smaller proportion of such sales.

We also explore whether restructuring activities that take place between the LBO and re-IPO influence post-exit long-run stock returns, and whether these corporate changes result in superior stock performance. Critics of buyouts claim that no value creation occurs through the restructuring process, but rather, private equity firms exploit market conditions to sell the firms that they have levered up at a high price without concern for the viability or survival of the exiting firm. To the extent that restructuring activity does not create value, the long-run performance will be lower than the benchmark groups. On the other hand, private period restructuring can create substantial value-enhancing corporate changes that can put the firm on a superior growth trajectory, thereby engendering superior future stock price performance. Thus, the fourth question we address is whether the restructuring activity is a driver of long-run stock performance in the post-RLBO period. We expect that superior stock performance is a function of improved future growth opportunities and improved firm prospects resulting from private period restructuring. This leads us to propose two alternative hypotheses:

H4a. To the extent that private period restructurings are value-enhancing, such activity will put the firm on a trajectory of superior post-re-IPO stock price performance.

H4b. To the extent that private period restructurings are exploitative and not value-enhancing, such activity will put the firm on a trajectory of inferior post-re-IPO stock price performance.

4. Sample formation process, data sources, and research methodology

4.1. Data sources

Our data collection process uses several sources to create an exhaustive sample of public-to-private transactions.[5] We use the Securities Data Company (SDC) Mergers and Acquisitions (M&A) database to identify leveraged buyouts and the corresponding LBO

date for transactions that are identified as having a future RLBO. We then use the SDC New Issues database to obtain information about the offering and identify the RLBO date. Because the SDC M&A database stopped tracking LBOs after 1998, we hand collect deals for the period 1999–2006 by matching IPOs with a prior leveraged buyout. We supplement the data with the public-to-private RLBOs in Cao and Lerner's (2009) sample.[6] Our sample of RLBOs spans 1986 to 2006 (for which the LBO event occurs during 1978–2003 period). The RLBO sample ends in 2006 to ensure that we have 60 months of stock returns post-offering.

We employ Gale Business Insights to validate candidate RLBOs by verifying that each firm was publicly listed, then privately held, and then publicly traded again. We also use this source to identify name changes taking place over the private period, and verify that SDC transaction dates are accurate. Firm names before the LBO and after exit are then used to search the Compustat Names table and the Center for Research in Security Prices (CRSP) Stocknames file to identify CUSIP codes. The usual filters of firm data availability in both Compustat and CRSP are then applied. We employ multiple sources of information on the offering, obtaining primary shares, secondary shares, and the underwriters from the SDC New Issues Database. Underwriter rankings and firm age are extracted from Jay Ritter's website.[7] Because of the extensive manual validation procedure that we use, we are able to collect a large sample of 207 public-to-private RLBOs.[8]

4.2. Research methodology

To compute abnormal stock returns, we employ a number of benchmarks. Our first benchmark sample consists of IPO industry means and medians (excluding RLBOs) from 1986 to 2006. IPO returns are computed beginning with the first month after the offering. To construct the mature-adjusted returns, we utilize the industry mean and median monthly returns for firms listed for at least five years. Since earlier RLBOs tend to be clustered in certain industries, we also examine abnormal returns relative to industry means and medians based on the 49 Fama and French (1997) industry groupings. Finally, we examine the post-offer performance of public-to-private RLBOs relative to that of division-to-private and private-to-private RLBOs.

Because public-to-private RLBO firms may differ in attributes compared to other IPO firms (e.g., they are larger than first IPOs and the two other types of RLBOs), it is particularly important to control for such differences. Therefore, as another benchmark, we create a sample of control firms using the propensity score matching technique that minimizes the difference between our sample firms and control firms on multiple dimensions. We select control firms based on propensity scores calculated at the RLBO, which allows us to obtain control-adjusted returns (Villalonga, 2004) based on firm characteristics. The propensity score matching technique utilizes information from the pool of firms with similar salient characteristics. This matching procedure also circumvents any effect of self-selection bias on our results.[9]

We estimate a logistic model using our sample firms at the year of the RLBO and control firms with Compustat data for the same year. The dependent variable, *RLBO Dummy*, assumes a value of one for RLBOs, and 0 otherwise. Guided by past research, we

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[4] Alternatively, it can be argued that insiders offering their shares in a secondary offering may be more motivated by diversification/liquidity than opportunistic selling.

[5] There are two relevant dates that define a public-to-private RLBO. The first is when the leveraged buyout occurs (*LBO Date*) and the second is the date of re-IPO (*RLBO Date*).

[6] We thank Jerry Cao and Josh Lerner for making their list of RLBOs available to us. We supplemented our sample with the subset of public-to-private RLBOs that appeared in their sample.

[7] http://bear.warrington.ufl.edu/ritter/ipodata.htm.

[8] Some tables report fewer observations due to lack of information on the underwriter, secondary shares, and propensity score matches for all 207 firms.

[9] We create separate sets of control firms for each type of RLBO and for our analysis of IPOs.

choose explanatory variables employed in Eq. (1) below to predict the RLBO.[10]

$$RLBO\,Dummy = f(Assets, ROA, Tobin's\,Q, P/Sales\,Ratio, Div/TA,$$
$$R\&D/Sales, Capex/Sales,\,Turnover, Year\,Dummies,$$
$$FF49\,Dummies) \qquad (1)$$

In defining our variables *Assets* is calculated as book value of total assets (item #6) in real 2006 dollars, *ROA* is earnings before interest (items #172 + #15) divided by total assets (item #6), *Tobin's Q* is computed as total assets (item #6) less common equity (item #60) plus market value of equity (items #199 ∗ #25) divided by total assets (item #6), *P/Sales is* market value of equity (items #199 ∗ #25) divided by sales (item #12), *Div/TA* is dividends (items #19 + #21) divided by total assets (item #6), *R&D/Sales* is research and development expenses (item #46) divided by sales (item #12), *Capex/Sales* is capital expenditures (item #128) divided by sales (item #12), *Turnover* is defined as common shares traded (item #28) divided by equity shares (item #25), and *FF49 Dummies* is industry dummies based on the Fama and French's (1997) 49 industry groupings.

Next, we group our sample firms by propensity score quintiles. Control firms with a predicted re-IPO probability below the lowest quintile or above the highest quintile are dropped. We then assign the control firms (without replacement) to the re-IPO quintiles based on the smallest absolute difference of propensity score with our sample firms. The robustness of our assignment process is verified using difference in means and medians at the re-IPO.[11]

4.3. Methodology: long-run stock returns and robustness checks

While Barber and Lyon (1997) recommend buy-and-hold returns over cumulative abnormal returns for longer horizons, later researchers have raised concerns over test statistics obtained from such an approach. Cowan and Sergeant (2001) show that buy-and-hold returns are highly non-normal due to skewness and kurtosis that increases with the time horizon. Their empirical tests suggest that both are ameliorated by winsorizing at the third standard deviation, so we follow that procedure in this analysis.

A second concern with buy-and-hold returns is that they are constructed in event time and suffer from cross-sectional correlation as the number of firms with overlapping months increases with the horizon. Test statistics that do not control for this issue may result in incorrect inferences. One remedy is to use test statistics based on unpaired group differences to reduce the impact of cross-sectional correlation. We, therefore, report results for both paired and unpaired statistics.

An alternative approach to cross-sectional correlation is to employ a calendar time methodology. As a robustness check, we compute mean calendar month returns for the re-IPOs, the benchmarks, and the difference between the two (see Brav and Gompers, 1997). Then we use these calendar month returns to estimate Carhart's (1997) four-factor model, where the intercept indicates abnormal returns. We avoid survivorship bias by computing the long-run stock returns for the post-IPO horizon period (12-, 36-, or 60-month period) or until delisting, whichever comes first. To address sample selection bias, we use control firms selected by propensity scores and Heckman's (1979) two-step model.

4.4. Sample description

Table 1 presents key descriptive statistics for our public-to-private RLBO (re-IPO) sample firms. Panel A reports statistics on firm size (*Assets*), return on assets (*ROA*), *Tobin's Q*, firm leverage (*Leverage*), the size of the gross proceeds from the offering (*Proceeds*), real size of proceeds in 2006 dollars (*Real Proceeds*), the percent of secondary shares in the offering (*Secondary*), firm age in years (*Age*), firm beta (*Beta*), and daily stock return standard deviation (*RetStdDev*) computed for the period from offer date + 6 through offer date + 260.

Not surprisingly, the mean *Beta* for RLBO firms, 0.96, is less than that observed in previous studies of IPOs. Similarly, mean *RetStdDev* for our samples firm, 3.10%, is slightly lower than that reported for IPOs. Carter et al.' (1998) study shows that the modified Carter-Manaster (*CM*) system provides the strongest relationship between underwriter reputation and stock returns. These rankings are based on the listing position of underwriter names in the "tombstone" announcements of stock offerings. We adopt the *CM* system for our analysis.

The most surprising characteristic of all RLBOs are the high underwriter rankings. Public-to-private (division-to-private) RLBOs have almost identical mean CM rankings of 8.60 (8.56), which contrasts with 6.97 for IPOs reported in Carter et al. (1998). Even the much smaller private-to-private RLBOs have a CM ranking of 8.32.[12] As shown in Panel B, which reports firm frequency of public-to-private RLBOs by *CM* score, a little over a third of the sample enlisted underwriters ranked below 9, while the remaining two-thirds engaged the highest quality investment banks. Division-to-private and private-to-private RLBOs have a qualitatively similar distribution. Loughran and Ritter (2004) find that underwriter rankings have increased over time.

To examine differences in performance over time, we partition the sample into two subperiods: 1986–1995 and 1996–2006, resulting in two subsamples composed of 135 and 70 firms, respectively. Firm characteristics (e.g. Tobin's Q, leverage) are generally similar across the two periods with the exception that firms tended to be larger in the latter period and slightly more inclined to use more prestigious underwriters (8.51 vs. 8.77).

5. Empirical results

5.1. Comparing post-offer long-run stock returns: RLBOs and IPOs

To examine the long-run stock price performance, we estimate the buy-and-hold stock returns following the RLBO for different time horizons: 12, 36, and 60 months. Table 2 reports the mean and median raw unadjusted returns (*Raw Returns*), industry-adjusted returns (*Industry-Adjusted*), returns adjusted by IPO medians (*IPO-Adjusted*), mature firm medians (*Mature-Adjusted*) returns, and control firm adjusted (*Control-Adjusted*) returns. Test statistics are computed using firm level paired means and medians as well as unpaired group differences between re-IPOs and the benchmarks.

The mean and median raw cumulative long-run stock returns are positive and statistically significant at better than 1% for all horizons. We find a three-year raw return of 45.25% compared to 50.39% by Mian and Rosenfield (1993) who examined RLBOs during 1983–1988. The 42.15% three-year raw return documented by Cao and Lerner (2009) for RLBOs from 1981 to 2003 is similar in magnitude to that of our sample. While the median raw stock performance declines somewhat over years 4 and 5, no such decline is observed for mean returns.

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[10] Eq. (1) is also used in Heckman's (1979) two-step process where the first step is a Probit regression predicting the probability of an RLBO.

[11] With minor exceptions, our focus variables are not significantly different from the controls in the same quintile. We also conduct our analysis using a smaller number of explanatory variables in Eq. (1) and find the results to be robust to alternative specifications.

[12] Division-to-private and private-to-private statistics are not tabulated for the sake of brevity.

Table 1
Descriptive statistics for public-to-private RLBO (or Re-IPO) firms.

	Mean	Median	Standard deviation
Panel A: Firm and issue characteristics of re-IPO firms			
Firm characteristics			
Assets ($ millions)	$1,528.48	$541.60	$3,117.98
ROA (%)	7.96	7.92	7.60
Tobin's Q	1.88	1.55	1.07
Leverage (%)	42.02	39.94	27.65
Age (years)	44.95	39.50	32.20
RetStdDev (%)	3.10	2.90	1.20
Beta	0.96	0.89	0.56
Issue characteristics			
Proceeds ($ millions)	$189.21	$87.46	362.82
Real Proceeds ($ millions)	$233.59	$117.18	439.71
Secondary (%)	13.20	0.00	24.59
Underwriter Rank	8.60	9.00	0.84

Underwriter ranking	Frequency	Percent	Cumulative percent
Panel B: Frequency by underwriter ranking			
3.001–6.001	8	3.90	3.90
7.001–8.000	6	2.93	6.83
8.001–8.999	56	27.32	34.15
>9.000	135	65.86	100.00
Total	205	100.00	

This table summarizes descriptive statistics for key variables for re-IPO firms going public between 1986 and 2006. *Assets* is total book value of assets standardized to the year 2006. *ROA* is calculated as earnings before interest scaled by total assets. *Tobin's Q* is total assets less common equity plus the market value of equity divided by total assets. *Leverage* is long-term debt divided by total assets. *Age* is the age of the firm at the offer. *Proceeds* is the gross proceeds from the offering. *Real Proceeds* is defined as the gross proceeds standardized in 2006 dollars. *Age* is the age of the issuing firm at the time of the offer. *Beta* and the standard deviation of returns (*RetStdDev*) are estimated from a daily time series of raw returns using the offer date + 6 through offer date + 260. *Underwriter Rank* is the underwriter rankings as updated by Carter et al. (1998).

Regarding *Industry-Adjusted* abnormal returns, both means and medians are positive and highly significant for all horizons using both paired and unpaired statistics. While our raw returns exhibit similar pattern to those reported by previous studies, the *Industry-Adjusted* returns for our sample firms differ in magnitude from those reported previously for commingled RLBO samples. For example, the mean industry-adjusted return over the 36-month period post-offering is 24.39% (*p*-value = 0.01) for our sample, while Mian and Rosenfield (1993) find the comparable return to be 21% (*p*-value = 0.10). Our measure of *Industry-Adjusted* returns is larger than that reported in Cao and Lerner (2009) (15.76%). Further, a comparison of our 60-month cumulative *Industry-Adjusted* return of 36.80% significantly exceeds the 5.85% reported by Cao and

Lerner (2009). The larger re-IPO returns that we observe suggest that post-offer stock price performance of public-to-private RLBOs differs substantially from that of other types of RLBOs.

The *Mature-Adjusted* returns are also positive and significant for all horizons that we studied. Our finding that *Control-Adjusted* cumulative returns are significantly positive and economically important in all horizons provides additional evidence on post-RLBO (re-IPO) stock performance. These results are particularly noteworthy as these controls were selected based on similar salient characteristics to our sample firms. The upward trend over the first 36 months is also consistent with the findings of De Bondt and Thaler (1985).

Fig. 1 illustrates the median buy-and-hold stock returns of re-IPOs, IPOs, mature firms and control firms over the 60-month horizon. Overall, in contrast to the findings reported for IPOs and consistent with our Hypothesis H1, public-to-private RLBO offerings outperform their benchmarks regardless of the benchmark used. Therefore, unlike IPOs, these results do not support the view that re-IPOs offerings are opportunistic.

Further, we conduct another test to investigate whether our results differ depending on the time period. Carter et al. (2011) find that IPO underperformance predominantly occurred in the 1980s and early 1990s. We compute *Control-Adjusted* cumulative returns for the two subperiods (1986–1995 and 1996–2006). We find (in unreported results) that the outperformance of re-IPOs is concentrated in the earlier wave of buyout deals. The latter wave does not exhibit superior performance. Thus, our results seem to be the mirror opposite of those exhibited by first IPOs. Our findings imply that private equity firms executed better deals early on, which is consistent with Kaplan and Stromberg's (2008) findings that private equity returns are negatively related to inflow of capital into private equity funds.

5.2. Robustness checks using private-to-private and division-to-private RLBOs

To test whether public-to-private RLBOs are different from other types of RLBOs, we replicate the analysis for private-to-private and division-to-private RLBOs and report the results in Panels A and B of Table 3. To perform this analysis, we create unique propensity score matched controls for each RLBO type. The results of the Logit regressions support our argument that these transactions are distinctly different from public-to-private RLBOs. The magnitude and significance of regression coefficients are noticeably different, particularly for private-to-private RLBOs, from those obtained for our sample of public-to-private RLBOs.

Table 2
Long-run stock returns of re-IPOs.

	Obs		12 month			36 month			60 month		
			Return	Paired *p*-Value	Unpaired *p*-Value	Return	Paired *p*-Value	Unpaired *p*-Value	Return	Paired *p*-Value	Unpaired *p*-Value
RLBO Raw Returns	207	Mean	15.83	0.00	N/A	45.25	0.00	N/A	64.39	0.00	N/A
		Median	11.71	0.00	N/A	23.34	0.00	N/A	16.12	0.00	N/A
Industry-Adjusted Returns	207	Mean	8.99	0.01	0.04	24.39	0.00	0.01	36.80	0.00	0.01
		Median	12.61	0.00	0.00	25.07	0.00	0.00	22.64	0.00	0.01
IPO-Adjusted Returns	207	Mean	10.63	0.00	0.01	24.67	0.00	0.01	35.01	0.01	0.02
		Median	18.17	0.00	0.00	28.35	0.00	0.00	29.60	0.00	0.01
Mature-Adjusted Returns	207	Mean	9.26	0.01	0.03	26.18	0.00	0.00	38.71	0.00	0.01
		Median	11.25	0.00	0.00	25.43	0.00	0.00	19.13	0.00	0.02
Control-Adjusted Returns	191	Mean	10.94	N/A	0.00	29.22	N/A	0.00	32.73	N/A	0.00
	(14,070)	Median	11.11	N/A	0.00	24.35	N/A	0.00	18.43	N/A	0.07

This table summarizes long-run buy-and-hold stock returns for a sample of public-to-private RLBOs (or re-IPO) raw returns and returns benchmarked to the industry, to IPO firms, to mature firms, and to propensity score control firms. Industries are based on Fama and French's (1997) groupings. Buy-and-hold returns are winsorized using the methodology of Cowan and Sergeant (2001). We provide test statistics based on paired and unpaired differences. Median test statistics are based on the Wilcoxon Signed-Rank test.
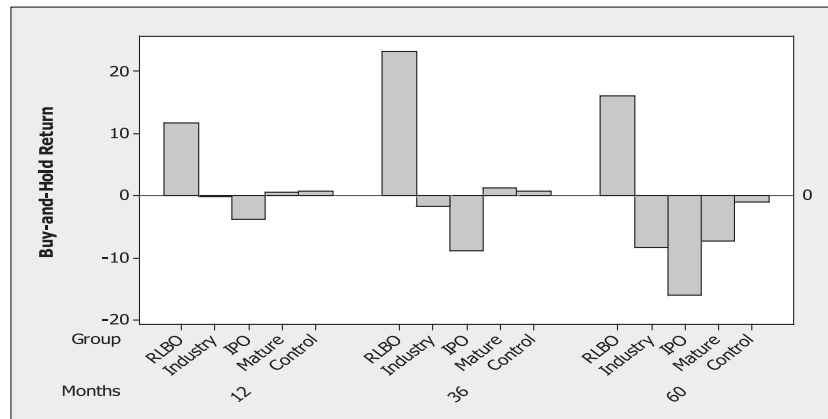
Fig. 1. Median Buy-and-Hold Returns. This figure plots the median buy-and-hold returns at 12, 36, and 60-month intervals for public-to-private RLBOs (RLBO), *Industry*, *IPO*, *Mature*, and control firms (*Control*). Industries are based on Fama and French's (1997) groupings. Returns are winsorized using the methodology of Cowan and Sergeant (2001). *Control* indicates returns of matching firms selected based on propensity scores.

Table 3
Long-run stock returns for other types of RLBOs.

|	Obs		12 month			36 month			60 month		
			Return	Paired *p*-Value	Unpaired *p*-Value	Return	Paired *p*-Value	Unpaired *p*-Value	Return	Paired *p*-Value	Unpaired *p*-Value
Panel A: private-to-private RLBOs											
RLBO Raw Returns	180	Mean	23.23	0.00	N/A	23.44	0.00	N/A	28.63	0.00	N/A
		Median	16.17	0.00	N/A	−13.76	0.26	N/A	−6.15	0.29	N/A
Industry-Adjusted Returns	180	Mean	17.64	0.00	0.00	15.25	0.04	0.19	17.09	0.05	0.18
		Median	17.95	0.00	0.00	2.48	0.00	0.28	21.15	0.00	0.03
IPO-Adjusted Returns	180	Mean	18.51	0.00	0.00	13.30	0.09	0.29	15.04	0.10	0.25
		Median	20.33	0.00	0.00	7.69	0.00	0.06	25.45	0.00	0.00
Mature-Adjusted Returns	180	Mean	18.65	0.00	0.00	16.86	0.03	0.13	19.45	0.03	0.11
		Median	17.52	0.00	0.00	1.44	0.01	0.55	19.76	0.00	0.11
Control-Adjusted Returns	169	Mean	10.82	N/A	0.01	3.84	N/A	0.63	1.92	N/A	0.86
	(14,280)	Median	14.07	N/A	0.04	−11.24	N/A	0.53	1.40	N/A	0.69
Panel B: division-to-private RLBOs											
RLBO Raw Returns	151	Mean	12.85	0.00	N/A	24.19	0.00	N/A	39.36	0.00	N/A
		Median	7.08	0.02	N/A	17.83	0.01	N/A	12.11	0.02	N/A
Industry-Adjusted Returns	151	Mean	10.00	0.01	0.05	18.91	0.00	0.02	25.20	0.01	0.05
		Median	10.65	0.00	0.00	22.52	0.00	0.00	27.71	0.00	0.00
IPO-Adjusted Returns	151	Mean	11.12	0.01	0.03	18.99	0.01	0.02	22.41	0.02	0.08
		Median	13.49	0.00	0.00	30.01	0.00	0.00	33.33	0.00	0.00
Mature-Adjusted Returns	151	Mean	9.83	0.02	0.05	18.68	0.01	0.02	25.30	0.01	0.05
		Median	11.73	0.00	0.00	20.46	0.00	0.00	19.86	0.00	0.00
Control-Adjusted Returns	141	Mean	6.54	N/A	0.14	7.51	N/A	0.37	11.25	N/A	0.33
	(13.063)	Median	7.99	N/A	0.06	23.04	N/A	0.07	20.24	N/A	0.12

This table summarizes long-run buy-and-hold stock returns for *private-to-private* RLBOs in Panel A and *division-to-private* in Panel B for various return measures (as described in Table 2). We provide test statistics based on paired and unpaired differences. Median test statistics are based on the Wilcoxon Signed-Rank test.

The results for private-to-private RLBOs suggest that positive and significant returns are limited to the first 12 months after the offering. While the mean raw returns are positive and statistically significant for all three horizons, median returns are generally negative and insignificant. Additionally, abnormal mean and median returns are only positive and significant for paired and unpaired tests over a 12-month horizon. Our finding that *Control-Adjusted* cumulative returns are insignificant at 36 and 60 months provides important evidence, as these results control for potential sample selection. Because private-to-private RLBOs were never previously public, these results may be attributed to a greater degree of information asymmetry (or less information availability).

While the cumulative raw returns, *Industry-Adjusted*, *IPO-Adjusted*, and *Mature-Adjusted* returns for division-to-private RLBOs are positive, once abnormal returns are calculated using propensity score matched firms, we fail to obtain consistently positive and significant returns at all horizons. Our results suggest that relative to matched control firms with similar salient characteristics, division-to-public RLBOs generate comparable returns. We illustrate graphically the buy-and-hold *Control-Adjusted* returns for the three different horizons for public-to-private RLBOs, division-to-private RLBOs and private-to-private RLBOs in Fig. 2.

Further, we examine the extent to which re-IPOs are similar to IPOs in terms of timing the market. It seems logical that firms undertaking re-IPOs take advantage of "windows of opportunity" to initiate an offering at the most opportune time. At the same time, an RLBO event may be dependent on when the LBO deal occurred. To investigate this issue, we report the distribution of re-IPO offerings, IPO offerings, and LBOs by year in Fig. 3. The figure reveals that while the distribution of re-IPOs is somewhat similar to that of IPOs, the association of re-IPOs with LBOs is much
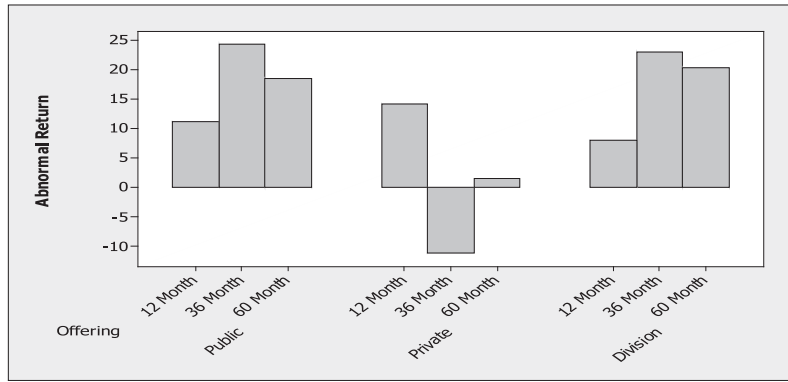
Fig. 2. Median Buy-and-Hold Abnormal Returns by RLBO Type. This figure plots the median buy-and-hold abnormal returns at 12, 36, and 60-month intervals for offerings of public-to-private RLBOs (Public), private-to-private RLBOs (Private), and division-to-private RLBOs (Division). Control firms are selected using propensity score matching. Returns are winsorized using the methodology of Cowan and Sergeant (2001).
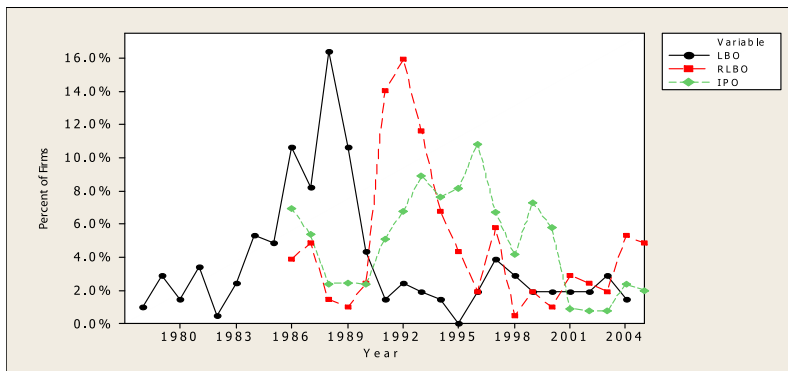
Fig. 3. Distribution of Offerings by Year. This figure plots the percent of total offerings by year for public-to-private RLBOs (RLBO) and first IPOs (IPO). For public-to-private RLBO offerings, the figure also plots the year of the LBO.

greater. This is also confirmed by the correlations where we find that the correlation between re-IPOs and IPOs is smaller (0.31) than that between re-IPOs and LBOs (0.53).

5.3. Robustness checks using the carhart model and difference-in-differences approach

To ensure that our findings are not affected by cross-sectional correlation, we measure abnormal returns using Brav and Gomper's (1997) calendar time approach in conjunction with Carhart's (1997) model as follows:

$$r_t = f(\alpha_t, RMRF_t, SMB_t, HML_t, MOM_t) \qquad (2)$$

The dependent variable, r, is the mean monthly return less the risk-free rate, $RMRF$ is the market risk premium, SMB (Small minus Big) represents firm size difference, HML (High minus Low), is the monthly difference in returns between high and low book-to-market stocks and MOM is momentum. Using this approach based on calendar time returns, abnormal returns are measured with the sign and significance of the intercept, α. The results for the raw return and four sets of benchmark-adjusted returns over 12, 36 and 60-month intervals are reported in Panel A of Table 4.[13] As the intercepts represent a monthly return, we report compounded returns in brackets to provide comparability with the findings in Table 2.

First, while the intercepts for *Raw Returns* are generally insignificantly negative, the intercepts for benchmark-adjusted returns are consistently positive and generally significant. Overall, the results using four-factor abnormal returns reinforce our earlier results that *public-to-private* RLBO firms outperform the benchmark firms up to 60 months after the offering.

We report another set of robustness tests in Panels B, C, and D of Table 4 that are based on difference-in-differences estimators. In Panel B, we estimate regressions utilizing returns of re-IPO firms and control firms for the dependent variable and *RLBO Dummy* as the test variable, while in Panels C and D, a set of four dummies controlling for different propensity score quintiles are added to those regressions (and where the median control firm is used in Panel D). The results in these panels confirm earlier findings. For instance, Panel C shows that RLBO firms' buy-and-hold returns over the 60-month period post offering are 30% points higher than control firms.

We next use the difference-in-differences estimator to compare public-to-private RLBOs to private-to-private RLBOs in Panels E and division-to-private RLBOs in Panel F. Our focus variable is *RLBO Dummy* which equals one for public-to-private RLBOs. We include a second dummy (*PubP Data*) set to one for both our sample and the propensity score controls. The models also incorporate dummy variables for the other type of RLBOs (*PrivP Dummy*) or (*DivP Dummy*).

Our results in Panels E and F are consistent with our prior findings. The *RLBO Dummy* is positive and highly significant at 12, 36, and 60 months in both panels. In contrast, Panel E shows that *PrivP*

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[13] Monthly returns for delisted RLBOs are calculated up to the last month the firm is publicly traded.

Table 4
Robustness Checks of Long-Run Re-IPO Stock Returns.

| | Calendar time returns using a Carhart model | | | | | |
| | 12 month | | 36 month | | 60 month | |
	Coeff.	p-Value	Coeff.	p-Value	Coeff.	p-Value
Panel A						
Raw returns						
Intercept Monthly	−0.432[c]	0.07	0.049	0.88	−0.048	0.86
Cumulative Intercept	(−5.06)		1.78		(−2.82)	
Sample Size	256		281		305	
Industry-adjusted returns						
Intercept Monthly	0.617[c]	0.10	1.002[a]	0.00	0.872[a]	0.00
Cumulative Intercept	(7.66)		(43.18)		(68.31)	
Sample Size	256		281		305	
IPO-industry-adjusted returns						
Intercept Monthly	0.836[b]	0.05	1.117[a]	0.00	0.966[a]	0.00
Cumulative Intercept	(10.51)		(49.15)		(77.99)	
Sample Size	256		281		305	
Mature-adjusted returns						
Intercept Monthly	0.540	0.13	0.950[a]	0.00	0.832[a]	0.00
Cumulative Intercept	(6.68)		(40.56)		(64.38)	
Sample Size	256		281		305	
Propensity score control adjusted returns						
Intercept Monthly	1.294	0.12	0.999[b]	0.04	0.895[b]	0.03
Cumulative Intercept	(16.68)		(43.00)		(70.66)	
Propensity Quintile Dummies	Yes		Yes		Yes	
Sample Size	892		1216		1305	

| | Difference-in-differences estimator | | | | | |
| | 12 month | | 36 month | | 60 month | |
	Coeff.	p-Value	Coeff.	p-Value	Coeff.	p-Value
Panel B			Public-to-Private RLBOs (re-IPO)			
RLBO Dummy	10.948[a]	0.00	29.225[a]	0.00	32.750[a]	0.00
Sample Size	14,252		14,252		14,252	
Propensity Quintile Dummies	No		No		No	
Panel C			Public-to-Private RLBOs			
RLBO Dummy	19.507[c]	0.10	22.285[a]	0.01	6.808[c]	0.08
Sample Size	14,252		14,252		14,252	
Propensity Quintile Dummies	Yes		Yes		Yes	
Panel D			Public-to-Private RLBOs (Control Medians)			
RLBO Dummy	8.675[b]	0.02	28.483[a]	0.00	33.381[a]	0.01
Sample Size	382		382		382	
Propensity Quintile Dummies	Yes		Yes		Yes	
Panel E			Public-to-Private vs. Private-to-Private RLBOs			
RLBO Dummy	11.08[a]	0.01	29.61[a]	0.00	35.44[a]	0.00
PubP Data	−2.55[a]	0.00	0.09	0.94	0.97	0.53
PrivP Dummy	10.62[b]	0.04	3.67	0.68	1.74	0.87
Sample Size	28,962		28,962		28,962	
Propensity Quintile Dummies	No		No		No	
Panel F			Public-to-Private vs. Division-to-Private RLBOs			
RLBO Dummy	11.00[a]	0.00	29.43[a]	0.00	33.90[a]	0.01
PubP Data	0.43	0.48	0.35	0.76	−1.70	0.28
DivP Dummy	6.53	0.13	7.77	0.30	11.40	0.31
Sample Size	27,447		27,447		27,447	
Propensity Quintile Dummies	No		No		No	
Panel G			Public-to-Private RLBOs			
Secondary Low	10.938[b]	0.02	32.455[a]	0.00	40.016[a]	0.00
Secondary High	11.943	0.11	22.483	0.19	14.543	0.53
Sample Size	14,197		14,197		14,197	

This table summarizes long-run stock returns for a sample of re-IPOs. Panel A reports intercepts from calendar-time returns in a Carhart (1997) model including raw returns, IPO-adjusted returns, returns adjusted by medians of mature firm in the same industry, industry adjusted returns, and control group adjusted returns. Calendar time returns are reported for 12, 36, and 60 month horizons. Propensity quintiles and Carhart four factors are not reported for conciseness. Industries are based on Fama and French's (1997) groupings. Panels B, C, D, E, and F report OLS regressions using the difference-in-differences estimator, where the dependent variable is buy-and-hold returns over 12, 36, and 60 months. Buy-and-hold returns are winsorized using the methodology of Cowan and Sergeant (2001). Panel B uses RLBO Dummy as an independent variable set to one for public-to-private buyouts. Panels C and D add dummies for the propensity score quintile of each firm (not reported). Panel E (F) compares public-to-private RLBOs to private-to-private (division-to-private) RLBOs. Panels E and F include dummy variables for public-to-private data (*PubP Data*), private-to-private RLBOs (*PrivP Dummy*), and division-to-private RLBOs (*DivP Dummy*). Panel G compares firms with high secondary shares (*Secondary High*) in the offering to those with low levels of secondary shares (*Secondary Low*). [a], [b], and [c] denote significance at the 1%, 5%, and 10% level, respectively.

Dummy is only significant during the first 12 months after exit, while in Panel F, the *DivP Dummy* is insignificant in all three cases. These results provide compelling and robust evidence that the only RLBOs that earn consistently superior returns are public-to-private RLBOs (or re-IPOs).

Finally, in Panel G we test hypothesis H3 by examining the impact of secondary share sales on future performance. We expect that insiders who choose to sell a smaller portion of their shares in a secondary offering at the time of the re-IPO will outperform firms where the insiders sell a larger proportion of their ownership. To test this, we create two indicator variables to represent low secondary offerings (those in the bottom three quartiles) and high secondary offerings (those in the highest quartile) and estimate a regression to explain long run performance.[14] The results confirm our conjecture and are consistent with the findings in Jain and Kini (1994).

5.4. Underwriter reputation and buy-and-hold stock returns of public-to-private RLBO firms

While prior studies find that underwriter reputation is positively related to IPO stock returns, the evidence on whether a similar relationship holds for re-IPOs is sparse. Because our RLBO firms were previously public, they are expected to be associated with less information asymmetry compared to IPO firms. Hence, we argue that the role of underwriters in mitigating information asymmetry in pubic-to-private RLBOs (re-IPOs) is small. However, if underwriters serve to signal the quality of the offering, superior stock price performance is expected for re-IPOs brought to market by prestigious investment banks.

In Table 5, we investigate the role of underwriter certification on abnormal returns in a univariate setting by classifying firms into two groups based on underwriter ranking. Because public-to-private RLBOs are more likely to hire prestigious underwriters (as shown in Table 1), we classify an investment bank as *Low* when the quality ranking is less than 9.0, otherwise they are sorted in the *High* rank group. We report returns over 12, 36, and 60-month horizons to determine if the effect varies over time. The results show that all five median buy-and-hold return metrics for offers by *High* quality underwriters are consistently positive and highly significant for all three horizons. In contrast, the median buy-and-hold returns for *Low* ranked underwriters are insignificant in all cases. Additionally, difference in medians between the groups is statistically significant in all cases.

Comparison of the median buy-and-hold returns of the high and low underwriter groups indicates that the returns of re-IPOs employing high quality underwriters significantly exceed those underwritten by *Low* ranked investment banks, irrespective of the return methodology applied. The differences between these two groups are both economically and statistically significant. For example, the median 36-month return difference between high and low underwriter sub-groups ranges from 24.78% to 41.22% depending on the metric used. Looking at control-adjusted 36-month returns, we find that those in the *Low* group experience an insignificant 5.19% abnormal return compared to 33.91% (*p*-value = 0.00) for offerings associated with high quality underwriters. The return differential between the two categories is highly significant.

Mean return differentials tell a similar story – that offers underwritten by prestigious banks outperform. However, the difference in means for 60-month horizon is only significant for control-adjusted returns. One contributing factor may be a proportionally higher number of takeovers in the *Low* group due to a

merger or acquisition. Prior studies find that a significant fraction of RLBOs is delisted due to M&A activity (Holthausen and Larcker, 1996). Our investigation indicates that over 31% of the *Low* group was subject to a merger or acquisition within five years of the offering compared to 16% for the *High* group. This evidence may imply that some of the RLBOs underwritten by less prestigious banks were not ready to go public again when the re-IPO was conducted, and hence are not able to survive as independent public entities after exiting the private period.

Overall, our findings indicate that issues handled by highly reputable underwriters are positively related to the long-run stock performance of re-IPO firms. Our findings, which support Hypothesis H2a, are consistent with the view that underwriter reputation has a "signaling effect" for re-IPOs. Thus, the quality of underwriter serves as a signal that is valued by the market. For comparison purposes, we present in Fig. 4 the buy-and-hold abnormal returns by low and high underwriter re-IPOs and first IPOs over the different horizons. The graph illustrates that the underperformance of re-IPOs by low ranking underwriters gets worse over longer horizons, while the over-performance of issues underwritten by highly ranked investment banks increases initially and then stabilizes. The pattern for first IPOs with low ranked underwriters is very similar to that of re-IPOs with less prestigious underwriters. However, the performance of these two types of IPOs differs when employing prestigious underwriters. Specifically, first IPOs exhibit neutral performance when compared to re-IPOs. This finding further underscores the need to examine first IPOs separately from re-IPOs.

5.5. Multivariate analysis: underwriter reputation and post-RLBO stock price performance

To validate the role of underwriter certification for re-IPOs in a multivariate setting, Table 6 reports results from OLS regressions explaining the 36-month buy-and-hold return. Due to the low cross-sectional variation in underwriter rankings, we create a dummy variable, *High UW*, which is set to one if the modified-Carter-Manaster score (*CM*) is nine, otherwise it is zero.[15] Standard errors are calculated using White's (1980) correction for heteroskedasticity. In addition to the five sets of return metrics reported earlier, we calculate market-adjusted returns for re-IPO firms using the CRSP value-weighted index for comparability with earlier research on IPOs.[16] Thus, six different return metrics are utilized as the dependent variables in the following model:

$$BHR = f(High\ UW, \log(Proceeds), \log(Age), Secondary, RetStdDev)$$
(3)

In the spirit of Carter et al. (1998), we include four variables to control for the size of the proceeds from the offer (log(*Proceeds*)), the age of the firm (log(*Age*)), the proportion of the offer that are secondary shares (*Secondary*), and the standard deviation of daily stock returns (*RetStdDev*).

Using *Raw Unadjusted* returns as the dependent variable in Model 1 in Table 6, the coefficient for *High UW* is positive and highly significant. In Model 2, which parallels Carter et al. (1998) analysis for IPOs by employing a value-weighted index, we also find a significantly positive coefficient on the underwriter certification test variable, *High UW*. The remaining four models (Models 3 through 6) confirm that the coefficient for *High UW* is positive and statistically significant when returns are *Industry-Adjusted, IPO-Adjusted, Mature-Adjusted,* and *Control-Adjusted*. To ensure

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[14] The median percent of secondary share sales is 0 in our sample.

[15] We do not define prestigious underwriters as those with a CM rank of 8 or more because that would lead to almost 93% of sample firms being in this category.

[16] Brav and Gompers (1997) find that IPO performance is sensitive to the benchmark used, where performance measured using equal-weighted index shows superior performance, but value-weighting the index does not.

Table 5
Long run re-IPO stock returns by underwriter prestige.

	Re-IPO Obs.	Control Obs.	12 month				36 month				60 month			
			Mean Return	*p*-Value	Median Return	*p*-Value	Mean Return	*p*-Value	Median Return	*p*-Value	Mean Return	*p*-Value	Median Return	*p*-Value
Re-IPO raw returns														
Underwriter Rank < 9	70	0	2.84	0.64	4.96	0.89	15.82	0.22	−9.28	0.84	42.00	0.06	−22.44	0.60
Underwriter Rank = 9	135	0	22.37	0.00	14.91	0.00	60.77	0.00	31.94	0.00	75.76	0.00	27.77	0.00
Differences in Groups Test	205	0	19.53	0.01	9.95	0.01	44.95	0.01	41.22	0.00	33.76	0.20	50.21	0.01
Industry-adjusted returns FF49														
Underwriter Rank < 9	70	70	−2.24	0.74	1.31	0.60	1.07	0.93	6.13	0.54	17.68	0.41	−0.50	0.52
Underwriter Rank = 9	135	135	14.43	0.00	16.82	0.00	36.76	0.00	34.19	0.00	45.63	0.00	35.12	0.00
Differences in Groups Test	205	205	16.67	0.02	15.51	0.02	35.70	0.02	28.05	0.01	27.96	0.28	35.62	0.02
IPO-adjusted returns FF17														
Underwriter Rank < 9	70	70	−0.53	0.93	5.26	0.25	−0.62	0.96	7.56	0.25	11.88	0.59	−1.62	0.26
Underwriter Rank = 9	135	135	16.02	0.00	19.63	0.00	38.31	0.00	47.50	0.00	46.17	0.00	45.00	0.00
Differences in Groups Test	205	205	16.55	0.03	14.37	0.04	38.94	0.02	39.94	0.00	34.29	0.20	46.62	0.01
Mature-adjusted returns FF49														
Underwriter Rank < 9	70	70	−2.59	0.67	0.33	0.70	2.99	0.80	7.51	0.62	21.87	0.31	−1.81	0.55
Underwriter Rank = 9	135	135	15.05	0.00	15.28	0.00	38.40	0.00	32.29	0.00	46.42	0.00	26.58	0.00
Differences in Groups Test	205	205	17.64	0.02	14.95	0.02	35.41	0.02	24.78	0.01	24.54	0.35	28.39	0.03
Control-adjusted returns														
Underwriter Rank < 9	62	6394	1.03	0.87	7.78	0.79	3.83	0.75	5.19	0.63	15.70	0.32	−18.17	0.16
Underwriter Rank = 9	126	7554	15.34	0.00	11.64	0.00	41.87	0.00	33.91	0.00	42.38	0.00	29.91	0.00
Differences in Groups Test	188	13,948	14.31	0.00	3.86	0.00	38.04	0.00	28.71	0.00	26.68	0.00	48.09	0.00

This table summarizes the influence of underwriter ranking on long-run stock returns in a univariate setting. Abnormal returns are adjusted by IPOs, mature firms, industry, and control firms. Industries are based on Fama and French's (1997) groupings. Control firms are selected based on propensity score matching technique. Underwriters are ranked on a scale of 0 to 9 where a ranking less than 9 is classified as low, and high otherwise. Buy-and-hold returns are winsorized using the methodology of Cowan and Sergeant (2001). Means, medians, and *p*-values based on unpaired test statistics are reported. Median test statistics are based on the Wilcoxon Signed-Rank test.
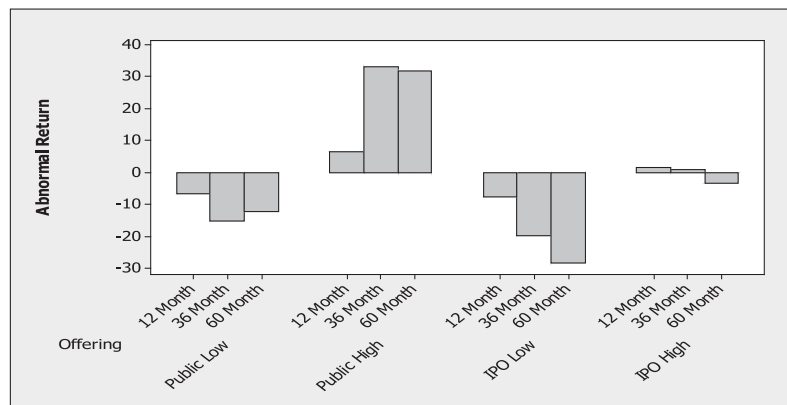
Fig. 4. Median Buy-and-Hold Abnormal Returns by Underwriter Ranking. This figure plots the median buy-and-hold abnormal returns at 12, 36, and 60-month intervals for offerings of public-to-private RLBOs with low and high ranked underwriters (*Public Low* and *Public High*) and first IPOs with low and high ranked underwriters (*IPO Low* and *IPO High*). Underwriters are categorized in the *Low* and *High* groups based on whether ranking is less than 9.00 or greater, respectively. Abnormal returns are calculated with control firms selected using propensity score matching. Returns are winsorized using the methodology of Cowan and Sergeant (2001).

our findings are not the result of the Carter et al. (1998) model, which controls for risk through the standard deviation of daily returns in post-offer period, we employ Carhart's (1997) model using 36 month calendar time returns as a robustness check. The intercept for *High UW – Low UW* is consistently positive and significant for raw returns and our four sets of adjusted returns.

In the last regression in Table 6, we include all RLBO types and first IPOs along with cross product terms between each of type of offering and *High UW* to control for potential association between the type of RLBO and underwriter reputation. The findings confirm those in the previous models as the cross-product term of public-to-private with high underwriter ranking remains positive and statistically significant.

We conduct an additional robustness test in Table 7 where we estimate difference-in-differences estimators that include the equity market capitalization four months after the offering (Chan et al., 2008), as well as the propensity score as additional control variables. In Model 1 we include all control firms, while in Model 2 we include the closest 10 control firms. The results corroborate those obtained in Table 6, confirming that the effect that we observe is not an just an underwriter effect but also a re-IPO effect. In unreported regressions, we also examine whether the re-IPO effect is limited to one of the two subperiods (1986–1995 and 1996–2006). Our results indicate that the effect is consistent across time.

The findings in this section are in support of Hypothesis H2a and provide robust evidence that underwriters fulfill a signaling role for re-IPOs. This evidence contrasts with Cao and Lerner (2009) who find no link between underwriter reputation and long run stock return in the post-RLBO period. It is noteworthy, however, that Cao and Lerner's sample consisted mostly of private-to-private and division-to-private RLBOs and excluded management buyout deals, while our sample is made up of all public-to-private RLBOs.

5.6. Linking restructuring activities during the private period to post-re-IPO stock return performance

While for the sample as a whole the long-run stock returns for RLBOs indicate over-performance, in this section we set out to identify which restructuring activities during the private period, if any, lead to better post-re-IPO performance. To the extent that private period restructuring is valuable in positioning the firm after the offering, we expect to find a link between changes in key firm

fundamentals during the private period and post-offer buy-and-hold returns. To test this proposition, we conduct a multivariate regression analysis where the dependent variable is the 36-month buy-and-hold returns. The results are reported in Table 8.

We control for the effects of key issuing firm characteristics on long-run stock performance such as size, leverage, change in ownership concentration, and firm risk proxied by *Beta*. The logarithm of total assets is utilized to proxy for more established issuers and for the size of the offering. In some regressions, instead of total assets, we use *PPE/TA*, as an alternative measure of size as a robustness check. We also control for macro-economic factors such as the term structure of interest rates with *Yield Curve*. As our independent variables measure restructuring due to the LBO and our propensity controls measure changes after the RLBO, we mitigate potential sample selection bias by using Heckman's (1979) two-step process.[17] We employ Eq. (1) in a Probit regression predicting the probability of an RLBO (re-IPO). We then calculate the inverse mills ratio (*Mills*), which is included as an explanatory variable in the specification below:

$$BHR_t = \mathrm{f}(Controls, Growth, \Delta ROA, \Delta R\&D/Sales, \Delta Capex/Sales,$$
$$\Delta Leverage, Mills) \qquad (4)$$

Since year and industry effects may be correlated, following Petersen (2009), we estimate double-clustered regressions, where *p*-values are based on standard errors adjusted for clustering by industry and RLBO date. The salient explanatory test variables are sales growth (*Growth*), change in profitability (ΔROA), and change in investments, such as capital expenditures ($\Delta Capex/Sales$) and research and development ($\Delta R\&D/Sales$). In Panels A and B of Table 8, we employ the 36-month buy-and-hold raw returns and industry-adjusted returns respectively, as the dependent variable. Firm fundamentals are adjusted by industry medians.

In Models 1 and 6, the coefficients for the focus explanatory variable, *Growth*, which measures sales growth from LBO to re-IPO, are positive and significant. Profitability improvements from restructuring also benefit stock returns after the re-IPO, where the coefficients of the variable ΔROA are positive and significant in all models. Increases in capital expenditures ($\Delta Capex/Sales$) and R&D ($\Delta R\&D/Sales$) emerge as positive factors in firm performance in post offering period, as the coefficient for these two

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[17] Cao (2011) uses the Heckman (1979) method in studying the impact of quick flips on post-RLBO performance.

Table 6
The impact of underwriter certification on stock returns following re-IPOs.

| Independent variables | Raw return | | Market-adjusted return | | Industry-adjusted return | | IPO-adjusted returns | | Mature-adjusted returns | | Control-adjusted returns | | | |
| | Model 1 | | Model 2 | | Model 3 | | Model 4 | | Model 5 | | Model 6 | | Model 7 | |
	Coeff.	p-Value	Coeff.	p-Value	Coeff.	p-Value	Coeff.	p-Value	Coeff.	p-Value	Coeff.	p-Value	Coeff.	p-Value
Intercept	1.553[a]	0.06	2.374[a]	0.00	2.440[a]	0.00	2.430[a]	0.00	2.446[a]	0.00	2.438[a]	0.00	2.362[a]	0.00
High UW	0.335[b]	0.02	0.036[b]	0.02	0.027[b]	0.05	0.030[b]	0.04	0.027[b]	0.05	0.034[b]	0.04		
Log (Proceeds)	−0.087	0.20	0.000	0.98	−0.006	0.41	−0.006	0.39	−0.007	0.33	−0.008	0.36	0.000	0.97
Log (Age)	−0.112	0.15	−0.014	0.14	−0.012	0.15	−0.007	0.41	−0.013	0.14	−0.010	0.26	−0.002	0.27
Secondary	−0.025	0.91	−0.003	0.93	0.002	0.95	−0.007	0.82	0.003	0.93	0.006	0.89	0.013	0.30
RetStdDev	−31.014[a]	0.00	−1.308[b]	0.04	−1.421[a]	0.01	−1.404[a]	0.01	−1.492[a]	0.01	−1.353[c]	0.07	−0.849[a]	0.00
Public RLBO													−0.021	0.22
Division RLBO													−0.005	0.75
First IPO													−0.033[a]	0.00
Public RLBO * High UW													0.027[c]	0.10
Division RLBO * High UW													0.002	0.91
First IPO * High UW													0.023[a]	0.00
Private RLBO * High UW													−0.018	0.22
Observations	204		204		204		204		204		187		2,744	
Adjusted R^2	12.75		3.87		2.93		2.55		3.16		0.78		2.67	
Industry Groups	N/A		N/A		Yes		Yes		Yes		N/A		N/A	
Propensity Dummies	No		No		No		No		No		Yes		Yes	

This table reports results of OLS regressions explaining 36-month stock returns of re-IPO firms. Raw return is the logarithm of (1 + raw return). Adjusted returns are the logarithm of (10 + adjusted-return). *Proceeds* are the gross proceeds standardized in 2006 dollars using the annual inflation rate from the Consumer Price Index. *Age* is the age of the issuing firm at the time of the offer. The standard deviation of returns (*RetStdDev*) is estimated from a daily time series of raw returns using the offer date + 6 through offer date + 260. *UW High* is a zero where the underwriter ranking is less than 9 and a one otherwise. *Secondary* is the percentage of secondary shares in the offering. *Public RLBO, Division RLBO* and *Private RLBO* and *First IPO* are dummy variables that represent type of offering. Propensity Dummies are four dummies to represent five quintiles. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 7
Additional robustness checks for the link between underwriter prestige and stock returns.

Independent variables	Difference-in-difference estimator			
	Model 1		Model 2	
	Coeff.	p-Value	Coeff.	p-Value
Intercept	41.817[a]	0.00	46.693[a]	0.01
Propensity Score	−30.025[a]	0.02	−32.969[a]	0.01
RetStdDev	−5.829[a]	0.00	−6.513[a]	0.00
Market Cap (month 4)	0.000[a]	0.00	0.000[a]	0.00
Percent Secondary	0.388[a]	0.01	0.377[a]	0.01
Public RLBO	−0.409	0.98	−2.581	0.85
Division RLBO	−2.442	0.84	−4.606	0.71
Private RLBO	−3.101	0.73	−4.888	0.59
First IPO	−13.323[a]	0.00	−14.562[a]	0.00
Public RLBO * High UW	31.768[b]	0.03	31.334[b]	0.03
Division RLBO * High UW	1.953	0.89	1.867	0.90
Private RLBO * High UW	−16.293	0.15	−16.525	0.14
First IPO * High UW	11.208[b]	0.05	11.148[c]	0.06
Observations	48,989		14,204	

This table reports results of OLS regressions explaining 36-month stock returns of after various types of IPO offerings where the dependent variable is the natural logarithm of (10 + adjusted-return). The standard deviation of returns (*RetStdDev*) is estimated from a daily time series of raw returns using the offer date + 6 through offer date + 260. *UW High* is a zero where the underwriter ranking is less than 9 and a one otherwise. *Market Cap* is calculated as the market value of equity four months after the offering. *Secondary* is the percentage of secondary shares in the offering; this variable is set to zero for control firms. *Public RLBO*, *Division RLBO*, *Private RLBO* and *First IPO* are dummy variables that represent type of offering. [a], [b], and [c] denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 8
The impact of private period restructuring on stock returns following re-IPOs.

Independent Variables	Variable Measure Period	Panel A: raw returns					Panel B: industry-adjusted returns				
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Leverage	At offering		1.234[a] (0.01)	1.215[a] (0.01)				1.009[b] (0.02)	0.993[b] (0.02)		
PPE/TA	At offering	0.033 (0.96)					0.154 (0.81)				
Log (Assets)	At offering		2.301 (0.79)	−0.555 (0.95)	13.058[c] (0.10)	8.743 (0.30)		1.322 (0.89)	−1.232 (0.89)	10.812 (0.22)	7.619 (0.37)
Log (Sales)	At LBO	5.003 (0.30)	1.008 (0.89)	4.069 (0.57)	−3.898 (0.53)	−3.438 (0.58)	4.381 (0.40)	0.816 (0.91)	3.471 (0.67)	−2.919 (0.66)	−2.579 (0.70)
Growth	LBO to RLBO	0.004[a] (0.00)					0.002[b] (0.02)				
ΔROA	LBO to RLBO	1.704[b] (0.07)	2.966[b] (0.04)	2.830[b] (0.04)	2.322[a] (0.01)	2.061[b] (0.03)	1.484[c] (0.09)	2.767[a] (0.01)	2.649[b] (0.04)	2.072[b] (0.02)	1.879[b] (0.03)
ΔCapex/Sales	LBO to RLBO		0.746[b] (0.04)					0.651[b] (0.03)			
ΔR&D/Sales	LBO to RLBO			2.434[a] (0.01)					2.111[a] (0.00)		
ΔShares/Owner	LBO to RLBO		−0.002[a] (0.01)	−0.002[a] (0.01)				−0.001[b] (0.02)	−0.001[a] (0.01)		
ΔLeverage	LBO to RLBO				0.970[a] (0.00)	0.989[a] (0.00)				0.864[a] (0.01)	0.876[a] (0.01)
Yield Curve	At offering	25.952[a] (0.00)	34.304[a] (0.00)	34.425[a] (0.00)	37.293[a] (0.00)	36.792[a] (0.00)	15.596[a] (0.00)	22.372[a] (0.00)	22.425[a] (0.01)	25.372[a] (0.00)	25.001[a] (0.00)
Beta	At offering		47.679[a] (0.00)	45.503[b] (0.00)	35.151[a] (0.01)	38.133[a] (0.00)		45.498[a] (0.00)	43.588[b] (0.02)	37.414[a] (0.00)	39.620[a] (0.00)
Mills	At offering	13.954 (0.63)	86.415[a] (0.00)	80.897[a] (0.00)	62.472[b] (0.02)	64.356[b] (0.02)	7.774 (0.75)	63.786[a] (0.00)	58.922[b] (0.02)	51.587[b] (0.02)	52.98[b] (0.02)
High UW	At offering					30.120[b] (0.02)					22.287[b] (0.04)
Observations		173	137	138	168	168	173	137	138	168	168
Adjusted R²		4.34	16.13	15.69	14.91	15.63	0.86	11.46	11.10	11.03	11.26

This table reports regressions explaining 36-month returns post re-IPO. The models employ Heckman's (1979) two-step approach with a first stage Probit regression using Eq. (1) to predict the probability of an RLBO. Control variables are long-term debt (*Leverage*), tangible fixed assets (*PPE/TA*), logarithm of total assets (*Log(Assets)*), logarithm of sales (*Log(Sales)*), the difference between a 10-year T-bond and a 3-month T-bill (*YieldCurve*), a measure of systematic risk (*Beta*), the change in ownership concentration (*ΔShares/Owner*), and the Inverse Mills Ratio (*Mills*). Focus variables are changes in: sales (*Growth*), profitability (*ΔROA*), capital expenditures (*ΔCapex/Sales*), R&D (*ΔR&D/Sales*), and leverage (*ΔLeverage*). Variables are measured at the LBO, at the offering, and over the private period (LBO to RLBO). Independent variables are industry-adjusted based on Fama and French's (1997) groupings. Buy-and-hold returns are winsorized. [a], [b], and [c] denote significance at the 1%, 5%, and 10% levels, respectively. *p*-Values (in parenthesis) are based on standard errors adjusted for clustering in industry and RLBO date. The intercept is not reported for conciseness.

variables are also positive and significant. These findings imply that investment decisions made during the private period are taken with the long-term view in mind. In Models 5 and 10, we include the underwriter ranking variable, *UW High*, to control for the possibility that post-offer performance is due to underwriter quality. The results in both models indicate that both underwriter prestige and restructuring activity are important to future performance. Overall, our evidence supports Hypothesis H4a, showing that sales growth, improvements in the return on assets, and increased in investments in capital expenditures and R&D during the private period have positive effects on stock price performance following the re-IPO.

In unreported regressions using (a) 36-month post-RLBO buy-and-hold raw return, and (b) 36-month buy-and-hold industry-adjusted return as dependent variables, we also include the interaction terms *Growth * High UW* and *ΔROA * High UW* to Eq. (4). We find that these two cross-product terms are positive and highly significant, indicating that high underwriter reputation further enhances the positive effects of restructuring activity on post-RLBO stock performance. In contrast, the interaction terms *Growth * Low UW* and *ΔROA * Low UW* are insignificant in these variants of Eq. (4).

Further, in Models 6 and 9 we include the change in leverage from LBO to RLBO (*ΔLeverage*) to test the validity of the common criticism in the popular press of private equity firms—specifically, that they over-lever these firms without consideration for the viability of the firm after exit. The significantly positive coefficients on this variable do not support this notion. In fact, our finding indicates that the increased leverage performs a valuable function that puts the firm on a trajectory to positive post-RLBO stock price performance.

In untabulated results, we also examine the impact of the length of the private period. Cao (2011) predicts a positive relationship between private period length and post-IPO performance based on the premise that a longer private period will result in deeper and more valuable restructuring. He finds that post-RLBO underperformance is concentrated in firms remaining private less than a year. In contrast to Cao's finding, our results of a negative but insignificant link (*p*-values between 0.42 and 0.67) imply that the restructuring period is of optimal length and that the length of private period depends on the financial condition of the firm at the time of the LBO. This result, in conjunction with our previous findings reported earlier, underscore the importance of examining the different types of RLBOs separately, as well as separating public-to-private RLBO offers from other IPOs. Prior RLBO and IPO studies have not examined these inherently different types of going public transactions separately.

We also use an indicator variable that denotes whether the firm is delisted from NSYE, AMEX or NASDAQ due to bankruptcy, liquidation or insufficient capital in the five year period following the RLBO, which takes a value of one if delisted and zero otherwise. Teoh et al. (1998) employ this variable as a proxy for the negative effect of pre-issue accounting "window dressing". Our result for the delist coefficient, which is significantly negative, indicates that investors are not able to see through the window dressing at the offering.

Finally, we examine whether the long-run returns are greater for firms that eventually get acquired by including a dummy variable that takes a value of 1 if the RLBO firm was acquired during the five-year period post exit, and 0 otherwise. Holthausen and Larcker (1996) attribute the excess return accumulated over 36-month period post-RLBO offering to firms that eventually get acquired. The coefficient for this indicator variable is positive, 5.169, but insignificant which suggests that the long-run stock returns that we observe are not influenced by firms that get acquired or merged with another firm after controlling for private period restructuring activities.

6. Conclusions

This is the first study to investigate the long-run stock performance of *public-to-private* RLBOs (re-IPOs) to provide new insights into the post-IPO stock price underperformance anomaly. We benchmark re-IPO returns against those of IPOs, mature firms, industry medians, and a propensity-score matched control sample. The findings reveal that *public-to-private* RLBO stock returns outperform first IPOs at 12, 36, and 60-month horizons after the offering. The findings are systematic and robust to all other benchmarks. Therefore, unlike first IPOs, these results do not support the view that re-IPO offerings are opportunistic. Our finding that re-IPOs are more strongly correlated with a prior hot LBO market than a current strong IPO market provides additional supporting evidence. Further, our results document that post-offering stock price performance of re-IPOs is different from *private-to-private* and *division-to-private* RLBOs. Our empirical evidence underscores the need not only to separately analyze IPOs without the inclusion of re-IPOs, but also to distinguish between the three different types of RLBOs.

When we partition our sample period into two subperiods (1986–1995 and 1996–2006), we find that the outperformance of re-IPOs is concentrated in the earlier wave of buyout deals. Thus, our results seem to be mirror opposite of those exhibited by IPOs. We also extend previous research by exploring whether underwriters play a signaling role for public-to-private RLBO offers. Our re-IPO sample allows us to isolate the effect of signaling firm quality based on underwriter certification from the information asymmetry effect, as these two effects are difficult to isolate for first IPO firms. Both univariate and multivariate analyses indicate that the underwriter type signals re-IPO quality. In particular, we find that regardless of the return benchmark, public-to-private RLBO deals underwritten by prestigious investment banks significantly outperform over the one-year and three-year horizons implying that the signaling role played by underwriters is important to future firm performance. Our results also show that first IPOs managed by high quality underwriters exhibit substantively different long-run stock returns compared to public-to-private RLBOs.

Our study further contributes by investigating what restructuring activities undertaken during the private period influence long-run stock performance following the exit in a public-to-private RLBO. Our evidence indicates that private period restructuring is highly relevant to firm performance after the RLBO. Specifically, firms that manage to enhance sales growth over the private period are able to garner superior stock returns after exit. Further, we find that the ability to improve profitability during the restructuring period is positively related to long-run stock returns after the offering.

We also document that post-offering performance of re-IPOs is positively related to increases in investments, namely capital expenditures and R&D, resulting from private period restructuring. For deals associated with prestigious investment banks, we find that the positive effects of sales growth and improved profitability during the private period are further enhanced. Our results also lend support to the notion that the increased leverage during the private period is beneficial to the firm, thus calling into question the common criticism of private equity firms from the popular financial media that the increase in leverage during the private period hurts firm prospects.

Appendix .

Variable Definitions

Age	Firm age in years
Assets	The book value of total assets (item #6) adjusted to year 2006
Beta	Firm beta based on stock returns from offer date + 6 through offer date + 260
BHR	12, 36, and 60 month buy-and-hold returns
Capex/Sales	Capital expenditures (item #128) divided by sales (item #12)
COGS/Sales	Cost of goods sold (item #41) divided by sales (item #12)
DivP Dummy	Set to one for division-to-private RLBOs
High UW	Dummy set to one if the underwriter ranking is 9.0
Leverage	Long-term debt (items #9 + #44) divided by total assets (item #6)
Mills	Inverse Mills ratio from a first step Probit regression
PrivP Dummy	Set to one for private-to-private RLBOs
Proceeds	Dollar amount of the proceeds of the public offering
PubP Data	Set to one for public-to-private RLBOs and corresponding control firms
RetStdDev	Standard deviation of daily stock return from offer date + 6 through + 260
ROA	Earnings before interest (items #172 + #15) divided by total assets (item #6)
R&D/Sales	Research and development expenses (item #46) divided by sales (item #12)
RLBO Dummy	Set to one for public-to-private RLBOs (Re-IPO)
Sales	Net sales (item #12) adjusted to year 2006
Secondary	Percentage of secondary shares in the public offering
Shares/Owner	Equity shares (item #25) divided by common shareholders (item #100) in thousands
Tobin's Q	Total Assets (item #6) less common equity (item #60) plus market value of equity (items #199 * #25) divided by total assets (item #6)
Yield Curve	The difference between 10 year T-bond and 3 mo. T-bill rates for a given month

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