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IPOS LONG-RUN PERFORMANCES, MERGER AND ACQUISITION, AND PRIVATE EQUITY

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Abstract

Analyzing 918 initial public offering (IPO) firmson the NASDAQ and NYSE over the period of1999 to 2013,we examine an impact of acquisition on long-run stock performancesby conducting the event-time approach. The results show that IPO firms that make an acquisition within their first year after going public significantly underperform than the other firms that do not engage an acquisition in their first year. However, if acquisition activities are delayed to years two or three, the performance of the acquiring firmsturns to be better than their associated non-acquiring firms. Moreover, private equity supports both acquiring and nonacquiring IPOs stock performance.

1.   Introduction

Brau and Fewcett (2006) find that a desire to infuse the capital for acquisitions is the primary motivation of the going public. Celikyurt, Selivir, and Shivdasani (2010) show that initial public offering (IPO) firms acquire other businesses using the IPO's capital and subsequent debt financing. Only 19% of IPO firms perform acquisition in the five years before going public, while 74% of them perform at least one acquisition within five years after IPO. In addition, IPO firms make more acquisitions, on average, than mature public firms in the same industry. Thisdemonstrates that newly issued firms show a greater tendency to acquire other businesses. In other words, the desire to acquire makes firms issue their shares to the public. However, IPO firms demonstrate relativelypoor long-term performanceswhen conductingmerger and acquisition (M&A) in the first year after going public.For example, Brau, Couch, and Sutton (2012) find that IPO firms that acquire within a year after going public significantly underperform in both event-time andbuy-and-hold stock excess returns over the first five years compared to the other IPO firms. Moreover, their regression results show that M&A activities in the first year significantly associate to the long-run underperformance puzzle of newly public firms, which is explained by the hubris hypothesis (Roll, 1986). The theory suggests that managers are overconfident in their skills to select a target, which subsequently destroy the firm value by overpaying for acquisition. This is later confirmed by Malmendier

and Tate (2008), who find that overconfident bidders create a value-destroying acquisitions.In addition, private equity-backed IPOs perform better than other IPOs in the long-run horizon (Degeorge and Zeckhauser, 1993, Holthausen and Larcker, 1996, Cao and Lerner, 2009, Cao, 2011, and Levis, 2011).

In this study, we compare the long-run performance of IPO firms that make post-IPO merger and acquisition within the first year anniversary after their IPOs to that of IPO firms that do not make a deal in the first year after their IPOs. Next, we divide the entire sample intothe private equity-backed IPOfirms and non-private equity-backed IPO firms for both the first-year acquirers and thefirst-year nonacquirers in order to explore an impact of private equity sponsors. In summary, we perform tests to address three following objectives. First, is the long-run performance of acquirers in the first year worse than that of nonacquirers in the first year? Second, if the hubris effect holds true for acquirers, do private equity sponsorsalleviate theIPO long-run underperformance? Third, if the hubris effect does not hold true for nonacquirers, do private equity sponsors make difference in performance among these groups?

Our scope of study is the IPO firms listed in NASDAQ and NYSE during the period of 1999 to 2013, obtained from Bloomberg. The results show that IPO firms that make an acquisition within their first year after going public significantly underperform than the other firms that do not engage an acquisition in their first year. However, if acquisition activities are delayed to years two or three, the performance of the acquiring firms turns to be better than their associated non-acquiring firms. Moreover, private equity supports both acquiring and nonacquiring IPOs stock performance.

2.   Literature review

Based on survey on 336 chief financial officers, Brau and Fawcett (2006) find that a primary motivation for going public is to promote an acquisition over the late dot-com bubble period of 2000-2002. This is consistent to the finding of Schultz and Zaman (2001), showing that many internet firms that went public involving in a significant amount of post-IPO acquisition activity. Later, Celikyurt et al. (2010) analyzing post-IPO acquisitions over the period of 1985 to 2004find that 31% (77%) of IPO firms make at least one acquisition within one (five) year(s) after going public, while only 19% of the firms make an acquisition within five years before going public. IPO firms make more acquisitions, on average, than their comparative mature public firms. Moreover, the average expenditure on acquisition is considerably larger than both capital expenditure and research and development expense. The evidence emphasizes that acquisition is an important reason for firms going public.Though the long-run underperforming IPO firms are widely documented, an examination of acquisition affecting the long-run performance of IPO firms is still limited. For example, Brau, Couch, and Sutton (2012) examine an association between M&A activities and long-run performance of IPO firms over the period of 1985 to 2003 and find that the firms making the acquisition within their first year after going public experience significantly worse long-run performance after the first year than the other relative IPO firms. The results yield the same for both the buy-and-hold excess return and calendar-time portfolio regressions. Their findings indicate that newly issued firms do not make value added from acquisitions, destroying the long-run performance. Specifically, making M&A within the first year after going public is an importantfactor for IPO

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Business, Management and Economics Engineering, 2023 Volume 21 Issue 1, ISSN: 2669-2481 / eISSN: 2669-249X

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underperformance. However, the reputation of underwriter and venture capital sponsorhelp alleviate poor performance of IPOs (Brav and Gompers, 1997 and Carter et al., 1998).

Degeorge and Zeckhauser (1993) find that the reverse leverage buyouts stock (RLBO)show a better accounting performance (a change in EBIT/Assets) compared to their peers when it does not go public.However, the performance continues to go down after the IPO. Holthausen and Larcker (1996), studying 90 RLBOs between 1983 and 1988, find that the accounting performance (EBITDA/Assets) is better than other firms in the same industry at the time of the IPO.The superior performance lasts for four fiscal years after the IPO, however, it cannot beat the market return. Cao and Lerner (2009), examining the performance of 437 RLBOs between 1981 and 2003, find that RLBOs appear to perform as well as or better than other IPOs and the overall stock market. The findings are similar to Cao (2011), examining 594 RLBOs between 1981 and 2006 and showing persistent superior operating performance (EBITDA/sales or ROA) and stock return.

3.   Research methodology

3.1 Buy-and-hold abnormal return (BHAR)

In a short brief, Mitchell and Stafford (2000) define the BHAR as the *"average multiyear return from a strategy of investing in all firms that complete an event and selling at the end of a pre-specified holding period versus a comparable strategy using otherwise similar non-event firms."*In this paper, the event is a merger and acquisition activity within the first year anniversary after the IPO date of any particular newly issued firmslisted in the NADAQ and NYSE.

In order to compare the performance between acquiring and nonacquiring firms, we first measure the performance through the buy-and-hold abnormal return for a firm starting from the day after IPO date to yearsone, two, three, four, and five, respectively. For example,equation (1) isthe calculation ofthe three-year buy-and-hold abnormal return.We apply the same method, when measuring for the one-year ($t = 12$), two-year ($t = 24$), four-year ($t = 48$), and five-year ($t = 60$)buy-and-hold abnormal returns.Each month consists of 21 trading days, totaling 252 trading days per year. In case of delisted IPOs, the abnormal return is calculated until the delisting date and represented for all long-horizon returns.

$$BHAR_{0,3}^{i} = \prod_{t=1}^{36}(1 + r_t^i) - \prod_{t=1}^{36}(1 + r_t^b), \qquad (1)$$

where $BHAR_{0,3}^{i}$ is the three-year buy-and-hold abnormal return for firm i.r_t^i is the monthly total return for firm i in month $t$after going public.$r_t^b$is thevalue-weighted CRSP total market return as the benchmark total return in month t.

In addition, we prefer to determine the performance after the first year post-IPO since our hypothesis on the hubris effect tends to show after the M&A activity. For example, equation (2) shows thethree-year abnormal return, which exclude the first year.

$$BHAR_{1,4}^{i} = \prod_{t=13}^{48}(1 + r_t^i) - \prod_{t=13}^{48}(1 + r_t^b), \qquad (2)$$

We compute the mean value of the buy-and-hold abnormal return for both acquirers and nonacquirer by t-test, as well as the skewness-adjusted t-test as suggested by Lyon, Barber, and Tsai (1999).

3.2 Skewness-adjusted t-test

We need to adjust the t-statisticestimation for potentially skewed abnormal return distributions that usually occur when using a portfolio as a benchmark, for example, the value-weight market portfolio. The skewness-adjusted t-test suggested by Johnson(1978) is employedto the test of long-run performance as shown in the study of Lyon et al. (1999).

$$T = \sqrt{N} \times \left(S + \frac{1}{3}yS^2 + \frac{1}{6N}y \right) \tag{3}$$

with

$$S = \frac{\overline{BHAR}_{t,T}}{\sigma\left(BHAR_{i(t,T)}\right)}, \tag{4}$$

$$y = \frac{1}{N} \times \frac{\sum_{i=1}^{N}\left(BHAR_{i(t,T)} - \overline{BHAR}_{t,T}\right)^3}{\sigma\left(BHAR_{i(t,T)}\right)^3} \tag{5}$$

$$\sigma\left(BHAR_{i(t,T)}\right) = \sqrt{\frac{1}{N-1} \times \sum_{i=1}^{N}\left(BHAR_{i(t,T)} - \overline{BHAR}_{t,T}\right)^2} \tag{6}$$

where $\overline{BHAR}_{t,T}$ is the average BHAR over a specified time frame and $BHAR_{i(t,T)}$ is the buy-and-hold abnormal return over the identical time period for company i.

4.   Data

4.1 Identifying the IPO sample

We collect IPO firms listed in the NASDAQ and NYSE over the period of 1999 to 2013[1] from the Bloomberg database. Closed-end funds, unit offers, financial and REITs firms, and the stocks issuance in over-the-counter market are excluded.Starting from 1,553 initialfirm sample,we have 918 final firm sample after filtering as showing in Table 1.Next, we match the final sample with theM&A dataset usingthe stock ticker in order todetermine their first M&A effective date. For the first-year acquirers, we require that M&A effective date must happen before the first anniversary date of each IPOs. Private equity-backed sponsor as a dummy variable in the IPO activity is from the Bloomberg.

Panels A and B of Table 2 show a detail of our 918 IPO firm sample grouped by issuing year and industry, respectively.Panel A shows the highest portion (61.3%) of the public firms that acquire in their first year in year 1999, the period before the dot-com bubble.The lastthree smallest portions happen in years 2002 (12.0%), 2003 (11.1%), and 2009(13.3%), which are the periods after the dot-com bubble and the sub-prime crisis.It is interesting to note that the number of merger and acquisition activities decreases substantially after the first-year IPO. On average, 253 firmsof the 918 (= 27.6%)IPOsare involved in M&A activities within their first year.As shown in Panel B of Table 2, top two largest IPOs are present in the healthcare (163

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[1] We have to reserve the data for the additional next five-year returns for computation.

IPO firms) and information technology (146 IPO firms), showing immense growths in these two industries in our sample.

4.2 Stock return and supplement data

Buy-and-hold dailystock returnsare from the total return index from the Bloomberg.Daily buy-and-hold benchmark return and monthlyrisk premium are from Kenneth R. French' webpage. In calendar-time portfolio, we extract monthly total return of each stock from Bloomberg.

5. Empirical results

5.1 Event-time approach,Buy-and-hold abnormal return (BHAR)

Panel A of Table 3 presents univariate tests of the abnormal returns of the buy-and-hold trading strategy for the full sample, using parametric and nonparametric tests.Starting from the parametric test, the mean value of abnormal return after IPO date is positive for all time horizons. A trend in abnormal return is upward from years 1 to 3, in which the three-year buy-and-hold strategy generates the highest abnormal returns (12.96%).After three-year holding period, abnormal returns are decreasing. Both t-statistic and skewness adjusted t-statistic[2] are significant up to the three-year holding period, confirming a statistically positive abnormal return.The results of parametric test in this study are different from those of in past studies. Turning to the non-parametric tests, the median value of abnormal return after the IPO date is negative for all time horizons.The magnitude of the median values increases monotonically to holding periods. The longer the periods, the larger the negative median values are.The findings on nonparametric approaches are consistent to previous results.

Panel B of Table 3 presents univariate tests of the abnormal returns of the buy-and-hold trading strategy for the acquirers and nonacquirers, using parametric and nonparametric tests.The results show that firms involving acquisition activitieswithin their first year after going public ($BHAR_{0,1}$)have higher mean and median in thefirst-year abnormal return after going public compared to the comparable firms. This suggests that firms showing a relative good performance in first year have a greater tendency to acquire other businesses.

Table 4 presents the results of abnormal returns of acquirers and their comparable nonacquirers when acquisition occurs in the 1st, 2nd, 3rd, and 4th years after the IPO issuance, respectively, using both parametric and nonparametric approaches. The mean values in Panel A on the first-year acquirers show that acquirers perform worse than nonacquirers over the one- and two-year holding periods and better than nonacquirers over the three- and four-year holding periods.These results are notconsistent with Brau et al. (2012), who find underperformance of acquirers in one- through four-year holding periods.The results are clearer in the median values as shown in Panel A. The performance of acquirers is worse than associated nonacquirers in all cases. Moreover, the difference between median values of these two groups are statistically significant. Thus, the performance of acquires are economically and statistically significant. The hubris hypothesis explains well for these results, confirming the findings of Brau et al. (2012).Opposite findings from the evidence on Panel A are present, whenacquisition occurs

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[2]The sample in this study shows that stock returns are largely positively skewed due to benchmark used and the number of our sample.

after the first-year IPO. In other words, if acquirers wait for an appropriate time (not in first year), they are more successful. The results show that acquirers performing M&A activities within their2nd, 3rd, and 4th yearsmainly outperform the nonacquirers as shown in Panels B, C, and D, respectively. These findings are generally consistent with Brau et al. (2012).

Table 5 shows a role of private equity sponsor for acquirers and nonacquirers. Panel A showing an impact of private equity sponsor on the abnormal returns of acquirers using both mean and median values demonstrates that abnormal returns of private equity backed acquirer are generally larger than those of non private-equity backed acquirers in all holding periods.This implies that private equity sponsorshelp tomakevalue-added acquisition.Similarly, Panel B shows that private equity-backed nonacquirers perform much better than non-private equity backed nonacquirers in nearly all cases.

6.   Conclusion

Our event-time study finds that the firms used to perform well within their first year have a greater tendency to become acquirers. After that, the acquisitions activity of IPO firm that acquire within the first year after going public experience lower buy-and-hold abnormal return compared to nonacquirers for at least 2 subsequent years. However, if firms delay acquisition activities beyond their first year to at least within third year instead, they could gain a higher BHAR than nonacquirers. Moreover, the private equity sponsors relate to the buy-and-hold abnormal return in both acquirers and nonacquirer. PE-backed firms show higher BHAR compared to non-PE backed firms in both acquirers (weak results)and also nonacquirers (strong results), even the performances are not persistent. More importantly, although IPOs show positive mean of abnormal returns in some cases on parametric tests, but non-parametric testing strongly suggest the underperformance of these IPOs.

The Hubris effect are found only in event-time approach, buy-and-hold abnormal returnand disappear after 2 years, as well as the private equity-backed stocks that shows a premiums compared to non-private equity backed stockjust only for 2 years.These temporary performances might occur because of investors in the market do their equilibrium mechanism or/and firms that (suffer) celebrate to the (poor) great stock performancemight (resolve) overlook their problems.

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Table 1Sample Filtering

Items	No. of Firms
Initialsample	1,553
-OTC market	(364)
-ADR	(45)
-Financial and REITs	(210)
-Absent return stocks	(16)
Final sample	918

Table 2 Frequency Distribution by IPO issue Year and Industry

This table shows the frequency distribution of 918 IPOs of our sample by year and industry, industry classifications are Global Industry Classification Standard (GICS). The sample excludes American Depositary Receipts (ADRs), close-end funds, unit offers, and financial firms.

Panel A: Frequency Distribution by IPO Issuing Year

IPO Year	Frequency	% of Total Sample	No. of 1st-Year Acquirers	% of 1st-Year Acquirers
1999	62	6.8%	38	61.3%
2000	52	5.7%	23	44.2%
2001	24	2.6%	14	58.3%
2002	50	5.4%	6	12.0%
2003	54	5.9%	6	11.1%
2004	78	8.5%	13	16.7%
2005	66	7.2%	20	30.3%
2006	69	7.5%	21	31.9%
2007	78	8.5%	20	25.6%
2008	13	1.4%	2	15.4%
2009	30	3.3%	4	13.3%
2010	66	7.2%	19	28.8%
2011	68	7.4%	16	23.5%
2012	88	9.6%	19	21.6%
2013	120	13.1%	31	25.8%
Total	918	100.0%	253	27.6%

IP0 Year	Freq.	1st-Year Acquirers	2nd-Year Acquirers	3rd-Year Acquirers	4th-Year Acquirers	5th-Year Acquirers	>5th-Year Acquirers	Not Acquire
1999	62	61.3%	12.9%	6.5%	3.2%	1.6%	11.3%	3.2%
2000	52	44.2%	15.4%	7.7%	5.8%	1.9%	15.4%	9.6%
2001	24	58.3%	16.7%	8.3%	0.0%	4.2%	8.3%	4.2%
2002	50	12.0%	8.0%	4.0%	8.0%	2.0%	4.0%	62.0%
2003	54	11.1%	3.7%	1.9%	3.7%	3.7%	9.3%	66.7%
2004	78	16.7%	11.5%	10.3%	2.6%	3.8%	10.3%	44.9%
2005	66	30.3%	10.6%	7.6%	0.0%	4.5%	12.1%	34.8%
2006	69	31.9%	17.4%	7.2%	7.2%	5.8%	7.2%	23.2%
2007	78	25.6%	7.7%	10.3%	5.1%	6.4%	12.8%	32.1%
2008	13	15.4%	7.7%	23.1%	7.7%	7.7%	15.4%	23.1%
2009	30	13.3%	10.0%	13.3%	6.7%	3.3%	10.0%	43.3%
2010	66	28.8%	15.2%	3.0%	6.1%	3.0%	7.6%	36.4%
2011	68	23.5%	8.8%	8.8%	4.4%	4.4%	2.9%	47.1%
2012	88	21.6%	19.3%	12.5%	3.4%	1.1%	5.7%	36.4%
2013	120	25.8%	12.5%	7.5%	5.0%	3.3%	0.8%	45.0%
Total	918	27.6%	12.2%	8.1%	4.5%	3.6%	8.0%	36.2%

Panel B: Frequency Distribution by Industry

Industry	Frequency	Percentage
Consumer Discretionary	103	11.2%
Health Care	163	17.8%
Commination Services	47	5.1%
Consumer Staples	16	1.7%
Real Estate	6	0.7%
Industrials	99	10.8%
Energy	90	9.8%
Financials	0	0.0%
Information Technology	146	15.9%
Materials	24	2.6%
Utilities	7	0.8%
Unspecified	217	23.6%

Table 3Buy-and-Hold Abnormal Return for the Full Sample

This table shows the means of buy-and-hold abnormal returns for 1- through 5-year holding periods. The benchmark returns are CRSP value-weighted index. If an IPO delists, the abnormal return is truncated at the date of delisting (total return index remain the same value as previous after delisting date). The parametric testing is performed by employingthe traditional$t$-test,[1] skewness adjusted t-test,[2] and difference in means test with unpaired and unequal variance.[3]The nonparametric testing is performed by employing signtest,[4] Wilcoxon signed-rank test,[5] and Wilcoxon rank-sum test (Mann-Whitney).[6] Panel B shows abnormal return between acquirers and nonacquirers.

Panel A: Buy-And-Hold Abnormal Returns (n=918) Variable

Variable	Mean	p-value[1]	Adjusted p-value[2]
$BHAR_{0,1}$	6.34%	0.007	0.004
$BHAR_{0,2}$	9.68%	0.019	0.002
$BHAR_{0,3}$	12.96%	0.091	0.015
$BHAR_{0,4}$	7.25%	0.209	0.179
$BHAR_{0,5}$	5.11%	0.460	0.389
Variable	Median	p-value[4]	Adjusted p-value[5]
$BHAR_{0,1}$	-7.42%	0.000	0.025
$BHAR_{0,2}$	-13.52%	0.000	0.002
$BHAR_{0,3}$	-21.20%	0.000	0.000
$BHAR_{0,4}$	-26.43%	0.000	0.000
$BHAR_{0,5}$	-38.11%	0.000	0.000

Panel B: Buy-And-Hold Abnormal Returns for 1-Year Acquirers and Nonacquirers

	Acquirers (n = 253)			Nonacquirers (n = 665)			Diff. Tests
Variable	Mean	p-value[1]	Adj. p-value[2]	Mean	p-value[1]	Adj. p-value[2]	p-value[3]
$BHAR_{0,1}$	11.29%	0.042	0.023	4.46%	0.071	0.043	0.259
$BHAR_{0,2}$	6.55%	0.179	0.161	10.88%	0.044	0.008	0.551
$BHAR_{0,3}$	6.17%	0.331	0.273	15.54%	0.131	0.034	0.438
$BHAR_{0,4}$	16.71%	0.152	0.101	3.65%	0.581	0.594	0.329
$BHAR_{0,5}$	16.84%	0.209	0.127	0.65%	0.936	0.902	0.301
Variable	Median	p-value[4]	p-value[5]	Median	p-value[4]	p-value[5]	p-value[6]
$BHAR_{0,1}$	-2.39%	0.571	0.922	-8.1%	0.000	0.005	0.531
$BHAR_{0,2}$	-5.73%	0.258	0.759	-15.3%	0.000	0.000	0.548
$BHAR_{0,3}$	-24.73%	0.006	0.117	-20.9%	0.000	0.000	0.929
$BHAR_{0,4}$	-23.32%	0.004	0.172	-27.0%	0.000	0.000	0.379

$BHAR_{0,5}$	-39.60%	0.000	0.071	-38.1%	0.000	0.000	0.141

Table 4Buy-and-Hold Abnormal Return for Acquirers and Nonacquirers
Panel A of Table 3 reports aggregate mean buy-and-hold abnormal returns excluding the 1st year after going public. Panel B-D compare abnormal returns for firm that acquire within a specific time frame. The benchmark returns are CRSP value-weighted index. If an IPO delists, the abnormal return is truncated at the date of delisting. The parametric testing is performed by employingthe traditional*t*-test,[1] skewness adjusted *t*-test,[2] and difference in means test with unpaired and unequal variance.[3]The nonparametric testing is performed by employing signtest,[4] Wilcoxon signed-rank test,[5] and Wilcoxon rank-sum test (Mann-Whitney).[6]
Panel A: Buy-And-Hold Abnormal Returns for Acquirers within 1 Year and Nonacquirers
Acquirers

	Acquirers(n = 253)				Nonacquirers (n = 665)			Diff. Tests
Variable	Mean	*p*-value[1]	Adj. value[2]	*p*-value[2]	Mean	*p*-value[1]	Adj. *p*-value[2]	*p*-value[3]
$BHAR_{1,2}$	2.5%	0.529	0.529		55.4%	0.000	0.000	0.000
$BHAR_{1,3}$	6.6%	0.318	0.202		26.7%	0.0000	0.000	0.016
$BHAR_{1,4}$	26.1%	0.245	0.144		-1.5%	0.0000	0.000	0.219
$BHAR_{1,5}$	28.1%	0.267	0.136		1.3%	0.610	0.582	0.292
Variable	Median	*p*-value[4]	*p*-value[5]		Median	*p*-value[4]	*p*-value[5]	*p*-value[6]
$BHAR_{1,2}$	-6.24%	0.078	0.092		7.5%	0.000	0.000	0.000
$BHAR_{1,3}$	-11.0%	0.131	0.171		3.2%	0.000	0.000	0.000
$BHAR_{1,4}$	-23.8%	0.000	0.044		-2.1%	0.000	0.000	0.000
$BHAR_{1,5}$	-27.6%	0.000	0.061		-6.8%	0.000	0.000	0.000

Panel B: Buy-And-Hold Abnormal Returns for Acquirers within 2 Year and Nonacquirers

	Acquirers(n = 365)				Nonacquirers (n = 553)			Diff. Tests
Variable	Mean	*p*-value[1]	Adj. value[2]	*p*-value[2]	Mean	*p*-value[1]	Adj. *p*-value[2]	*p*-value[3]
$BHAR_{2,3}$	7.5%	0.103	0.064		5.7%	0.058	0.050	0.745
$BHAR_{2,4}$	30.5%	0.055	0.001		10.8%	0.159	0.044	0.262
$BHAR_{2,5}$	35.7%	0.049	0.000		8.8%	0.364	0.365	0.188
Variable	Median	*p*-value[4]	*p*-value[5]		Median	*p*-value[4]	*p*-value[5]	*p*-value[6]
$BHAR_{2,3}$	-6.6%	0.059	0.149		-4.3%	0.011	0.035	0.565
$BHAR_{2,4}$	-8.9%	0.005	0.463		-11.1%	0.000	0.000	0.338
$BHAR_{2,5}$	-15.2%	0.001	0.329		-17.7%	0.000	0.000	0.038

Panel C: Buy-And-Hold Abnormal Returns for Acquirers within 3 Year and Nonacquirers

	Acquirers(n = 439)				Nonacquirers (n = 479)			Diff. Tests
Variable	Mean	p-value[1]	Adj. value[2]	p-	Mean	p-value[1]	Adj. p-value[2]	p-value[3]
$BHAR_{3,4}$	18.5%	0.000	0.000		3.03%	0.355	0.250	0.005
$BHAR_{3,5}$	24.4%	0.000	0.000		1.31%	0.739	0.731	0.002
Variable	Median	p-value[4]	p-value[5]		Median	p-value[4]	p-value[5]	p-value[6]
$BHAR_{3,4}$	-3.5%	0.294	0.464		-6.3%	0.000	0.000	0.070
$BHAR_{3,5}$	-6.6%	0.152	0.489		-10.9%	0.000	0.000	0.011

Panel D: Buy-And-Hold Abnormal Returns for Acquirers within 4 Year and Nonacquirers

	Acquirers (n = 439)				Nonacquirers (n = 479)			Diff. Tests
Variable	Mean	p-value[1]	Adj. value[2]	p-	Mean	p-value[1]	Adj. p-value[2]	p-value[3]
$BHAR_{4,5}$	7.7%	0.006	0.006		-0.9%	0.779	0.874	0.048
Variable	Median	p-value[4]	p-value[5]		Median	p-value[4]	p-value[5]	p-value[6]
$BHAR_{4,5}$	-2.9%	0.218	0.715		-7.1%	0.000	0.000	0.027

Table 4Buy-and-Hold Abnormal Return for Acquirers and Nonacquirers

Panel A of Table 4 reports aggregate mean buy-and-hold abnormal returns excluding the 1st year after going public in subsample groups, PE-backed acquirers, and Non-PE backed acquirers. Panel B show the PE-backed nonacquirers and Non-PE backed nonacquirers. The benchmark returns are CRSP value-weighted index. If an IPO delists, the abnormal return is truncated at the date of delisting. The parametric testing is performed by employingthe traditional$t$-test,[1] skewness adjusted t-test,[2] and difference in means test with unpaired and unequal variance.[3]The nonparametric testing is performed by employing signtest,[4] Wilcoxon signed-rank test,[5] and Wilcoxon rank-sum test (Mann-Whitney).[6]

Panel A. Buy-And-Hold Abnormal Returns for Acquirers within 1 Year which are PE-backed and Non-PE-backed PE-backed

	PE-backed (n = 72)				Non PE-backed (n = 181)			Diff. Tests
Variable	Mean	p-value[1]	Adj. value[2]	p-	Mean	p-value[1]	Adj. p-value[2]	p-value[3]
$BHAR_{1,2}$	9.6%	0.171	0.142		-0.4%	0.934	0.975	0.235
$BHAR_{1,3}$	20.1%	0.279	0.122		1.3%	0.825	0.801	0.331
$BHAR_{1,4}$	63.2%	0.401	0.389		11.4%	0.252	0.189	0.495
$BHAR_{1,5}$	84.4%	0.333	0.200		5.8%	0.468	0.484	0.369
Variable	Median	p-value[4]	p-value[5]		Median	p-value[4]	p-value[5]	p-value[6]

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Business, Management and Economics Engineering, 2023 Volume 21 Issue 1, ISSN: 2669-2481 / eISSN: 2669-249X

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$BHAR_{1,2}$	-1.7%	0.100	0.645	-12.5%	0.037	0.026	0.071
$BHAR_{1,3}$	-9.5%	0.724	0.849	-12.8%	0.137	0.131	0.722
$BHAR_{1,4}$	-35.9%	0.003	0.070	-19.5%	0.003	0.23	0.151
$BHAR_{1,5}$	-43.6%	0.006	0.140	-20.8%	0.004	0.252	0.151

Panel B: Buy-And-Hold Abnormal Returns for Nonacquirers which are PE-backed and Non-PE-backed PE-backed

PE-backed (n = 135)				Non PE-backed (n = 530)			Diff. Tests
Variable	Mean	p-value[1]	Adj. p-value[2]	Mean	p-value[1]	Adj. p-value[2]	p-value[3]
$BHAR_{1,2}$	97.7%	0.003	0.000	44.7%	0.000	0.000	0.117
$BHAR_{1,3}$	48.7%	0.009	0.000	21.1%	0.000	0.000	0.146
$BHAR_{1,4}$	1.7%	0.003	0.002	-1.5%	0.000	0.000	0.720
$BHAR_{1,5}$	9.2%	0.354	0.241	-0.7%	0.739	0.795	0.329
Variable	Median	p-value[4]	p-value[5]	Median	p-value[4]	p-value[5]	p-value[6]
$BHAR_{1,2}$	29.4%	0.000	0.0000	6.0%	0.000	0.000	0.018
$BHAR_{1,3}$	1.9%	0.491	0.076	3.6%	0.000	0.000	0.556
$BHAR_{1,4}$	-2.6%	0.001	0.001	-2.1%	0.000	0.000	0.994
$BHAR_{1,5}$	-7.6%	0.121	0.148	-6.8%	0.000	0.000	0.496