Examining the Discount-Premium Puzzle of Private Company Valuation: The Case of China

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Abstract: In this study, we argue that private M&A deals with a premium are not just an outlier problem, but an interesting empirical research issue worthy of further investigation. We believe that in a less developed stock market like China where listing opportunity is limited due to government regulation and intervention, private deals with a premium can be a more common phenomenon.   Furthermore, a strong growth element in Chinese private transactions may increase the probability of receiving a valuation premium as well. Another contribution of our study is local relevance. A comprehensive study of private company valuation using local China data provides a useful reference for industry professionals and regulators to evaluate private transactions. A significant portion of our sample exhibits valuation premiums (45% using one-peer matching and 38% with a three-peer matching), indicating that non-liquidity factors dominate a liquidity discount in these private target valuations. Our analysis shows that premium deals and discount deals have their own separate relationships with firm size, deal size, and percentage acquired. Therefore, we conclude that benchmarking private target value using public peers must consider these firm and deal characteristics.

Keywords: Private Company Value of Firms, China, Discount Premium Puzzle; Asset Pricing

JEL: G21, G32, G34, F39

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1. Introduction

The empirical issue of private company valuation should be a topic of interest for both academics and practitioners. The issue of finding a relevant approach and possible benchmarks to determine private firm value has become an increasingly important issue in China. The literature concludes that there is a private valuation discount due to lack of marketability or liquidity. In particular, Officer (2007) reports that nearly 70% of private targets are acquired at a

discount compared to their public peers, meaning that the remaining 30% of the private targets are actually paid at a premium[1].

In this study, we argue that private deals with a premium are not just an outlier problem, but an interesting empirical research issue. Under a less developed stock market such as China where listing opportunity is limited due to government regulation and intervention[2], private deals with premium can be a more common phenomenon. In addition, if the valuation of private transactions reflects a significant growth and technological aspect, then the probability of receiving a premium compared with the public peers can also be higher. We conjecture that Chinese private M&As possess the characteristics of premium transactions mentioned above. Consequently, our study aims to explore the discount/premium puzzle of private company valuation using China data.

Another contribution of our study is local relevance. Valuation professionals and regulators in Hong Kong and China normally use valuation discount averages from US studies as the main source of reference to determine the valuation discount for private targets. A comprehensive study of private company valuation using local data is useful for industry professionals and the financial regulators to assess private target transactions. We are motivated by such a demand for private company discount benchmarks for the China market[3].

In fact, the periodical IPO suspensions[4] by the Chinese government make it difficult for private firms to seek external funding for expansion through listing in the stock market. Thus, private companies have little choice but turn to the M&A market if they need external capital to maintain competitiveness or to survive. Furthermore, the economic growth and the more relaxed government regulation on the M&A market in China have jointly stimulated the increasing activities of private acquisitions recently. For example, in 2013, the transaction volume of M&As in Mainland China has increased by 24.3%, reaching 1,232 deals with a total dollar value of US$93 billion (an increase of 83.6%). As of June 2014, the number of deals has already reached 784 (a 79.8% 6-month growth rate) with a total value of US$51 billion.[5]

When we focus on the private deals as reported in Thomson One database, there are a total of 5,726 deals with private targets during our sample period of 25.4 years between 1989 and May 2014; however, about 72% (4114 deals) occurred during the most recent 10.4 years. Unfortunately, only 4% of these 5,726 (227) deals contain data needed to conduct analysis for the discount/premium issue. This data issue explains why such research on China data has not been feasible until now. In short, we believe that such a rapid expansion of Chinese private transactions and the availability of a sufficiently large sample with valid data provide us an opportunity as well as the right timing to evaluate the private discount/premium for China.

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[1] Moreover, his data exhibits extreme values in the right-tail, leading to his adoption of an outlier truncation rule of deleting private deals with a valuation premium over 100% relative to their public peers.

[2] Government intervention in the capital market in China is a common phenomenon, for instance, from 1994 to June 2014, there were a total of eight IPO suspensions imposed by the central government. These suspension periods range from approximately 4 months to a maximum of 14 months.

[3] Our original intention was to examine Hong Kong and mainland markets separately. But the very small sample size of private transactions from Hong Kong in the past 20 years in Thomson One database forced us to combine the Hong Kong and Mainland data in most of our analysis.

[4] The IPO suspensions from 1994 to June 2014 were: 1) 1994.7.21-1994.12.7; 2) 1995.1.19-1995.6.9; 3) 1995.7.5-1996.1.3; 4) 2004.8.26-2005.1.23; 5) 2005.5.25-2006.6.2; 6) 2008.9.16-2009.6.29; 7) 2012.11.16-2014.1.17; 8) 2014.2.19-2014.6.9.

[5] China M&A market research report 2013, available on http://www.pedaily.cn/.

The challenge of conducting a private target valuation study for China is the data limitation. The Thomson One database contains mainland China and Hong Kong data. But among all valuation ratios using Enterprise Value (EV)[6], only EV/Revenue ratio has data for most transactions. Therefore, we are limited to use EV/Revenue to compute the valuation discount/premium in our study. Nevertheless, our valuation figures are comparable to those in the literature[7].

During our sample period between 1989 and May 2014, there are a total of 227 deals with valid data. Private target-public buyer transactions account for 85% (192 deals) and private-private transactions take the remaining 15% (35 deals). Our findings show that a significant portion of our sample exhibits valuation premiums (45% using one-peer matching and 38% with a three-peer matching), indicating that non-liquidity factors dominate liquidity discount in these private target valuations. Under such a discount/premium distribution, the mean and median figures for the whole distribution may not be appropriate to be used as a benchmark for valuation purposes. We therefore argue that deal and firm level characteristics must be considered in generating relevant discount/premium benchmarks. Our two-sample comparative analysis suggests that firm size is an important factor affecting discount/premium. More specifically, large targets show significant discounts of -40.5% (one-peer matching) and -47.5% (three-peer matching). For small targets, one-peer matching shows a significant premium of 57.3%. Obviously, large targets show a significantly deeper discount than small targets. Our regression results also support our conjecture that premium deals and discount deals have their own separate relationships with firm size, deal size, and percentage acquired. In conclusion, we suggest that benchmarking private target value using public peers must consider these firm and deal characteristics.

2. China M&A Market

The past several years have witnessed a fast growth for the Chinese M&A market. Since 2010, the PRC has issued several policies to provide a more favorable regulatory environment for both domestic and international M&A activities. Based on Thomson One, M&A activities with China targets (including Hong Kong), experienced a five-year average growth of 32.2% in total value and 8.9% in number of transactions during the 2009-2014 period. Just for 2014, 742 transactions totaling US$ 60.4 billion were reported. During the same five-year period, the US has an average growth of 0.5% in value and 8.2% in number of transactions. During 2014, the US has 4721 M&A transactions with the total deal value of US$ 488.3 billion. Compared with the US data, we can see that while the US still has a much larger transaction base, the Chinese growth rate in terms of dollar value for M&As is indeed significant.

In fact, Chinese M&As in the technology, consumer-related, and financial industry sectors have become more dominant. Among the 742 deals with Chinese targets, 292 targets (or 39.3%) are in the TMT industry. The TMT transactions show a five-year average growth rate of 33% and an annual growth of 108.6% (292 deals) in 2014, among which 264 are private firms.

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[6] Koeplin et al. (2000) and Block (2007) both use valuation ratios based on EV mainly, so we follow the practice in this study.

[7] Block (2007) examines liquidity discount for 91 US private acquisitions, which also employs EV/Revenue in his analysis. The median and mean discounts using EV/Revenue are 24.49% and 26.35% respectively. In fact, these figures are extremely close to those generated from other valuation ratios, indicating that EV/Revenue is a stable and reliable measure for our valuation analysis.

3. Valuation Approaches

Finance literature has suggested three main approaches in estimating private company discount. They are 1) the IPO approach; 2) the restricted stock approach; and 3) the acquisition approach. The first two approaches focus more on the marketability discounts and employ firms that eventually are publicly tradable, which may not be the case for many private transactions. Pratt and Niculita (2008) summarized 12 studies on restricted stock transactions from the late 1960s to 1998 and the reported discounts ranges from 13.0% to 45.0%[8]. Comment (2012) argues that most previous studies may have overestimated the liquidity discount. Based on his estimation of marketability discount of 2.5% for risk-free asset, any discount beyond 2.5% should be redundant.

The second method to estimate valuation discount is the IPO approach. Garland and Reilly (2004) summarizes a series of studies from Willamette Management Associates on valuation discounts for lack of marketability based on IPO approach. The mean (median) discount for 5-year period 1998-2002 is 23.9% (36.1%)[9]. Pratt and Niculita (2008) also provide a summary of the findings using the IPO method and show discounts ranging from 40% to 72%.

Finally, private company discount can be estimated by the acquisition approach. Koeplin et al. (2000) first match the private acquisitions with their public peers based on industry and size. Then median valuation multiples for the private target and public peers are used to compute the valuation discount. For US transactions, the median discount using EV/EBIT ratio is 30.62%, 18.14% using the EV/EBITDA, 0.79% for EV/Revenue, and -7.00% for EV/Book Value. As for foreign transactions, the median discount using EV/EBIT is 5.96%, 23.49% for EV/EBITD, 17.18% for EV/Revenue, and is 19.64% for EV/Book Value.

Based on four multiples (Price/Book Value of Equity, Price/Earnings, Deal Value/EBITDA, or Deal Value/Revenue), Officer (2007) finds the average discounts for private companies relative to matched public companies are 15% to 30%[10]. In this study, we follow the methodologies by Koeplin et al. (2000) and Officer (2007) to examine the valuation discount/premium issue for private targets in Mainland China.

4. Data and Methodology

4.1 Data

We first identify all the completed private transactions in Hong Kong and mainland China from 1989 to 2014 through the Thomson One database. After examining the data availability, we find that valuation multiples including EV/EBIT, EV/EBITDA (except the EV/Revenue ratio) have less than 12 valid data points for Hong Kong and 40 observations for the mainland in this

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[8] Silber (1991) estimates the average stock discount for 1981-1988 is 33.75%.

[9] Using 53 transactions, Emory, Dengel, Emory (2000) estimates the discounts of IPO companies for firms with a name that contained ".com" from May 1997 to March 2000 and show that discounts of sale transactions prior to IPO is 54%.

[10] Kooli, Kortas, L'Her (2003) uses three different multiples to evaluate liquidity discount and report median discount of 17% with Price/Sales multiple, 34% with Price/Earnings multiple, and 20% with Price/Cash flows multiple. Block (2007) reports that EV/Revenue has the biggest median discount of 24.49% (mean 26.35%) and the EV/Book Value shows the smallest median discount value of 14.47% (mean 16.25%). He also finds the discounts vary among different industries.

30-year period. Thus, we have no choice but to focus on EV/Revenue ratios[11]. A total of 444 private transactions remained, including 26 Hong Kong transactions and 418 mainland China transactions. After mapping for public peers, only 227 private targets remain in our final sample (12 from Hong Kong and 215 from mainland China).

While Koeplin et al. (2000) mentions that sales/revenue multiple may not be as good as earnings multiple to estimate discount/premium when comparing different industries, we believe that EV/Revenue is appropriate for the following three reasons:

1) Just as Koeplin et al. (2000) mentioned, EV/Revenue is commonly used in the M&A deals to determine valuation. 2) Revenue multiple has two distinct advantages over earnings multiple as revenue is subject to less management manipulations compared with earnings; and revenue multiple can also be applied for loss-making companies while earning multiples cannot. 3) Officer (2007) and Block (2007) employ larger sample sizes of private targets and both of them use revenue multiples[12]. In short, based on the three reasons above, we believe that EV/Revenue is a reliable measure for our valuation discount/premium analysis.

Next, we explore a possible matching criterion using the acquisition approach in determining an appropriate discount or premium in private company valuation in M&A transactions when comparing with their public peers[13]. Based on the literature, we construct our own public peer selection criteria to generate the public target benchmark to compute the discount/premium. The accuracy of our public peer selection is mainly affected by two factors: the first one is the closeness of the industry matching; the other is the proximity of firm size. In addition, we have to optimize the number of private targets in the sample so that the sample size is big enough to conduct our analysis. In other words, our objective is to choose the most accurate industry definition with the closest firm size of public peers while achieving sufficiently large sample. Thus, we conduct simulation to test the net effect of various combinations of these three conditions. As we can see from Table 3B, we match public peers by all possible industry groupings, namely, one-digit SIC code, two-digit SIC code, three-digit SIC code and finally four-digit SIC code. Then we use the same time frame (six months prior to or after the private transactions' announcement date) and one-peer criterion to identify public peers. Next, we compute firm size (revenue) difference between the private targets and their public peers then standardized by the private target revenue.

Table 3B: Comparison of Discount/Premium Subsample Sizes and Firm Size (Revenue)

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[11] The definition of Enterprise Value/Revenue from Thomson One is: Enterprise value is calculated by multiplying the number of actual target shares outstanding from its most recent balance sheet by the offer price and then by adding the cost to acquire convertible securities, plus short-term debt, straight debt, and preferred equity minus cash and marketable securities. Sales are the primary source of revenue after taking into account returned goods and allowances for price reductions for the last 12 months ending on the date of the most current financial information prior to the announcement of the transaction. If not available, total revenues are used. For banks, net sales equals interest income plus non-interest income.

[12] Officer (2007) has a sample size of 364 and Block (2007) uses 91 private deals in his analysis. For instance, Block (2007) shows a similar median discount of 24.49% for EV/Revenue compared with other multiples (such as 24.29% median discount with EV/EBIT, 22.49% median discount with EV/EBITDA).

[13] Koeplin et al. (2000) demonstrate that the acquisition approach employs transaction data from both private and public firms, leading to a more comprehensive statistical coverage in generating discount benchmarks. In addition, Block (2007) uses the same approach and generates median private discounts ranging from 14.47% (EV/Book) to 24.49% (EV/Revenue). We will use the same valuation ratio (EV/Revenue) to examine our China data.

Differences using One to Four Digit SIC Codes
Matching firm size difference is defined as revenue difference between the private targets and their public peers standardized by the private target revenue.

	One-Digit (One-Peer)	Two-Digit (One-Peer)	Three-Digit (One-Peer)	Four-Digit (One-Peer)	Three-Digit (Three-Peer)
N (Overall)	426 (100%)	363 (100%)	227 (100%)	174 (100%)	227 (100%)
N (Discount)	265 (62%)	212 (58%)	125 (55%)	85 (49%)	140 (62%)
N (Premium)	161 (38%)	151 (42%)	102 (45%)	89 (51%)	87 (38%)
Mean	-478.88%	-2541.19%	1747.69%	3453.33%	2968.33%
Median	0.07%	-31.84%	45.67%	193.50%	222.58%
Min	-31950.00%	-86921.43%	-99.67%	-99.44%	-99.67%
Max	98.89%	99.96%	56730.00%	56730.00%	56730.00%
STD	23.22	105.77	62.80	88.48	79.86

As reported in Table 3B, using one-digit, 426 private targets can find their public peers and the mean value of firm size differences is -478.9%; two-digit 363 deals with mean firm size difference value -2541.2%; three-digit 227 deals with mean value 1747.7% and four-digit 174 deals with mean value 3453.3%. While one-digit mapping has a smaller mean value of firm size difference, the nature of the mapped peers can be very different from the private targets as one-digit SIC code is a very broad classification. Next, using a broader industry classification of two-digit matching shows no advantage in firm size difference compared to the three-digit scheme. Although four-digit matching is more accurate in industry level, the sample has become too small and also results in a large firm size difference. Based on this analysis, we believe that three-digit SIC matching results in the best public peers and a large enough sample size for our analysis. Based on a three-digit SIC code mapping, we also conduct our analysis using three-peer matching. The mean valuation ratios of the three public peers are then used to compute the discount/premium.

The matching criterion requires that 1) the public targets have the same first three-digit SIC code as the private targets; 2) the M&A transactions for the public targets occur within six months prior to or after the private transactions' announcement date; and 3) if there are several public targets meeting the first two criteria, then the public target with the closest revenue amount relative to the private target would be chosen as the peer. We realize that these matching criteria are subjective. For robustness test, we maintain criteria 1) and 2), but use a maximum of three public targets with the closest sales amount relative to the private transaction as the peers to compute discount/premium. Similarly, the average EV/Revenue ratios of these public peers are used to compute the discount/premium for each of the private target transactions.

The EV/Revenue ratios of the public peers and the private targets are used to compute the discount/premium for the private targets. For the one-peer matching criterion, the sample of private transactions is 227 including 12 Hong Kong transactions and 215 mainland China transactions. Since there may not be three matching public peers available for each private target, the final public matching sample using three-peer matching is 554. Our paper distinguishes discount deals from premium deals. In order to better describe our results, we add a negative sign for our discount figures to differentiate them from premium ones in our result section.

In our sample, 45% of the private targets with one-peer matching in our sample are sold at a higher EV/Revenue value compared to their public peers, and 38% of the private targets with three-peer matching are sold at a premium.

5. Empirical Results

5.1 Descriptive Statistics

In Table 1A, we report the distribution of the private and matched public transactions by year group. We check sample statistics for the EV/Revenue ratios of the private (median=2.72 and mean=10.91) and public transactions under both one-peer matching (median=3.12 and mean=27.75) and three-peer matching (median=3.78 and mean=24.20) criteria for the overall sample. Two observations are worthwhile to be mentioned: first, comparing the median ratios with the mean ratios, we can easily conclude that the distributions are not normal at all, with the mean values consistently greater than the medians. Such a skewed distribution requires the use of non-parametric statistics when comparing the possible differences of central tendency of various samples. Consequently, in the statistical analysis for the medians and sample comparison later, we employ the non-parametric procedure including One-sample Wilcoxon test, Mann-Whitney U test and the Median test instead of t-tests.

We divide the years from 1989 to 2014 into nine groups. Each group includes a three-year period (i.e., the first subgroup refers to the year from 1989 to 1991) except the last group (group nine includes the year 2013 and the first five months of 2014). The distribution indicates that most of the private transactions occur after 2009. During 1989 to 2009, deals in the three-year subgroups range from 0 (year set 1992-1994) to 18 (year set 2004-2006), however deals in the 2010-2012 period increase greatly to 107. In particular, the number of deals increases monotonically (89 in the last period, 2013-2014 May, which contains only one year and 5 months), indicating that the M&A market in China is experiencing a rapid expansion. Two casual observations can be made on the EV/Revenue ratios. First, the median values are all bigger than the mean values for the private targets or public peers (expect those with only one or two observations). Second, the EV/Revenue ratios of the public peers do not show big difference under the one-peer matching method and three-peer matching method except for the period 2007 to 2009.

In Table 1B, we report the sample distribution by industry. As some industries contain very few deals, we organize the industries into eight groups according to their industry similarity. As we can see from the table, the most transactions included in our sample is in the manufacturing industry containing 118 deals (two groups together), which takes up 52% of our whole sample. The second largest industry in our sample is the services industry, which contains 71 deals and takes up 31% of our whole sample. The median EV/Revenue ratios do show some variations across industries but the range appears to be within a reasonable boundary.

Table 1A: Descriptive Statistics of EV/Revenue Ratios by Years using Three-digit SIC Code Matching

EV/Revenue Ratio

Period	Private N	Private N	Mean	Median	Public (One-Peer) N	Mean	Median	Public (Three-Peer) N	Mean	Median
1989-1991	68	2	1.20	1.20	2	1.26	1.26	4	1.77	1.94
1992-1994	151	0	-	-	0	-	-	0	-	-
1995-1997	276	1	4.24	4.24	1	19.90	19.90	3	6.70	0.10
1998-2000	531	1	0.36	0.36	1	0.28	0.28	2	0.28	0.28
2001-2003	586	2	1.87	1.87	4	2.13	2.32	10	1.51	1.42
2004-2006	1070	18	67.21	2.31	16	11.47	3.61	39	8.98	3.78
2007-2009	1325	7	4.91	1.35	8	4.68	3.35	17	37.91	3.99
2010-2012	1192	107	4.80	2.39	114	34.49	2.95	262	33.72	2.95
2013-2014 May	527	89	7.95	3.50	81	26.12	5.01	207	15.90	6.77
Total	5726	227	10.91	2.72	227	27.75	3.12	544	24.20	3.78

Table 1B: Descriptive Statistics of EV/Revenue Ratio by Industry using Three-digit SIC Code Matching

EV/Revenue Ratio

Industry	SIC Code Two-digit	Private N	Mean	Median	Public (One-Peer) N	Mean	Median	Public (Three-Peer) N	Mean	Median
Agriculture, Mining, Construction	01-17	4	43.35	16.39	4	12.36	5.67	4	12.36	5.67
Manufacturing (Food, Tobacco, Textile, etc.)	20-29	50	4.66	2.54	50	3.66	2.77	130	7.12	2.50
Manufacturing (Rubber, Leather, Stone, etc.)	30-39	68	4.00	1.67	68	28.71	3.09	135	17.34	2.74
Transportation, Communications, Electric, Gas	40-49	3	2.71	3.89	3	11.93	17.76	4	9.02	9.02
Wholesale, Retail	50-59	7	3.86	3.09	7	1.83	0.50	10	1.85	1.53
Finance, Insurance, Real Estate	60-67	24	4.16	3.12	24	84.42	3.79	55	43.07	3.79
Services (Hotel, Personal, Business, etc.)	70-79	70	23.72	3.76	70	29.14	3.12	204	36.39	13.46
Services (Health, Legal, Educational, etc.)	80-89	1	1.78	1.78	1	1.65	1.65	2	0.96	0.96
Total	01-89	227	10.91	2.72	227	27.75	3.12	544	24.20	3.78

5.2 Findings

In Table 2, we report the descriptive statistics of valuation multiples for the total sample, Hong Kong and China subsamples separately. Specifically, the median EV/Revenue ratio for private targets ranges from 1.6 to 2.7, while the ratios for public targets are between 2.5 to 3.8. Judging from the various statistics in Panel C for the overall sample, both one-peer and three-peer matching criteria generate similar valuation multiple benchmarks.

Table 2: Descriptive Statistics of EV/Revenue by Country/Region

EV/Revenue of Target Firms						
Panel A: Hong Kong Sample						
	N	Mean	Median	Min	Max	STD
Private	12	14.74	1.61	0.02	136.04	38.77
Public (One-Peer)	12	6.63	2.50	0.28	36.70	10.90
Public (Three-Peer)	30	22.85	1.61	0.09	508.98	92.51
Panel B: Mainland China Sample						
	N	Mean	Median	Min	Max	STD
Private	215	10.69	2.73	0.01	1133.57	77.39
Public (One-Peer)	215	28.93	3.15	0.25	1901.42	160.78
Public (Three-Peer)	514	24.28	3.79	0.09	1901.42	125.24
Panel C: Overall						
	N	Mean	Median	Min	Max	STD
Private	227	10.91	2.72	0.01	1133.57	75.80
Public (One-Peer)	227	27.75	3.12	0.25	1901.42	156.55
Public (Three-Peer)	544	24.20	3.78	0.09	1901.42	123.59

Next, we show the valuation discount/premium percentages in Table 3. In Table 3A, we report both mean and median valuation discount/premium percentages based on EV/Revenue ratio. However, we recognize that the mean values cannot be used for statistical analysis due to the extremely skewed distribution in small samples. Our findings in Table 3A show a much deeper median discount/premium figures (ranging between -28.9% for Hong Kong data and -36.3% for Mainland data) compared with -0.79% for the US and -17.18% for the foreign data reported in Koeplin et al. (2000). Several interesting observations can be made. Owing to the very small sample sizes for the Hong Kong data, we have reservation in making any extended interpretation on the median discounts observed. Nevertheless, the median discounts of -13.8% to -28.9% (One-peer is -28.9% and three-peer is -13.8%) from the Hong Kong data can serve as an indicative range for the possible valuation discount. Table 3A reports a relatively deep median discount for the China samples. The combined Hong Kong and mainland China sample shows a -18.6% median discount (with one-peer Matching) and a -36.3% discount (with three-peer

matching). One main problem is that, the median discounts for overall sample and Hong Kong/mainland subsamples using both matching procedures are not significantly different from zero. Given the fact that a significant portion of our sample has a premium (45% using one-peer and 38% using three-peer matching) instead of discount, the median values are unlikely to be different from zero for the overall samples. Therefore, we cannot say for sure the Chinese firms exhibit a liquidity discount in general without any further classifying of firms by additional firm level and deal characteristics.

Table 3A: Valuation Discount/Premium Percentages based on EV/Revenue Ratio for Hong Kong and Mainland Private Targets
** denotes statistical significance at the 0.01 level. For means, two-tailed t test is used and for medians, one-sample Wilcoxon test is used.

	One-Peer Matching			Three-Peer Matching		
	N	Mean	Median	N	Mean	Median
Overall	227	94.72%**	-19.72%	227	50.83%**	-36.29%
Hong Kong Subsample	12	81.94%	-28.93%	12	94.07%	-13.82%
Mainland Subsample	215	95.43%**	-18.60%	215	48.41%**	-36.29%
Discount Subsample	125	-63.50%**	-68.53%**	140	-65.32%**	-70.00%**
Premium Subsample	102	288.62%**	147.71%**	87	237.74%**	94.79%**

To better understand the insignificant medians[14] for the overall samples above, we divide our sample into discount and premium subsamples in Table 3A. The median discount/premium values are significantly different from zero at 0.01 level in the discount subsample (-68.53% for one-peer and -70% for three-peer) and premium subsample (147.71% for one-peer and 94.79% for three-peer) for both matching procedures.

Figure 1 demonstrates the magnitude of outlier problems in our discount/premium distribution. The discount/premium values are divided into 12 groups. Each group contains 20 deals except that the 12th group only contains 7 deals. We can clearly see that the influence of outliers creates a strong bias to the mean discounts/premiums. For discount deals, owning to the fact that the discount cannot exceed 100%, the outlier problem is bounded. However for the premium side, the values have no boundary and therefore present a stronger outlier problem. In Table 3A, we compute descriptive statistics by dividing our sample into discount and premium subsamples separately. It is interesting to point out that for both one-peer and three-peer matching; the premium deals constitute a significant percentage (45% and 38% respectively) of the total sample. These significant percentages of premium deals support the conjecture that higher valuation for private transactions in China relative to their public peers cannot be just noise or outliers due to measurement errors. In order to make sure that our premium deal percentages are not a result of methodology-specific bias, we repeat the percentage count by

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[14] In fact, we have followed Officer (2007) to delete private deals with a valuation premium over 100% relative to their public peers and re-do the analysis, then the median discount/premium value become significant at 1% level for both one-peer (median discount -50.2%) and three-peer matching (median discount -54.8%) for the overall samples. However, we feel that this procedure of eliminating premium deals may not be appropriate for our analysis using China data.

using all possible industry mapping in creating the public peers. The result is shown in Table 3B. From one-digit to four-digit SIC mapping, the premium deals constitute 38% to 51% of the sample, supporting our argument that premium deals are not a random event.

Figure 1: Frequency Distribution of Discount/Premium Value
The discount/premium values are divided into 12 groups. Each group contains 20 deals except that the 12th group only contains 7 deals.

Figure 1A: Frequency Distribution of Mean Value of 12 Discount/Premium Groups using One-peer Matching
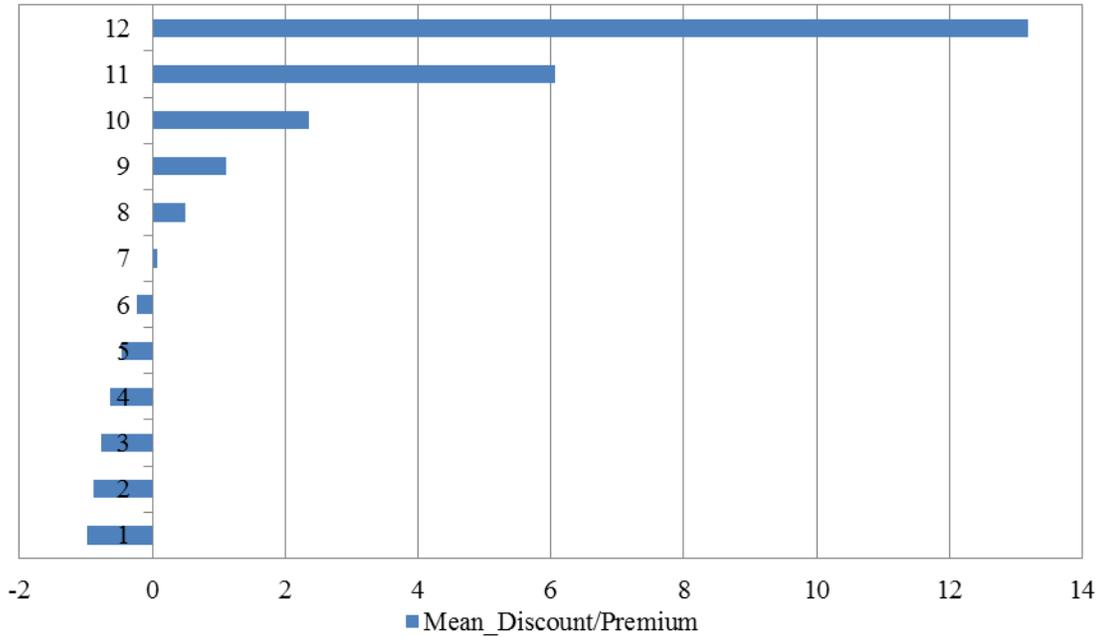
Figure 1B: Frequency Distribution of Mean Value of 12 Discount/Premium Groups using Three-peer Matching
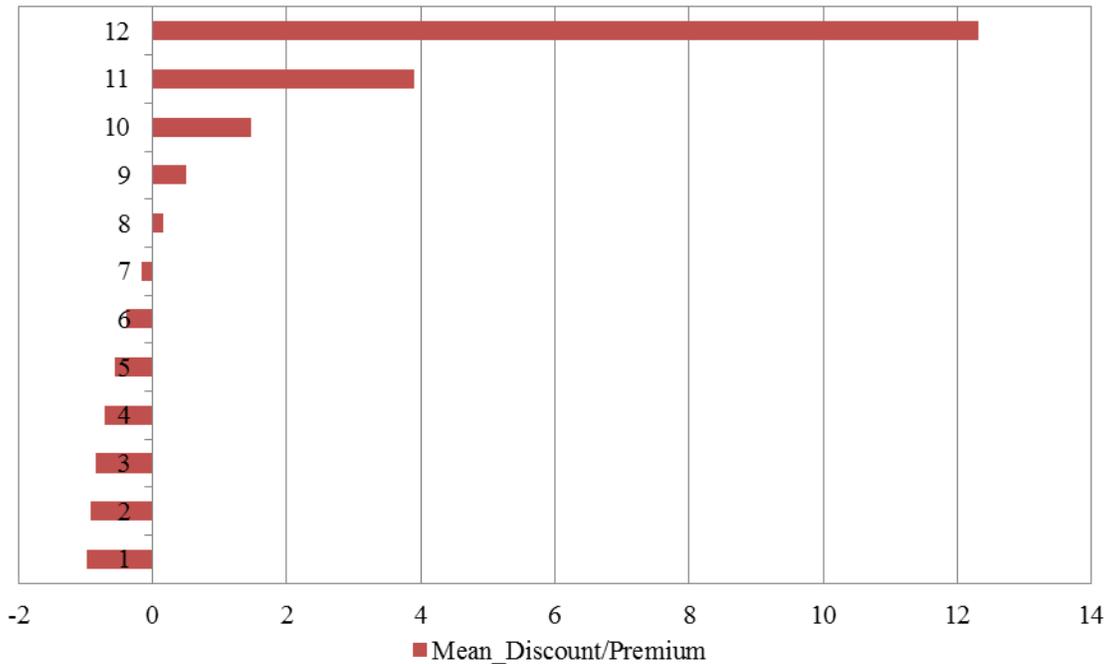
Based on these figures, we conclude that premium deals are indeed a significant phenomenon and should not be deleted as outlier in research study on private company valuation. Indeed, these outliers can be interesting case study for further examination. We will discuss four outlier cases (two top premium and two top discount deals) in the next section. Nevertheless, in the rest of the paper, we will focus our statistical analysis with the median discounts/premiums.

6. Case Analysis and Government Policies[15]

In Table 4, we list the top five premium and top five discount deals in our sample. It is interesting to point out that all of the top five premium deals belong to the Tech industries. While the top discount deals mainly belong to manufacturing. In order to better understand these private transactions with extreme valuations, we select four deals to provide more discussion here[16].

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[15] We thank the referee for suggesting the discussion of extremer cases and government policies.
[16] As some of the smaller deals listed in Table 4 do not have any meaning for media coverage for us to write up the cases, the four deals selected are bigger ones.

Table 4: List of Top 5 Premium and Discount Deals

Announcement Date	Bidder Name	Bidder SIC	Target Name	Target SIC	Deal Value (US$mil)	Premium/ Discount	Industry Dis/Pre	Bidder Size (US$mil)	Target Size (US$mil)
Top 5 Premium Deals									
09/24/2011	Zhongshan Broad-Ocean Motor Co	3621	Ningbo Co-Star Material	3679	13.6	1830.97%	-19.16%	369.6	6.8
08/23/2013	Beijing Ultrapower Software Co	7372	Tianjin Shell Wood Software	7372	214.3	1788.09%	-19.16%	308.9	3.6
12/17/2013	Wiscom System Co Ltd	3679	Shanghai Suneast Elec Power	7372	8.2	1445.66%	-19.16%	172.2	0.3
05/31/2011	Guangzhou Haige Commun Grp Inc	3679	Shenzhen Tele Tone Info Tech	3663	4.9	1126.27%	-19.16%	154.2	1.0
07/24/2013	Huayi Brothers Media Corp	7812	Guangzhou Yinhan Technology Co	7372	131.3	1099.39%	-19.16%	326.4	6.9
Top 5 Discount Deals									
05/11/2012	Chengdu Yide Electronic	3541	Shenzhen Holesh Ind Co Ltd	3499	0.2	-99.84%	-54.72%	-	26.9
12/3/2011	Guangdong Taiantang Pharm Co	2834	Chaozhou Shanyuan Invest Co	6799	21.4	-99.83%	-31.70%	65.9	6.3
1/15/2013	Guangzhou Hi-Target Navigation	3812	Guangzhou Dushiquan Internet	7376	1.5	-99.53%	-19.16%	85.9	3.1
10/26/2013	Chinascholars Group Co Ltd	3663	Beijing Allday Science&Tech Co	3699	103.3	-99.52%	-54.72%	87.4	27.4
11/19/2013	CSG Smart Science&Tech Co Ltd	3612	Shanghai New-Tronics M&E Co	3699	145.3	-99.24%	-54.72%	54.3	24.7

6.1 Premium Deal # 1: Bejing Ultrapower Software Co acquires Tianjin Shell Wood Software.

Bejing Ultrapower Software Co was first established in 2001 and later listed in ShenZhen Stock Exchange in 2009 (stock code: SZ 300002). At the time of acquisition in 2013, Bejing Ultrapower had annual revenue of US$308.9 million. Announced on 23 August 2013, it acquired 100% of Tianjin Shell Wood Software, which is an online game developer, at a price tag of US$214.3 million. Tianjin Shell Wood Software was founded in 2012. Its main revenue comes from 12 mobile games. It already owns a large user base and a solid brand compared to peer firms. For example, its number one game "Little Empire" has over 8 million registered users from more than 200 countries/regions. In the first half year of 2013, income from this game exceeded US$1.46 million. The transaction was paid with US$69.3 million in cash and the rest by 45.7 million shares. Both target and acquirer belong to the same industry. The enterprise value/sales ratio of Tianjin Shell Wood Software is 59. The valuation premium is 1,788%.

Based on various media reports[17], there exist two possible reasons that may partially explain why Bejing Ultrapower paid such a high premium. First, acquiring Tianjin Shell Wood can help Bejing Ultrapower to improve its internet technology in order to better capture the mobile games market. Second, with the international coverage of Tianjin Shell Wood, Bejing Ultrapower can speed up its expansions into international markets.

6.2 Premium Deal # 2: Huayi Brothers Media Corp acquires Guangzhou Yinhan Technology Co Ltd.

Established in 1994 and then listed in ShenZhen Stock Exchange in 2009, Huayi Brothers Media Corp (stock code: SZ 300027) is one of well known TV show and movie producers. Its business includes movie and TV show production, talent agencies, music labels, and operating movie theaters. As of April 2015, the company was worth US$7.9 billion. At the time of acquisition in 2013, Huayi Brothers Media Corp had annual revenue of US$326.4 million. Announced on 24 July 2013, it acquired 100% of Guangzhou Yinhan Technology Co Ltd, which is an online game developer for US$131.3 million.

Guangzhou Yinhan Technology Co Ltd was founded in 2001. It is a ten-year old mobile game developer with a market share of about 6% in China, second only to Tencent. For example, its main product "Space Hunter", generated a monthly cash flow of US$5.7 million in April, 2013. The transaction is paid by US$72.6 million in cash and the rest by 7.6 million shares. The target is in tech industry while the bidder is in Services (Hotel, Personal, Business, etc.) industry. The enterprise value/sales ratio of Guangzhou Yinhan Technology Co Ltd is 37. The valuation premium is 1,099%.

According to Zhongjun Wang, chairman of Huayi Brothers[18], the company is interested in combining the innovative process of film production and mobile games production, both businesses demand creativity and technology. This acquisition is expected to create synergy and this can be a possible reason for paying such a high premium.

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[17] See more on http://stock.hexun.com/2013/szty4/; http://tech.sina.com.cn/i/2014-06-09/01259424245.shtml; http://news.zol.com.cn/article/135231.html

[18] See more on http://it.sohu.com/20130904/n385879195.shtml; http://news.4355.com/hangyexinwen/37665.html; http://epaper.dfdaily.com/dfzb/html/2013-07-24/content_795680.htm

6.3 Discount Deal # 1: ChinaScholars Group Co., Ltd acquires Beijing Allday Science & Tech Co.

ChinaScholars Group Co., Ltd was regarded as a mature manufacturer of military and civilian communications products in China. It was established in 1955 and then listed in ShenZhen Stock Exchange in 1993 (stock code: SZ 000547). In 2013, ChinaScholars Group Co., Ltd has annual revenue of US$87.4 million when it announced on October 26, 2013 the acquisition of 100% ownership of Beijing Allday Science & Tech Co. Established in 2003, Beijing Allday Science & Tech specializes in manufacturing products for electromagnetic security to be used in defense industry. The deal carried a price tag of US$103.3 million and was paid by US$24.0 million in cash and the rest by 153.5 million shares. Both target and acquirer belong to the same broad industry. The enterprise value/sales ratio of Beijing Allday Science & Tech Co is 4. The valuation discount is -99.52%.

There are two possible reasons for such a huge discount. First, the business revenue of electromagnetic security products manufactured by the target firm is strongly affected by mainland government policies on national security. Thus, such a business uncertainty can lead to a deep discount. Second, Beijing Allday Science & Tech provides a credit period 12-18 months, leading to a prolonged cash conversion cycle and a substantial account receivable which normally cross over two fiscal years. Such a liquidity issue can result in a high valuation discount.

6.4 Discount Deal # 2: CSG Smart Science & Tech Co Ltd acquires Shanghai New-Tronics M&E Co Ltd.

CSG Smart Science & Tech Co Ltd was first established in 2002 and later listed in ShenZhen Stock Exchange in 2011 (stock code: SZ 300222). It manufactures electric automatic systems and provides complete electric automation system solutions to electrical power companies in China. At the time of acquisition in 2013, CSG Smart Science & Tech Co Ltd had annual revenue of US$54.3 million. Announced on 19 November 2013, it acquired 100% of Shanghai New-Tronics M&E Co Ltd. Shanghai New-Tronics was founded in 1993, which mainly manufactures and wholesale electric equipment and is the largest power manipulator producer in China. The transaction price is US$145.3 million and paid by US$12.9 million in cash and the rest by 40.0 million shares. Both target and acquirer belong to the same industry. The enterprise value/sales ratio of Shanghai New-Tronics M&E Co Ltd is 6. The valuation discount is -99.24%.

No obvious reason can be found in media reports to explain the deep discount. Based on the official announcement document submitted by CSG to the stock exchange, it appears that Shanghai New-Tronics is operating in a very narrow industry manufacturing balance cranes and robotic arms. It is possible that the huge discount is related to the keen technological competition and continuous R&D expenditure needed to maintain market share in this specialized market.

7. Government Policy

It is well-known that Chinese government plays an active role in managing Corporate China. Often time, intervention by regulations and policies are used to speed up or slow down certain economic and corporate activities. Thus we consider understanding the regulations and policies related to M&As is worthwhile to be documented here.

We searched and summarized government policies and regulations related to M&As during the past decade. Table 5 reports the key findings from 4 selected regulations/policies that may have significant impacts on M&A activities. The first regulation was announced in 2006. It spells out some rules on how foreign institutions can purchase Chinese firms. Such a regulation can be seen as a signal by the Mainland government to encourage more qualified international acquirers to invest in Corporate China. In 2010-2011, the State Council (and later supported by Ministry of Industry and Information Technology) announced favorable policy for M&As for a designated group of industries including automobile, steel, cement, machinery manufacturing, aluminum, rare earth, shipbuilding, information technology, food, medicine, cosmetics, and agriculture. Finally, in 2014, the China Securities Regulatory Commission (CSRC) announced two related policies for M&As related to private (unlisted) firms. In conclusion, these Chinese regulations and policies are designed to remove unnecessary regulatory hurdles and make M&As more market driven for both domestic and foreign institutions.

Table 5: Government Policies and Regulation related to M&A Activities in Mainland China

Government Agency	Announcement
Ministry of Commerce of the People's Republic of China	Date: August 8, 2006 Title: "Regulations on the Mergers and Acquisitions involving Domestic Targets by Foreign Acquirers" Led by Ministry of Commerce, six PRC regulatory agencies jointly announce the new M&A Regulation first in 2006 and the regulation was subsequently amended in 2009. The 2006 M&A Rules established a general legal framework for foreign investors to acquire either equity or assets of a Chinese company. This is PRC's first attempt to provide clear instructions for foreign investors to engage in M&A activities in China. http://www.mofcom.gov.cn/aarticle/b/c/200608/20060802839585.html
PRC State Council	Date: September 6, 2010 Title: "Views of the State Council on Encouraging Corporate Mergers and Acquisitions" Representing the highest authority from the PRC central government, the State Council announced its views on the state policy in pushing for strengthening six industries through M&As, namely 1) automobile, 2) steel, 3) cement, 4) machinery manufacturing, 5) aluminum, and 6) rare earth. The policy view also explicitly stated an "Open-door policy" by encouraging cross-regional domestic and even international M&As. We can observe that these six industries are natural resources and manufacturing oriented. The policy view also announced the corresponding reduction of unnecessary provincial and regional administrative procedures to simplify the approval process for M&A activities. Some tax incentives and relaxation of restriction on private capital market funding were also given to encourage the private firms to engaging in M&A activities. http://www.gov.cn/zwgk/2010-09/06/content_1696450.htm
PRC State Council	Date: December 30, 2011 Title: "Strategic Plan on Industrial Transformation (2011-2015)" In addition to the six industries mentioned in the State Views in 2010, five more industries have been added in the five-year strategic plan. They are 1) shipbuilding, 2) information technology, 3) food, 4) medicine, and 5) cosmetics. In other words, a total of 11 industries were named by the state to go through rapid expansion through M&As. We can see that the newly added industries are more technology oriented and begin to include consumer products. http://www.gov.cn/gongbao/content/2012/content_2062145.htm p.s. Ministry of Industry and Information Technology announced on January 22, 2013 its view on the objectives and guiding principles for nine industries in conducting M&As. These industries are 1) automobile, 2) steel, 3) cement, 4) shipbuilding, 5) aluminum, 6) rare earth, 7) information technology, 8) medicine, and 9) agriculture. http://www.miit.gov.cn/n11293472/n11293832/n11293907/n11368223/15130615.html

China Securities Regulatory Commission	Date: June 23, 2014 Title: "Regulatory Practice of Major Asset Restructuring for Unlisted Companies" and "Regulatory Practice of Acquisition of Unlisted Companies" The two policies make substantial improvement on simplifying the governmental approval requirement on asset restructuring and M&As activities. The new process is more market driven and transparent. Improvement areas include flexibility in payment and financing methods, autonomy in price determination, and elimination of reporting detail ownership structure of companies involved. The mandatory requirement on earnings forecast after acquisitions was also removed. http://www.csrc.gov.cn/pub/newsite/gzgsb/fgbzcfg/201407/t20140715_257818.html http://www.csrc.gov.cn/pub/zjhpublic/G00306201/201406/t20140627_256784.htm?keywords=

8. Private Company Valuation Discounts/premiums by Target Revenue, Percentage Acquired and Technology Relatedness

In Table 6, we continue to explore possible discounts/premiums by dividing our data into subsamples based on revenue (i.e., targets with large revenue versus those with small revenue using sample median as benchmark), percentage acquired during this transaction (i.e., high percentage acquired versus low percentage acquired using sample median as benchmark) and technology relatedness (i.e., targets in technology related industry versus those in non-technology industry).

Table 6 Panel A reports results on discount/premium figures by comparing large targets vs. small targets19. We define large targets as targets' revenue larger than the sample median and vice versa. Two interesting observations can be made. First, there is some weak evidence for a significant premium of 57.3% for the small targets (using one-peer matching). More importantly, large targets experience significant and deep discounts of -40.5% (one-peer) and -47.5% (three-peer), indicating that target firm size is a significant factor in determining private company discount in China. Second, there exists a significant difference between the valuation for small targets (57.3% with one-peer matching and -16.0% with three-peer matching) and large targets (-40.5% with one-peer matching and -47.5% with three-peer matching). This result seems to suggest that purchasing a larger private target would receive a bigger discount while buying a small target may need to pay a premium instead.

Next, we explore if ownership control will affect valuation discount/premium. Two methods are used to examine this issue. The data is divided into two subsamples first by percentage acquired (median as the divider) in Table 6 Panel B1and second by minority/majority ownership after acquisition in Panel B2. Unfortunately, none of the subsample medians are significantly differently from zero. In addition, the subsample comparisons do not result in any material difference either. The analysis on ownership control indicates that it is not an important factor by itself in determining valuation premium/discount.

So far, we examine two separate factors, but only target size shows a significant effect to valuation discount/premium. To further strengthen the results on firm size, we explore the interactive effects between size and ownership control. Table 6 Panel C1 and C2 report results on how target size and ownership control jointly affect discount. We conduct a subsample analysis by further splitting the 114 small targets and the 113 large targets into subsamples (majority ownership after acquisition versus minority ownership after acquisition). Then we compare the discount/premium by ownership again.

The result in Panel C1 indicates that, for small targets with majority control transferred to the buyers after transactions, the small targets experience a significant premium of 64.4%, which is even higher than the 57.3% premium shown in Panel A. This finding is interesting because after controlling for ownership, the result is consistent with an industry wisdom that buyers have to pay an additional premium for majority ownership control. We have to be cautious for this interpretation as this finding is only supported by one-peer matching. Panel C2 reports valuation discount/premium for large targets with majority control transferred. The large targets with majority control by buyers show statistically significant discounts of -53.9% with one-peer

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[19] In fact, we also conduct a subsample analysis by splitting the targets into two subsamples based on deal size (i.e., targets with large deal size versus those with small deal size using sample median as the benchmark). The result is shown in Appendix 1 but not significant.

matching and -58.1% with three-peer matching. However, the two sample comparisons for Panel C1 and C2 are not significant. In short, the interaction analysis of target size and ownership support the initial target size analysis in Panel A that there exists a significant discount for larger targets. Figure 2 summarizes all the significant valuation discount/premium medians in a decision tree format for easy of reference.

Figure 2: Decision Tree Presentation for Valuation Discount/Premium Medians

Graph A: Discount/Premium Value in Different Subsamples using One-peer Matching

```
                                                   Minority Share Acquired

                        Small Revenue Sample
                            57.29%
                                                   Majority Control Acquired
                                                        64.44%%
Overall Sample

                                                   Minority Share Acquired
                                                        -36.27%
                        Large Revenue Sample
                            -40.48%
                                                   Majority Control Acquired
                                                        -53.94%
```
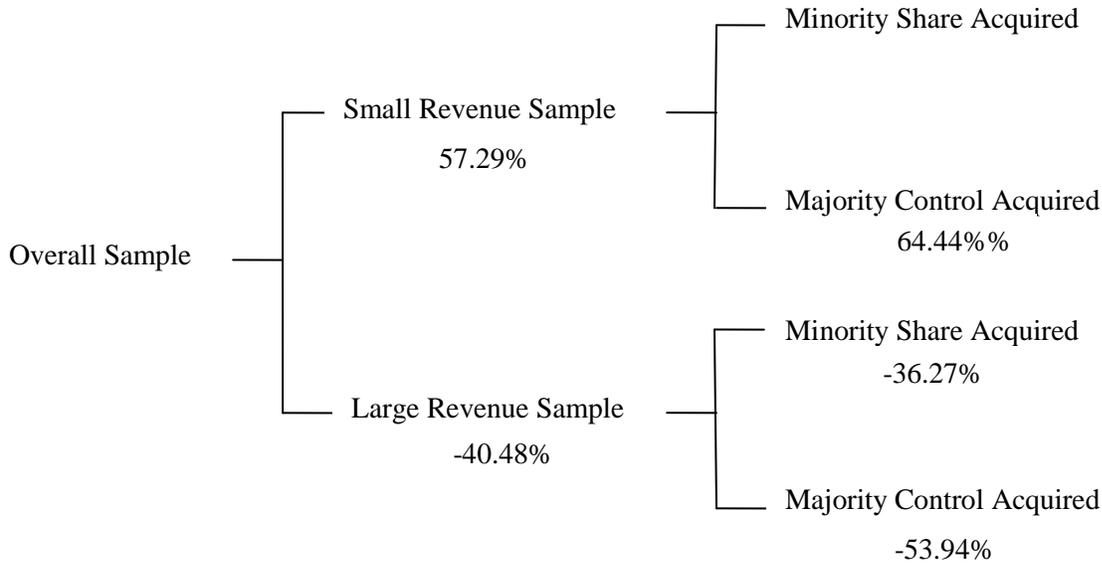
Graph B: Discount/Premium Value in Different Subsamples using Three-peer Matching

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                                                   Minority Share Acquired

                        Small Revenue Sample
                                                   Majority Control Acquired

Overall Sample

                                                   Minority Share Acquired
                                                        -27.94%
                        Large Revenue Sample
                            -47.54%
                                                   Majority Control Acquired
                                                        -58.07%
```
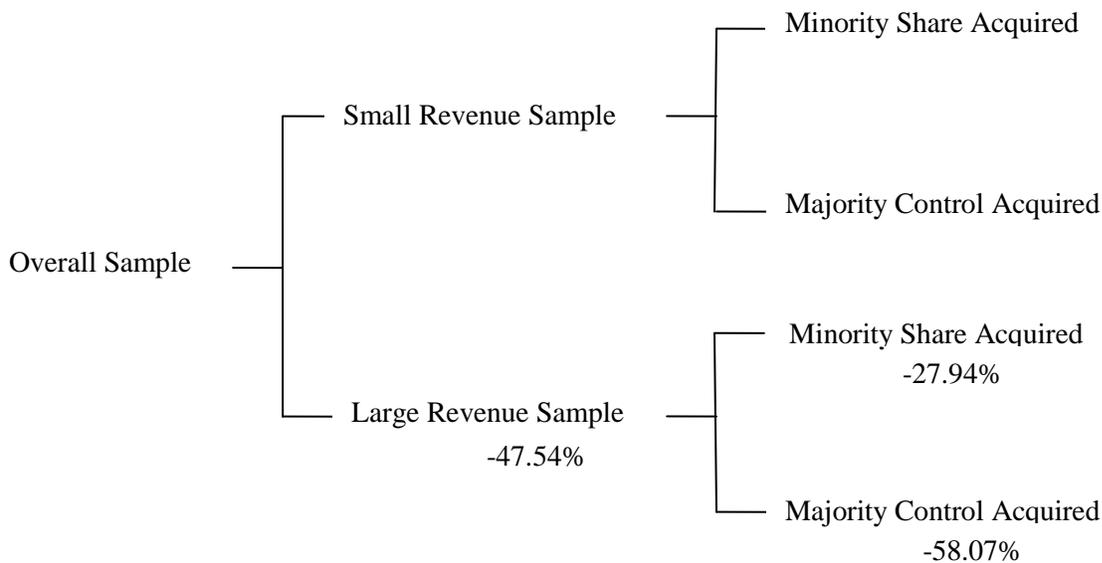
Table 6 Panel D reports the results on discount/premium figures by comparing technology related vs. non-technology targets. We expect that the technology related targets may call for a bigger premium/smaller discount. Unfortunately, the result only provides some weak evidence that technology related targets demonstrate a smaller discount (-19.2%) for one-peer matching. Also, the two sample comparison between Tech and Non-Tech is not significant. Once again, we further explore if technology may show consistent result when interacting with ownership. We conduct a subsample analysis by splitting the 134 Tech targets into two subsamples (majority ownership after acquisition versus minority ownership after acquisition)20. Then we compare the premium/discount by ownership acquired again. The result in Panel E indicates that, for technology related targets with majority control transferred to the buyers, the technology related targets experience a significant discount of -19.2%, which incidentally is identical to the discount of the Tech subsample in Panel D. Combining findings from Panel D and Panel E, some weak evidence is documented for a relatively smaller discount for Tech targets.

Table 6: Discount/Premium Analysis by Target Revenue and Ownership Control and Industry Type

**, and * separately denote statistical significance at the 0.01 and 0.05 levels.

Panel A: Comparison by Revenue of Private Target

	Discount/Premium (One-Peer)	Discount/Premium (Three-Peer)
Small Revenue Subsample	57.29%** (N=114)	-15.98% (N=114)
Large Revenue Subsample	-40.48%** (N=113)	-47.54%** (N=113)
Two-Sample Comparison		
P-value (Mann-Whitney)	0.000	0.036
P-value (Median Test)	0.003	0.259

Panel B1: Comparison by Ownership (Percentage Acquired) of Private Target

	Discount/Premium (One-Peer)	Discount/Premium (Three-Peer)
Small Percentage Acquired	-25.06% (N=114)	-30.62% (N=114)
Large Percentage Acquired	-12.52% (N=113)	-38.46% (N=113)
Two-Sample Comparison		
P-value (Mann-Whitney)	0.493	0.464
P-value (Median Test)	0.642	0.550

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[20] In fact, we also conduct a subsample analysis by splitting the 93 Non-Tech targets into two subsamples (majority ownership after acquisition versus minority ownership after acquisition). The result is not significant, so we do not report the table in the paper.

Panel B2: Comparison by Ownership (Control Acquired) of Private Target

	Discount/Premium (One-Peer)	Discount/Premium (Three-Peer)
Minority Share Acquired	-25.86% (N=79)	-32.98%** (N=79)
Majority Control Acquired	-15.56% (N=148)	-36.73% (N=148)
Two-Sample Comparison		
P-value (Mann-Whitney)	0.579	0.576
P-value (Median Test)	0.712	0.641

Panel C1: Comparison of small targets by ownership control

	Discount/Premium (One-Peer)	Discount/Premium (Three-Peer)
Minority Share Acquired	11.74% (N=28)	-46.03% (N=28)
Majority Control Acquired	64.44%** (N=86)	-7.84% (N=86)
Two-Sample Comparison		
P-value (Mann-Whitney)	0.594	0.204
P-value (Median Test)	0.663	0.384

Panel C2: Comparison of large targets by ownership control

	Discount/Premium (One-Peer)	Discount/Premium (Three-Peer)
Minority Share Acquired	-36.27%* (N=51)	-27.94%** (N=51)
Majority Control Acquired	-53.94%* (N=62)	-58.07%** (N=62)
Two-Sample Comparison		
P-value (Mann-Whitney)	0.277	0.205
P-value (Median Test)	0.303	0.159

Panel D: Comparison by Technological Involvement of Private Target

	Discount/Premium (One-Peer)	Discount/Premium (Three-Peer)
Tech	-19.16%* (N=134)	-48.90% (N=134)
Non-Tech	-21.52% (N=93)	-23.53% (N=93)
Two-Sample Comparison		

| | P-value (Mann-Whitney) | 0.411 | 0.125 |
| | P-value (Median Test) | 0.936 | 0.038 |

Panel E: Comparison of Tech targets by ownership control

	Discount/Premium (One-Peer)	Discount/Premium (Three-Peer)
Minority Share Acquired	-19.15% (N=42)	-46.03%* (N=42)
Majority Control Acquired	-19.16%* (N=92)	-49.52% (N=92)
Two-Sample Comparison		
P-value (Mann-Whitney)	0.539	0.546
P-value (Median Test)	1.000	0.710

9. Regression Analysis

In order to examine whether premium and discount deals are related to different firm level and deal characteristics, we employ a binary logistic and OLS regressions with the following model.

$$Discount/Pr\,emiumVariable_j = \alpha_0 + \beta_1 Ln\,\mathrm{Re}\,venue + \beta_2 LnDeal + \beta_3 OriginalOwnership$$

$$+ \beta_4 PercentageAcquired + \beta_5 TechDummy + \beta_6 T\arg etNation + \beta_7 Year$$

$$Discount/Pr\,emiumVariable_j = \begin{cases} j=1: Discount/Pr\,emiumDummy\left(Premium=1, Discount=0\right) \\ j=2: Ln(Pr\,emium \times 100) \\ j=3: Ln(abs(Discount) \times 100) \end{cases}$$

The dependent variable, Discount/Premium, takes three forms. First, Discount/Premium is a binary variable (equals to 1 for premium deals and 0 for discount deals) using a logistic regression approach to determine if discount and premium deals are related to a different group of independent variables. Next, we run two OLS regressions for the premium and the discount transactions separately. In these cases, Discount/Premium equals to Ln(Premium*100) for the premium transaction regression and equals to Ln(abs(Discount)*100) for the discount transaction regression.

We define our independent variables as follows. LnRevenue is used to measure target firm size, which is defined as log value of sales amount of the target company. LnDeal is log value of deal size of transaction. Original Ownership is the percentage of shares owned by the acquirer before transaction. Percentage Acquired is the ownership acquired during transaction by the acquirer. Tech Dummy is a dummy coded 1 if the target company is in the technology-oriented

industry,[21] and 0 otherwise. Target Nation equals to 1 if the target nation is Hong Kong and equals to 2 if it is mainland China. Year is a dummy variable refers to the announcement year of the transaction.

In the first two columns of Table 7 (one-peer and three-peer), both the LR statistics of the logit regression are highly significant, indicating that the premium deals and the discount deals are related to the independent variables differently. In other words, the firm and deal characteristics employed in the regression successfully differentiate premium and discount deals.

Table 7: Results of the LNV-inf-PS unit root test

	LNV-inf-PS		
	Model A	Model B	Model C
Austria	-1.417	-1.187	-0.793
Belgium	-1.978	-2.878	-1.394
Canada	-1.779	-1.642	-2.517
Denmark	-1.122	-1.869	-1.680
Finland	-2.887	-2.777	-2.721
France	-3.022	-4.561**	-2.734
Greece	-2.788	-3.044	-2.125
Iceland	-1.471	-3.365	-1.824
Ireland	-3.256	-3.046	-3.651
Italy	-2.544	-2.743	-2.186
Japan	-2.167	-2.180	-2.343
Luxembourg	-1.885	-4.292*	0.338
Netherlands	-1.713	-1.558	-2.701
New Zealand	0.212	0.140	0.140
Norway	-0.428	-3.675	-3.675
Spain	-3.118	-3.053	-2.040
Sweden	-2.364	-4.123*	-4.106
Switzerland	-2.821	-1.617	-3.515
the UK	-3.069	-1.572	-1.547
the US	-2.851	-3.571	-1.676
10% cv	− 3.320	− 4.005	− 4.344
5% cv	− 3.999	− 4.332	− 4.665
1% cv	− 4.697	− 5.012	− 5.348

(1) *, **, *** denote significance at the 10%, 5% and 1% levels, respectively. (2) The critical values for the LNV-inf-PS statistics are obtained via Monte Carlo simulation.

Next, we conduct two subsample regressions by splitting the sample into premium subsample and discount subsample. The subsample regressions confirm the difference between premium and discount deals. As we can see from column 3 to column 6, the LnRevenue coefficients are significant for premium deals. In the discount deal regressions, the LnRevenue coefficients are significant but with a smaller coefficient. We can see that, while target size variable is significant in both premium and discount regressions, the magnitude of the size coefficient (which measure the effect of size on discount/premium changes) on premium deals is much stronger than that of the discount deals. In addition to target size, deal size (LnDeal) and percentage acquired (Percentage Acquired) also demonstrate some significant relationships with

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[21] Appendix 2 shows the list of technology related industries determined subjectively.

discount/premium in the regressions. While our focus here is not to explore the individual relationship between discount/premium and their factors, we believe that the results have shown enough evidence to support our conjecture that premium deals are a significant phenomenon in private company transactions in China.

10. Conclusion and Discussion

Traditional industry wisdom and the literature conclude that the private company valuation should be at a discount compared with the public (tradable) peers due to the lack of marketability (illiquidity) of the private firms. We argue that, there are other factors (both positive and negative) that can result in valuation discount as well as premium.
Owing to the mainland Chinese government's frequent intervention on domestic IPOs, the market for corporate control in terms of M&A activities involving private targets has become important. The recent bloom of private firm acquisitions allows us to test the discount/premium issue using China data.

In this study, we first explore a possible matching criterion using the acquisition approach in determining an appropriate discount or premium in private company valuation in M&A transactions when comparing with their public peers. We also explore the phenomenon of valuation premium to private targets relative to their public peers. In our sample, a significant portion exhibits valuation premiums (45% using one-peer matching and 38% with a three-peer matching), indicating that non-liquidity factors dominate liquidity discount in these private target valuations. Our valuation analysis indicates that firm size is an important factor affecting discount. Larger targets show a -40.5% discount by one-peer matching and a -47.5% discount using three-peer matching. Furthermore, large targets show a significantly deeper discount than small targets. Our regression results suggest that premium deals and discount deals have their own separate relationships with firm size, deal size, and percentage acquired. Therefore, we argue that benchmarking private target in China using public peers must consider these firm and deal characteristics. For instance, Chen, Kim, and Marcus (2011) find that the transaction premiums are negatively correlated with the buyout managers' stock holdings. In addition, using Chinese data, Cheng and Leung (2011) find management demography of a firm is related to audit quality and board governance, which arguably can be related to firm value. Thus for future research direction for private acquisition premium, we should consider additional characteristics such as bidder's relationship to the targets and management demography.

Our findings on valuation discount show a relatively deeper discount but premium also exists in certain cases. We have some conjecture on why the Chinese median discount is bigger than those in the US. Even though our sample period is very long, most of the private transactions occurred in the past 10 years. The young history of Chinese M&A activities implies that most of the deals are part of the learning process of Corporate China, which tend to result in a wider range of valuation differences relative to public peers, especially if the Chinese M&A market is characterized by high information uncertainty and lack of competition. Therefore, we argue that private acquisitions in China are driven by strong growth-related motivations (e.g., market expansion and growth opportunity related to technology) compared to their public peers. These growth-related features may domain the negative liquidity factor and lead to valuation premium.

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Appendix 1: Discount/Premium Analysis by Target Deal Size
**, and * separately denote statistical significance at the 0.01 and 0.05 levels.

Panel A: Comparison by Deal Size of Private Target		
	Discount/Premium (One-Peer)	Discount/Premium (Three-Peer)
Small Deal Subsample	-39.94% (N=114)	-54.84%* (N=114)
Large Deal Subsample	-9.94% (N=113)	-21.44% (N=113)
Two-Sample Comparison		
P-value (Mann-Whitney)	0.161	0.003
P-value (Median Test)	0.207	0.002
Panel C: Comparison of majority control		
	Discount/Premium (One-Peer)	Discount/Premium (Three-Peer)
Small Deal Size Sample	-43.88% (N=63)	-53.38% (N=63)
Large Deal Size Sample	-6.58% (N=85)	-23.07% (N=85)
Two-Sample Comparison		
P-value (Mann-Whitney)	0.324	0.069
P-value (Median Test)	0.406	0.067
Panel D: Comparison of minority control		
	Discount/Premium (One-Peer)	Discount/Premium (Three-Peer)
Small Deal Size Sample	-36.34% (N=51)	-58.40%* (N=51)
Large Deal Size Sample	-17.85% (N=28)	-17.73% (N=28)
Two-Sample Comparison		
P-value (Mann-Whitney)	0.362	0.009
P-value (Median Test)	0.580	0.001

Appendix 2: Definition of Technology Related Industry

SIC Code	Industry Name
2833	Medicinal Chemicals and Botanical Products
2834	Pharmaceutical Preparations
2835	In Vitro and In Vivo Diagnostic Substances
2836	Biological Products, Except Diagnostic Substances
3571	Electronic Computers
3572	Computer Storage Devices
3575	Computer Terminals
3577	Computer Peripheral Equipment, not Elsewhere Classified
3578	Calculating and Accounting Machines, Except Electronic Computers
3579	Office Machines, not Elsewhere Classified
3661	Telephone and Telegraph Apparatus
3663	Radio and Television Broadcasting and Communications Equipment
3669	Communications Equipment, not Elsewhere Classified
3671	Electron Tubes
3672	Printed Circuit Boards
3674	Semiconductors and Related Devices
3675	Electronic Capacitors
3676	Electronic Resistors
3677	Semiconductors and Related Devices
3678	Electronic Connectors
3679	Electronic Components, not Elsewhere Classified
4812	Radiotelephone Communications
4813	Telephone Communications, Except Radio Telephone
4822	Telegraph and Other Message Communications
4832	Radio Broadcasting Stations
4833	Television Broadcasting Stations
4841	Cable and Other Pay Television Services
4899	Communications Services, not Elsewhere Classified
7311	Advertising Agencies
7312	Outdoor Advertising Services
7313	Radio, Television, & Publishers' Advertising Reps
7319	Advertising, not Elsewhere Classified
7371	Computer Programming Services
7372	Prepackaged Software
7373	Computer Integrated Systems Design
7374	Computer Processing and Data Preparation and Processing Services
7375	Information Retrieval Services
7376	Computer Facilities Management Services
7377	Computer Rental and Leasing
7378	Computer Maintenance and Repair
7379	Computer Related Services, not Elsewhere Classified
8731	Commercial Physical and Biological Research
8732	Commercial Nonphysical Research
8733	Noncommercial Research Organizations
8734	Testing Laboratories