

**The impact of institutional investors' cross-ownership in takeover process,
empirical results in SIC 7300 industry**

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A Thesis

In John Molson School of Business

Presented in Partial Fulfillment of the Requirements

For the Degree of Master of Science in Administration (Finance Option) at

Concordia University

Montreal, Quebec, Canada

February 2015

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CONCORDIA UNIVERSITY

School of Graduate Studies

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Abstract

The impact of institutional investors' cross-ownership in takeover process, empirical results in SIC 7300 industry

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Institutional investors exert an important influence in the takeover process. Several relationships are identified in this paper. Institutional ownership increases the probability of firms becoming takeover targets. The cross-holders' (institutional investors owning shares in both acquirers and targets) shares before takeover bids are negatively related to the likelihood of takeover success, offer price and total acquirers' premiums. Institutional investors and cross-holders achieve insignificant positive excess returns around the announcement period, compared to heavy loss of total acquirer stockholders. Higher excess returns during event window (-1, +1) will raise the possibility that acquiring firms becoming new targets in following three years. The empirical results are derived from 7300 industry (Business Service Industry) from 1985 to 2010.

Key words: Institutional investors; Cross-ownership; Takeovers; Takeover gains

Acknowledgements

I would like to express my sincere gratitude to my supervisor Dr. Betton for the continuous support of my master study and research, for her patience, motivation, enthusiasm, and immense knowledge. I would also like to thank the rest of my thesis defense committee: Dr. Kryzanowski, and Dr. Ullah. For their encouragement, insightful comments, and hard questions. My sincere thanks also go to the MSc program and all the professors for helping me with my studies in the program.

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I. Introduction

From the existing literature, we see that takeovers are beneficial for firms being acquired, but negative for acquiring firms (see Jensen and Ruback (1983), Jovanovic and Braguinsky (2002) and Jarrell, Brickley, and Netter (1988)). Jarrell and Poulsen (1989) find that target firms' stockholders on average achieve 30% positive premiums in takeovers but for acquiring firms, negative returns are observed in 1980s. Andrade, Mitchell and Stafford (2001) find a negative discount for acquirers' stock price but a 3 to 4 percent premium on target stock price. Bugeja and Walter (1995) find that takeovers create value for targets because of the removal of inefficient target management and a reduction of agency costs. Chatterjee (1992) shows that restructuring is the motive behind a takeover and creates value for the target firms. Malmendier and Tate (2008) show that bidder's CEO will overpay for target firms and make value-damaging mergers due to overconfidence.

On the other side, the hypothesis that all the investors are rational and seek to earn maximum profit, is still widely accepted, although Shleifer and Vishny (2003) have assumed the investors are irrational. Thus, there should be a reason for acquirers' stockholders to vote for these negative takeover decisions. Matvos and Ostrovsky (2008) showed that despite suffering heavy losses in takeover period, acquiring firms' shareholders prefer to vote for the mergers when cross-ownership exists in both bidders and targets. Institutional investors' cross-ownership is defined as the institutions' investment in both takeover acquirers and targets. In this situation, the bidders' negative return can be compensated by the positive premium from the stake they hold in target firms, sometimes even earning a significant profit. A specific example of Microsoft and Yahoo is shown in Appendix.

In this paper, we will follow Matvos and Ostrovsky (2008), using the sample containing all takeovers in SIC 7300 industry from 1985 to 2010.

All the firms in the research sample are in only one industry, SIC 7300. According to United States Standard Industrial Classification (SIC), 7300 industry mainly includes

the firms that render business services on a contract or fee basis, such as prepackaged software (operating, utility, and applications programs as important products) and advertising services¹. Numerous famous companies (such as Microsoft, Yahoo and Ebay) exist in this industry and have substantial revenues in U.S. market. Howe's (1986) evidence shows that the employment rate in Business Services Industry (SIC 7300 industry) experienced a rapid growth during the 1980s, especially in computer and data processing services (by more than 250%). Mowery (1995) states that prepackaged software accounts for 70% revenue in the industry in 1992. Based on these data, we can find that SIC 7300 industry can be a large and emerging industry with high revenue. In this kind of industry, it is possible that more takeovers can be observed.

By concentrating only on Business Service Industry, we can control some factors that may vary significantly between different industries. There may be many different motivations for takeover, for example, Berkovitch and Narayanan (1993) distinguish the motives into three categories, synergy, agency and hubris. Malmendier and Tate (2008) state that CEO overconfidence will lead to higher possibility of making takeover decision. By focusing only on one industry, we may exclude the factors that differ by industry and may control the takeover motivations. An additional benefit to study this industry is that many observations and takeovers exist in this industry from 1985 to 2010, much more than in other industries (see appendix table 30).

The companies in this industry regularly have large proportion of intangible assets to their total assets and high level of research & development expenses. Accordingly, in the Business Services Industry, which is highly reliant on new technologies and services, we would expect to see more mergers and acquisitions with the intent of acquiring new technologies, enhancing market share and reducing competition. In contrast, due to the high concentration of market share in a relatively small number of firms, antitrust laws are influential in some historical case of horizontal takeovers.

With the objective of exploring the other effects of institutional investors' cross-

¹ The details of SIC 7300 industry can be found on the website of United States Department of Labor. https://www.osha.gov/pls/imis/sicsearch.html?p_sic=73&p_search=

holding in the whole takeover process, some questions are put forward first and the answers will be developed as hypotheses in later part. For the firms in 7300 industry, are the institutional holdings a critical factor that makes them become a takeover target? Is it probable that the cross-holders' shares in target firms and acquiring firms before takeover can impact the success of takeover bid? How the cross-ownership will influence the offer price? Could institutional investors with cross-ownership achieve a different return around bid announcement day? How is the takeover premium affected by the cross-ownership? What's the relation between return to cross-ownership and firm performance? What kind of acquiring firms will become targets in new takeovers after the previous one?

The rest of the paper is organized as follows. Section II develops the hypotheses and reviews the related literature. Section III describes the two samples used, total sample and takeover sample, and presents their descriptive statistics. Section IV denotes the empirical tests, including the regression models, the variable characteristics for regression procedures, the robustness test if available, and the empirical results for each corresponding procedure. Section V concludes.

II. Hypothesis development and related literature

H1: For all the firms in the 7300 industry, the institutional holding increases the probability of becoming takeover target, but the effects are different for horizontal and non-horizontal takeovers. The firms with higher shareholdings by institutions are expected to be more likely to attract horizontal acquirers. We can attribute this phenomenon to institutions' better communication with corporate management and their role as corporate monitor. Shleifer and Vishny (1986) find the greater size of ownership they hold in investee, the stronger incentive the institutions have to monitor the management. Since horizontal bidders pay more attention on the post-takeover benefits, such as reducing competition, increasing productive efficiency and enhancing buying power, they need more institutions' monitor on wealth protection, corporate

management, agency problem and decision making.

Fee and Thomas (2004) show that horizontal mergers do not raise monopolistic collusion, but increase productive efficiency and buying power. Hannan and Rhoades (1987) show that higher market share and a lower capital-to-asset ratio will lead to higher possibility of being acquired by non-horizontal bidders in the banking industry. Shleifer and Vishny (1986) believe that shareholders having block shares will be more effective monitors of the management. Jarrell and Poulsen (1987) find that firms with lower levels of institutional investment tend to adopt more value-reducing antitakeover charter amendments. Romano (2001) finds out that in the 1990s, institutional investors improved corporate performance and eliminated takeover defenses. Ambrose and Megginson (1992) show that if there's significant net change in institutional holdings, the probability of receiving a takeover bid will decrease. Agrawal and Mandelker (1990) suggest that institutional investors can be good monitors for other shareholders' wealth, a similar point to Hart (1995). Consequently, the existence of institutional ownership in 7300 industry firms may be attractive for horizontal acquirers.

H2: For all the public takeovers in 7300 industry, the institutions' stake will positively affect the probability of takeover success. In contrast, the institutional cross-ownership in acquirers and targets may have indeterminate influence on the possibility of completion. Some previous studies have found positive relationship between the chance of takeover success and toehold size (pre-bid ownership by bidders). Betton and Eckbo (2000) find that a larger bidder toehold can decrease competition and remove certain target defenses. Betton, Eckbo and Thorburn (2009) make the statement that buying some small part of targets before making takeover announcement can yield a competitive advantage when multiple bidders are present, based on auction theory. Bulow, Huang and Klemperer (1999) show that owning part of the target before takeover can help bidders win the auction. However, Bris (2001) takes the position that the bidders' pre-takeover trades may be hidden by market liquidity, and thus the takeover probabilities are contingent on whether the trades are disclosed or not by the

market. In this paper, the shares of cross-holders (the institutional investors owning stock shares in both target and bidder) are studied. The cross-holders' shares in target firms are similar to toeholds. Therefore, we hypothesize that the relationship between the probability of takeover success and toehold size can be applied to the probability of takeover success and cross-ownership as well.

H3: The institutional cross-owners' share in both firms (bidder and target) before bidding should have a negative effect on the offer price. The acquirers who have a higher level of ownership in the target firms, could offer higher consideration for the takeover. This hypothesis is made on the insider basis, namely, assuming that if the institutional investor are cross-owners, they will know more clearly about the intrinsic value of the target firms. Singh (1998) concludes that bidders with a toehold are more likely to bid above firms' real valuation in order to extract greater surplus from other bidding rivals. On the contrary, Bulow, Huang and Klemperer (1999) show the empirical results that owning part of the targets before takeover can help bidders win the auction, often with a lower offer. Betton and Eckbo (2000) also find evidence that the expected payoff is decreasing with higher toehold, consistent with Bris (2001). Thus, we hypothesize that the effect of cross-holders' ownership in target firms can be similar with toeholds, reducing the offer price. Similarly with the hypothesis 2, we hypothesize that the negative relationship between the offer price and toehold size can be applied to the offer price and cross-ownership as well.

When we only consider the institutional shares in the two firms before takeover, we will expect them to have a crucial effect in limiting the offer price to a reasonable level. Hart (1995) supports the idea that institutional investor will put a person in the management, a person who will diminish agency problems and serve for the institutions' benefit instead of pursuing his own goals, like extracting value from a takeover event.

H4: From former studies, takeovers are beneficial for firms being acquired, but negative for acquiring firms (see Jensen and Ruback (1983) and Jarrell, Brickley, and Netter (1988)). Jarrell, Annette and Poulsen (1989) even find that target firms'

stockholders, on average, achieve 30% positive premiums in takeovers but for acquiring firms, negative returns are observed in 1980s. Therefore, we can conclude that bidders lose in takeover activities generally. Nevertheless, Matvos and Ostrovsky (2008) obtain empirical results showing that the positive returns of substantial stakes held by acquiring firms in the targets compensate the loss in acquirers' shares. In addition, Betton and Eckbo (2000) find that greater toehold is associated with lower bidding premiums and lower level of stock price runups before acquisition announcement. We, therefore, hypothesize that the takeover announcement period return will be negative for the acquiring firms, but not significant or even positive for the cross-owners. The gains to cross-holders are determined by adding up total dollar returns in both acquirers and targets divided by the total dollar value held by the institutional cross-owners.

H5: We expect a higher level of ownership in targets held by cross-holders and an increase in institutional shares to be negatively related to takeover premiums. Stulz, Walkling and Song (1990) show a negative correlation between successful takeover gains and institutional holdings. Goldman and Qian (2005) state that when a high level of toehold exists, the after event agency problem may be serious due to enhanced managerial entrenchment and lower firm value, the problem which could probably drive down the premiums. Bris (2001) also shows a negative relation between toehold size and takeover premiums. Compared to this idea, Betton and Eckbo (2000) find that toehold purchases will lead to target stock price runups before takeover announcement and then pull up the total takeover costs (markup pricings).

H6: The higher takeover premiums earned by acquirers, the better post-takeover performance (such as higher market-to-book ratio) they will have. This phenomenon may be attributed to synergy. Better mergers and acquisitions with higher takeover premiums can be attributed to synergy, which will increase the efficiency of the new consolidated corporation and make the best use of the resources. Based on Hypothesis 5, it can be hypothesized that higher premiums are derived from lower cross-ownership, which reduces the post-takeover managerial entrenchment and increases firm value,

based on Goldman and Qian's (2005) conclusion. In addition, Jensen (1986) puts forward the theory, agency cost of free cash flow, that takeover is the only effective way to change control in the firms whose managements do not maximize value. Thus, if a bad management has been taken over, a positive gain and better follow-up performance will be expected.

H7: The bidders gain significant negative abnormal returns around announcement period will become new takeover targets in the following three years. Mitchell and Lehn (1990) offer empirical results that one motive for takeover is to drive out firms that previously made value-damaging acquisitions. Jensen (1986) argues that takeover is the only effective way to remove the agency problem produced by free cash flow. It is rational to predict that bidders gained low excess returns or lost heavily in previous bid activity will become a target in later new takeovers.

III. Sample description

Two samples are employed for later empirical tests, full sample and takeover sample. The full sample includes all the public firms in Business Service Industry from 1985-2010, reported in COMPUSTAT database with SIC code 7300. After that, a subsample (takeover sample) is used, containing all the companies in SIC 7300 industry that become takeover targets from 1985-2010, takeover data reported in Thomson Financial SDC Platinum (SDC) merger databases. The acquirers for these takeovers are all U.S. public firms with daily price data and fundamental data available on Center for Research in Security Prices (CRSP) database and COMPUSTAT database.

In the first step, 26595 observations in the initial full sample and 748 takeovers in the takeover subsample are found.

For the later part regression stage, the institutional stake in each acquiring firms and target firms are needed. The Thomson Financial CDA/Spectrum Institutional (13f) Holdings database provides the exact ownership data of each institutional investor in targets and acquirers and this data is used to calculate the cross-ownership. The

institutional ownership data is reported quarterly at every March 31th, June 30th, September 30th and December 31th.

Hence, when testing the relationship between institutional ownership and the probability of receiving a takeover bid (empirical test 1) based on the full sample, we use the data reported on December 31th of year (t-1) as institution ownership data for each firms in year t. Unfortunately, only 10857 observations in full sample have the institutional ownership data available on December 31th in year (t-1).

In the later section, when computing the cross-ownership for the firms in takeover sample, we use the latest report data before takeover to get the cross-holdings. For example, if the takeover announcement is on April 17th of year t, the reported institutional share data on March 31th of year t is used. Only 660 pairs of firms in takeover sample have the data available.

To find out whether these two incomplete samples can represent the initial one, the following statistical table1 are utilized.

For the takeover sample, the percentage of completed takeovers, defenses adopted takeovers, bid auction takeovers, horizontal takeovers and cash paid takeovers to total takeovers are similar for the initial sample and final sample. For the full sample, no significant difference is observed for the logarithm of firms' average market value and leverage. However, the proportion of intangible assets to total assets and logarithm value of market share are significantly different between the sample used in this paper and the original sample.

We then use the latter two samples (containing 660 takeovers and 10857 firm observations) as proxies. If we focus on solving this problem in the future, hand-collecting institutional ownership data from the firms' proxy statement will work.

For the final sample, 10857 observations with obtainable institutional share data are included. From 1985 to 2010, 660 takeovers take place, of which 452 are horizontal takeovers and 208 are held by bidders from another industry. Of these 660 takeovers, 553 are successful mergers and 100% shares are owned by the acquirers after takeover

Table1 Comparison of initial sample and final sample

Market share is specific firms' sales divided by total industry sales in the corresponding year. Leverage is the ratio of total liability to total assets. Log size stands for the logarithm of bidders' market value. Takeover status indicates whether the former takeover bids succeed or not. Defense is the presence of antitakeover measures used in former takeover. Multiple bidder is the indicator of whether multiple bidders exist in former takeover. Horizontal is the binary variable if acquiring firms also belong to 7300 industry. Medium indicates whether cash employed or not in former takeover bid. Defense refers to the adoption of takeover defenses. *Significant at 10%; **Significant at 5%; ***Significant at 1%

Panel A. Takeover sample							
	N=748(initial)			N=660(final)			
	Indicator=1	Percent	Total	Indicator=1	Percent	Total	
Takeover status	611	81.68	748	553	83.79	660	
Defense	103	13.77	748	99	15.00	660	
Multiple bidders	33	4.41	748	32	4.85	660	
Horizontal	492	65.78	748	452	68.48	660	
Medium	251	33.56	748	228	34.55	660	
Panel B. Full sample							
	N=26595(initial)			N= 10857(final)			t value
	mean	median	Std. Dev	mean	median	Std. Dev	
Log (market value)	18.17	18.16	2.66	19.18	19.06	2.02	1.23
Intangible/total asset	0.18	0.08	0.21	0.16	0.08	0.19	5.22***
Log (market share)	-9.65	-9.51	2.48	-8.64	-8.75	1.97	2.01*
Leverage	0.66	0.48	0.87	0.71	0.40	14.10	0.75

activity, while 107 takeovers fail at last. From table 2, it can be observed that horizontal takeovers are more prevalent in this industry during 1985 to 2010, about two times of the non-horizontal takeovers. And most part of the bids turn out to be accepted by the targets finally. Only one fifth of the takeovers are incomplete. The takeover results (success or failure) are uniformly distributed when analyzing two parts, horizontal and non-horizontal takeovers separately. When focusing on ratio of takeovers to the total number of firms existing each year, we can point out that only a tiny fraction of firms (5.5% on average for each year) become targets in this industry.

From the table 30 in the appendix, as we discussed before, we can find that 7300 industry has the most observations in firms' number. Therefore, this industry is selected to study in.

From 1998 to 2001, a larger fraction of firms become takeover targets, ranging from

Table2 Annual number of firms with horizontal mergers, successful takeovers and no takeover in 7300 industry

Horizontal takeovers refer to the firms who receive takeover bid from acquirers also in the 7300 industry and they are divided into two categories, successful and unsuccessful. Non-horizontal takeovers represent the firms receive takeover bid from companies belonging to other industry, classified as successful and unsuccessful as well. Total takeovers sum up both the horizontal takeovers and non-horizontal takeovers. No takeover refers to the rest firms that receive no bid in 7300 industry. Percent of horizontal to total takeovers is computed as the number of total takeovers divided by the horizontal takeovers. Percent of targets to total firms is computed as the total takeovers divided by total sample. Total sample refers to the total number of firms that have institutional shares data available on the Thomson Financial CDA/Spectrum Institutional (13f) Holdings database. The takeover data is from Thomson Financial SDC Platinum (SDC) merger databases.

Takeover Year	Horizontal takeovers			Non-horizontal takeovers			Total takeovers	No takeover	Percent of horizontal to total takeovers (%)	Percent of targets to total firms (%)	Total sample
	Successful	Unsuccessful	Total	Successful	Unsuccessful	Total					
1985	1	0	1	3	0	3	4	175	25.0	2.2	179
1986	2	0	2	4	1	5	7	187	28.6	3.6	194
1987	6	2	8	2	0	2	10	191	80.0	5.0	201
1988	3	3	6	4	2	6	12	206	50.0	5.5	218
1989	3	4	7	6	1	7	14	201	50.0	6.5	215
1990	6	2	8	5	2	7	15	197	53.3	7.1	212
1991	5	1	6	2	1	3	9	195	66.7	4.4	204
1992	2	1	3	1	0	1	4	206	75.0	1.9	210
1993	3	2	5	2	0	2	7	224	71.4	3.0	231
1994	6	3	9	3	2	5	14	258	64.3	5.1	272
1995	12	2	14	6	2	8	22	289	63.6	7.1	311
1996	14	2	16	8	1	9	25	354	64.0	6.6	379
1997	23	0	23	12	0	12	35	474	65.7	6.9	509
1998	32	4	36	11	1	12	48	525	75.0	8.4	573

1999	37	8	45	12	3	15	60	521	75.0	10.3	581
2000	35	8	43	11	1	12	55	672	78.2	7.6	727
2001	39	6	45	16	2	18	63	691	71.4	8.4	754
2002	25	2	27	7	3	10	37	635	73.0	5.5	672
2003	25	1	26	7	1	8	34	583	76.5	5.5	617
2004	15	2	17	9	3	12	29	528	58.6	5.2	557
2005	20	2	22	10	0	10	32	514	68.8	5.9	546
2006	13	2	15	11	2	13	28	517	53.6	5.1	545
2007	16	4	20	8	1	9	29	487	69.0	5.6	516
2008	15	6	21	4	1	5	26	482	80.8	5.1	508
2009	8	4	12	5	2	7	19	454	63.2	4.0	473
2010	11	4	15	7	0	7	22	431	68.2	4.9	453
Total	377	75	452	176	32	208	660	10197	68.5	6.1	10857

Table3 Wald and LR tests for combining outcomes

Ho: All coefficients except intercepts related to give pair of outcomes are 0 (categories are indistinguishable). The likelihood of being a target has been divided into five categories. Category 1 refers to the horizontal successful takeovers, while category 2 is non-horizontal successful takeovers. Category 3 represents horizontal unsuccessful takeovers and Category 4 is non-horizontal unsuccessful takeovers. The last category refers to firms don't receive any takeover bid in the given year. The column (1), (2) and (3) are derived when ROA, ROE and market-to-book ratio are independent variables respectively. Chi-square is also shown. *Significant at 10%; **Significant at 5%; ***Significant at 1%.

Panel A. Wald combine test								
(1)			(2)			(3)		
Categories	tested	chi-square	Categories	tested	chi-square	Categories	tested	chi-square
1	2	34.09	1	2	34.08	1	2	34.08
1	3	45.38**	1	3	44.89**	1	3	45.08**
1	4	24.27	1	4	24.39	1	4	24.46
1	5	127.1***	1	5	127.09***	1	5	127.1***
2	3	24.51	2	3	24.23	2	3	24.31
2	4	9.06	2	4	9.02	2	4	9.08
2	5	32.31	2	5	32.30	2	5	32.27
3	4	16.79	3	4	16.35	3	4	16.33
3	5	30.10	3	5	29.49	3	5	29.68
4	5	11.90	4	5	11.89	4	5	11.94
Panel B. Likelihood ratio combine test								
1	2	35.75	1	2	35.75	1	2	35.78
1	3	58.4***	1	3	57.95***	1	3	58.13***
1	4	34.29	1	4	34.28	1	4	34.34
1	5	149.8***	1	5	149.79***	1	5	149.8***
2	3	40.94	2	3	40.67	2	3	40.84
2	4	23.17	2	4	23.14	2	4	23.23
2	5	35.80	2	5	35.78	2	5	35.81
3	4	28.34	3	4	28.07	3	4	28.06
3	5	48.8**	3	5	48.18**	3	5	48.36**
4	5	28.64	4	5	28.63	4	5	28.68

7.6% to 10.3% of the total firms in each year. These years are at the end of the fifth merger wave, during which many cross-border takeovers appeared. According to Black (1999), so many mergers and acquisitions occurred in the late 1990s due to the favorable political climate. The increasing proportion of takeovers could be attributed to the fifth merger wave but the wave ends due to the economic recession.

IV. Empirical tests

1. Institutional ownership's effect on attracting a bidder

1.1 The estimation procedure

This estimation step is employed mainly to test whether the results in 7300 industry are consistent with extant literature which finds that the level of institutional ownership in a firm will positively affect the probability of attracting a takeover acquirer. But in this paper, we consider the further study of the industry the acquirers belong to, horizontal (from 7300 industry as well) acquirers or the rest, as some control variables are added indicating whether the bidders are inside or outside the industry. Next, whether the ultimate takeovers succeed will also be tested as a possibility. Finally, we can also find which explanatory variables may take on significant value during different time period from 1985 to 2010. Correspondingly, to reach the task, a multinomial logit regression process will be employed accounting for the following five mutually exclusive conditions for each observation in 7300 industry: (1) it attracts bidders that come from the same industry and successful complete the takeover; (2) it attracts bidders that come from the same industry but ultimately fail; (3) it attracts bidders that are from non-horizontal industry and succeeds; (4) it attracts bidders that are from non-horizontal industry and fail at last or (5) it attracts no bidder.

This multinomial logit model is similar to the one Hannan and Rhoades (1987) used, describing the relation between the probability of any outcome occur during each given year t and the institutional ownership, as well as some other control variables.

The multinomial logit model employs the method of maximum likelihood, choosing the values that maximize the likelihood function. And this model has the assumptions of independence of irrelevant alternatives (IIA). This assumption states that the odds of preferring one class over another do not depend on the presence or absence of other "irrelevant" alternatives. That means, if a new distinct alternative event appears, the probability of the other event's occurrence will not change or will not be affected by the new added event. This assumption will be tested in the following part.

As the multinomial logit regression model is employed in this section, whether

any two different outcomes of the dependent variable should be combined, must be tested. According to Long and Freese (2006), if none of the independent variable has a significant impact on the odds of the dependent variable's outcome M versus outcome N, we can conclude that M and N are indistinguishable with respect to the variables in the model. If outcomes M and N are proved to be indistinguishable, it is more proper to combine them. To test whether the five categories of dependent variable (the likelihood of being taken over) are indistinguishable or not, a Wald test and a Likelihood ratio test are employed. In the table 3, the Wald combining test and Likelihood ratio test results are shown. These two tests focus on the relationships between each two categories and give similar results.

The table 3 shows that only the differences among category 1 (horizontal successful takeovers), 3 (horizontal unsuccessful takeovers) and 5 (no takeover) are significant, that means the other two categories, non-horizontal successful takeovers and non-horizontal unsuccessful takeovers, can be combined to any other categories due to the insignificant distinction. Accordingly, only three categories of dependent variables remain: successful takeovers, unsuccessful takeovers and no takeover.

Based on this testing results, a logit model with dependent variable only classified into three categories are used (successful, unsuccessful and no takeover) initially. However, some of the independent variables, that are important explanatory variables for takeover motivations in 7300 industry and that are designed to be industry specific, such as the ratio of intangible assets to total assets, the market share, the growth rate and the leverage, are meaningless. With the intent to find out more specific information of the industry effect, the dependent variable classified into five mutually exclusive events is employed finally, horizontal successful takeovers, horizontal unsuccessful takeovers, non-horizontal successful takeovers, non-horizontal takeovers and no takeover.

The model is expressed as

$$P^{HS}(t) / P^{NT}(t) = \exp(X'_t \beta^{HS}), \quad (1)$$

$$P^{HU}(t) / P^{NT}(t) = \exp(X'_t \beta^{HU}), \quad (2)$$

$$P^{NS}(t)/P^{NT}(t) = \exp(X'_t \beta^{NS}), \quad (3)$$

$$P^{NU}(t)/P^{NT}(t) = \exp(X'_t \beta^{NU}), \quad (4)$$

Where $P^{HS}(t)$, $P^{HU}(t)$, $P^{NS}(t)$ and $P^{NU}(t)$ denote the probability of the firms' being acquired by horizontal bidders successfully, being acquired by horizontal bidders unsuccessfully, being acquired by non-horizontal bidders successfully, and being acquired by non-horizontal bidders unsuccessfully². $P^{NT}(t)$ represent the likelihood that no takeover occur for this firm during the year t , and it's set to be reference category when running the multinomial logit regression. X'_t denotes a vector of independent variables that may affect the dependent variable. β^{NU} stands for a vector of regression procedures' coefficients.

1.2 Variable design and statistics

Table4 gives the descriptive statistics for the regression variables. Panel A shows the same takeover numbers with Table2 and Panel B is the statistics for the explanatory variables. All the variables are lagged for one year (except the pre-takeover market-to-book ratio, calculated as the three year average before takeover), as this may be the rational length of time period for independent variables' effects on dependent variable. The takeover data is derived from Securities Data Corporation (SDC) Mergers & Acquisitions database. The institutional shares data is from Thomson Financial SDC Platinum (SDC) merger database and the other fundamental data is from COMPUSTAT database.

To test hypothesis 1, whether the institutional holdings increase the likelihood of attracting takeover bid, and the different effects of horizontal and non-horizontal acquirers, dependent variable is used to indicate the 5 categories of firms' conditions. It obtain a value of 1 when firms attract horizontal bids and accept, a value of 2 when firms get horizontal bids and fail, a value of 3 when firms get non-horizontal bids and success, a value of 4 when firms get non-horizontal bids and fail, and a value of 5 when

² These relations can be expressed more generally as

$$P_j(t) = \exp(X_t \beta^j) / \sum_{k=1}^5 \exp(X_t \beta^k)$$

Where $P_j(t)$ denotes the probability that the observed firms will fall into category j of five categories during year t . Equations (1), (2), (3) and (4) can be derived after the normalization by transforming the four categories' coefficients correlated with the fifth alternatives, referring to Greene (2008) p842.

Table4 Summary statistics of regression variables

Dependent variable is defined as the probability of each of the following five events occurring during any given year t : (1) the firm attracts bidders that come from the some industry and successful complete the takeover, (2) the firm attracts bidders that come from the some industry but fail at last, (3) the firm attracts bidders that are from non-horizontal industry and success, (4) the firm attracts bidders that are from non-horizontal industry and fail at last or (5) the firm attracts no bidder. Instown is the institutional ownership in each firm, using the last December 31th data before the year t , reported on Thomson Financial CDA/Spectrum Institutional (13f) Holdings database. Intangible assets proportion refers to the ratio of intangible assets to total assets during the year previous to t . ROA and ROE refers to the net income on total assets and equity during the year previous to t , respectively. RELROA (RELROE) refers to ROA (ROE) divided by the average industry ROA (ROE) during the year previous to t . Pre-takeover MB ratio is computed as the average book-to-market ratio during the three years previous to t . Log (size) is the logarithm of market capitalization. Log (market share) represents the sales divided by the industry total sales during the year previous to t . Growth opportunity is calculated as the research & development expenses divided by the sales during the year previous to year t . Leverage is data during the year previous to year t . The year indicates the year the firms is observed to be acquired or not to be acquired.

Panel A. Dependent variable			
	Number of observations	Percent of sample (%)	Total sample
Horizontal takeover	452	4.16	10857
Successful takeover	377	3.47	10857
Unsuccessful takeover	75	0.69	10857
Non-horizontal takeover	208	1.92	10857
Successful takeover	176	1.62	10857
Unsuccessful takeover	32	0.29	10857
No takeover	10197	93.92	10857
Panel B. Independent variables (year dummy excluded)			
	Mean	Median	Std. Dev
Instown	0.331	0.259	0.291
Intangible assets proportion	0.164	0.085	0.191
ROA	-0.340	0.024	14.633
Relative ROA	0.184	-0.012	2.745
ROE	-0.213	0.058	10.172
Relative ROE	-0.200	-0.020	59.459
Pre-takeover MB ratio	9.682	2.265	136.379
Market cap	2.449E9	1.899E8	1.625E10
Log (size)	19.176	19.062	2.018
Log (Market share)	-8.644	-8.750	1.971
Growth rate	0.849	0.083	28.148
Leverage	0.707	0.404	14.096

firms attract no takeover in given year t .

The shares held by institutional investors in each firm are utilized as major independent variable. The institutional shares data are collected from Thomson Financial SDC Platinum (SDC) merger databases. It can be found that on average, institutions own 33.1% shares of all the firms in Business Service Industry, with a median of 25.9%. That means, for each public traded firm in 7300 industry, one third of the shares are controlled by institutional investors.

Other control variables are employed as well. As the total sample includes the firms from service industry, the intangible assets and research & development expenses will be important factors to be taken into account when acquirers make a takeover bid. In this model, the ratio of intangible assets to the total assets and research & development expenses to the sales (defined as growth rate) are added as control variables. These two variables can be designed to be horizontal indicator, as they are the major value source for horizontal takeovers and can be predicted to be positively related to the possibility of horizontal takeover. Ambrose and Megginson (1992) show that the level of tangible assets will raise the likelihood of receiving a takeover bid. Hall (1992) claims that intangible resources can play a major role when developing management strategies. Hence, the fraction of intangible assets and the growth rate are employed here to explain the probability of attracting takeover bids. For the companies in 7300 industry, 16.4% of their total assets consist of intangible assets and research & development expenses make up 84.9% of their sales, on average.

Pre-takeover ROA, ROE and market-to-book ratio (defined as market value of total assets divided by book value of total assets) are utilized as a proxy for performance. Relative ROA and relative ROE, calculated by sample firms' ROA or ROE divided by the industry average ROA or ROE, are employed as well. Former studies have found that one incentive for takeovers is to drive out bad management suggesting that firms with lower performance ratios will become takeover targets. However, Hannan and Rhoades (1987) find no significant impact of the pre-takeover performance on receiving a takeover bid later, even when they use the relative ROA and relative ROE. Jensen

(1986) holds the view that takeover is the only effective way to drive out badly performing management.

The logarithm of firm market capitalization is used to indicate the firms' size effect in the takeover process. As in previous research in U.S. market, larger bidders tend to acquire smaller targets. Palepu (1986) finds an inverse relationship between firm size and takeover probability, using net book asset value as the proxy for size. In this sample, the 10857 firms have an average market capitalization of 2448.67 million and a mean capitalization of 189.94 million, with the mean and median logarithm of 19.176 and 19.602.

Market share is computed as each firm's sales divided by the 7300 industry total sales in the same year. Contingent on this variable, we can determine the firms' position in the Business Service Industry. As Bextor (1985) states, a larger position in the market will, to some extent, promise a long run existence. Thus, a positive effect of market share on takeover possibility can be predicted for the non-horizontal takeovers. In contrast, as the antitrust laws have been enforced for many cases in this industry, the higher market share may lead to a negative motives for horizontal acquirers to announce a bid. Therefore, market share can be used to indicate the acquirers from horizontal or non-horizontal industry. In this sample, the firms have a mean (median) value of market share at 0.185% (0.016%), which is really a trivial number. We then transformed this variable into a logarithm as well.

Leverage shows the financial structure in each firms and is derived from total liabilities divided by total assets. It has an average value of 0.707 and a median of 0.404.

1.3 Empirical results

Table5 gives the results for the multinomial logit procedure. Three estimation processes are employed as the table 4 displaying, using ROA, ROE and market-to-book ratio as the control variables. Each regression procedure produces four coefficient vectors, respectively referring to horizontal successful takeovers, horizontal unsuccessful takeovers, non-horizontal successful takeovers and non-horizontal unsuccessful takeovers.

For the major independent variable, institutions' shareholdings play a positive role in attracting bidders and increasing the likelihood of takeover success, for both horizontal and non-horizontal takeovers (significant at the 1% level). This result supports the former conclusion that institutions can monitor the investee and remove value-damaging anti-takeover defenses, thereby, increasing the probability of a firm being acquired. What's more, in this part, we also find evidence that institutions' holdings have a significant positive impact on the likelihood of a bid's success.

When it comes to the control variables, several results can be observed. The fraction of intangible assets in total assets is a significant factor for horizontal takeover success. However, less intangible assets proportion for a firm in Business Service Industry will be more attractive for acquirers in the same industry to hold a successful takeover. Since the intangible assets can be the main factor for acquirers' management to make the takeover decisions, for the competitiveness, productive efficiency and bargaining power, when a takeover bid is offered by horizontal firms, the target is more willing to accept in order to offset the poor condition of intangible assets.

It can be seen that the size effect on the likelihood of becoming target is consistent with Palepu (1986), that smaller firms are more likely to receive tender offer. There's a significant adverse relationship between logarithm of size and the probability of attracting a bid. The firms with a smaller market capitalization will be more likely to be offered a takeover bid no matter whether the bidders are from the same industry or not. But for the non-horizontal bidders, the takeovers are more likely to be successful. This result may be explained by the consolidation costs after takeover and the existence of antitrust laws for horizontal acquisitions. It will be costly to consolidate two entities to a new one after completed takeover, since the two entities may possess quite different technologies, resources, operating strategies and the like before consolidation. Therefore, they will benefit a lot from a smaller target, which leads to a quick alignment. In addition, due to the antitrust laws, if two big firms both from 7300 industry merge, they tend to make up a relatively large market share, which is likely to face an antitrust challenge. For an outside industry acquirer, a smaller firm can also be a better choice

to reduce post-merger cost. Fortunately, no antitrust laws existing, non-horizontal takeovers are more likely to turn out to be successful.

Market share, however, gives us an interesting result. We can observe that only in unsuccessful horizontal takeovers, does market share show a positive impact. For this result, we may try to give a reason that for enhancing market power, reducing competitiveness and adding products' selling price, the firms in 7300 industry show more interest in other firms having large market share also in this industry but get an unwanted results at last. Although acquiring firms in Business Service Industry are willing to merge with other large-market-share firms, but they may not able to afford a satisfactory offer price because of the target's relative large market share.

Leverage turns out to be another indicator for the bidders' industry. It only has a significant negative effect on horizontal takeover probability. As a member in Business Service Industry, the intangible assets, like technologies patent and goodwill, are really critical factors to live on. Too much leverage may limit the resources available to develop intangible assets and increase the financial risk and bankruptcy possibility for the firm, which may not be beneficial for long run operations. Based on this consideration, horizontal acquirers are more likely to choose the lower leveraged targets. However, when considering the whole market, the leverage ratio may not be an important element for other industries and areas, so that it shows insignificant relation with the non-horizontal takeovers' appearance frequency.

Finally, the time dummies' results are shown in the table 6. This table is the omitted part of table5 column (1). Only this part is shown in table6 because the other two columns represent similar regression results. This variable displays the level of takeover possibility in each given year. Only for the horizontal successful takeovers this variable gives positive impact. We can find that in 1999, time dummy shows the most significance at the 1% level for the horizontal successful takeovers, as this event accounts for 6.37% of all the mutually exclusive events (horizontal success, horizontal incompleteness, non-horizontal success, non-horizontal incompleteness, no takeover) in that year, largest percentages of each year. And for the other year with high probability

Table5 What makes the firm to be a takeover target in the whole 7300 industry

Dependent variable is defined as the probability of each of the following five events occurring during any given year t: (1) the firm attracts bidders that come from the some industry and successful complete the takeover, (2) the firm attracts bidders that come from the some industry but fail at last, (3) the firm attracts bidders that are from non-horizontal industry and success, (4) the firm attracts bidders that are from non-horizontal industry and fail at last or (5) the firm attracts no bidder. Instown is the institutional ownership in each firm, using the last December 31th data before the year t, reported on Thomson Financial CDA/Spectrum Institutional (13f) Holdings database. Intangible assets proportion refers to the ratio of intangible assets to total assets during the year previous to t. ROA and ROE refers to the net income on total assets and equity during the year previous to t, respectively. MB is defined as 3 years average market-to-book ratio before takeover. Log (size) is the logarithm of market capitalization. Log (market share) represents the sales divided by the industry total sales during the year previous to t. Growth opportunity is calculated as the research & development expenses divided by the sales during the year previous to year t. Leverage is data during the year previous to year t. The year t indicates the year the firms is observed to be acquired or not to be acquired. Time dummies are omitted and will be displayed in following table. LR denotes to likelihood ratio for the total logistic model. *Significant at 10%; **Significant at 5%; ***Significant at 1%. Wald Chi-Square value are shown in parentheses.

	(1)				(2)				(3)			
	Horizontal		Non-horizontal		Horizontal		Non-horizontal		Horizontal		Non-horizontal	
	Success	Unsuccess	Success	Unsuccess	Success	Unsuccess	Success	Unsuccess	Success	Unsuccess	Success	Unsuccess
Intercept	-2.717*	-9.075	-0.539	-18.085	-2.723*	-9.226	-0.567	-18.083	-2.738*	-9.074	-0.619	-17.933
	(2.894)	(0.002)	(0.073)	(0.003)	(2.924)	(0.002)	(0.082)	(0.003)	(2.919)	(0.002)	(0.095)	(0.003)
Instown	1.17***	0.326	1.144***	1.102	1.17***	0.322	1.144***	1.102	1.169***	0.33	1.142***	1.11
	(24.589)	(0.453)	(11.988)	(2.112)	(24.585)	(0.444)	(11.988)	(2.111)	(24.529)	(0.466)	(11.928)	(2.136)
IA/AT	-1.686***	-0.656	-0.49	-1.262	-1.685***	-0.642	-0.486	-1.268	-1.685***	-0.645	-0.487	-1.263
	(21.174)	(0.836)	(1.085)	(1.057)	(21.183)	(0.805)	(1.071)	(1.067)	(21.199)	(0.811)	(1.074)	(1.06)
ROA	-0.003	-0.09	-0.012	0.013								
	(0.003)	(1.705)	(0.032)	(0.014)								
ROE					0.000	-0.001	0.000	-0.001				

					(0.000)	(0.001)	(0.003)	(0.003)				
MB									0.000	0.000	0.000	0.000
									(0.006)	(0.287)	(0.023)	(0.083)
Log (size)	-0.167***	-0.219*	-0.178**	0.032	-0.167***	-0.216*	-0.178**	0.033	-0.167***	-0.222*	-0.176**	0.027
	(10.662)	(3.41)	(5.224)	(0.033)	(10.659)	(3.329)	(5.203)	(0.034)	(10.408)	(3.482)	(4.962)	(0.023)
Log(Market share)	-0.064	0.312**	0.058	-0.069	-0.065	0.301**	0.056	-0.068	-0.065	0.308**	0.054	-0.062
	(1.564)	(5.875)	(0.56)	(0.153)	(1.642)	(5.522)	(0.534)	(0.15)	(1.64)	(5.708)	(0.485)	(0.123)
Growth rate	-0.009	-0.028	0	-0.004	-0.009	-0.025	0	-0.004	-0.009	-0.025	0	-0.004
	(0.417)	(0.052)	(0.007)	(0.007)	(0.415)	(0.049)	(0.007)	(0.007)	(0.417)	(0.047)	(0.006)	(0.006)
Leverage	-0.284**	-1.091**	-0.113	0.013	-0.282**	-1.034**	-0.103	-0.001	-0.282**	-1.033**	-0.103	-0.001
	(3.881)	(4.232)	(0.453)	(0.013)	(4.091)	(3.885)	(0.442)	(0.001)	(4.088)	(3.875)	(0.437)	(0.002)
Time dummies	-	-	-	-	-	-	-	-	-	-	-	-
Number of obs	377	75	176	32	377	75	176	32	377	75	176	32
LR		260***				259***				259***		

Table6 Time dummy coefficients and the number of acquisitions in each year

The time dummy for year 1985 is set to be a reference category and is not put into the regression. *Significant at 10%; **Significant at 5%; ***Significant at 1%. Wald Chi-Square value are shown in parentheses.

Year	Time dummy coefficient					Horizontal/total firms	Year	Time dummy coefficient				
	Horizontal	Non-horizontal	Horizontal	Non-horizontal	Horizontal/total firms			Horizontal	Non-horizontal	Horizontal	Non-horizontal	Horizontal/total firms
1985	-	-	-	-	0.56%		1998	2.442** (5.694)	11.218 (0.003)	0.335 (0.248)	10.368 (0.001)	5.58%
1986	0.609 (0.245)	0.016 (0.000)	0.187 (0.059)	11.541 (0.001)	1.03%		1999	2.65*** (6.724)	12.279 (0.003)	0.464 (0.482)	11.483 (0.001)	6.37%
1987	1.656 (2.326)	11.41 (0.003)	-0.54 (0.345)	-0.013 (0.000)	2.99%		2000	2.454** (5.715)	12.319 (0.003)	0.257 (0.14)	10.151 (0.001)	4.81%
1988	0.897 (0.599)	11.785 (0.003)	0.106 (0.019)	12.144 (0.001)	1.38%		2001	2.469** (5.835)	11.755 (0.003)	0.53 (0.651)	11.291 (0.001)	5.17%
1989	0.936 (0.651)	12.15 (0.003)	0.545 (0.58)	11.453 (0.001)	1.40%		2002	2.09** (4.131)	10.657 (0.002)	-0.264 (0.137)	11.361 (0.001)	3.72%
1990	1.633 (2.262)	11.465 (0.003)	0.368 (0.248)	12.136 (0.001)	2.83%		2003	2.147** (4.363)	10.014 (0.002)	-0.259 (0.133)	10.315 (0.001)	4.05%
1991	1.455 (1.746)	10.76 (0.002)	-0.548 (0.355)	11.435 (0.001)	2.45%		2004	1.823* (3.056)	10.894 (0.002)	0.151 (0.047)	11.491 (0.001)	2.69%
1992	0.487 (0.157)	10.727 (0.002)	-1.302 (1.258)	-0.125 (0.000)	0.95%		2005	2.115** (4.167)	10.959 (0.003)	0.244 (0.124)	-0.12 (0.000)	3.66%
1993	0.838 (0.522)	11.366 (0.003)	-0.675 (0.536)	-0.134 (0.000)	1.30%		2006	1.699 (2.618)	10.958 (0.003)	0.321 (0.218)	11.038 (0.001)	2.39%
1994	1.391	11.708	-0.382	11.778	2.21%		2007	2.016* (4.167)	11.717 (0.003)	0.082 (0.218)	10.43 (0.001)	3.10%

	(1.639)	(0.003)	(0.214)	(0.001)			(3.737)	(0.003)	(0.013)	(0.001)	
1995	1.952*	11.217	0.184	11.641	3.86%	2008	1.987*	12.327	-0.59	10.44	2.95%
	(3.469)	(0.003)	(0.065)	(0.001)			(3.606)	(0.003)	(0.546)	(0.001)	
1996	1.91*	11.1	0.315	10.709	3.69%	2009	1.404	11.746	-0.345	10.532	1.69%
	(3.357)	(0.003)	(0.206)	(0.001)			(1.716)	(0.003)	(0.205)	(0.001)	
1997	2.129**	0.458	0.463	-0.145	4.52%	2010	1.802*	11.535	0.069	-0.24	2.43%
	(4.276)	(0.000)	(0.482)	(0.000)			(2.905)	(0.003)	(0.009)	(0.000)	

Table7 Robustness test: What makes the firm to be a takeover target in the whole 7300 industry

Dependent variable is defined as the probability of each of the following five events occurring during any given year t: (1) the firm attracts bidders that come from the some industry and successful complete the takeover, (2) the firm attracts bidders that come from the some industry but fail at last, (3) the firm attracts bidders that are from non-horizontal industry and success, (4) the firm attracts bidders that are from non-horizontal industry and fail at last or (5) the firm attracts no bidder. Instown is the institutional ownership in each firm, using the last December 31th data before the year t, reported on Thomson Financial CDA/Spectrum Institutional (13f) Holdings database during the year previous to t. RELROA (RELROE) refers to ROA (ROE) for each specific firm divided by industry average ROA (ROE) during the year previous to t, respectively. Log (size) is the logarithm of market capitalization. Log (market share) represents the sales divided by the industry total sales during the year previous to t. Growth opportunity is calculated as the research & development expenses divided by the sales during the year previous to year t. Leverage is data during the year previous to year t. The year t indicates the year the firms is observed to be acquired or not to be acquired. Time dummies are omitted and will be displayed in following table. LR denotes to likelihood ratio for the total logistic model. *Significant at 10%. **Significant at 5%; ***Significant at 1%; Wald Chi-Square value are shown in parentheses.

	(1)				(2)			
	Horizontal		Non-horizontal		Horizontal		Non-horizontal	
	Success	Unsuccess	Success	Unsuccess	Success	Unsuccess	Success	Unsuccess
Intercept	-2.746*	-8.87	-0.402	-18.038	-2.724*	-9.226	-0.567	-18.054
	(2.953)	(0.002)	(0.041)	(0.003)	(2.924)	(0.002)	(0.082)	(0.003)
Instown	1.17***	0.331	1.137***	1.107	1.169***	0.322	1.145***	1.107
	(24.591)	(0.471)	(11.873)	(2.129)	(24.578)	(0.443)	(11.995)	(2.131)
IA/AT	-1.681***	-0.675	-0.513	-1.283	-1.685***	-0.642	-0.487	-1.267
	(21.001)	(0.89)	(1.189)	(1.091)	(21.193)	(0.804)	(1.075)	(1.067)
RELROA	-0.009	0.14	0.055	0.026				
	(0.028)	(1.444)	(0.844)	(0.08)				
RELROE					0.000	0.000	0.000	-0.001
					(0.026)	(0.000)	(0.010)	(0.873)
Log (size)	-0.167***	-0.221*	-0.18**	0.032	-0.167***	-0.216*	-0.178**	0.033
	(10.593)	(3.519)	(5.349)	(0.033)	(10.648)	(3.329)	(5.205)	(0.034)
Log(Market share)	-0.067	0.327**	0.07	-0.063	-0.065	0.301**	0.056	-0.064
	(1.653)	(6.358)	(0.797)	(0.126)	(1.637)	(5.522)	(0.534)	(0.135)
Growth rate	-0.009	-0.03	0.000	-0.004	-0.009	-0.025	0.000	-0.004
	(0.414)	(0.053)	(0.01)	(0.007)	(0.415)	(0.049)	(0.007)	(0.007)
Leverage	-0.275*	-1.177**	-0.16	-0.006	-0.282**	-1.034**	-0.103	-0.001
	(3.621)	(4.699)	(0.786)	(0.011)	(4.096)	(3.885)	(0.44)	(0.001)
Time dummies	-	-	-	-	-	-	-	-
Number of obs	377	75	176	32	377	75	176	32
LR			261***				260***	

Table8 Hausman test of IIA

Ho: Outcome j and outcome k are independent of other alternatives. Column (1), (2) and (3) are derived when ROA, ROE and market-to-book ratio as independent variable, respectively. Category 1 refers to the horizontal successful takeovers, while category 2 is non-horizontal successful takeovers. Category 3 represents horizontal unsuccessful takeovers and Category 4 is non-horizontal unsuccessful takeovers. The last category refers to firms don't receive any takeover bid in the given year. The "a" stands for Significance at 1%.

(1)			(2)			(3)		
Categories	Chi-square	Conclude	Categories	Chi-square	Conclude	Categories	Chi-square	Conclude
1	(0.00) ^a	Ho	1	(0.00) ^a	Ho	1	(0.00) ^a	Ho
2	(0.00) ^a	Ho	2	(0.00) ^a	Ho	2	(0.00) ^a	Ho
3	(0.00) ^a	Ho	3	(0.00) ^a	Ho	3	(0.00) ^a	Ho
4	(0.00) ^a	Ho	4	(0.00) ^a	Ho	4	(0.00) ^a	Ho
5	(0.00) ^a	Ho	5	(0.00) ^a	Ho	5	(0.00) ^a	Ho

of horizontal successful takeovers' appearance, significant relation at the 5% and the 10% level can be observed as well.

1.4 Robustness test

In table 7, the multinomial logit regression model similar as section 1.3 is employed and the relative ROA and relative ROE are used as alternative proxies for firm's performance. They are calculated as the ROA (ROE) for each firm divided by the industry average ROA (ROE) in corresponding year. The results for this test are the same as the results obtained in the former regression model, in which ROA and ROE are used.

The multinomial logit model makes the assumption as independence of irrelevant alternatives (IIA). Under this assumption, each outcome of the dependent variable is irrelevant to each other, which means that adding or deleting any one category won't affect the probability of the remaining ones. This assumption is usually explained by the example of making choice between blue and red bus and the car (see McFadden (1974) and Hensher (1986, 1991)). The Hausman test proposed by Hausman and

McFadden (1984) will be employed to test whether IIA holds.³

The null hypothesis for this test is that dependent variable's outcome J and outcome k are independent of other alternatives. In the table 8, the testing results are shown. The column (1), (2) and (3) represents the situations when the ROA, ROE and market-to-book ratio are the independent variable respectively. We can observed that none of the tests reject the Ho that IIA holds, and all of the tests get a Chi-square value of zero. Hausman and McFadden (1984) note that small Chi-square value proves that IIA has not been violated. Thus, we can conclude that the dependent variable of multinomial logit model in this paper follows the IIA and each outcome is independent and irrelevant.

2. Cross-ownership and takeover success

2.1 Logistic regression procedure

Based on 660 takeovers sample, this section examines the impact of cross-ownership on takeover success. All the acquisitions are divided into two categories, successful and unsuccessful. Utilizing the probability of takeover success or failure as the dependent variable, a binary logistic regression will model the relation between cross-holders' shareholdings in acquirers and targets and this dependent variable. The observations of unsuccessful takeovers is designed to be the reference category.

2.2 Variables design and statistics

Table9 shows the statistics of each characteristic.

With the cross-ownership in bidding firms and target firms as the major variable, the other independent variables are designed as follows. The takeover data is derived from Securities Data Corporation (SDC) Mergers & Acquisitions database. The institutional share data is from Thomson Financial SDC Platinum (SDC) merger database and the other fundamental data is from COMPUSTAT database.

³ Following Long and Freese (2006), the Hausman value is calculated as

$$H = (\widehat{\beta}_R - \widehat{\beta}_F)' [\widehat{\text{Var}}(\widehat{\beta}_R) - \widehat{\text{Var}}(\widehat{\beta}_F)]^{-1} (\widehat{\beta}_R - \widehat{\beta}_F)$$

Where $\widehat{\beta}_F$ is the estimator when estimating the full model with all J outcomes included. $\widehat{\beta}_R$ is the estimator when the model is estimated restrictively. $\widehat{\beta}_F^*$ is a subset of $\widehat{\beta}_R$ after eliminating coefficients not estimated in the restricted model.

Table 9 Summary statistics of observations

The sample contains 660 takeovers from 1985-2010. Cross-holders' shares in acquirers refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in acquiring firms. Cross-holders' shares in acquirers refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in target firms. Institutions' shares in acquirers (targets) is defined as shares held by institutional investors in acquirers (targets). Cross-holders' shares in acquirers refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in acquiring firms. Relative size is computed as market value of target firms divided by market value of acquiring firms. MB is defined as 3 years average market-to-book ratio before takeover. Log (market share) represents the sales divided by the industry total sales. Growth rate is calculated as the research & development expenses divided by the sales.

	Number of observations	Percent of sample (%)	Total sample
Successful takeover	553	83.788	660
Unsuccessful takeover	107	16.212	660
	Mean	Median	Std. Dev
Cross-holders' shares in acquirers	0.149	0.104	0.152
Cross-holders' shares in targets	0.136	0.038	0.195
Institutions' shares in acquirers	0.493	0.527	0.295
Institutions' shares in targets	0.367	0.324	0.273
Intangible asset proportion	0.130	0.046	0.173
Relative size	0.278	0.089	0.698
MB	9.141	2.376	39.264
Log (market share)	-8.873	-9.064	1.519
Growth rate	0.470	0.149	4.453
Leverage	0.441	0.352	0.447

Cross-holders refer to the institutional investors who have holdings in both acquirers and targets. This section seeks to identify the respective effects of cross-holders' shares in acquirers and targets before takeover. Based on the conclusion from earlier studies, we can predict that there is a positive relationship between cross-ownership in targets and probability of takeover success, but this relation may be largely affected by pre-takeover trading for toeholds. On average, 14.9% and 13.6% shares in bidders and targets are held by the same institutional stockholders, median value of 10.4% and 3.8%. The data distribution is skewed and has a low level of standard deviation.

By the way, the institutional share stake in firms is also added as another main variables for testing. From the previous literature we see that as institutions focus on removing value-reducing resistance, they will, to some extent, raise the chance of takeover success. In acquiring firms, an average 49.3% of shares are held by institutions, while 36.7% in targets' shares. This data is uniformly distributed.

Size effect is a classical variable when researching takeover topics. In this section, relative size, defined as the ratio of targets' market value to bidders' market value, is used. Targets' market cap is, on average, 27.8% of acquirers'. The median pair in all the 660 takeovers has the target accounting for 8.9% of bidders' market value.

Market-to-book ratio here is a proxy for firms' performance. The badly performing firm and management are more likely to be driven out by the market. Thus the firms with a low market-to-book ratio before takeover are more likely to accept the takeover bid and a negative correlation is expected to be observed between MB ratio and the likelihood of takeover success. The target firms' market value are, on average, 9.141 times of their book value.

For the firms in 7300 industry, intangible assets proportion in total assets and the research & development expenses to sales (defined as growth rate) are still strategic. For all the 660 target firms, a mean of 13% of their total assets consist of intangible assets. And the growth rate has an average value of 47%.

Market share will largely affect the success of horizontal takeovers when antitrust laws are powerful. Leverage is also a critical factor in horizontal mergers in 7300 industry, but may not be a vital variable for vertical or conglomerate mergers.

2.3 Empirical results

Table10 displays the regression results for the estimation procedure.

The cross-ownership in target firms before takeover shows a negative and significant relation with takeover success, at the 1% level, while the cross-holding in acquiring firms has no significant impact on the takeover results. This result is similar to the idea of Bris (2001), that some pre-bid trades occur and increase the target firms'

Table 10 The impact of institutional cross-holders' ownership on probability of takeover success

The sample contains 660 takeovers from 1985-2010. Dependent variable is defined as 1 if takeover completes and a value of 0 if fails. Cross-holders' shares in acquirers refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in acquiring firms. Cross-holders' shares in targets refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in target firms. Institutions' shares in acquirers (targets) is defined as shares held by institutional investors in acquirers (targets). Relative size is computed as market value of target firms divided by market value of acquiring firms. MB is defined as 3 years average market-to-book ratio before takeover. Log (market share) represents the sales divided by the industry total sales. Growth rate is calculated as the research & development expenses divided by the sales. LR denotes to likelihood ratio for the total logistic model. *Significant at 10%; **Significant at 5%; ***Significant at 1%. Wald Chi-Square value are shown in parentheses.

N=660	(1)	(2)	(3)	(4)
Intercept	-1.566*	0.044	-1.894***	-1.896**
	(3.518)	(0.003)	(6.798)	(4.838)
Cross-holders' shares in acquirers	0.928			
	(1.267)			
Cross-holders' shares in targets		-1.473***		
		(7.652)		
Institutions' shares in acquirers			1.159***	
			(8.363)	
Institutions' shares in targets				0.78
				(2.675)
IA/AT	-0.364	-0.053	-0.566	-0.362
	(0.337)	(0.007)	(0.809)	(0.342)
Relative size	-0.011	-0.012*	-0.009	-0.011
	(2.665)	(2.871)	(1.795)	(2.626)
MB	-0.005**	-0.005**	-0.004**	-0.005**
	(5.16)	(4.607)	(3.959)	(4.776)
Log (Market share)	-0.366	-0.224***	-0.36	-0.385
	(17.758)	(7.562)	(22.673)	(20.199)
Growth rate	0.014	0.025	0.014	0.012
	(0.031)	(0.067)	(0.024)	(0.027)
Leverage	0.034	-0.083	0.015	0.068
	(0.016)	(0.11)	(0.003)	(0.06)
LR	26***	32***	33***	28***

stock price which makes the control bidder give up, or that acquirers already get the shares they want at a lower price by pre-takeover inside trading and do not need the takeover to complete any longer.

The results also show that greater institutional ownership in the acquiring firms will increase the likelihood of the merger completion. That can be attributed to Hart's (1995) idea that institutions put a representative in management, who will serve for institutional investors, negotiate better with targets' shareholders and adopt the suggestions from institutions at discovering good target firms. Shleifer and Vishny (1986) show that due to the large size of their stock investment, institutions have greater incentives to monitor the management. Hence, the managers are more likely to adopt beneficial decisions and complete these decisions when institutional ownership are greater in acquirers.

The 3-year average market-to-book ratio can have an important contribution to chance of takeover success. It has a significant negative relationship with the probability of takeover completion. As former study states, takeover is the effective way to drive out badly performing firms, stated by Jensen (1986), firms with lower market-to-book ratio are more likely to become targets. The market will drive out bad firms so that this kind of acquisitions obtains higher possibility to success. Furthermore, the shareholders in these firms may lose confidence about the firms' profitability and the management, and are more willing to sell their shares.

When considering only column (2), we see that relative size and market share are inversely correlated with the likelihood of takeover success, at the level of significance 10% and 5%, respectively. In a previous study, Branch, Wang and Yang (2008) find that transaction size has a significant negative impact on the likelihood of takeover success. Similarly, we find relative size (market value of target firms relatively to market value of acquiring firms) has a negative impact on the chance of takeover success. Smaller targets may find it more difficult to effectively defend against takeovers and are more easily acquired. Similarly, more resistance may occur when attempting to acquire firms with a large market share because of antitrust laws and the more powerful defenses. Accordingly, if bidders want to increase the likelihood of takeover success, relative size and the targets' market share can be taken into account.

3. Cross-ownership and offer price

3.1 Variables and regression procedure description

To identify the explanatory factors to influencing the takeover offer price, this section employs the ratio of offer price per share to market value per share as the dependent variable, and use the institutional cross-holding in targets and acquirers as the major explanatory. Based on the previous research conclusion, (see Bulow, Huang and Klemperer (1999), Betton and Eckbo (2000), and Bris (2001)) a higher toehold can lead to lower pay off, we could anticipate that cross-owners' higher holdings in target firms will lower the offer price. The institutional shares data is from Thomson Financial SDC Platinum (SDC) merger database and the other fundamental data is from COMPUSTAT database. The presence of takeover defenses, multiple bidders and the industry classification data are derived from Securities Data Corporation (SDC) Mergers & Acquisitions database. Table 11 presents the summary statistics for the variables.

Pre-takeover 3-year average market-to-book ratio and net operating assets (NOA) change are employed as proxies for pre-bid performance. Net operating assets only include the information of firms' operating activities. It is computed by reformatting the balance sheet so that operating activities are separated from financing activities. Based on NOA, we can only focus on operating performance of the business, excluding financing performance, since the financing activities are considered not to create value for the firms in Business Service Industry. Utilizing NOA helps us get a more accurate valuation of the company performance. NOA is computed as

$$NOA_t = (\text{total assets} - \text{cash} - \text{short-term cash investment}) - (\text{total liability} - \text{total debt})$$

Since the net operating assets may vary a lot along with firm size, we use the accrual ratio to measure the level of net operating assets change between two calendar years.

Accrual ratio is calculated as

$$\text{Accrual ratio} = \frac{(NOA_t - NOA_{t-1})}{(NOA_t + NOA_{t-1})/2}$$

Where $(NOA_t - NOA_{t-1})$ is defined as aggregate accruals, referring to the current

Table 11 Summary statistics, indicator variables, and number of observations

Offer price/market price stands for the ratio of bidders' offer price per share to targets' market share price at day (-6). Cross-holders' shares in acquirers refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in acquiring firms. Cross-holders' shares in targets refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in target firms. Institutions' shares in acquirers (targets) is defined as shares held by institutional investors in acquirers (targets). MB is defined as 3 years average market-to-book ratio before takeover. Accrual ratio is defined as the indicator of firms' earning quality one year before takeover. Relative size is computed as market value of target firms divided by market value of acquiring firms. Defense is the indicator whether the target firms make takeover defense to reflect to takeover bids. Multiple bidder is an indicator and gets a value of 1 when more than one bidder exist, otherwise 0. Horizontal takeover is a binary variable with a value of 1 when bidders and targets are both from 7300 industry, otherwise 0.

	Mean	Median	Std. Dev	Indicator=1	Percent of sample (%)	Total sample
Dependent variable						
Offer price/market price	1.429	1.364	0.424			
Independent variable						
Cross-holders' share in acquirers	0.160	0.124	0.144			
Cross-holders' share in targets	0.139	0.055	0.186			
Institutions' shares in acquirers	0.527	0.552	0.274			
Institutions' shares in targets	0.399	0.358	0.259			
MB	3.683	2.354	4.916			
Accrual ratio	0.243	0.214	1.858			
Relative size	1.099	1.099	12.874			
Defense				91	17.268	527
Multiple bidder				26	4.934	527
Horizontal takeover				376	71.347	527

period's change in non-cash balance sheet items, excluding the cash and debt. Since the aggregate accruals are the "discretionary" component of earnings apart from cash earnings, they are more likely to indicate management manipulation on earnings. When aggregate accruals is divided by $(NOA_t + NOA_{t-1})/2$, we can remove the size effect and obtain the accrual ratio. As the increase of accrual ratio means the number of "discretionary" factors and level of manipulation grow, a higher accrual ratio indicates a lower quality of earnings and poorer performance.

Whether a takeover defense is made by the target can also be an indicator of a hostile or friendly takeover. The one motive for anti-takeover measures is to drive up the offer price and it really works. Ruback (1987) finds defenses attract more bidders and slightly increases the offer price. From table 11, we can see in our sample, 17.27% of target firms adopt takeover defenses.

The presence of multiple bidders will reasonably lead to a higher bidding price due to the “winner’s curse”. Ravid and Spiegel (1997) also proposed that the toehold will only be observed when multiple bidders appear. Bradley, Desai and Kim (1986) report substantially greater gains for targets when multiple bidders exist. From table 11, we can see 4.93% bids have multiple bidders in our sample.

The horizontal indicator is added as well, with the goal to find out industry effect on the offer price. It has a value of 1 when acquirers are from 7300 industry, 0 otherwise. In our sample, 71.35% acquirers are from the SIC 7300 industry.

3.2 Empirical results

Table 12 shows the regression results for the offer price. The cross-holders’ share in both acquirers and targets are negatively related to the dependent variable, the ratio of offer price to market price. This relation is similar with findings of Bulow, Huang and Klemperer (1999) and Betton and Eckbo (2000). Since the institutional investors hold shares in the two firms before bid, they tend to limit the offer price to a rational level and remove value-reducing resistance, according to Jarrell and Poulsen (1987). The results show that when the cross-holdings increase by 1% share in acquirers (targets), the ratio of offer price to market price can decrease by 0.0034 (0.00212), other factors controlled.

Similarly, the target firms with lower institutional shares need larger consideration to complete the acquisition. According to Hart (1995), institutions owning large stakes will put a representative in the investee’s management, a manager serving the interests of the institutions and making investee management less likely to extract value from the takeover, which lower the offer price.

Table12 The effect of cross-ownership on offer price level

Offer price/market price is the ratio of bidders' offer price per share to targets' market share price at day (-6). Cross-holders' shares in acquirers refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in acquiring firms. Cross-holders' shares in targets refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in target firms. Institutions' shares in acquirers (targets) is defined as shares held by institutional investors in acquirers (targets). MB is defined as 3 years average market-to-book ratio before takeover. Accrual ratio is defined as the indicator of firms' earning quality one year before takeover. Relative size is computed as market value of target firms divided by market value of acquiring firms. Defense is the indicator whether the target firms make takeover defense to reflect to takeover bids. Multiple bidder is an indicator and has a value of 1 when more than one bidder appear meantime, otherwise 0. Horizontal takeover is a binary variable with a value of 1 when bidders and targets are both from 7300 industry, otherwise 0. *Significant at 10%; **Significant at 5%; ***Significant at 1%. T statistics are shown in parentheses.

N = 527	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	1.488*** (54.264)	1.477*** (33.647)	1.458*** (63.491)	1.45*** (35.649)	1.482*** (36.754)	1.52*** (27.304)	1.505*** (44.627)	1.497*** (31.053)
Cross-holders' share in acquirers	-0.363*** (-2.853)	-0.34*** (-2.624)						
Cross-holders' share in targets			-0.21** (-2.121)	-0.212** (-2.119)				
Institutions' shares in acquirers					-0.102 (-1.498)	-0.131* (-1.875)		
Institutions' shares in targets							-0.191*** (-2.69)	-0.191*** (-2.665)
MB		-0.003 (-0.73)		-0.002 (-0.617)		-0.004 (-1.089)		-0.003 (-0.813)
Accrual ratio		0.007		0.007		0.008		0.008

	(0.678)	(0.688)	(0.808)	(0.795)
Relative size	-0.025	-0.023	-0.218***	-0.02
	(-0.973)	(-0.921)	(-4.166)	(-0.788)
Defense	0.113**	0.124**	0.119**	0.121**
	(2.257)	(2.466)	(2.395)	(2.419)
Multiple bidder	0.088	0.089	0.14	0.103
	(1.037)	(1.045)	(1.638)	(1.217)
Horizontal	-0.003	-0.008	0.01	-0.006
	(-0.081)	(-0.194)	(0.249)	(-0.154)

It is not surprising to observe that the presence of anti-takeover measures drives up the offer price. This result is already shown in former studies (see Ruback (1987)). One motive of defenses is to obtain higher takeover considerations. The appearance of any kind of takeover resistance is associated with a 12% increase in the ratio of offer price to market price.

We can find that the appearance of more than one bidder does not have any significant influence on offer price. While many bids increase the competitiveness, the pre-bid trading hidden by market liquidity may have greater impact. To guarantee the success of final acquisition, bidders could buy some trivial shares of targets in public market, which does have some influence on the final pay off, but not determinate. The exact shares bought and how the market treats the trading will decide the final effect.

4. Event study and takeover cumulative abnormal returns

4.1 Data and model descriptions

To obtain the cumulative abnormal returns, an event study is conducted. The return data is obtained from the Center for Research in Security Prices (CRSP) database. The estimated window is set as (-275, -20) and only trading-day data is used. Then six event windows are employed: (0), (-5, +1), (-1, +1), (-5, +5), (-5, +20) and (-20, +20). If the firms bid for several targets in a very short term (240 workdays), only the first bid is retained while the later ones are dropped to reduce contamination.

To derive the cumulative abnormal returns of bidders and targets in the six event windows, three different estimated methods are employed to obtain abnormal returns: market model, Carhart four-factor model and raw returns. The CRSP equally-weighted market return in given day t is employed as market return.

Market model is

$$A_{i,t} = R_{i,t} - \hat{\alpha}_i - \hat{\beta}_i R_{m,t}$$

where $A_{i,t}$ stands for the excess return of firm i at day t ; $R_{i,t}$ represents the observed return of firms i at day t ; $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the estimated coefficients from the regression

Table13 Cumulative abnormal returns of acquirers and targets for different event window (full sample)

The sample in Panel A contains bidding firms in mergers and acquisitions of public U.S. companies between 1985 and 2010. The sample in Panel B contains target firms in mergers and acquisitions of public U.S. firms. Three methods are employed to calculate cumulative abnormal returns over six event windows, market model, Carhart four-factor model and raw returns. Market equally-weighted returns are used as market returns. Data are from CRSP stock price database. *Significant at 10%; **Significant at 5%; ***Significant at 1%. Z score are shown in parentheses.

	Event window					
	(0,0)	(-5,+1)	(-1,+1)	(-5,+5)	(-5,+20)	(-20,+20)
Panel A. Acquiring firms' CAR (full sample)						
Market- model (N=609)						
Mean	-0.019***	-0.021***	-0.027***	-0.028***	-0.042***	-0.051***
Median	-0.009	-0.015	-0.018	-0.023	-0.028	-0.029
Z score	-12.822	-6.602	-11.553	-5.627	-4.679	-4.536
Carhart four-factor model (N=613)						
Mean	-0.019***	-0.021***	-0.027***	-0.027***	-0.042***	-0.052***
Median	-0.009	-0.016	-0.017	-0.017	-0.02	-0.03
Z score	-4.684	-4.229	-6.022	-3.822	-4.392	-3.938
Raw return (N=597)						
Mean	-0.019***	-0.015***	-0.024***	-0.015***	-0.006	0.013
Median	-0.01	-0.007	-0.016	-0.008	0.01	0.024
Z score	-11.411	-4.402	-9.630	-2.694	0.072	2.135
Panel B. Target firms' CAR (full sample)						
Market- model (N=613)						
Mean	0.172***	0.274***	0.243***	0.274***	0.278***	0.323***
Median	0.095	0.238	0.203	0.243	0.246	0.3
Z score	36.675	19.729	29.545	15.223	9.248	9.022
Carhart four-factor model (N=613)						
Mean	0.173***	0.276***	0.245***	0.277**	0.287***	0.336***
Median	0.097	0.234	0.206	0.248	0.252	0.304
Z score	5.632	6.865	7.482	2.342	5.837	5.632
Raw return (N=598)						
Mean	0.172***	0.276***	0.243***	0.278***	0.291***	0.353***
Median	0.095	0.241	0.203	0.243	0.258	0.325
Z score	33.060	18.697	27.019	14.498	9.703	10.794

model; $R_{m,t}$ is the CRSP market equally-weighted return at day t.

Carhart four-factor model is

$$R_{i,t} - R_{f,t} = \hat{\alpha}_i + \hat{\beta}_{i,1} (R_{m,t} - R_{f,t}) + \hat{\beta}_{i,2} \text{SMBt} + \hat{\beta}_{i,3} \text{HMLt} + \hat{\beta}_{i,4} \text{UMDt}$$

where $R_{i,t}$ represents the observed return of firms i; $R_{f,t}$ is the risk-free rate, $R_{m,t}$ is the CRSP market equally-weighted return; SMBt is the difference between the return on the portfolio of “small” stocks and “big” Stocks; HMLt is the difference between the return on the portfolio of “high” and “low” book-to-market stocks; UMDt is the difference between the return on the portfolio of past one-year “winners” and “losers,”; $\hat{\alpha}_i$ stands for the excess return of firm i. $\hat{\beta}_{i,1}$, $\hat{\beta}_{i,2}$, $\hat{\beta}_{i,3}$ and $\hat{\beta}_{i,4}$ are the estimated coefficients from regression model.

4.2 Cumulative abnormal returns

Table 13 shows the statistics for cumulative abnormal returns for bidding firms and target firms in six event windows, and z scores⁴ for testing the significance of abnormal returns are shown in parentheses. The results give average and median cumulative abnormal returns of acquirers and targets in six event windows. Two subsamples in table14 and table15 are listed below and show the CARs when takeover bids complete or fail.

Previous studies have shown that takeovers are generally beneficial for targets but value-reducing for acquiring firms. The results of this analysis are consistent with the extant literature.

For the total sample, the abnormal returns at the event day are significant negative for bidding firms at -1.9%, for all three models. On the event day for targets, we see significant positive returns, at 1.72% from market model and raw return and at 1.73% from Carhart four-factor model. Accounting for other event windows, the results have

⁴ The method to construct standardized test statistics are employed for Patell Z score for CAR. According to Patell (1976) and Mitchell and Lehn (1990), the test statistics for the CAR is $(1/\sqrt{T}) \sum_{t=1}^T Z_t$, where T is the length of event window and Z_t stands for the test statistics for AR. Z_t is computed as $Z_t = (1/\sqrt{N}) \sum_{i=1}^N sar_{it}$ and Standardized AR is computed as $sar_{it} = ar_{it}/\sigma_{ar}$. σ_{ar} is the standard deviation of abnormal returns and is calculated as $\sigma_{ar} = \left\{ \sigma^2 \left[1 + \frac{1}{L} + \frac{(R_{mt} - \bar{R}_m)^2}{CSSR_m} \right] \right\}^{1/2}$, where σ^2 stands for the estimated residual variance for the estimation period, L is the number of observations in the estimation period, \bar{R}_m is the estimation period mean of the market return, and $CSSR_m$ is the corrected sum of squares of the market return during the event window.

the same direction for acquirers' and targets' gains. Therefore, a conclusion can be reached that in 7300 industry from 1985 to 2010, the firms receiving takeover bids achieve positive gains around the announcement, from minus 20 days to 20 days after the event day. Firms who make the takeover offers will lose during the bid announcement period.

However, when the total sample is divided into two subsamples, the results may be different. When only considering the subsample of successful takeovers, with the event day -1.9% returns, the event windows (-5, +1), (-1, +1) and (-5, +5) lose a bit more at -2.3% , -2.9% and 2.7% from market model, compared to -2.1%, -2.7% and 2.8% loss of full sample. For the event window (-5, +20) and (-20, +20), the firms in successful subsample lose less than the total sample's firms. For the targets firms who finally accepted the takeover offer, they do much better than the full-sample targets. At the event day, in the successful subsample, target firms earn 18.8% positive return on average by the three models, while in full sample, targets earn 17.2%. During (-5, +5), more than 29% returns are obtained by completed takeover targets, while targets in full sample obtain 27.4%, 27.7% and 27.8% returns calculated by market model, Carhart four-factor model and raw return, respectively.

When considering the bidding firms in the unsuccessful subsample, only the negative abnormal returns calculated by market model and raw return at the event day are significant, -1.9% and -1.8%, respectively, exactly the same as in full sample. For the other event windows (-5, +1) and (-1, +1), the subsample loss are reduced or even insignificant, while in the (-5, +5), (-5, +20) and (-20, +20) windows, the subsample of unsuccessful bidders suffer heavier loss than firms in the full sample. In contrast, the target firms in unsuccessful bids, obtain significant gains during all the event windows, but all the gains are slightly lower than the full-sample targets, 9.2% at the event day, 19.6% over (-5, +1), 15.8% over (-1, +1), 19.0% over (-5, +5), 17.7% over (-5, +20) and 19.8% over the longest window (-20, +20).

Based on these results, a conclusion may be drawn that for the takeovers in 7300

Table 14 Cumulative abnormal returns of acquirers and targets for different event window (successful takeovers)

The sample in Panel A contains bidding firms in mergers and acquisitions of public U.S. companies between 1985 and 2010. The sample in Panel B contains target firms in mergers and acquisitions of public U.S. firms. Three methods are employed to calculate cumulative abnormal returns over six event windows, market model, Carhart four-factor model and raw returns. Market equally-weighted returns are used as market returns. Data are from CRSP stock price database. *Significant at 10%; **Significant at 5%; ***Significant at 1%. Z score are shown in parentheses.

	Event window					
	(0,0)	(-5,+1)	(-1,+1)	(-5,+5)	(-5,+20)	(-20,+20)
Panel A. Acquiring firms' CAR (successful takeovers)						
Market- model (N=510)						
Mean	-0.019***	-0.023***	-0.029***	-0.027***	-0.039***	-0.049***
Median	-0.01	-0.018	-0.021	-0.022	-0.025	-0.028
Z score	-12.014	-6.537	-11.545	-5.327	-3.927	-3.971
Carhart four-factor model (N=514)						
Mean	-0.019***	-0.023***	-0.029***	-0.026***	-0.039***	-0.049***
Median	-0.009	-0.018	-0.019	-0.017	-0.02	-0.028
Z score	-4.116	-4.153	-5.752	-3.088	-3.532	-3.836
Raw return (N=503)						
Mean	-0.019***	-0.016***	-0.026***	-0.014**	0.001	0.021**
Median	-0.011	-0.008	-0.017	-0.007	0.014	0.027
Z score	-10.675	-4.418	-9.566	-2.509	0.710	2.451
Panel B. Target firms' CAR (successful takeovers)						
Market- model (N=515)						
Mean	0.188***	0.289***	0.259***	0.290***	0.297***	0.347***
Median	0.107	0.248	0.212	0.253	0.261	0.323
Z score	98.69	58.433	80.826	46.717	31.342	28.901
Carhart four-factor model (N=515)						
Mean	0.188***	0.291***	0.259***	0.296***	0.317***	0.385***
Median	0.112	0.253	0.214	0.255	0.281	0.346
Z score	14.57	18.108	18.108	17.128	16.238	15.882
Raw return (N=506)						
Mean	0.188***	0.289***	0.259***	0.292***	0.306***	0.360***
Median	0.11	0.244	0.209	0.254	0.27	0.326
Z score	93.277	55.77	76.706	45.069	31.179	29.728

Table 15 Cumulative abnormal returns of acquirers and targets for different event window (unsuccessful takeovers)

The sample in Panel A contains bidding firms in mergers and acquisitions of public U.S. companies between 1985 and 2010. The sample in Panel B contains target firms in mergers and acquisitions of public U.S. firms. Three methods are employed to calculate cumulative abnormal returns over six event windows, market model, Carhart four-factor model and raw returns. Market equally-weighted returns are used as market returns. Data are from CRSP stock price database. *Significant at 10%; **Significant at 5%; ***Significant at 1%. Z score are shown in parentheses.

	Event window					
	(0,0)	(-5,+1)	(-1,+1)	(-5,+5)	(-5,+20)	(-20,+20)
Panel A. Acquiring firms' CAR (unsuccessful takeovers)						
Market- model (N=99)						
Mean	-0.019***	-0.014*	-0.016**	-0.029**	-0.06***	-0.058**
Median	-0.005	-0.007	-0.005	-0.026	-0.039	-0.033
Z score	-4.659	-1.695	-2.398	-2.008	-3.055	-2.360
Carhart four-factor model (N=99)						
Mean	-0.018	-0.014	-0.017	-0.029**	-0.062***	-0.064***
Median	-0.005	-0.008	-0.006	-0.019	-0.028	-0.039
Z score	-1.576	-0.537	-0.745	-1.992	-2.615	-2.823
Raw return (N=94)						
Mean	-0.018***	-0.009	-0.014**	-0.019	-0.042*	-0.024
Median	-0.008	0.008	-0.004	-0.009	-0.025	-0.003
Z score	-4.198	-1.043	-2.138	-1.14	-1.797	-0.373
Panel B. Target firms' CAR (unsuccessful takeovers)						
Market- model (N=98)						
Mean	0.092***	0.196***	0.158***	0.190***	0.177***	0.198***
Median	0.042	0.148	0.089	0.158	0.126	0.148
Z score	20.622	16.537	21.706	13.032	7.864	7.135
Carhart four-factor model (N=98)						
Mean	0.093***	0.193***	0.157***	0.184***	0.156***	0.188***
Median	0.053	0.147	0.101	0.159	0.133	0.152
Z score	5.469	6.729	6.309	6.519	4.419	2.739
Raw return (N=92)						
Mean	0.095***	0.206***	0.166***	0.197***	0.184***	0.203***
Median	0.054	0.14	0.107	0.19	0.147	0.148
Z score	18.947	15.38	20.247	11.981	6.897	6.695

industry from 1985 to 2010, the acquiring firms will get a significant negative cumulative abnormal return while the target firms will achieve significant positive CARs during the event window (-20, +20) no matter which models are used to do the event study. However when the full sample is divided into two subsamples, successful bids and incomplete ones, we can find that target firms achieve more (better than the total sample) in successful takeovers and less (not as good as the full sample) in unsuccessful ones on average. The bidders lose a similar amount at the event day regardless of sample.

4.3 Returns to institutional investors and cross-holders

Table 16 gives the information of three different returns of shareholders in full sample. Column (1) is the cumulative abnormal returns of acquiring firms during the event window (-5, +5). It's calculated as

$$CAR_A = \sum_t AR_t$$

Column (2) is return to institutional holders that is computed as the total dollar return to institutional shareholders in acquirers and targets divided by the total value they hold in acquirers and targets. It's calculated as

Return to institutional holders =

$$\frac{CAR_A \times Market\ cap_A \times Institutional\ shares_A + CAR_T \times Market\ cap_T \times Institutional\ shares_T}{Market\ cap_A \times Institutional\ shares_A + Market\ cap_T \times Institutional\ shares_T}$$

Column (3) is cross-ownership adjusted return which is computed as the total dollar return of institutions who have shares both in acquirers and targets, divided by the total value they hold in acquirers and targets. It's calculated as

$$Return\ to\ cross-ownership = \frac{CAR_A \times Market\ cap_A \times ownership_A + CAR_T \times Market\ cap_T \times ownership_T}{Market\ cap_A \times ownership_A + Market\ cap_T \times ownership_T}$$

In column (1), we see that the bidders, on average, suffer a 2.8% loss by market model, 2.7% loss by Carhart four-factor model and 1.5% loss by raw return. All of these results are significant at the 1% level. Based only on these results, we may conclude that acquiring firms generally suffer a loss.

However, when we consider the institutional investors and the institutional cross-ownership, the results reversed. The returns to institutional holders and cross-ownership

Table16 Returns to institutional investor around merger announcements, full sample

The sample contains bidding firms in mergers and acquisitions of public U.S. companies between 1985 and 2010. Three methods are employed to calculate cumulative abnormal returns over six event windows, market model, Carhart four-factor model and raw returns. Market equally-weighted returns are used as market returns. Return on acquirer stock is the acquirers' CAR on (-5, +5). Return to institutional holders is computed as the total dollar return to institutional shareholders in acquirers and targets divided by the total value they hold in acquirers and targets. Cross-ownership adjusted return refers to the total dollar return of institutions, who has shares both in acquirers and targets, divided by the total value they hold in acquirers and targets. Daily price data are from CRSP stock price database. Institutional shares data is derived from Thomson Financial CDA/ Spectrum Institutional (13f) Holding database. *Significant at 10%; **Significant at 5%; ***Significant at 1%. T statistics are shown in parentheses.

	Return on acquirer stock (1)	Return to institutional holders (2)	Cross- ownership adjusted return (3)	Return difference (2-1)	Return difference (3-1)
Market model					
Mean	-0.028***	0.004	-0.003	0.034***	0.027***
Median	-0.023	0.003	-0.001	0.009	0.003
t value	-4.930	0.54	-0.53	6.91	9.23
Size of the sample	618	579	559	579	559
Carhart 4 factor model					
Mean	-0.027***	0.007	0.0003	0.035***	0.028***
Median	-0.017	0.004	0.0002	0.01	0.003
t value	-4.620	0.93	-0.04	6.92	8.85
Size of the sample	604	566	545	566	545
Raw return					
Mean	-0.015***	0.017**	0.009	0.034***	0.027***
Median	-0.008	0.017	0.011	0.009	0.003
t value	-2.630	2.37	1.34	6.78	9.19
Size of the sample	622	583	562	583	562

are not significantly different from zero and the average value of these two kinds of return is positive. The institution investors achieve a significant positive return of 1.7% when using raw return. In column (3), when calculating the total returns in bidders and targets for the institutional cross-holders, they gain an insignificant negative return of -0.3% calculated by market model, an insignificant positive return of 0.03% computed by Carhart four-factor model, and an insignificant positive return of 0.9% from raw

return. Therefore, on average, the institutional investors of acquiring firms do not have significant negative returns during takeover process.

Another way to assess the impact of cross-ownership on the returns is to analyze the difference in acquirer stock returns and the cross-ownership adjusted returns, a value derived from the mean value in column (3) minus the mean value in column (1). The difference for three models is all about 2.7%, significant at the 1% level. These results indicate that the acquirers' stockholders with or without ownership in target firms will have significantly different excess returns. This result is consistent with Hypothesis 4 and Matvos and Ostrovsky's (2008) conclusion.

When the full sample is divided into successful and unsuccessful subsamples, a similar result to the full sample can be found, significant negative returns to the acquirer stock and insignificant positive returns to cross-holders. Meanwhile, a significant difference exists between the acquiring firms' shareholder returns and the cross-owners' returns.

The subsample incorporating unsuccessful takeovers in table 18 get a slightly different result. During the event window (-5, +5), the acquirers' returns are not very significant, -3.1% return derived from market model at 5% significant level, -3.0% return calculated from Carhart four-factor model at 10% significant level and raw return insignificant. The returns to institutional investors and institutional cross-owners show the same tendency with the full sample, both insignificant. The difference between all acquirers' returns and cross-holders' return is still significant at the 1% level.

Consequently, whether the takeover offer to 7300 industry firms succeeds or not, the institutional investors with cross-ownership will not suffer significant losses from the offer. This conclusion may encourage the cross-holders to vote for management's takeover decisions in 7300 industry without estimating the likelihood of takeover success.

Table17 Returns to institutional investor around merger announcements (successful sample)

The sample contains bidding firms in mergers and acquisitions of public U.S. companies between 1985 and 2010. Three methods are employed to calculate cumulative abnormal returns over six event windows, market model, Carhart four-factor model and raw returns. The market model uses market equal-weighted returns. Return on acquirer stock is the acquirers' CAR on (-5, +5). Return to institutional holders is computed as the total dollar return to institutional shareholders in acquirers and targets divided by the total value they hold in acquirers and targets. Cross-ownership adjusted return refers to the total dollar return of institutions, who has shares both in acquirers and targets, divided by the total value they hold in acquirers and targets. Daily price data are from CRSP stock price database. Institutional shares data is derived from Thomson Financial CDA/ Spectrum Institutional (13f) Holding database. *Significant at 10%; **Significant at 5%; ***Significant at 1%. T statistics are shown in parentheses.

	Return on acquirer stock (1)	Return to institutional holders (2)	Cross- ownership adjusted return (3)	Return difference (2-1)	Return difference (3-1)
Market model					
Mean	-0.028***	0.003	-0.006	0.033***	0.025***
Median	-0.023	0.004	-0.001	0.009	0.002
t value	-4.449	0.380	-0.814	6.054	8.107
Sample size	517	486	471	486	471
Carhart 4 factor model					
Mean	-0.027***	0.006	-0.002	0.035***	0.026***
Median	-0.017	0.005	-0.002	0.010	0.002
t value	-4.181	0.808	-0.280	6.132	7.815
Sample size	509	479	463	479	463
Raw return					
Mean	-0.015**	0.018**	0.008	0.034***	0.026***
Median	-0.007	0.018	0.009	0.009	0.002
t value	-2.271	2.298	1.153	6.138	8.287
Sample size	521	490	474	490	474

Table18 Returns to institutional investor around merger announcements, unsuccessful sample

The sample contains bidding firms in mergers and acquisitions of public U.S. companies between 1985 and 2010. Three methods are employed to calculate cumulative abnormal returns over six event windows, market model, Carhart four-factor model and raw returns. The market model uses market equal-weighted returns. Return on acquirer stock is the acquirers' CAR on (-5, +5). Return to institutional holders is computed as the total dollar return to institutional shareholders in acquirers and targets divided by the total value they hold in acquirers and targets. Cross-ownership adjusted return refers to the total dollar return of institutions, who has shares both in acquirers and targets, divided by the total value they hold in acquirers and targets. Daily price data are from CRSP stock price database. Institutional shares data is derived from Thomson Financial CDA/Spectrum Institutional (13f) Holding database. *Significant at 10%; **Significant at 5%; ***Significant at 1%. T statistics are shown in parentheses.

	Return on acquirer stock (1)	Return to institutional holders (2)	Cross- ownership adjusted return (3)	Return difference (2-1)	Return difference (3-1)
Market model					
Mean	-0.031**	0.008	0.009	0.037***	0.036***
Median	-0.027	-0.011	0.000	0.006	0.011
t value	-2.120	0.504	0.579	3.588	4.448
Sample size	101	93	88	93	88
Carhart 4 factor model					
Mean	-0.030*	0.008	0.009	0.038***	0.036***
Median	-0.021	-0.001	0.003	0.007	0.012
t value	-1.953	0.482	0.560	3.399	4.203
Sample size	95	87	82	87	82
Raw return					
Mean	-0.021	0.012	0.012	0.032***	0.031***
Median	-0.012	0.013	0.021	0.005	0.010
t value	-1.360	0.659	0.690	2.910	3.956
Sample size	101	93	88	93	88

5. Cross-ownership and takeover returns

5.1 Variables design

The main purpose of this section is to examine how the takeover premiums and the institutional investors' returns will be affected by the cross-ownership in target firms

and acquiring firms before takeover. Accordingly, the impact of cross-owners' shares in acquirers and targets are tested by three kinds of returns: the cumulative abnormal returns to acquirers (derived from market model), the returns to institutional investors, and the returns to cross-ownership.

To control the other factors that may have influence on the returns, I employ several explanatory variables. The pre-takeover market-to-book ratio works as a proxy for performance, and accrual ratio serves as a proxy for earning quality and future stock returns. Servaes (1991) finds that firms (acquirers and targets) with lower Tobin's Q will achieve higher total returns, which confirms Lang, Stulz, and Walkling's (1989) findings that taking over poorly performing firms can create more value. Similarly, we expect that the accrual ratio will have a positive relation with the takeover returns, as a higher accrual ratio indicates lower earning quality.

Previous studies also show that the other characteristics of takeovers, for instance, hostile or friendly, single or multiple bidders, horizontal or outside market, medium of exchange and relative size, also have some impacts on the takeover premiums. These characteristics are added into the regression model in this paper as control variables as well.

Morck, Shleifer, and Vishny (1988) find that increasing market power can gain takeover synergy. Therefore, horizontal takeovers may lead to higher premiums. They also expect that synergistic takeovers to be friendly takeovers, so that the targets of takeovers without defenses will be more likely to obtain positive returns.

Huang and Walkling (1987) find that the takeover abnormal returns are more associated with cash takeovers, while they are less associated with stock exchange ones, and that the takeovers with defenses earn insignificantly higher returns than the takeovers without defenses.

The idea of adding the payment medium as a control variable is based on Carleton, Guilkey, Harris, and Stewart's (1983) finding that the medium of exchange plays a critical role in takeovers. Stimmelmayer, Liberini and Russo (2014) find that if the

acquisition incorporates a toehold, the taxes on capital gains will discourage cash payments, which is consistent with the findings of Travlos (1987) and Asquith, Bruner, and Mullins (1987). Thus, in order to reduce tax, acquirers are more willing to pay considerations by other mediums than cash. Travlos (1987) finds that there are significant differences between cash-financing and pure stock exchange in the takeover returns of acquiring firms. The medium is a binary variable, which equals 1 if all the considerations are paid by cash, and equals 0 otherwise.

5.2 The empirical results

Table 19 presents the results of the regression procedure. It is consistent with my prediction that institutional investors' holdings negatively affect the takeover premiums. When the cross-ownership in bidders increases by 1%, the total acquirers' return drops by 0.118%, which is significant at 1% level. The relation between cross-holders' share in target firms and takeover returns to bidders is negative but insignificant. The relation between institutional investors' total return and the cross-owners' total return presents a similar pattern. The number of targets' shares owned by cross-holders does not significantly affect the final returns to any kind of acquirers, while the number of bidders' shares owned by cross-holders has an adverse effect to all kinds of acquirers. The returns to cross-holders can be explained as a real gain to the investors who have shares in both the acquirers and the targets. Correspondingly, the institutional cross-holders should give up a slight fraction of their shares in acquirers before those firms make takeover bids to firms in 7300 industry firms, compared to the findings of Bris (2001) and Goldman and Qian (2005) that an optimal toehold size should be acquired before takeover announcement in order to maximize profits. When every 1% shares in acquiring firms are abandoned, cross-holders achieve 0.151% higher return in takeover activity.

Except for the shares in acquirers, the pre-takeover market-to-book ratio and the choice of cash payment shows a significant impact on the takeover gains as well. The market-to-book ratio is negatively related to takeover gains while cash payment is

positively related to takeover gains, which are consistent with the anticipation.

5.3 Robustness test

Table 19 exhibits the results for returns derived from market model. To test the conclusion, two additional models, Carhart four-factor model in table 20 and raw returns in table 21, are employed to calculate the dependent variables.

According to the tables, when raw return is used to calculate acquirers' premium, the results are less significant, but still have a negative relation at the 5% level between cross-holders' shares in acquiring firms and return to cross-ownership. When Carhart four-factor model is employed, similar results are displayed. Besides shares in acquirers, the pre-takeover market-to-book ratio and medium of payment also have impacts on returns. And for the column (1) and (2), acquirers' total returns in takeover activities are negatively influenced by the presence of defenses. This result is consistent with Morck, Shleifer, and Vishny's (1988) conclusion, that only friendly takeovers seem to be synergetic.

6. Takeover returns and post-takeover performance

6.1 Variables and data description

This section is designed to examine the takeover returns' impact on post-takeover performance, especially the return to cross-ownership. Four ratios: market-to-book ratio, ROA, ROE and accrual ratio, are employed in this section to be proxies for firm performance.

Table 22 shows the average value, mean and standard deviation of four performance ratios related to pre-takeover target firms and acquiring firms, and to post-takeover acquiring firms. In Panel A, B and C, column (4) presents the paired t test statistics for the performance difference of bidders and targets before takeover is made. And column (5) shows the paired t test statistics for the performance difference of a same bidder before and after takeover activity.

For the total sample before acquisition announcement, ROA and ROE of target firms

are lower than the average ROA and ROE of bidders. Acquired firms have an average ROA of -17.8% and average ROE of -34.3% compared to -7.3% ROA and -2.0% ROE of acquirers. And the difference for ROA is significant at 1% level. In contrast, targets on average have a significantly higher market-to-book ratio than bidders before takeovers, which is 9.45 of targets compared to 3.59 of bidders. The accrual ratio for two kinds of firms shows no significant difference. Moreover, when the full sample is divided into two subsamples of successful acquisitions and other acquisitions, the results arrive at the same conclusions. Therefore, in 7300 industry, many takeover offers are made by the bidders who have lower share price premiums but higher returns on assets. According to the idea of Servaes (1991), firms with low Tobin's Q will eventually suffer heavy losses if they try to merge with firms having a high Tobin's Q. This conclusion may be a reasonable explanation for the trend of post-takeover ratios. The firms making acquisition bids suffer from a tremendous drop in market-to-book ratio after the bid, and this phenomenon can also be applied to two subsamples. From 1985 to 2010, in 7300 industry, firms are mostly offered takeover bid by the bidders whose share price is more close to book value, and the bidders who have a lower MB ratio afterwards. The accrual ratio, however, reflects a better condition for the acquiring firms in the full sample and the subsample of successful acquisitions. The significant decrease in the accrual ratio implies an improvement in firms' earning quality.

In terms of the subsample of the failed firms, unsuccessful takeover bids will only lead to a decline in MB ratio with no significant effect on other ratios. Virtually, the performance ratio is not obviously influenced by the failure of the bidding. The change of market-to-book ratio is aroused by the negative return around the event window.

In general, bidding firms suffer from worse performance, which is measured by market-to-ratio, after the bid. This conclusion applies for all samples.

Panel D tests the takeovers' effects on the target firms that refuse to accept the bid. This group of firms still exist in public market after takeover bid. When focusing on column (4), it should be noted that the target firms which turn down the bid will suffer

Table19 Impact of characteristics on different takeover cumulative abnormal returns, CARs calculated by market model

Column (1) and (2) employs the CARs of acquirer stock during (-5, +5) event window as dependent variable. Column (3) to (4) uses returns to institutional investors' total returns as dependent variable. Column (5) to (6) sets the cross-owners' returns as dependent variable. Cross-holders' shares in acquirers refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in acquiring firms. Cross-holders' shares in targets refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in target firms. MB is defined as 3 years average market-to-book ratio before takeover. Accrual ratio is defined as the indicator of firms' earning quality one year before takeover. Relative size is computed as market value of target firms divided by market value of acquiring firms. Defense is the indicator whether the target firms make takeover defense to reflect to takeover bids. Multiple bidder is an indicator and gets a value of 1 when more than one bidder appear meantime, otherwise 0. Horizontal takeover is a binary variable with a value of 1 when bidders and targets are both from 7300 industry, otherwise 0. Medium is the binary variable with a value of 1 when the takeover considerations are paid only by cash, 0 otherwise. *Significant at 10%; **Significant at 5%; ***Significant at 1%. T statistics are shown in parentheses.

	Return on acquirer stock		Return to institutional investors		Adjusted return to cross-ownership	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.003 (0.15)	0.016 (0.69)	0.02 (0.75)	0.028 (1.04)	0.014 (0.61)	0.044* (1.92)
Cross-holders' share in targets	-0.041 (-1.26)		-0.04 (-1.06)		-0.003 (-0.1)	
Cross-holders' share in acquirers		-0.118*** (-2.73)		-0.094* (-1.86)		-0.151*** (-3.48)
Relative size	-0.001 (-0.07)	0.000 (0.03)	0.028 (1.44)	0.03 (1.53)	0.024 (1.4)	0.024 (1.44)
MB	-0.003*** (-2.72)	-0.003*** (-2.73)	-0.004*** (-2.72)	-0.004*** (-2.74)	-0.004*** (-3.38)	-0.004*** (-3.29)
Accrual ratio	-0.002	-0.002	0.001	0.000	-0.001	-0.001

	(-0.54)	(-0.64)	(0.15)	(0.09)	(-0.24)	(-0.4)
Defense	-0.027	-0.03*	0.002	0.000	-0.009	-0.012
	(-1.57)	(-1.74)	(0.11)	(-0.01)	(-0.52)	(-0.72)
Multiple bidder	-0.027	-0.027	0.025	0.026	0.011	0.009
	(-0.88)	(-0.88)	(0.7)	(0.72)	(0.37)	(0.31)
Horizontal	0.001	0.001	0.000	0.001	0.007	0.006
	(0.07)	(0.11)	(0.02)	(0.06)	(0.49)	(0.44)
Takeover status	-0.022	-0.021	-0.012	-0.01	-0.019	-0.024
	(-1.17)	(-1.15)	(-0.54)	(-0.47)	(-0.98)	(-1.32)
Medium	0.04***	0.041***	0.027	0.027*	0.028*	0.031**
	(2.78)	(2.87)	(1.61)	(1.65)	(1.94)	(2.2)

Table20 Impact of characteristics on different takeover cumulative abnormal returns, CARs calculated by raw returns

Column (1) and (2) employs the CARs of acquirer stock during (-5, +5) event window as dependent variable. Column (3) to (4) uses returns to institutional investors' total returns as dependent variable. Column (5) to (6) sets the cross-owners' returns as dependent variable. Cross-holders' shares in acquirers refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in acquiring firms. Cross-holders' shares in targets refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in target firms. MB is defined as 3 years average market-to-book ratio before takeover. Accrual ratio is defined as the indicator of firms' earning quality one year before takeover. Relative size is computed as market value of target firms divided by market value of acquiring firms. Defense is the indicator whether the target firms make takeover defense to reflect to takeover bids. Multiple bidder is an indicator and gets a value of 1 when more than one bidder appear meantime, otherwise 0. Horizontal takeover is a binary variable with a value of 1 when bidders and targets are both from 7300 industry, otherwise 0. Medium is the binary variable with a value of 1 when the takeover considerations are paid only by cash, 0 otherwise. *Significant at 10%; **Significant at 5%; ***Significant at 1%. T statistics are shown in parentheses.

	CAR on acquirer stock		CAR to institutional investors		Adjusted CAR to cross-ownership	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.007 (0.31)	0.016 (0.68)	0.017 (0.60)	0.021 (0.76)	0.012 (0.49)	0.038 (1.58)
Cross-holders' share in targets	-0.027 (-0.79)		-0.022 (-0.55)		0.013 (0.37)	
Cross-holders' share in acquirers		-0.081* (-1.78)		-0.052 (-0.98)		-0.11** (-2.41)
Relative size	-0.008 (-0.42)	-0.006 (-0.37)	0.02 (0.99)	0.021 (1.04)	0.014 (0.79)	0.014 (0.77)
Pre-takeover MB ratio	-0.001 (-0.95)	-0.001 (-0.94)	-0.002 (-1.29)	-0.002 (-1.3)	-0.002 (-1.56)	-0.002 (-1.44)
Pre-takeover accrual ratio	0.003 (0.85)	0.003 (0.78)	0.005 (1.21)	0.005 (1.17)	0.004 (1.04)	0.003 (0.93)
Defense	-0.016	-0.018	0.017	0.015	0.005	0.002

	(-0.91)	(-1.02)	(0.79)	(0.73)	(0.25)	(0.13)
Multiple bidder	0.000	0.000	0.05	0.05	0.038	0.036
	(-0.01)	(-0.01)	(1.31)	(1.32)	(1.16)	(1.1)
Horizontal	-0.012	-0.011	-0.01	-0.009	-0.004	-0.005
	(-0.79)	(-0.77)	(-0.56)	(-0.54)	(-0.25)	(-0.33)
Takeover status	-0.014	-0.013	0.000	0.001	-0.006	-0.013
	(-0.71)	(-0.7)	(0.00)	(0.05)	(-0.32)	(-0.64)
Medium	0.029*	0.03**	0.019	0.019	0.018	0.021
	(1.94)	(1.99)	(1.07)	(1.09)	(1.16)	(1.37)

Table21 Impact of characteristics on different takeover cumulative abnormal returns, CARs calculated by Carhart four-factor model

Column (1) and (2) employs the CARs of acquirer stock during (-5, +5) event window as dependent variable. Column (3) to (4) uses returns to institutional investors' total returns as dependent variable. Column (5) to (6) sets the cross-owners' returns as dependent variable. Cross-holders' shares in acquirers refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in acquiring firms. Cross-holders' shares in targets refers to the ownership of cross-holders (institutional investors who have shareholdings in both takeover acquirers and targets) in target firms. MB is defined as 3 years average market-to-book ratio before takeover. Accrual ratio is defined as the indicator of firms' earning quality one year before takeover. Relative size is computed as market value of target firms divided by market value of acquiring firms. Defense is the indicator whether the target firms make takeover defense to reflect to takeover bids. Multiple bidder is an indicator and gets a value of 1 when more than one bidder appear meantime, otherwise 0. Horizontal takeover is a binary variable with a value of 1 when bidders and targets are both from 7300 industry, otherwise 0. Medium is the binary variable with a value of 1 when the takeover considerations are paid only by cash, 0 otherwise. *Significant at 10%; **Significant at 5%; ***Significant at 1%. T statistics are shown in parentheses.

	CAR on acquirer stock		CAR to institutional investors		Adjusted CAR to cross-ownership	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-0.001 (-0.04)	0.014 (0.61)	0.016 (0.62)	0.026 (0.99)	0.012 (0.51)	0.043* (1.95)
Cross-holders' share in targets	-0.025 (-0.75)					
Cross-holders' share in acquirers		-0.105** (-2.47)	-0.021 (-0.54)	-0.077 (-1.54)	0.015 (0.46)	-0.137*** (-3.21)
Relative size	-0.003 (-0.19)	-0.002 (-0.13)	0.024 (1.25)	0.025 (1.3)	0.02 (1.19)	0.02 (1.19)
Pre-takeover MB ratio	-0.003** (-2.28)	-0.003** (-2.26)	-0.004*** (-2.87)	-0.004*** (-2.87)	-0.004*** (-3.27)	-0.004*** (-3.14)
Pre-takeover accrual ratio	-0.002 (-0.48)	-0.002 (-0.58)	0.001 (0.31)	0.001 (0.25)	0.000 (-0.15)	-0.001 (-0.31)
Defense	-0.035**	-0.038**	-0.003	-0.005	-0.017	-0.02

	(-2.08)	(-2.23)	(-0.16)	(-0.25)	(-0.98)	(-1.16)
Multiple bidder	-0.024	-0.025	0.027	0.027	0.013	0.01
	(-0.8)	(-0.82)	(0.76)	(0.75)	(0.41)	(0.33)
Horizontal	0.000	0.000	0.000	0.000	0.005	0.003
	(-0.03)	(-0.03)	(-0.01)	(0.00)	(0.33)	(0.23)
Takeover status	-0.017	-0.017	-0.003	-0.004	-0.014	-0.021
	(-0.9)	(-0.96)	(-0.16)	(-0.17)	(-0.72)	(-1.16)
Medium	0.034**	0.036**	0.018	0.019	0.023	0.027*
	(2.41)	(2.53)	(1.08)	(1.14)	(1.61)	(1.9)
Number of observations	531	531	531	531	531	531

Table22 Statistics of performance proxies before and after takeover

Column (1) gives 3-year average performance ratio before takeover bids for targets. For Panel A, B and C, column (2) gives 3-year average ratio before takeover bids for acquirers. For Panel D, column (2) is 3-year average ratio after takeover bids for targets. Column (3) gives 3-year average ratio after takeover bids for acquirers. Column (4) are the paired t test statistics for the difference between (1) and (2). Column (5) are the paired t test statistics for the difference between (1) and (3). *Significant at 10%; **Significant at 5%; ***Significant at 1%.

	Pre-takeover targets (1)			Pre-takeover acquirers (2)			Post-takeover acquirers (3)			(4)=(2)-(1)	(5)=(3)-(2)
	Mean	Std. Dev	Median	Mean	Std. Dev	Median	Mean	Std. Dev	Median	t statistics	t statistics
Panel A. Full sample (N=647)											
MB ratio	9.450	40.095	2.414	3.594	4.932	2.242	2.286	1.679	1.833	-3.710***	-7.01***
ROA	-0.178	0.402	-0.041	-0.073	0.479	0.038	-0.104	2.893	0.024	5.120***	-1.49
ROE	-0.343	0.021	0.021	-0.020	0.959	0.099	0.101	0.968	0.064	1.07	-2.24**
Accrual ratio	0.287	7.658	0.267	0.243	1.858	0.214	-0.002	0.523	0.108	0.040	-1.67*
Panel B. Completed takeovers (N=541)											
MB ratio	8.326	36.425	2.374	3.554	4.816	2.220	2.316	1.650	1.838	-3.000***	-6.23***
ROA	-0.180	0.391	-0.043	-0.078	0.510	0.038	-0.113	0.463	0.027	4.510***	-1.44
ROE	-0.365	8.385	0.026	-0.037	0.921	0.100	-0.140	1.013	0.069	0.91	-1.78*
Accrual ratio	0.144	7.079	0.282	0.253	1.157	0.210	0.094	0.508	0.110	0.65	-2.92***
Panel C. Uncompleted takeovers (N=106)											
MB ratio	15.233	55.132	2.431	3.797	5.507	2.310	2.130	1.825	1.700	-2.21**	-3.22***
ROA	-0.168	0.455	-0.023	-0.047	0.270	0.023	-0.057	0.271	0.018	2.46**	-0.380
ROE	-0.230	1.624	0.003	0.070	1.135	0.083	-0.103	0.702	0.038	1.60	-1.55
Accrual ratio	1.031	10.160	0.153	0.191	3.814	0.293	0.138	0.593	0.089	-0.88	0.21

Panel D. Uncompleted takeovers (N=106)											
	Pre-takeover targets (1)			Post-takeover targets (2)			Post-takeover acquirers (3)			(4)=(2)-(1)	(5)=(3)-(2)
	Mean	Std. Dev	Median	Mean	Std. Dev	Median	Mean	Std. Dev	Median	t statistics	t statistics
MB ratio	15.233	55.132	2.431	3.670	5.050	2.404	2.130	1.825	1.700	-2.25**	-3.01***
ROA	-0.168	0.455	-0.023	-0.163	0.474	-0.008	-0.057	0.271	0.018	0.570	2.39**
ROE	-0.230	1.624	0.003	-0.370	1.911	0.011	-0.103	0.702	0.038	-1.67*	1.490
Accrual ratio	1.031	10.160	0.153	2.729	14.267	0.286	0.138	0.593	0.089	2.35**	-1.75*

poor performance in the next three years. The MB ratio and ROE drops largely at 5% and 10% significance level, with accrual ratio rising synchronously. It might be because the target firms refuse to receive new technology, higher market power, better management and improved competitiveness when they turn down the bid.

6.2 Empirical results

Table 23 shows the impact of takeover returns on the change of performance ratio. Column (1), (4), (7) and (10) employ return to acquirers as the main explanatory factor. When market model are used to run the event study, a significant negative relation can be observed between the change in ROA and bidder returns. And the bidders' gains will have positive effect on market-to-book ratio change if raw returns are used. This can be attributed to the synergy effect produced by the consolidation and it will benefit the market value of the firms afterwards.

Institutional investors' return is the main factor in column (2), (5), (8) and (11). All models produce positive correlations between the main variable and MB ratio change, which indicates that institutions are always good at seeking attractive targets and achieving capital premiums.

Column (3) (6) (9) and (12) use adjusted return to cross-ownership as independent variables. The growth of cross-holders' return also increases the MB ratio.

Consequently, the increase of all kinds of returns will finally drive up the market-to-book ratio. When measured with MB ratio, acquiring firms' post-takeover performance will change positively if they perform well in the takeovers.

6.3 Robustness test

To test the effectiveness of this model and to examine the different effects on successful and unsuccessful bids, the total sample is divided into two subsamples according to the takeover results. Table 24 presents the results of the subsample of successful firms, which are similar to the results of full sample. Higher takeover returns contributes to higher market-to-book ratio, compared to the pre-takeover MB ratio, but it will lead to lower ROA after acquisition.

Table23 Impact of different returns on post-takeover performance, CARs calculated in three methods (full sample)

The change from pre-takeover ratio to post ratio is employed as dependent variable. Three kinds of returns are the major independent variables. Column (1) (4) (7) and (10) used return on acquirer stock as independent variables. Column (2), (5), (8) and (11) used return to institutional investors as independent variables. Column (3) (6) (9) and (12) used adjusted return to cross-ownership as independent variables. Returns are derived from (-5, +5). N refers to number of observations. *Significant at 10%; **Significant at 5%; ***Significant at 1%. T statistics are shown in parentheses.

	△Market-to-book ratio			△ROA			△ROE			△Accrual ratio		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A. Cumulative abnormal returns are derived from market model												
Intercept	-0.116*** (-5.756)	-0.137*** (-6.886)	-0.142*** (-7.234)	-1.241** (-2.489)	-0.839** (-2.372)	-0.884** (-2.419)	-0.850 (-1.52)	-0.872 (-1.492)	-0.821 (-1.374)	-1.3** (-2.549)	-1.411*** (-2.677)	-1.459*** (-2.683)
Returns	0.185 (1.348)	0.255** (2.19)	0.152 (1.147)	-5.907** (-1.744)	-4.248** (-2.047)	-4.282** (-1.733)	-0.062 (-0.020)	-3.697 (-1.078)	-0.874 (-0.217)	-0.111 (-0.032)	-0.764 (-0.247)	-0.177 (-0.048)
N	609	574	554	606	571	551	599	564	544	604	569	547
Panel B. Cumulative abnormal returns are derived from raw returns												
Intercept	-0.117*** (-5.87)	-0.14*** (-7.053)	-0.144*** (-7.354)	-1.155** (-2.337)	-0.82** (-2.303)	-0.851** (-2.322)	-0.807 (-1.457)	-0.87 (-1.482)	-0.84 (-1.404)	-1.33*** (-2.634)	-1.379*** (-2.608)	-1.438*** (-2.642)
Returns	0.257** (1.922)	0.308*** (2.759)	0.241** (1.878)	-4.297 (-1.299)	-2.897 (-1.447)	-3.293 (-1.374)	2.960 (0.801)	-1.611 (-0.488)	2.256 (0.577)	-2.284 (-0.676)	-2.183 (-0.734)	-2.34 (-0.657)
N	613	578	557	610	575	554	603	568	547	608	573	552
Panel C. Cumulative abnormal returns are derived from Carhart four-factor model												
Intercept	-0.116*** (-5.729)	-0.137*** (-6.888)	-0.142*** (-7.231)	-1.219** (-2.441)	-0.839** (-2.37)	-0.885** (-2.417)	-0.860 (-1.537)	-0.869 (-1.487)	-0.822 (-1.377)	-1.288** (-2.523)	-1.414*** (-2.682)	-1.458*** (-2.682)
Returns	0.201 (1.449)	0.257** (2.185)	0.176 (1.299)	-4.962 (-1.446)	-4.229** (-2.016)	-3.19 (-1.26)	-0.485 (-0.125)	-3.977 (-1.148)	-1.431 (-0.346)	0.375 (0.107)	-0.358 (-0.115)	0.299 (0.08)
N	597	562	557	594	559	538	587	552	531	592	557	536

Table 24 Impact of different returns on post-takeover performance, CARs calculated in three methods (successful sample)

The change from pre-takeover ratio to post ratio is employed as dependent variable. Three kinds of returns are the major independent variables. Column (1) (4) (7) and (10) used return on acquirer stock as independent variables. Column (2), (5), (8) and (11) used return to institutional investors as independent variables. Column (3) (6) (9) and (12) used adjusted return to cross-ownership as independent variables. Returns are derived from (-5, +5). N refers to number of observations. *Significant at 10%; **Significant at 5%; ***Significant at 1%. T statistics are shown in parentheses.

	△Market-to-book ratio			△ROA			△ROE			△Accrual ratio		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A. Cumulative abnormal returns are derived from market model												
Intercept	-0.112*** (-5.007)	-0.133*** (-6.078)	-0.138*** (-6.453)	-1.408** (-2.438)	-0.856** (-2.084)	-0.911** (-2.152)	-0.895 (-1.382)	-0.864 (-1.281)	-0.803 (-1.168)	-1.353** (-2.294)	-1.474** (-2.433)	-1.52** (-2.439)
Returns	0.12 (0.79)	0.259** (2.055)	0.12 (0.835)	-5.988 (-1.522)	-4.693** (-1.973)	-4.851** (-1.7)	-0.038 (-0.009)	-4.47 (-1.145)	-1.524 (-0.329)	0.555 (0.138)	-0.57 (-0.162)	0.218 (0.052)
N	511	464	468	511	464	465	511	464	459	511	464	466
Panel B. Cumulative abnormal returns are derived from raw returns												
Intercept	-0.112*** (-5.076)	-0.137*** (-6.269)	-0.14*** (-6.57)	-1.316** (-2.301)	-0.828** (-2.003)	-0.864** (-2.036)	-0.854 (-1.333)	-0.851 (-1.254)	-0.815 (-1.184)	-1.394** (-2.389)	-1.435** (-2.359)	-1.499** (-2.403)
Returns	0.213 (1.441)	0.33*** (2.699)	0.231** (1.647)	-4.267 (-1.116)	-3.205 (-1.383)	-3.726 (-1.339)	3.158 (0.737)	-2.314 (-0.609)	1.867 (0.414)	-2.174 (-0.557)	-2.363 (-0.693)	-2.469 (-0.603)
N	515	464	471	515	464	468	515	464	462	515	464	469
Panel C. Cumulative abnormal returns are derived from Carhart four-factor model												
Intercept	-0.111*** (-4.968)	-0.133*** (-6.084)	-0.138*** (-6.449)	-1.385** (-2.395)	-0.854** (-2.079)	-0.909** (-2.144)	-0.91 (-1.404)	-0.86 (-1.275)	-0.806 (-1.173)	-1.339** (-2.269)	-1.477** (-2.437)	-1.518** (-2.436)
Returns	0.151 (0.981)	0.263** (2.069)	0.15 (1.02)	-4.969 (-1.246)	-4.671** (-1.953)	-3.628 (-1.242)	-0.623 (-0.139)	-4.78 (-1.217)	-2.244 (-0.474)	1.103 (0.271)	-0.133 (-0.038)	0.727 (0.169)
N	505	464	462	505	464	459	505	464	453	505	464	460

Table25 Impact of different returns on post-takeover performance, CARs calculated in three methods (unsuccessful sample)

The change from pre-takeover ratio to post ratio is employed as dependent variable. Three kinds of returns are the major independent variables. Column (1) (4) (7) and (10) used return on acquirer stock as independent variables. Column (2), (5), (8) and (11) used return to institutional investors as independent variables. Column (3) (6) (9) and (12) used adjusted return to cross-ownership as independent variables. Returns are derived from (-5, +5). N refers to number of observations. *Significant at 10%; **Significant at 5%; ***Significant at 1%. T statistics are shown in parentheses.

	△Market-to-book ratio			△ROA			△ROE			△Accrual ratio		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A. Cumulative abnormal returns are derived from market model												
Intercept	-0.139*** (-3.06)	-0.16*** (-3.38)	-0.168*** (-3.387)	-0.302 (-0.5)	-0.758** (-2.32)	-0.769** (-2.237)	-0.592 (-0.86)	-0.945 (-1.37)	-0.981 (-1.348)	-1.011 (-1.56)	-1.036 (-1.48)	-1.061 (-1.436)
Returns	0.531* (1.74)	0.226 (0.75)	0.36 (1.064)	-5.318 (-1.31)	-1.113 (-0.54)	-0.871 (-0.371)	-0.15 (-0.03)	1.779 (0.4)	3.19 (0.642)	-3.676 (-0.85)	-2.194 (-0.49)	-2.823 (-0.56)
N	98	80	86	98	80	86	98	80	85	98	80	83
Panel B. Cumulative abnormal returns are derived from raw returns												
Intercept	-0.143*** (-3.15)	-0.16*** (-3.36)	-0.167*** (-3.36)	-0.245 (-0.400)	-0.759** (-2.32)	-0.771** (-2.245)	-0.545 (-0.79)	-0.956 (-1.39)	-0.985 (-1.36)	-0.97 (-1.51)	-1.048 (-1.49)	-1.076 (-1.456)
Returns	0.495 (1.62)	0.17 (0.62)	0.297 (0.932)	-4.079 (-0.999)	-0.991 (-0.53)	-0.804 (-0.364)	1.952 (0.42)	2.673 (0.67)	4.483 (0.963)	-2.76 (-0.64)	-0.995 (-0.25)	-1.582 (-0.333)
N	98	80	86	98	80	86	98	80	85	98	80	83
Panel C. Cumulative abnormal returns are derived from Carhart four-factor model												
Intercept	-0.141*** (-3.08)	-0.16*** (-3.37)	-0.167*** (-3.376)	-0.287 (-0.47)	-0.762** (-2.33)	-0.773** (-2.247)	-0.58 (-0.84)	-0.947 (-1.37)	-0.982 (-1.352)	-1.006 (-1.55)	-1.039 (-1.48)	-1.066 (-1.443)
Returns	0.466 (1.51)	0.216 (0.68)	0.352 (1.008)	-4.794 (-1.16)	-0.822 (-0.38)	-0.522 (-0.215)	0.304 (0.07)	2.238 (0.48)	3.736 (0.729)	-3.494 (-0.8)	-2.132 (-0.45)	-2.597 (-0.498)
N	92	80	79	92	80	79	92	80	78	92	80	76

Table 25 shows that the return effects on performance cannot be applied to the unsuccessful bidders' performance. No significant relation can be observed in this table.

In conclusion, only the returns of successful bidders will exert influence on their performance change, higher market-to-book ratio and lower ROA.

7. Previous acquirers become targets in three years

7.1 Empirical test

Table 26 gives the influence of the CARs' in six different event windows on the likelihood that acquirers themselves become public takeover target in following three years. The new takeover data is obtained from Thomson Financial SDC Platinum (SDC) merger databases. The CARs are the cumulative abnormal returns derived from market model, raw return and Cahart four-factor model in six different event window, (0,0), (-5,1), (-1,+1), (-5,+5), (-5,+20), (-20,+20). Log (size) is the logarithmic value of bidders.

There are 609 firms with CARs value available, 81 of which receive new takeover bid in the following three years and 87 new bids offered, since 6 firms get bids for two times.

The results of the probability model are only positive and significant during event window (-1, +1). It means that the more excess returns the bidders gain during days (-1, +1) around announcement day, the higher the possibility of the bidders becoming new takeover target in the future three years, Regardless of the models used to compute CARs. Nevertheless, this results are quite different from the statement made by Mitchell and Lehn (1990), who find that bidders doing badly in previous takeovers will become good target in the following bids. In their research, all the CARs in different event window, (0), (-5, +1), (-1, +1), (-5, +40) and (-20, +40), are adversely related with the probability of bidders becoming targets.

This difference in results may be due to the different control variables, time period of data collection or industry effects. Mitchell and Lehn (1990) use 1158 public companies in 51 industries covered by *Value Line* during the fourth quarter of calendar

Table 26 Logit estimates of probability that firms become target

The probability that bidders become takeover targets themselves in three years after offering takeover bid is dependent variable. The cumulative abnormal returns in six event windows and the logarithm of bidders' size are designed to be independent variables. *Significant at 10%; **Significant at 5%; ***Significant at 1%. T statistics are shown in parentheses.

(N=609, takeover=81, no takeover=528)	Event window					
	[0,0]	[-5,1]	[-1,+1]	[-5,+5]	[-5,+20]	[-20,+20]
Panel A. CARs are derived from market model						
Intercept	-1.147 (0.308)	-1.212 (0.283)	-1.251 (0.260)	-1.181 (0.294)	-1.150 (0.31)	-1.134 (0.316)
CARs	0.526 (0.772)	0.468 (0.619)	2.741** (0.023)	0.311 (0.705)	-0.025 (0.961)	-0.102 (0.802)
Log(size)	-0.034 (0.522)	-0.031 (0.561)	-0.027 (0.604)	-0.032 (0.542)	-0.034 (0.520)	-0.035 (0.509)
Model chi-square	0.496	0.655	5.630	0.555	0.414	0.473
Panel B. CARs are derived from acquirers' raw returns						
Intercept	-1.158 (0.303)	-1.164 (0.304)	-1.214 (0.276)	-1.167 (0.303)	-1.125 (0.323)	-1.158 (0.307)
CARs	0.792 (0.661)	-0.197 (0.829)	2.200* (0.060)	-0.258 (0.745)	-0.267 (0.597)	-0.222 (0.599)
Log(size)	-0.033 (0.527)	-0.034 (0.523)	-0.030 (0.568)	-0.034 (0.524)	-0.036 (0.503)	-0.034 (0.522)
Model chi-square	0.590	0.442	3.955	0.501	0.673	0.670
Panel C. CARs are derived from four-factor model						
Intercept	-1.030 (0.367)	-1.053 (0.359)	-1.117 (0.322)	-0.973 (0.401)	-1.024 (0.373)	-0.981 (0.396)
CARs	0.542 (0.767)	0.167 (0.858)	2.244* (0.056)	-0.455 (0.243)	-0.110 (0.894)	-0.381 (0.423)
Log(size)	-0.040 (0.452)	-0.039 (0.465)	-0.035 (0.513)	-0.045 (0.411)	-0.041 (0.446)	-0.044 (0.419)
Model chi-square	0.661	0.604	4.258	0.590	1.184	1.871

year 1981, while the sample in this paper uses 660 public takeovers collected from Thomson Financial SDC Platinum (SDC) merger databases in 7300 industry from 1985 to 2010.

To further study the impact of variables, the robustness test is added.

7.2 Robustness test

In the previous section, *Cross-Ownership And Takeover Returns*, the returns on acquirer stock price are regressed on cross-holders' share in acquirers, relative size, 3-year average market-to-book ratio, accrual ratio, presence of defense, existing of multiple bidder, horizontal takeover dummy, takeover status, and medium of exchange. In this section, using return to acquirer stock price as the major independent variable does not show satisfying results. Therefore, the error terms of the regression express the other information that is contained in CARs but cannot be explained by the control variables. In this section, this error terms serves as the new main variables in the regression procedure. The error term is derived from the regression model in table 17, column (2). This regression model uses the CARs in event widow (-5, +5). Therefore, the CARs during the other five windows are regressed using the same model in order to attain the other five error terms.

The institutional shares, market share, leverage and logarithm of size are added as fundamental variables, which are the same as the model in the former section *Institutional ownership's effect on attracting a bidder*.

Since some of the firms receive new takeover bids more than once in the following three years, I collect the fundamental data for the next three years. Each firm has three observations, while each observation has the same error terms and previous takeover characteristics (such as presence of defense, existing of multiple bidder, horizontal takeover or not, takeover status and medium of exchange) but each observation has different fundamental data according to the corresponding year. In addition, the indicator year1 (or year2), a binary variable, is added to show that the observations are in the first (or second) year after the previous bid made. If the values of both variable year1 and variable year2 equal 0, it refers to the third year after the takeover.

Table 27 gives the information of variables selected in the following regression model. The statistics of the error terms in each event window are shown in Panel A. Panel E gives the statistics of the characteristics in the previous bid. Among 609

takeovers with available data for CARs, 541 are failed, 99 make defense, 32 have more than one bidder, 446 are horizontal and 220 use only cash as the payment method.

In Panel B, C and D, statistics for fundamental variables in the following 3 years are presented. Average institutional shares grow from 51.2% to 52.3% and firms' average market share climbs up from 29.9% to 31.1%. The average market shares of these previous bidders are much larger than their target firms. Moreover, the leverage ratio also increases from 0.439 to 0.508, showing that bidders slightly increase liabilities after the bid is completed. The increase in the logarithm of market value can be explained by the consolidation of two firms.

Table 28 shows the regression procedure results. Only the error terms derived from the market model CARs are shown in this table. The raw return and the Carhart four-factor model are also used but are not presented because they generate similar results. Identically, only the error terms from event window (-1, +1) are positively associated with the probability of becoming target at 5% significant level. This result is consistent with those in the last part. Thus, the difference between the results in this paper and the findings of Mitchell and Lehn (1990) are not because of the difference in the variables employed, but probably because of the time effect and sample difference. And the factors to attract new bidders are not the same as the previous section regarding the characteristics of targets in 7300 industry. The industry effect is expected to affect the results, as this part focuses on the bidders in previous takeovers, and these bidders are not from the 7300 industry.

Based on the conclusions drawn from in the previous section, the reason for the results in this robustness test could be that in the 7300 industry, higher excess return may come from lower cross-holders' shares in acquirers, lower pre-takeover market-to-book ratio, and cash payment (see table 15). These three factors can lead to lower premiums paid to other shareholders in targets without cross-ownership, lower share price afterwards, and no stock price volatility risk related to the previous target shareholders. According to these features, these firms with higher excess returns after

Table 27 Statistical summary and indicator variables.

The acquiring firms becoming target in later three years gives a value of 1 to the dependent variable in regression procedure. EMM refers to error terms in previous regression model. Error terms are derived from previous regressions (CARs on cross-ownership). Instown refers to the institutional ownership of the acquiring firms after bid in following three years respectively. Market share is specific firms' sales divided by total industry sales in the corresponding year. Leverage is the ratio of total liability to total assets. Log size stands for the logarithm of bidders' market value. Takeover status indicates whether the former takeover bids succeed or not. Defense is the presence of antitakeover measures used in former takeover. Multiple bidder is the indicator of whether multiple bidders exist in former takeover. Horizontal is the binary variable if acquiring firms also belong to 7300 industry. Medium indicates whether cash employed or not in former takeover bid.

Panel A. Variables					
	Mean	Std Dev	Median	Minimum	Maximum
EMM(0,0)	-0.00019	0.065	0.005	-0.422	0.387
EMM(-5,1)	-0.00051	0.120	-0.002	-0.550	1.100
EMM(-1,+1)	-0.00049	0.097	-0.002	-0.609	0.547
EMM(-20,+20)	0.00127	0.281	0.010	-1.823	1.699
EMM(-5,+5)	-0.00089	0.141	-0.003	-0.936	0.813
EMM(-5,+20)	0.00055	0.227	0.007	-1.610	1.279
Panel B. Fundamental characteristics (year 1)					
Instown	0.512	0.300	0.561	2.046	0.000
Market share	0.299	2.271	0.010	46.859	0.000
Leverage	0.439	0.224	0.414	1.785	0.017
Log(size)	20.865	20.689	2.274	27.377	13.979
Panel C. Fundamental characteristics (year 2)					
Instown	0.515	0.300	0.562	1.347	0.000
Market share	0.309	2.082	0.016	40.043	0.000
Leverage	0.491	0.249	0.458	1.761	0.044
Log(size)	21.063	20.853	2.274	27.524	14.877
Panel D. Fundamental characteristics (year 3)					
Instown	0.523	0.302	0.575	1.147	0.000
Market share	0.311	2.254	0.014	45.167	0.000
Leverage	0.508	0.966	0.459	23.128	0.020
Log(size)	21.193	20.892	2.332	27.149	14.790
Panel E. Indicator variables					
	Indicator=1	Percent of sample (%)	Full sample		
Takeover Status	541	88.834	609		
Defense	99	16.256	609		
Multiple bidder	32	5.255	609		
Horizontal	446	73.235	609		
Medium	220	36.125	609		

Table 28 Logit estimates of probability that firms become target

The acquiring firms becoming target in later three years gives a value of 1 to the dependent variable in regression procedure. Error terms are derived from previous regressing (market model CARs on cross-ownership). Instown refers to the institutional ownership of the acquiring firms after bid in following three years respectively. Market share is specific firms' sales divided by total industry sales in the corresponding year. Leverage is the ratio of total liability to total assets. Log size stands for the logarithm of bidders' market value. Takeover status indicates whether the former takeover bids succeed or not. Defense is the presence of antitakeover measures used in former takeover. Multiple bidder is the indicator of whether multiple bidders exist in former takeover. Horizontal is the binary variable if acquiring firms also belong to 7300 industry. Medium indicates whether cash employed or not in former takeover bid. Year 1 is the indicator with a value of 1 if the independent variables are from the first year after bid, while year 2 indicates the second year after bid. *Significant at 10%; **Significant at 5%; ***Significant at 1%. Wald Chi-Square value are shown in parentheses.

	(N=609, takeover=81, no takeover=528)		Event window			
	[0,0]	[-5,1]	[-1,+1]	[-5,+5]	[-5,+20]	[-20,+20]
Intercept	-4.261** (5.524)	-4.442** (6.093)	-4.511** (6.447)	-4.188** (5.26)	-4.329** (5.755)	-4.275** (5.485)
Error terms	0.143 (0.003)	1.247 (0.996)	3.57** (4.353)	-0.268 (0.255)	0.605 (0.271)	0.057 (0.007)
Instown	-0.468 (0.548)	-0.449 (0.505)	-0.465 (0.542)	-0.456 (0.522)	-0.466 (0.547)	-0.467 (0.548)
Market share	-0.001 (0.000)	0.000 (0.000)	-0.002 (0.002)	-0.001 (0.000)	0.000 (0.000)	-0.001 (0.000)
Leverage	0.314 (1.021)	0.303 (0.989)	0.278 (0.834)	0.318 (0.913)	0.308 (1.051)	0.314 (1.031)
Log(size)	0.068 (0.713)	0.075 (0.887)	0.079 (0.998)	0.065 (0.629)	0.071 (0.784)	0.069 (0.716)
Takeover status	-0.412 (0.906)	-0.404 (0.868)	-0.43 (0.978)	-0.41 (0.899)	-0.412 (0.906)	-0.412 (0.905)
Defense	-0.039 (0.007)	-0.035 (0.006)	-0.035 (0.006)	-0.041 (0.008)	-0.036 (0.006)	-0.04 (0.007)
Multiple bidder	-0.698 (0.44)	-0.669 (0.404)	-0.679 (0.417)	-0.696 (0.438)	-0.686 (0.425)	-0.698 (0.44)
Horizontal	0.046 (0.015)	0.062 (0.027)	0.088 (0.053)	0.036 (0.009)	0.054 (0.02)	0.047 (0.015)
Medium	-0.667 (2.323)	-0.675 (2.383)	-0.647 (2.196)	-0.661 (2.281)	-0.669 (2.341)	-0.668 (2.327)
Year1	-0.133 (0.124)	-0.131 (0.12)	-0.136 (0.129)	-0.135 (0.126)	-0.133 (0.124)	-0.133 (0.124)
Year2	-0.614 (1.912)	-0.61 (1.886)	-0.612 (1.897)	-0.613 (1.906)	-0.614 (1.916)	-0.614 (1.913)
Model chi-square	14.9	15.8	19.0	15.1	15.1	14.9

the takeover activities are expected to be undervalued, which is attractive for new bidders.

However, these expectation may not be generally applicable, and can only be applied to firms in the 7300 industry during 1985- 2010 time period.

V. Conclusion

This paper discusses the institutional effect on the entire takeover process in the 7300 industry, which includes the probability of attracting a takeover bid, the success of the bid, the offer price, the stock price premiums, the characteristics affecting the premiums, the post-bid performance, and the possibility of previous bidders becoming new targets. Some of the results are consistent with previous studies, while some are new findings of this paper.

Firms from different industry sectors vary in their consideration when selecting target firms from 7300 industry. For the firms in Business Service Industry, the factors distinguishing whether an acquirer is from the 7300 industry sector are the fraction of intangible assets to total assets, market share and leverage. More importantly, the more institutional shares held in a firm, the more likely that the firm receives a takeover bid, and this bid is more likely to be accepted by the firm. These results prove the former conclusion that institutions can monitor the investee and remove value-damaging anti-takeover defenses.

Next, the bidders with lower level of cross-ownership are more likely to acquire the targets successfully. . This result is consistent with the hypothesis 2 that the negative relationship between the probability of takeover success and toehold size can be applied to the probability of takeover success and cross-ownership as well. The previous studies about the toeholds show that holding a proportion of toehold can lead to winning in auction, but there's an optimal toehold size. According to the findings of Bris (2001), some acquirers secretly buy toehold before takeover, which may drive up the targets' share price and give rise to the failure of the final takeover. In addition, lower average

market-to-book ratio before takeover bid also increases the possibility of success.

When considering the offer price for the transaction, the institutional investors' cross-ownerships in acquirers and targets before takeover are important and have inverse influence. The increase in ownership in target firms reduces the probability of success as well as the offer price. The institutional investors are more likely to be good monitors and to remove value-reducing takeover resistance when they have higher ownership in the target firms. In addition, the institutional shares that are not cross-owned also negatively affect the offer price. The hostile bids with the presence of takeover defenses significantly pull up the offer price.

Jensen and Ruback (1983), Jarrell, Brickley, and Netter (1988) and Jarrell and Poulsen (1989) have confirmed that target firms benefit a lot from the takeover activities, while acquirers lose a lot. This paper obtains the same results for the takeovers in the 7300 industry. Furthermore, when the full sample is divided into two subsamples of successful takeovers and unsuccessful bids, we can find that the loss of bidders are almost at the same level in each sample, while the targets in the successful sample perform much better than the ones in the unsuccessful sample. These results arrive at the conclusion that although on average all target firms achieve positive returns around takeover bid announcement, the target firms finally accepting the bid will gain more positive premiums.

The gains of institutional investors and cross-holders are also obtained. These results are consistent with the previous conclusion made by Matvos and Ostrovsky (2008) that even if acquirers lose a lot in takeovers, the premiums of cross-holders who own shares in targets will not be significantly negative, as the loss of acquirer stock price can be offset by the gains in targets stock price. When the takeover data in the 7300 industry is used to calculate the results, I find that acquirers in general lose dramatically, but institutional acquirers and cross-owners' shares in acquirers are insignificant and positive. The difference between the excess returns of total acquirers and cross-holders is also significant. When the sample is divided into two subsamples

of successful takeover and unsuccessful takeovers, same results are displayed.

The performance of bidders and targets are also discussed in this paper. In general, bidding firms suffer from a decrease in performance, especially when measured by market-to-ratio, after the bid. This conclusion applies in all samples. The acquired firms that turn down the bid will suffer from a poor performance in the next three years. This bad performance can be explained as that the target firms refused new technology, higher market power, better management and improved competitiveness when they turn down the bid. In addition, the return to cross-holders and institutional investors will positively affect the change of market-to-book ratio due to synergy.

Last but not least, on the contrary to Mitchell and Lehn's (1990) finding, I find only the excess return during (-1, +1) event window is positively correlated with the probability that previous bidders become new targets in the following three years. I also add the robustness test, in which excess returns are replaced by regression independent variables and error terms (excess returns as dependent variable) from previous regressions. Similar results are obtained from the robustness test. However, the difference in the results may be due to different observations in the sample and the difference of time period.

According to the previous studies, Bris (2001) and Betton and Eckbo (2000) find that acquiring toehold before making takeover bid may be observed by the market and affect the run-up period before announcement day. Nevertheless, if the institution investors in acquiring firms grasp the inside information for future takeover, they are convenient to buy the future target's share in public market, without attracting special attention from the public, as they are shareholders of so many securities.

In this research, certain limitations still exist. This paper studies only the firms in the 7300 industry, and includes only public takeovers in U.S. market in the full sample. If possible, the whole industry firms should be included into the sample in order to obtain more accurate results.

When collecting institutional ownership data for the full sample, up to half of the

observations are dropped because of the lack of institutional data in the database. To improve the accurateness of this research, hand-collection would be better to obtain data from every fund's quarterly report.

In addition, the individual shareholders that are not institutional shareholders can also hold the shares in target firms if they invest in the public capital market. Similarly, the institutional holders in bidding firms that do not report holding shares in targets, possibly have the shares of another fund or portfolio which includes the security of target firms. Moreover, even if institutions don't possess any stock in the targets, they could be, for example, the bond holders of the targets, which can affect the takeover probability as well. This kind of effect has not been taken into account in this paper.

Goldman and Qian (2005) find out the optimal toehold size to obtain maximum premiums in takeover. Similarly, future studies can focus on the takeovers in the 7300 industry to find the optimal number of shares held by cross-holders in acquiring firms and target firms before offering the takeover bid, which can maximize the cross-holders' returns after the takeover announcement.

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Appendix

Table29 The shares held by cross-holders and returns to stockholders in Microsoft and Yahoo case

Panel A shows 10 largest cross-owners' share in target and bidder. Panel B is the dollar return in million to 10 largest cross-shareholders' ownership in target and bidder. Panel C gives the data of return to target and bidder in percentage and dollar. Return is calculated by market model.

Panel A. 10 largest cross-shareholders' ownership in target and bidder		
10 largest cross-shareholders	Ownership in Yahoo	Ownership in Microsoft
Barclays	3.731%	3.114%
Capital research	2.561%	6.368%
Capital world	3.037%	5.211%
Axa	1.248%	0.455%
Fidelity	1.692%	1.357%
Franklin	1.213%	0.139%
Mellon	1.303%	1.390%
T. Rowe	1.460%	1.706%
State	2.895%	2.783%
Vanguard	2.564%	2.793%
Total	21.704%	25.316%
Panel B. Dollar return to 10 largest cross-shareholders' ownership in target and bidder (mil)		
10 largest cross-shareholders	Yahoo return	Microsoft return
Barclays	399.63	-1706.82
Capital research	274.29	-3490.81
Capital world	325.28	-2856.73
Axa	133.66	-249.44
Fidelity	181.29	-743.79
Franklin	129.97	-76.18
Mellon	139.58	-761.73
T. Rowe	156.34	-935.35
State	310.12	-1525.31
Vanguard	274.70	-1531.19
Total	2324.84	-13877.34
Panel C. Return to target and bidder (mil)		
	Yahoo	Microsoft
Return (-5,+5)	36.933%	-17.714%
Dollar return	10711.72	-54817.23
10 largest cross-holders' dollar return	2324.84	-13877.34
Total cross-holders' dollar return	5302.871032	-37449.8078

Aktas, Bodt and Roll (2013) give the case that on February 1, 2008, Microsoft offered a price of 43.7 billion U.S. dollars to acquire Yahoo, but this bid failed at last and Microsoft suffered a heavy loss.

In my research, another aspect of this case will be analyzed. Table 29 shows the cross-ownership in two firms reported on the last report day. Data is from Thomson Financial CDA/Spectrum Institutional (13f) Holdings database and Center for Research in Security Prices (CRSP). We can find in Panel A that the largest 10 cross-owners make up 21.707% of Yahoo's shares and 25.316% of Microsoft shares before takeover announcement. Around the announcement day, from -5 to +5, Yahoo achieves 36.933% excess return and 11 dollar return, while Microsoft suffers the loss of -17.714% excess return and -37 billion dollar. For the stockholders in Microsoft as a whole, they really lost a lot in this takeover bid. However, when we only focus on the cross-stockholders, who also own the shares in Yahoo, the result may be a little different.

In Panel C, the 10 largest cross-holders lose -13.88 billion dollars in Microsoft, but this loss is partially offset by the gains of 2.324 billion dollars in Yahoo. For these cross-owners, their rate of return is calculated as $(2.324 + (-13.88)) / (29.003 \times 21.707\% + 309.457 \times 25.316\%) = -13.653\%$, which is much better than the total loss of -17.714%.

Similarly, if we turn to the total cross-holders, we can find that they suffer a loss of -37.449 billion dollar in Microsoft, but gain 5.303 billion dollars from Yahoo's share. Therefore, the return for the total cross-holders can be computed as $(-37.449 + 5.303) / (29.003 \times 68.318\% + 309.457 \times 49.505\%) = -14.248\%$, also better than -17.714%.

In this case, Aktas, Bodt and Roll (2013) attribute the overbidding to agency problems or manager hubris. No matter which holds, firm value will be destroyed and shareholders' wealth will decline. However, the institutional investors will not worry so much as they already own a little part of target firms' share, which will earn positive premium in the takeover and compensate the loss. This case supports the idea of Matvos and Ostrovsky (2008).

Table30 Number of firms in each year of nine largest industries

Number of firms exist in each year from 1985 to 2010. 1000 stands for Metal Mining industry. 1300 refers to Oil And Gas Extraction industry. 2800 represents for Chemicals And Allied Products industry. 3500 is for Industrial And Commercial Machinery And Computer Equipment industry. 3600 stands for Electronic And Other Electrical Equipment And Components, Except Computer Equipment industry. 3800 includes Measuring, Analyzing, And Controlling Instruments; Photographic, Medical And Optical Goods; Watches And Clocks industry. 4900 refers to Electric, Gas, And Sanitary Services industry. 6000 defines as Depository Institutions industry. 7300 is Business Service industry.

SIC	1000	1300	2800	3500	3600	3800	4900	6000	7300
1985	130	400	315	419	399	360	428	463	390
1986	182	453	407	517	515	459	444	559	546
1987	187	436	441	527	528	467	453	645	568
1988	190	434	449	522	515	471	459	690	572
1989	190	427	464	506	519	465	454	709	581
1990	180	419	500	501	533	473	454	728	613
1991	177	424	545	525	547	504	460	740	703
1992	180	438	593	546	568	531	458	811	800
1993	177	458	627	566	612	549	457	1006	911
1994	195	467	643	580	655	551	460	963	1046
1995	211	471	709	601	711	600	459	906	1251
1996	212	465	736	604	736	595	461	858	1380
1997	200	444	735	584	736	585	445	801	1471
1998	201	452	788	585	757	591	433	836	1614
1999	227	461	820	547	749	583	436	928	1628
2000	258	467	830	517	720	550	413	917	1527
2001	272	449	850	476	681	529	417	912	1387
2002	295	445	841	457	666	521	414	898	1279
2003	340	469	849	430	648	513	417	915	1172
2004	391	499	873	412	665	509	416	869	1134
2005	442	518	872	383	664	493	418	848	1103
2006	516	539	877	363	655	474	422	805	1048
2007	529	527	852	350	640	447	406	759	995
2008	553	530	805	330	617	412	400	733	937
2009	602	523	792	321	588	390	397	725	907
2010	670	559	794	309	557	378	389	721	920
2011	126	34	50	41	97	40	10	16	112
Sum	7833	12208	18057	12519	16278	13040	11280	20761	26595