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Mergers LeverageDynamics and Post-Merger Integration Duration

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***Abstract*—This paper examines the effects of the post-merger integration duration on acquiring firms' leverage behavior before and after a merger, using a dynamic model in which full merger benefits cannot be consumed at the instant of a merger, but rather after a pre-specified post-merger integration period. The model generates new implications related to acquiring firms' leverage dynamics along with method of payment choice. Specifically, the model indicates that the post-merger integration duration is negatively associated with the market leverage of newly-merged firms at the time of merger completion and during the integration period. Further, acquirer managers are more likely to use equity to finance amerger when the integration duration is likely to be lengthy. Our empirical tests provide evidence consistent with the model implications.**

Keywords-post-merger integration duration, leverage, method of payment

I. INTRODUCTION

The integration of two merging firms takes time to complete. This means that the synergy gains from the merger cannot be captured instantly at the merger date but rather only afte rthe firms go through an integration/transition period. This period is often associated with temporarily higher costs and an elevated uncertainty about the merger success. Only after the post-merger integration is complete, can the newly-merged firm fully enjoy the merger benefits. We refer to this time lag between the initiation of the merger and its completion as the "post-merger integration duration". This merger integration period receives a great deal of attention among practitioners, but is largely ignored in both the theoretical and empirical literature on mergers. Annual reports of acquiring firms frequently discuss the challenges and diffculties firms may face during the integration period, such as possible problems in maintaining key employees, consolidating and rationalizing corporate infrastructures and eliminating redundant processes. There have been numerous reports of culture clashes,confusion and internal disruptions leading to declines in employee and customer satisfaction and loss of profitability. For these reasons, companies that expect a longer post-merger integration period may face temporarily higher expenses spread over a longer period coupled with higher operating risk. In turn, this expectation of a long integration duration should directly affect an acquirer's decision when to merge, how to pay, and most importantly the capital structure of the newly-merged firm.

This paper presents a dynamic model and empirical tests that describe the impact of the post-merger integration period on the capital structure dynamics of the acquiring and target associated with the post-merger integration period, the model can provide new implications for the leverage behavior around the merger. For example, the model predicts that the longer the expected post-merger integration period, the lower the leverage an acquirer will choose for the newly-merged firm at the time of the merger. Moreover, the merged firm will keep its leverage at a lower level during the transition period if the remaining integration period is long. Finally, an acquiring firm will optimally choose to merge/acquire target firms that have lower than optimal leverage ratios. The rationale behind the model implications is straightforward. Since acquiring managers foresee the integration process to be risky, they will maintain a higher degree of financial flexibility during the period. As such, they will be less likely to choose higher leverage for the merged firm and are more likely to retain this lower leverage throughout the transition period.

II. DESCRIPTION OF THE MODEL

We assume that the acquiring firm continuously observes the earnings and debt level of the target firm and can choose to acquire it where the timing of the merger is endogenously determined. The merged firm will be producing the two products of the two firms and its earnings depend on the prices of both products and the combined fixed production costs. The merger synergy comes from the cost savings that can be obtained only after some prespecified time lag. Specifically, we assume that at merger completion, the combined fixed production costs of the merged firm is higher than the respective total costs at the pre-merger level of the two stand alone companies. During the prespecified post-merger integration period, the costs will decline gradually to a level which is below the combined pre-merger level, withnewly-merged firm has to go through the integration period which is often associated with temporarily higher costs. Only after the prespecified post-merger integration period passes, can the merged firm start capturing the synergies of the lower production costs. The length of the post-merger period, over which the combined production costs decline, is referred to as "integration period" or "integration duration". The "integration period" and the post-merger cost structure dynamics is known to the acquirer and to the market. When the acquiring firm chooses the timing of

its merger, it also can choose its financing source which can be any mix of coupon debt and external equity. The merged firm will have to default if its earnings decline below its periodic debt payments. At the merger date, the acquirer has to pay the market value of the target's equity and the face value of target's existing debt. In addition, we assume that the acquirer has to pay a premium to the equity holders of the target firm, which is proportional to the total market value of the target firm. Thus, the value of the acquirer's equity depends not only on its own earnings and its own debt level but also on the value of the option to merge. The value of such an option is also a function of the target's earnings, its production costs and its debt level. The acquiring firm's decisions with respect to a merger are made with the objective of maximizing the equity value of its existing shareholders. For simplicity, we assume that the seller does not know that it can be acquired so that its capital structure decisions and the value of its equity and debt are not affected by the merger possibility. The formula listed below is the model.

$$E_2(p_2, d_2) = \max_{\widehat{d_2} > d_2} [E(p_2, \widehat{d_2}) + D(p_2, \widehat{d_2}) - D(p_2, d_2) - TC_2^{debt}],$$
$$\text{such that } E(p_2, \widehat{d_2}) > 0,$$

III. VALUATION

We assume the market is complete for the firms' product, which implies that each product is a continuously traded asset (e.g. gold). The debt and equity of each firm can be regarded as tradeable financial claims for which the usual pricing conditions must hold (see Merton(1974)). Specifically, for each firm, the market values of its equity and debt are the present values of expected cash flows to equity holders and debt holders, respectively, where the cash flows are discounted under the risk-neutral measure.

IV. EMPIRICAL TESTS

A. Sample Description

In the following sections we test several predictions derived from the model with a particular focus on the effect of integration duration on the leverage decision of the merging firms. Specifically, acquirer managers will choose a lower degree of leverage for the merged entity if they expect that the newly-merged firm will face higher operating costs and cannot fully consume the merger benefits during the transition period. Additionally, managers will retain this low level of leverage during the transition period until integration is complete and will finance the merger with a higher fraction of equity the longer the transition period.

We obtain managers' discussions about the merger deal from several data sources including annual 10-K filings, 8-K filings, and merger-related proxy statements on Edgar Online and news stories from FACTIVA. In these data sources, we search for the information about managerial expectations as to when merger-related gains are expected to materialize in order to create the post-merger integration duration (PMID) variable. For each deal, we conduct a key word search through the entire text of annual 10-K filings, 8-K filings and merger-related proxy statements from the fiscal year of merger announcement to the fiscal year of merger completion and identify all sections of text in which the integration process and expected merger gains are discussed. News stories are retrieved on FACTIVA though deal-by-deal keyword searches for a time-period from three months before the merger announcement date to the three months after the merger effective date. Keywords used in the search include: bidder name, target name, merger, acquisition, merger-related, synergy, enhance (ment), revenue growth, revenue enhancement, save, saving, cost saving, improve, economic, scale, expected, profit, benefit, integrate and integration.

B. Empirical Findings

As listed in Table1, we first report summary statistics on acquirer and target firm characteristics for the whole sample and subsamples in which we are able to create PMID. Next, we examine the association between PMID and market leverage at the year of merger. Thirdly, we examine the impact of PMID on the choice of method of payment. Fourthly, we verify our results by examining the magnitude of the change in leverage around the merger that is attributable to PMID. Finally, we examine the leverage dynamics during the post-merger integration period.

- Acquirer and target firm characteristics

Table 1Acquirer And Target Characteristics

	All Deals	Equity Payment	Cash or Mixed	With *PMID*	Without *PMID*
Panel A: Median Acquirer Characteristics					
CPI adjusted Market Value of Assets($mm)	429.33	313.84	561.10***	1819.67***	351.04
Market-to-Book Ratio	1.76	2.23	1.57***	1.64**	1.78
Profitability	0.12	0.09	0.13***	0.13***	0.11
Cash Holding	0.13	0.29	0.07***	0.06***	0.12
Market Leverage	0.22	0.14	0.28***	0.28***	0.21
Pre-Merger Leverage Deviation	-0.09	-0.13	-0.06***	-0.06***	-0.10
Panel B: Median Target Characteristics					
CPI adjusted Market Value of Assets($mm)	187.38	144.95	221.81***	916.36***	145.93
Relative size to acquirer	0.45	0.48	0.42***	0.52**	0.44
Market Leverage	0.26	0.14	0.28**	0.29**	0.26
Panel C: Median Acquirer Characteristics with Different Integration Duration					
Integration Period	***PMID* <2**	***PMID* =2**	***PMID* >2**		
CPI adjusted Market Value of Assets($mm)	801.36	1469.99**	4061.68***		
Market-to-Book Ratio	1.60	1.60	1.78*		
Profitability	0.13	0.13	0.14		
Cash Holding	0.06	0.06	0.05		
Market Leverage	0.26	0.29*	0.28		
Pre-Merger Leverage Deviation	-0.10	-0.05**	-0.05		

Table 1 provides median values for selected acquirer and target firm characteristics for the initial sample and subsamples across three PMID groups. We tabulate the information based on the median values of non-missing observations of each variable.

The sample consists of 1365 mergers that are announced between 2004 and 2016 in which the relative size of the target to the acquirers is at least 20%. All variables are constructed from Compus tat information. All variables are measured during the fiscal year prior to the year in which a merger is completed. We tabulate the information based on the nonmissing observations of each variable. Market value of assets is book value of

liabilities plus market value of equity. The market assets are in millions of inflation adjusted year 1990 dollars.

As listed in Figuer1, panel A and panel B. Market-to-Book ratio is market value of assets over book values of assets, where market value of assets is obtained as the sum of the market value of equity (price-close × shares outstanding) + debt in current liabilities + long-term debt - deferred taxes and investment tax credit. Profitability is EBITDA/book assets. Cash holding is the ratio of cash and marketable securities to the book value of total assets. Market leverage is defined as (book assets-book equity+ market equity)/book assets, where book equity is measured as total assets-[total liabilities + preferred stock] +deferred taxes+ conv. Debt. Pre-merger leverage deviation is pre-merger actual market leverage minus regression predicted market leverage. Relative size to acquirer is the transaction value of the deal/market value of acquirer assets in year t-1. ***, ** and * represent significance at the 1%, 5% and 10% level, respectively, for two-tailed Wilcoxon rank-sum tests to determine whether distributions differ between equity and cash or mixed deals, deals with PMID reported and without PMID in Panel A and B.

Panel A shows that the market value of acquirers paying with equity is smaller than that of acquirers paying with cash or paying with a mix of cash and equity. The higher ratio of market-to-book assets for acquirers paying with equity suggests that these acquirers have larger growth opportunities ,consistent with Martin (1996) and Harford et al. (2009). In addition, acquirers paying with equity tend to be less profitable and hold more cash. Furthermore,

Panel A also shows that market leverage is much lower for equity deals. Given that acquirers paying with equity tend to have larger investment opportunities, it is likely that they hold larger cash balances and are less leveraged (i.e., Opler, Pinkowitz, Stulz and Williamson, 1999; Titman and Wessels,1988).Panel A also indicates that the market value of acquirers for the PMID sample is larger than that of the sample of acquirers in which we are not able to construct PMID. This is not surprising as there is likely much more media/news coverage of larger firms. Since one source of information we use to collect PMID is news searches on FACTIVA, this causes us to find PMID more often for relatively larger firms. The median asset value is approximately$1.8 billion for acquirers in which we can construct PMID, but only $351 million for their counterparts in which we cannot find information to construct PMID. However, the market-to-book ratio of acquirers in which we can create PMID is slightly lower than that of acquirers in which we cannot construct PMID. Moreover, acquirers that have PMID are likely to be more profitable, hold less cash and have higher leverage. They are in general more similar to acquirers paying with cash or with mix of cash and equity. Panel A also reports acquirer firm leverage deviations. The leverage deviation is defined as actual market leverage for year before a merger minus the model predicted target leverage of that year for the firm.

Panel B presents summary statistics regarding target firm characteristics. Particularly, market size and relative size of target to acquirer are both larger for deals in which we can construct PMID. Additionally, target market leverage is higher in deals in the PMID sample. Furthermore, Panel B shows that market leverage, defined as total book debt scaled by total market assets is 0.26 for the PMID<2 years group, 0.29 for the PMID=2 years group, and 0.28 for the PMID>2 years group. Moreover, the firms with shorter PMID tend to have a larger leverage deficit prior to the merger.

Panel C provides information about acquirer characteristics across different PMID groups. The median market value of acquirers' assets increases monotonically as PMID becomes longer. For example, the median market value of acquirers in PMID<2 years group is approximately $800 million, while the median market value of acquirers in PMID>2 years group is approximately $4 billion. In addition, the market-to-book ratio increases monoton-ically across PMID groups, but the differences are only marginally significant.

- Change in market leverage resulting from mergers.

Our previous results demonstrate a negative relation between market leverage after the merger completion and PMID, and also a positive relation between PMID and the fraction of the deal paid for with equity. In this section, we further assure our results by analyzing the change in market leverage around the year of merger. The results of regressions that explain the change in leverage from year t-1 to year t (i.e. one year before merger to the year of the merger) show that, other than the variables included in the regression of Table 1, we also include the change in optimal leverage in each specification. Harford et al. (2009) show that managers are more likely to increase leverage around a merger if they believe an acquisition increases their target leverage ratio. To show that PMID has additional power in explaining the leverage change before and after a merger, we include the merger-induced change leverage in the regression. Consistent with Harfordet al. (2009), this variable is calculated as predicted market leverage in year t+1 subsequent to a merger minus predicted market leverage in t-1. In line with our hypothesis, we expect a negative relation between PMID and the actual change in market leverage from year t-1to year t. We conduct the analysis on our initial sample and PMID sample respectively. Consistent with our expectation, PMID is negatively related with the change in market leverage around the merger. A one year increase in PMID reduces the change in market leverage by 1.8% and 2.1%, depending on the model specification. These results are also consistent with Harford et al. (2009) in that the pre-merger year leverage deviation and the merger-induced change in target market leverage have predictive power in explaining the actual change in market leverage around merger completion.

V. CONCLUSION

This paper provides a model and empirical evidence that

the leverage behavior around mergers and during the post-merger integration period is affected by the acquirer's expectation about the length of the post-merger integration duration. The model offers new implications as well as economically plausible explanations to several stylized facts about the observed capital structures of mergers. The model substantiates the argument that due to anticipated delays in capturing merger-related gains, an acquiring firm should rationally preposition itself by choosing lower leverage immediately before initiating the merger and should keep a lower degree of leverage during the post-merger integration period. Empirical tests support the model implications by showing that the longer the expected post-merger integration process, the less likely the acquirer will structure the financing of the combined firm in a manner that increases firm leverage. Since integration takes time to complete, an acquirer tends to retain financial flexibility during the integration process by assuming lower levels of debt when determining the capital structure of the merged entity. We document that the market leverage of a newly merged firm is negatively associated with the length of the integration period. Our results also suggest that, other things being equal, acquires are more likely to finance the deal with equity when they expect a longer integration period. Finally, we show that the duration of the integration period can help explain leverage dynamics during the post-merger integration period. Overall, our results suggest that acquirer managers are forward-looking in financing the merger, considering the post-merger integration characteristics of the combined firm.

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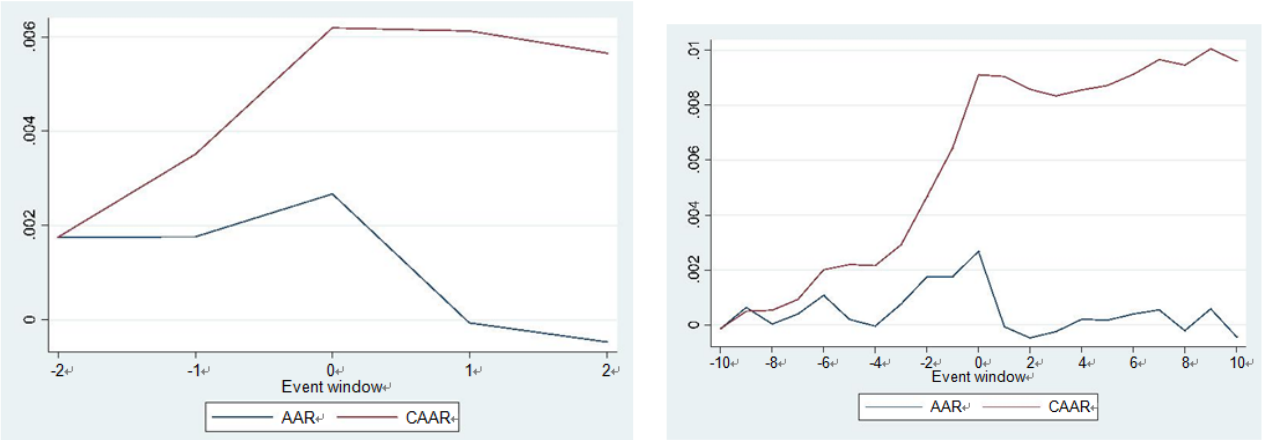
The Figure shows the development of both the AAR and CAAR over 5-day and the 21-day event windows for a sampleof 1921 M&A announced by Chinese listed firms between 2007 and 2016.



Panel A: Bidder AAR and CAAR (-2, +2)Panel B: Bidder AAR and CAAR (-10, +10)

Figure 1: Development of AAR and CAAR