INDUSTRY CONCENTRATION, FIRM SIZE AND ENTRY-TIMING IN MERGER WAVES

Lin Lin[1], Ngou Teng Pun[2] and Zhongda He[2]*

[1]*Department of Banking and Finance, New Huadu Business School, Minjiang University, 200 Xiuangong Road, University Town, Fuzhou, Fujian, China*
[2]*New Huadu Business School, Minjiang University, 200 Xiuangong Road, University Town, Fuzhou, Fujian, China*

*Corresponding author: hezhongda@nbs.edu.cn

ABSTRACT

As early mover advantage and late mover advantage have been discussed for decades, the conditions for the best use of them are yet unclear. Using the U.S. merger data during 2000–2019, this study examines the entry-timing and the post-merger performance of 1,376 bidders in the merger waves recognised. We find that early movers have advantages with higher post-merger performance in a merger wave, while the effect of late mover advantage is not significant. Moreover, early mover advantage can only be implemented in competitive industries. Our analysis further provides the entry-timing strategies for large firms and small/mid enterprises, respectively. Our results indicate that late mover advantage can only be adopted in large companies, while small/mid firms should be followers, not early or late movers, in high concentration industries. Overall, our study sheds new light on the entry-timing in a merger wave with the consideration of different market concentration environment and different firm size.

Keywords: Merger wave, Early mover advantage, Late mover advantage, Industry concentration, Size effect

INTRODUCTION

Early mover advantage has long been discussed in finance and management literature. Early mover advantage refers to that a pioneer, by acting early relative to peers, may establish a competitive advantage that will generate positive economic profits (Lieberman & Montgomery, 1988; Carow et al., 2004). Investors prefer the firms with early mover advantage partly because they can usually be expected to have stronger growth with new leading technologies, products or business models than their competitors (Lieberman & Montgomery, 1988; Wang et al., 2016; Williamson, 1985), which will bring about higher expected stock premium. Take Merger and Acquisition (M&A) activity as an example, empirical evidence seems to support a significant positive market response to those early movers in merger waves, especially during their 3-year post-merger period (Carow et al., 2004; McNamara et al., 2008; Noda & Collis, 2001).

In contrast, prior studies also point out that early movers in merger waves might fail to produce synergies if they find out later that they actually do not quite understand the industry where their targets are located, or misjudge the business opportunities that such mergers can bring (Boulding & Christen, 2001; Cho et al., 1998). Their overconfidence will also drive them to make irrational or impulsive merger decisions (Carow et al., 2004; Goel & Thakor, 2010). Rahman (2022) summarises the managerial hubris hypothesis and suggests that during merger waves, irrational managers exhibit overconfidence in their ability to estimate the potential gains from acquisitions. This overconfidence can lead to suboptimal decision-making and may, conversely, boost the scale of merger waves. Meanwhile, based on the proxy theory, these bad decisions may simply stem from the conflict of interests between managers and stockholders of the firm. For example, top management will convince the board to rush into a bid for merger to maximise their own compensation schemes at the expense of the stockholders. This is supported by the management overconfidence hypothesis which points out that the cause of fatal problems in mergers could be the board of directors of the firm itself (D'aveni, 2010; Villalonga & McGahan, 2005). This so-called early mover disadvantage thus provides opportunities for late movers.

Similarly, the advantages and disadvantages of late movers, who act late relative to their peers, have been documented and discussed in the literature. The late mover may enjoy advantages from the market, competition, and the late moving firm itself (Cho et al., 1998). For example, late players can succeed by adopting disruptive strategies to compete against well-established incumbents and late mover advantages may also take the form of free-rider effects stemming from the evolution of the market and technology (Cho et al., 1998). Moreover, industry competitive dynamics may also lead to advantages for late movers because of the

inertia forces of early movers, and late movers can observe the market response to the initial movements of competitors and make judgements with more concrete information (Cho et al., 1998).

Given the mixed evidence related to early mover/late mover advantage, we are motivated to empirically investigate this issue. Using a large sample of 1,376 deals of mergers and acquisitions from 2000 to 2019, we explore whether early mover or late mover in a merger wave will enjoy early mover/late mover advantage. Our empirical results indicate that the post-merger advantages, in general, exist in early movers, while the effect of late mover advantage is not significant.

Industrial characteristics like industry concentration and competition, are playing an important role in better explaining the relationship between entry-timing in merger waves and post-merger performance. For example, Carow et al. (2004) found that early movers in mergers can gain the market premium only in expansionary industries. Andonova et al. (2013) later claimed that only manufacturing enterprises will experience superior earning performance by being early movers in merger waves. In addition, the merger of good long-term returns is often occurred in the industry with a higher level of capital liquidity (Harford, 2005). It seems that early mover advantages are, to some extent, related to industrial characteristics, but the effect is not clear yet.

We further investigate the early mover/late mover advantages in different industrial concentration environments. We find that the early mover advantages are more pronounced in industries of high competition than in high concentration industries. This indicates the early mover advantage can be magnified in competitive industries. But the late mover story is still not clear.

Early mover advantages/late mover advantages may also be influenced by firm characteristics, the most popular one of which may be the firm size. Apart from their well-known bargaining/pricing power (Matsumoto et al., 2012; Roberts, 2014) and impactful business resources, large firms usually have access to information of good quality, with which they can be more confident while considering undertaking innovative activities for profits (Chen et al., 1989; Kim & Singal, 1993). These size advantages can be more easily found in monopolistic or oligopolistic industries (Harris, 1998; Martínez☐Ferrero et al., 2016). To large bidders, their profound business networks and resources give them more strategic flexibility to participate in new lines of business or ventures via mergers (Damania et al., 2005; Ozer & Lee, 2009), and could as well offer higher bid prices or use cash as a mean of payment to discourage their potential competitors (Hackbarth & Miao, 2012; Madura et al., 2012). Therefore, the size and early mover advantages

will be magnified in the industries in which the concentration rate, usually measured in literature by the Herfindahl-Hirschman Index (HHI), is relatively higher.

According to Gorton et al. (2009), some kinds of merger strategies such as defensive acquisitions can only be adopted by companies with specific sizes. For example, managers, in a large firm, may have stronger motivation to exercise the unprofitable defensive acquisition if their private benefits are high. In addition, the post-merger synergies are different regarding the bidder's size. Therefore, the entry-timing is critical to influence the post-merger performance in the market wave and the success or failure of early movers could serve as good lessons to their followers. We investigate the best entry-timing strategies (to be early mover, follower, or late mover?) for large firms and small firms respectively. Our empirical results show that both large companies and small/mid enterprises should adopt the early move strategy in competitive industries. Alternatively, in the concentrative market, large companies, as the industry leader, should enter the merger wave in the last stage, while small/mid enterprises may choose to be the follower to imitate the early mover.

We contribute to the literature in several ways. First, we contribute to the acquisition literature by showing that early movers have advantages in a merger wave and may enjoy better post-merger performance. Second, we link early mover advantage with industrial concentration and indicate early mover may have different levels of advantage in different industrial concentration environment. Last, we make a detailed analysis of the entry-timing strategy for large firms and small/mid enterprises respectively, which provides evidence for firms to choose their entry-timing in a merger wave based on the information asymmetry and their own bargaining power.

LITERATURE AND EARLY HYPOTHESES

Mover Advantage

Early mover advantage has been extensively studied in the literature. Klepper (1996) suggests that the size of first mover firms typically surpasses that of late movers when the latter enter the market, first-movers have the advantage of spreading their initial R&D investments across a larger range of products or services. This allows them to achieve economies of scale, reducing the average cost per item developed. In contrast, late movers face the challenge of making similar R&D investments with smaller-scale operations, which can result in higher costs per item. By leveraging economies of scale, first movers gain a competitive

edge and enhance their profitability in the market. In addition, Early entrants have a significant advantage as they have already accumulated a large user base, making their offering more attractive to potential users. This leads to a reinforcing cycle where more users attract even more users, further solidifying the early entrant's market dominance (Brouthers et al., 2016; Zhu & Iansiti, 2012). The recent study further suggests that early mover advantage can be applied to the country-level aspect. Early and strategic initiatives aimed at attracting specific industries can create a significant impact by attracting a substantial number of investments. Over time, this accumulation of investments can foster an environment that becomes highly attractive for businesses and investors (McKendrick et al., 2021).

Regarding mergers, the early mover's aggressive investment strategy and advantageous performance can be partly explained by the information asymmetry hypothesis (Jarrell et al., 1988; Lieberman & Montgomery, 1988; Williamson, 1985). It is found that early movers in merger waves usually have advanced information which helps them to identify and study potentially qualified targets, save the labor cost from hiring boutique advisors, and bid with a more reasonable premium (Jarrell et al., 1988; McNamara et al., 2008; Noda & Collis, 2001; Loyeung, 2019). They will also try to speed up the process of mergers and make it more likely to be completed (Doan et al., 2020). Their followers, especially those who bid around the peak of merger waves, could, unfortunately, be forced to raise their bid prices due to the fierce competition, which will reduce the expected post-merger returns (Doan et al., 2016; McNamara et al., 2008; Sonenshine, 2020). The merger synergy, if occurred, will further enhance these early movers' competitive advantages in terms of the increase of their market shares, improvement of productivity, or the flexibility of business strategy (Makadok, 1998; McNamara et al., 2008; Rabier, 2017; Sirower, 1997), which are usually accompanied with higher expected returns on their stocks. However, recent research discovers the opposite results on the entry time of the merger wave, say the Nordic bidders in the first half of the merger wave exhibit poorer performance than the ones during the second half (Holmberg, 2023).

Late Mover Advantage

Contrary to early mover advantage, literature affirms the existence of late mover advantage and documents it can effectively mitigate the uncertainty of the late entrants. Late movers in the economic context can benefit from positive externalities created by first movers, effectively "free riding" on the innovation efforts of pioneers. As customer needs become better understood over time, reducing market uncertainty, late movers who swiftly adopt the dominant design can reap the advantages of product standardisation without incurring the costs

associated with experimentation and technology switching that first movers encounter (Dowell & Swaminathan, 2006; Suarez et al., 2015). On top of that, late movers have access to a wider range of functionalities and insights gained from the efforts of early movers. This enables them to incorporate and integrate these known functionalities into their product designs, resulting in superior offerings compared to their predecessors (Querbes & Frenken, 2017). For example, the literature points out that sharing its expertise with less developed countries played a crucial role in sulfur emission control. Zhong et al. (2020) conducted an evaluation using a hypothetical "no late mover" scenario which means developing countries have no chance to gain the experience from developed countries and undertake the comparison with the real. Their results support the importance of the experience that late movers gain. In the merger wave aspect, the late movers, when acquisition fury declines, may be able to evaluate the true value of potential target and undertake the merger more rationally (McNamara et al., 2008).

Cho and Chung (2022) consider acquisition decision as a long-term investment with shareholders expecting benefits over an extended period, thus emphasising the importance of reassessing the impact of mergers and acquisitions on long-term post-merger performance. Based on the above analysis, we start with testing the existence of early mover/late mover advantage and present the following hypothesis:

> H1: Early movers and late movers both tend to show advantages in merger waves and outperform their peers in terms of higher buy-and-hold return and higher ROA in the post-merger period.

As mentioned above, the early mover advantages in the merger wave are primarily the result of exceeded information, the relatively lower price compared to acquisition fury, and the market proportion can be seized. However, this effect may not be well activated in the high concentration market. Ali et al. (2014) and Gentzkow and Shapiro (2008) suggest that in high concentration markets, there is reduced competition among firms, which lowers the likelihood of any individual firm providing accurate information to investors. Further, they are more likely to engage in fraudulent accounting practices since it is hard to be exposed, which will make the target pricing in the merger more difficult. Contrary to the competitive market, the pricing power in high concentration market is more likely to be monopolised by the market dominants (Liozu, 2019; Peteraf, 1993). Therefore, it is reasonable to conjecture that being the early mover may not be able to enjoy the price benefit, meanwhile, the acquirers in merger fury may not need to overpay the targets. In addition, with fewer competitors in the market, firms in concentrated industries face less immediate threats to their market position,

thus reducing competitive pressure which can compel firms constantly innovate and improve efficiency (Shleifer, 2004). This market feature may eliminate the motivation, seizing the market proportion, of potential early movers. Accordingly, we consider that the features of high concentration market may weaken the early mover advantage in merger wave.

Based on the above analysis, we then investigate whether the early mover advantage is different in industries with different industrial concentrations and propose the following hypothesis:

H2: Early movers have larger advantage in competitive industries than in high concentration industries.

Similarly, for companies, especially the industry leader, in the concentrated market, the first aim is to reduce uncertainty instead of chasing opportunity. So, the late mover strategy may be more valuable to these companies. Accordingly, we present the following hypothesis for late movers:

H3: Late movers have larger advantage in high concentration industries than in low concentration industries.

METHODOLOGY AND DATA

Sample and Merger Wave

The record and data of the 48,658 M&A transactions during 2000–2019 in the U.S. are obtained from the Security Database Company (SDC). For the calculation of the 3-year post-merger performance of bidders, the financial accounting information and the monthly stock returns of our sampled acquirers during 2000–2021 will be downloaded from COMPUSTAT. The sampled firms with incomplete merger state records, financial accounting, or market data will be removed, and so are the transactions of the bidding firms in financial or real estate industries (SIC 6000–6999). Once the merger waves are identified and confirmed, the transactions which are not involved in merger waves will also be excluded from the sample.

The definition of a merger wave in this study can be referred to Carow et al. (2004). Based on the two-digit SIC codes of the firms in our sample, 29,942 transactions for 59 industries can be identified. For each industry, the peak year of the wave is the year with the highest number of merger transactions between 2000 and 2019. To determine the starting year of the merger wave, we look back from

the peak year and find the first year where the number of merger transactions drops to one-third or less than the number in the peak year, and the next year is defined as the starting year of a merger wave. Conversely, to find the end year of the wave, we look forward and identify the year when the number of merger transactions in the following year reaches one-third or less of the number in the peak year. If mergers are infrequent in a specific industry, it is possible to mistakenly interpret a small increase or decrease in the number of merger cases as a merger wave. Therefore, following Carow et al. (2004), we also remove from the sample the merger waves in which the total number of merger transactions is less than 30, or the number of merger transactions in their peak years is less than 10. In our final sample there are, in total, 15 merger waves, and 1,376 completed merger transactions occurred in 15 corresponding industries, as illustrated in Table 1.

In Table 1, it is noted that the merger wave with the smallest number of completed transactions is Wave 14 (Motion pictures, 34 cases) and the wave with the largest number of completed transactions is Wave 10 (Automotive dealers and service station, 285 cases). Wave 10 is also the longest merger wave of our sample, formed in 2002 and ended in 2018. The total number of transactions in the largest 20% merger waves (Waves 5, 9, 10) is 584, which does not exceed half of the merger cases in our sample, ensuring the sample unbiasedness for later analyses. In addition, the peak years (marked as boldface) of 8 merger waves are placed during 2006–2007 (Waves 1, 5, 6, 7, 11, 12, 13, 15), and 4 waves have the peak years in the year 2014 (Waves 3, 4, 8, 10).

We then list the merger transactions in the order of their merger announcement dates for each merger wave and define the bidders in the top 20% of the list as Early Movers (*EMR*), those in the bottom 20% of the transactions as Late Movers (*LMR*), and the rest as Followers (*FLR*). Finally, an acquirer will be defined as Large Firm (*LG*) if its market value is in the top 20% of its industry one quarter prior to its merger announcement date.

Table 1

The 15 merger waves and the number of completed M&A transactions for 15 industries within them in the sample during 2000–2019

Wave no.	Industries (SIC 2-digital)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
1	Metal, mining (10)						8	**19**	13	7	10	17	15	14	11							114
2	General building contractors (15)		8	**12**	11	7	6															44
3	Lumber and wood products (24)														5	**10**	9	5	9	**10**		48
4	Furniture and fixtures (25)											4	8	7	4	**11**						34
5	Paper and allied products (26)							26	**32**	20	15	20	14	11								138
6	Primary metal industries (33)				21	16	23	24	**47**													131
7	Miscellaneous manufacturing (39)			9	13	10	15	**22**	12	17												98
8	Transportation services (47)												11	18	15	**19**	15					78
9	Wholesale trade-nondurable goods											35	**84**	4								161

Table 1 (*Continued*)

Wave no.	Industries (SIC 2-digital)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
10	Automotive dealers and service stations (55)			18	13	15	13	23	14	15	12	10	19	25	20	**26**	11	15	22	14		285
11	Eating and rinking places (58)							20	20													40
12	Personal services (72)					10	11	7	**14**	6												48
13	Auto repair, services and parking (75)						6	11	**17**	6												40
14	Motion pictures (78)				4	9	**10**	8	6													37
15	Amusement and recreation services (79)				9	14	13	13	**23**	8												80

Event Models and Variables

Following Barber and Lyon (1997) as in most event studies in finance literature, the Buy-and-Hold Abnormal Return (*BHAR*) formula will be used here to compute the long-term post-merger abnormal returns of acquiring companies in the sample. All U.S. listed companies will be equally divided into 5 groups each year by their market value (*MV*). Then, within each group, these firms will be again divided equally into 5 sub-groups by their Market-to-Book (*MB*) ratios. This thus creates 25 controlled groups. Since the outlier might be an enormous interference in the mean value of the given group, we use the median return[1] of the matched controlled group in the corresponding period to adjust the bidder's market return, the specification which calculates the 3-year BHARs of each bidder in the final sample is:

$$BHAR_{it} = \left[\prod_{t=1}^{T} (R_{m,t} + 1) - 1 \right] - \left[\prod_{t=1}^{T} (R_{m,t} + 1) - 1 \right] \tag{1}$$

where $R_{i,t}$ is the return on stock i in month t, $R_{m,t}$ is the median return of the matched controlled group to the stock i in month t.

Apart from market performance *BHAR*, a popular financial accounting performance of firms, the change of *ROA* (Δ*ROA*), in the post-merger period will also be measured to detect the potential operating-related synergy. Finally, t denotes the year after a merger is announced. $t = 0$ is the merger announcement month. $t = 1, 2, 3$, respectively denotes the 1st, 2nd and 3rd year (12, 24, 36 months) following the merger of interest.

Referring to Xu (2017), we control other variables including capital expenditure to total assets ratio (*CAPEXP*), research and development scaled by total assets (*R&D*), market- to-book ratio (*MB*), logarithm of firm size (*Size*), total liabilities to total equity (*Leverage*), operating cash flow to Total assets (*Liquidity*), and *ROA*. *TP*, *Cash*, *Diversification* and *Dividend* are dummy variables. *TP* equals to 1 if the target firm of the transaction is publicly listed, and 0 otherwise. *Cash* equals 1 if the bidder pays by cash, and 0 otherwise. *Diversification* equals to 1 if the bidder and the target are in different industries, and 0 otherwise. Finally, *Dividend* equals to 1 if the bidder pays dividend in the merger announcement year, and 0 otherwise.

To examine the impact of early/late mover advantage on firm performance, we employ the following regression model:

$$Performance_{i,t} = \alpha + \beta\ EMR(LMR)_{i,t} + \gamma\ Controls_{i,t} + \varepsilon_{i,t} \tag{2}$$

Following the recent finance literature, the Herfindahl-Hirschman Index (HHI) will be adopted to measure the industrial concentration rate of sampled acquirers (Faizan et al., 2019; Liu et al., 2017). From each industry and year, we add up the square value of the market proportion of each company, and the formula is as follows:

$$HHI_{i,t} = \sum_{j=1}^{J} Proportion_{i,j,t}^{2} \tag{3}$$

Where $Proportion_{i,j,t}$ means the market value of j company divided by the total market value in i industry and t year.

Aimed to understand if the impact of early/late mover advantage will be strengthened/weakened in the industry with different concentration ratios, we employ the interaction term of *EMR*/*LMR* and HHI, and the regression model is as follows:

$$Performance_{i,t} = \alpha + \beta_1 EMR(LMR)_{i,t} + \beta_2 HHI_{i,t} +$$

$$\beta_3 EMR(LMR) * HHI_{i,t} + \gamma Controls_{i,t} + \varepsilon_{i,t} \tag{4}$$

Table 2 demonstrates the descriptive statistics of the variables in the present study. All continuous variables are winsorised at the 5% and 95% levels. In line with the previous finding, Table 2 suggests that the average market performance of bidders, i.e., *BHAR*, in 3 years after mergers are negative as a whole except for early movers (*EMR*). The difference of the $BHAR_1$, $BHAR_2$ and $BHAR_3$ between early movers (*EMR*) and their followers (*FLR*), and between early movers (*EMR*) and late movers (*LMR*), are also significant at the 1% level. However, probably because mergers largely increase firm sizes or simply fail to create synergy, the ROA change (ΔROA) as an indicator of the financial accounting performance of the bidder is negative regardless of the timing of their mergers. Compared to early movers, it seems that late movers are more willing to pay dividend (t-value = –3.1), larger in size (t-value = –3.57), and more leveraged (t-value = –2.8), indicating that late movers could be more matured than early movers (*EMR*). It is also interesting to learn that the later a firm enters a merger wave the more possible it is interested in the target in other industries (average *Diversification* = 35% for *EMR*, 41% for *FLR*, and 44% for *LMR*). Moreover, it seems that early movers (*EMR*) have higher growth potential (*MB* = 2.9) but this difference with the other two groups of bidders, i.e., followers (*FLR*) and late movers (*LMR*), are not significant.

Table 2
Summary statistics of variables

Variables	Full sample					EMR	FLR			LMR		
	Obs.	Mean	Std.	Min	Max	Mean	Mean	Diff (EMR-FLR)	t-value	Mean	Diff (EMR-FLR)	t-value
$BHAR_1$	1,225	−0.023	0.319	−0.562	0.650	0.054	−0.040	0.094***	4.030	−0.055	0.109***	3.966
$BHAR_2$	1,205	−0.029	0.490	−0.897	1.053	0.095	−0.061	0.156***	4.298	−0.063	0.158***	3.649
$BHAR_3$	1,165	−0.020	0.622	−1.149	1.395	0.137	−0.070	0.207***	4.456	−0.035	0.172***	2.908
ΔROA_1	1,337	−0.023	0.077	−0.225	0.111	−0.002	−0.029	0.027***	5.036	−0.027	0.025***	4.182
ΔROA_2	1,302	−0.071	0.218	−0.892	0.114	−0.025	−0.100	0.075***	4.534	−0.034	0.009	0.843
ΔROA_3	1,231	−0.044	0.116	−0.359	0.110	−0.019	−0.057	0.038***	4.431	−0.030	0.011	1.373
HHI	1,228	0.160	0.060	0.086	0.289	0.162	0.156	0.006	1.456	0.170	−0.008	−1.407
EMR	1,376	0.203	0.403	0.000	1.000	-	-	-	-	-	-	-
FLR	1,376	0.604	0.489	0.000	1.000	-	-	-	-	-	-	-
LMR	1,376	0.193	0.394	0.000	1.000	-	-	-	-	-	-	-
$Cash$	1,376	0.262	0.440	0.000	1.000	0.268	0.259	0.009	0.301	0.268	0.000	−0.002
$Diversification$	1,376	0.404	0.491	0.000	1.000	0.354	0.409	−0.056*	−1.646	0.442	−0.088**	−2.102
TP	1,376	0.064	0.245	0.000	1.000	0.061	0.059	0.002	0.107	0.083	−0.022	−1.009
$Dividend$	1,376	0.543	0.498	0.000	1.000	0.507	0.525	−0.018	−0.507	0.638	−0.131***	−3.100
$CAPEXP$	1,375	0.048	0.042	0.005	0.177	0.047	0.050	−0.003	−1.140	0.046	0.001	0.200
$R\&D$	1,376	0.006	0.014	0.000	0.049	0.005	0.006	−0.001	−0.978	0.005	0.000	0.322

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Table 2 (*Continued*)

Variables	Full sample					EMR	FLR			LMR		
	Obs.	Mean	Std.	Min	Max	Mean	Mean	Diff (EMR-FLR)	t-value	Mean	Diff (EMR-FLR)	t-value
MB	1,374	2.762	2.154	0.644	9.445	2.925	2.712	0.212	1.437	2.747	0.178	0.891
Size	1,376	7.018	1.854	2.888	10.087	6.846	6.947	−0.102	−0.796	7.420	−0.574***	−3.568
Leverage	1,376	1.836	1.523	0.121	5.937	1.833	1.720	0.110	1.079	2.202	−0.367***	−2.823
Liquidity	1,375	0.052	0.088	−0.167	0.180	0.061	0.046	0.015**	2.349	0.063	−0.002	−0.348
ROA	1,376	0.018	0.097	−0.295	0.139	0.024	0.015	0.009	1.415	0.024	0.000	0.045

Notes: The variables here are: Buy-and-hold Abnormal Return (*BHAR$_t$*) and ROA change (ΔROA_t) in time *t*; *t* denotes the year right after mergers ($t = 1$–3); HHI, represents the Herfindahl-Hirschman Index of acquirer industry in the current month to the announcement; H-HHI, indicator variable which equals one if the industry HHI of acquirer above the median value of our sample; EMR, indicator variable which equals one if it is the first 20% of the acquisitions in the merger wave; FLR, indicator variable equal one if it is the middle 60% of the acquisitions in the merger wave; LMR, indicator variable which equals one if it is the last 20% of the acquisitions in the merger wave; Cash, indicator variable which equals one if the deal is processed with cash. Diversification, an indicator variable which equals one if the acquirer and target are from different industries. TP, indicator variable which equals one if the target is a publicly listed company; Dividend, indicator variable which equals one if the acquirer distributed the dividend in the current year; CAPEXP, represents the acquirer's capital expenditure to total assets in the current year; R&D, represents acquirer's research and development expense to total assets in the current year; MB, represents acquirer's market value to book value in the current year; Size, represents the acquirer's total assets (in log) in the current year; Leverage, represents the acquirer firm's total debt to total equity in the current year; Liquidity, represents acquirer operating cash flow to total assets in the current year; ROA, represents acquirer return on assets in the current year. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

EMPIRICAL RESULTS

Early Mover/Late Mover Advantage

We investigate whether early movers have a better post-merger performance and the results are presented in Table 3.

Table 3 shows that both the financial accounting performance (ΔROA) and market performance ($BHAR$) of early movers (EMR) in merger waves are all positive within three years after their merger announcement dates. Both ΔROA and $BHARs$ are all significant at least at 10% level within three years period, except that ΔROA of EMR is not statistically significant in the third year. In contrast, Table 4 demonstrates that, in spite of a significant ΔROA of late movers (LMR) in the second (3.9%***) and third year (1.8%**) after mergers, the market responds pessimistically to their stocks within the 3-year test window. All $BHARs$ of $LMRs$ are negative but the influence is not significant. Accordingly, corresponding to H1, our results support the early mover advantage indeed plays a positive role to the bidder in the merger wave, indicating that the early movers can generally implement the synergy by acquiring, in advance to their peer, the more potential target. This finding is in line with the literature. However, late mover advantage cannot be consistently supported by our result. It seems that being the last player, which has an advantage theoretically, in merger wave is not as beneficial as being the first runner. McNamara et al. (2008) also presented a figure indicating that only the early mover can gain a positive stock return around announcement (CARs). The acquirer CARs, in the peak of the merger wave, is the worst in the whole period, and it begins to recover in the last period, but still negative.

Table 3

The long-term performance of early movers (EMR) in merger waves

Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.104***	−0.135	−0.251***	−0.063	−0.108***	0.308
	(−3.97)	(−1.45)	(−5.22)	(−0.43)	(−3.11)	(1.53)
EMR	0.011*	0.074**	0.061***	0.084*	0.017*	0.118*
	(1.75)	(2.43)	(4.44)	(1.68)	(1.76)	(1.84)
HHI	0.058	1.232***	0.266	1.338**	−0.292*	−1.876**
	(0.50)	(2.83)	(1.33)	(2.02)	(−1.77)	(−1.97)
Cash	0.007	−0.024	−0.034***	0.024	0.004	0.076*
	(1.34)	(−1.11)	(−2.74)	(0.71)	(0.49)	(1.70)
Diversification	0.004	−0.012	−0.005	−0.006	0.008	−0.031
	(0.92)	(−0.62)	(−0.50)	(−0.20)	(1.15)	(−0.76)

(*Continued on next page*)

Table 3 (*Continued*)

Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
TP	0.010	0.019	0.013	−0.071	0.007	−0.108
	(0.86)	(0.42)	(0.59)	(−1.07)	(0.48)	(−1.26)
Dividend	0.036***	0.132***	0.097***	0.231***	0.046***	0.361***
	(7.25)	(6.17)	(8.55)	(6.72)	(5.70)	(7.87)
CAPEXP	0.040	−0.946***	−0.078	−1.544***	−0.023	−1.344*
	(0.44)	(−2.84)	(−0.44)	(−3.05)	(−0.20)	(−1.93)
R&D	0.156	1.296	−0.102	3.341**	−0.034	5.545***
	(0.74)	(1.41)	(−0.22)	(2.24)	(−0.10)	(2.96)
MB	−0.000	0.014**	−0.003	−0.016*	−0.004*	−0.015
	(−0.13)	(2.19)	(−0.91)	(−1.73)	(−1.66)	(−1.23)
Size	0.003	−0.037***	0.000	−0.064***	0.005*	−0.069***
	(1.25)	(−4.43)	(0.05)	(−4.94)	(1.65)	(−4.20)
Leverage	0.007***	0.032***	0.031***	0.078***	0.018***	0.123***
	(3.52)	(3.73)	(6.78)	(6.48)	(6.68)	(7.16)
Liquidity	0.060	0.165	0.387***	0.535*	0.188***	0.474
	(1.30)	(0.82)	(3.34)	(1.79)	(2.76)	(1.25)
ROA		0.911***		1.370***		1.394***
		(4.41)		(4.80)		(3.94)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1,172	1,190	1,147	1,170	1,095	1,130
Adj. R^2	0.289	0.264	0.557	0.245	0.430	0.240

Notes: The variables here are: Buy-and-Hold Abnormal Return ($BHAR_t$) and ROA change (ΔROA_t) in time t; t denotes the year right after mergers ($t = 1$–3); HHI, represents the Herfindahl-Hirschman Index of acquirer industry in the current month to the announcement; EMR, indicator variable which equals one if it is the first 20% of the acquisitions in the merger wave; FLR, indicator variable equal one if it is the middle 60% of the acquisitions in the merger wave; LMR, indicator variable which equals one if it is the last 20% of the acquisitions in the merger wave; Cash, indicator variable which equals one if the deal is processed with cash. Diversification, an indicator variable which equals one if the acquirer and target are from different industries. TP, indicator variable which equals one if the target is a publicly listed company; Dividend, indicator variable which equals one if the acquirer distributed the dividend in the current year; CAPEXP, represents the acquirer's capital expenditure to total assets in the current year; R&D, represents acquirer's research and development expense to total assets in the current year; MB, represents acquirer's market value to book value in the current year; Size, represents the acquirer's total assets (in log) in the current year; Leverage, represents the acquirer firm's total debt to total equity in the current year; Liquidity, represents acquirer operating cash flow to total assets in the current year; ROA, represents acquirer return on assets in the current year. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 4

The long-term performance of late movers (LMR) in merger waves

Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.107***	−0.154*	−0.261***	−0.085	−0.111***	0.278
	(−4.10)	(−1.66)	(−5.42)	(−0.58)	(−3.23)	(1.39)
EMR	−0.009	−0.029	0.039***	−0.066	0.018**	−0.059
	(−1.26)	(−1.02)	(3.01)	(−1.54)	(2.07)	(−1.02)
HHI	0.099	1.458***	0.340*	1.649**	−0.282*	−1.496
	(0.85)	(3.40)	(1.67)	(2.53)	(−1.73)	(−1.58)
Cash	0.007	−0.025	−0.037***	0.025	0.003	0.075*
	(1.33)	(−1.14)	(−2.93)	(0.73)	(0.34)	(1.69)
Diversification	0.004	−0.013	−0.006	−0.007	0.007	−0.032
	(0.89)	(−0.64)	(−0.57)	(−0.24)	(1.11)	(−0.81)
TP	0.010	0.017	0.007	−0.072	0.005	−0.112
	(0.86)	(0.38)	(0.34)	(−1.08)	(0.37)	(−1.31)
Dividend	0.036***	0.133***	0.098***	0.231***	0.046***	0.361***
	(7.37)	(6.21)	(8.64)	(6.73)	(5.74)	(7.90)
CAPEXP	0.034	−0.980***	−0.103	−1.586***	−0.027	−1.406**
	(0.38)	(−2.97)	(−0.58)	(−3.18)	(−0.24)	(−2.05)
R&D	0.119	1.102	−0.212	3.089**	−0.051	5.231***
	(0.56)	(1.18)	(−0.44)	(2.06)	(−0.15)	(2.79)
MB	−0.000	0.015**	−0.002	−0.015*	−0.004	−0.014
	(−0.03)	(2.34)	(−0.47)	(−1.66)	(−1.48)	(−1.12)
Size	0.003	−0.037***	0.001	−0.064***	0.006*	−0.069***
	(1.25)	(−4.41)	(0.15)	(−4.98)	(1.76)	(−4.23)
Leverage	0.008***	0.034***	0.030***	0.080***	0.018***	0.125***
	(3.56)	(3.87)	(6.65)	(6.77)	(6.60)	(7.34)
Liquidity	0.064	0.178	0.377***	0.555*	0.180***	0.494
	(1.38)	(0.88)	(3.23)	(1.85)	(2.63)	(1.30)
ROA	-	0.926***	-	1.403***	-	1.428***
		(4.47)		(4.85)		(3.97)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1,172	1,190	1,147	1,170	1,095	1,130
Adj. R²	0.288	0.261	0.554	0.244	0.430	0.238

Notes: The variables here are: Buy-and-Hold Abnormal Return (*BHAR*_t) and ROA change (ΔROA_t) in time *t*; *t* denotes the year right after mergers (*t* = 1–3); HHI, represents the Herfindahl-Hirschman Index of acquirer industry in the current month to the announcement; EMR, indicator variable which equals one if it is the first 20% of the acquisitions in the merger wave; FLR, indicator variable equal one if it is the middle 60% of the acquisitions in the merger wave; LMR, indicator variable which equals one if it is the last 20% of the acquisitions in the merger wave; Cash, indicator variable which equals one if the deal is processed with cash. Diversification, an indicator variable which equals one if the acquirer and target are from different industries. TP, indicator variable which equals one if

the target is a publicly listed company; Dividend, indicator variable which equals one if the acquirer distributed the dividend in the current year; CAPEXP, represents the acquirer's capital expenditure to total assets in the current year; R&D, represents acquirer's research and development expense to total assets in the current year; MB, represents acquirer's market value to book value in the current year; Size, represents the acquirer's total assets (in log) in the current year; Leverage, represents the acquirer firm's total debt to total equity in the current year; Liquidity, represents acquirer operating cash flow to total assets in the current year; ROA, represents acquirer return on assets in the current year. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Merger wave and successful deals may be triggered by bidders of good performance and the baseline model may suffer from potential sample selection bias. We use a two-stage Heckman correction method to mitigate this concern. First, we estimate a selection model using a logit regression, which predicts the propensity for a merger to be initiated within the merger wave. Following Ahern and Harford (2014), we adopt various explanatory variables including the industry-year median Market-to-Book ratio (*Industry median MB*), R&D ratio (*Industry median R&D*), stock return in the previous twelve months (*Industry median return*), and the standard deviation of the stock return (*Industry median std return*). The industry concentration (*industry HHI*) and the number of firms in a given industry-year (*industry size*) are also included. Accordingly, we run the logit regression and generate the correction variable, Lambda, then input it into the Equation (2) as a robustness test and the results are presented in Table 5. The finding in Table 5 Panel A (Panel B) correspond to the results in Table 3 (Table 4) and present a similar conclusion.

Table 5
The robustness test after correcting sample selection bias

Panel A						
Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.081**	−0.053	−0.242***	0.112	−0.128***	0.362
	(−2.51)	(−0.44)	(−4.08)	(0.60)	(−2.77)	(1.43)
EMR	0.013*	0.079**	0.062***	0.094*	0.016	0.121*
	(1.92)	(2.56)	(4.43)	(1.86)	(1.62)	(1.88)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Lambda	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1,172	1,190	1,147	1,170	1,095	1,130
Adj. R^2	0.290	0.264	0.557	0.246	0.430	0.239

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Table 5 (*Continued*)

Panel B						
Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.088***	−0.099	−0.271***	0.057	−0.135***	0.293
	(−2.78)	(−0.84)	(−4.58)	(0.31)	(−2.99)	(1.17)
LMR	−0.008	−0.029	0.039***	−0.066	0.018**	−0.059
	(−1.25)	(−1.00)	(3.01)	(−1.52)	(2.05)	(−1.02)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Lambda	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1,172	1,190	1,147	1,170	1,095	1,130
Adj. R^2	0.288	0.261	0.554	0.244	0.430	0.237

Notes: The variables here are: Buy-and-hold Abnormal Return ($BHAR_t$) and ROA change (ΔROA_t) in time t; t denotes the year right after mergers ($t = 1$–3); HHI, represents the Herfindahl-Hirschman Index of acquirer industry in the current month to the announcement; EMR, indicator variable which equals one if it is the first 20% of the acquisitions in the merger wave; FLR, indicator variable equal one if it is the middle 60% of the acquisitions in the merger wave; LMR, indicator variable which equals one if it is the last 20% of the acquisitions in the merger wave; Cash, indicator variable which equals one if the deal is processed with cash. Diversification, an indicator variable which equals one if the acquirer and target are from different industries. TP, indicator variable which equals one if the target is a publicly listed company; Dividend, indicator variable which equals one if the acquirer distributed the dividend in the current year; CAPEXP, represents the acquirer's capital expenditure to total assets in the current year; R&D, represents acquirer's research and development expense to total assets in the current year; MB, represents acquirer's market value to book value in the current year; Size, represents the acquirer's total assets (in log) in the current year; Leverage, represents the acquirer firm's total debt to total equity in the current year; Liquidity, represents acquirer operating cash flow to total assets in the current year; ROA, represents acquirer return on assets in the current year. Lambda is the Heckman correction. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Early Mover/Late Mover Advantage in Different Industrial Concentration

A dummy variable *H-HHI* will be created to consider the moderate effect of industrial concentration on post-merger performance. *H-HHI* equals 1 if a bidder is located in the industry in which HHI is above the median value of all sampled U.S. industries, and 0 if otherwise. In Table 6, all coefficients of *EMR* in six regression models are positive and statistically significant, indicating that the early mover could have a better chance to outperform the followers within 3 years after their mergers. However, the interaction term of *H-HHI* and *EMR* implies that the scales of the early mover advantage amazingly decrease in high concentration industries. All coefficients of *H-HHI*EMR* are becoming negative and all of them are at least significant at 5% level.

We conduct the same test for late movers and present the results in Table 7. Although late movers (*LMR*) in high-HHI industries tend to gain significant positive returns in the market since the 2nd year after mergers (*H-HHI*LMR* = 0.154* and 0.234**), its influences on financial performance and market performance are not consistent, as shown in Table 7.

Our empirical results suggest that a bidder is capable to take early mover advantage if it is located in a more competitive industry, but "to wait and see" might be a better strategy if it is in an industry where its competitors are giant firms and main players of that industry, correspond to our H2. Our results are reasonable as applying the findings of Ali et al. (2014) and Gentzkow and Shapiro (2008), which indicated the information asymmetry appeared in the concentrative market, to merger wave. However, the evidence, so far reported, does not consistently support our H3.

Table 6

The relationship between the industrial concentration and the long-term performance of early movers (EMR) in merger waves

Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.096***	0.040	−0.225***	0.118	−0.155***	−0.010
	(−5.48)	(0.65)	(−6.11)	(1.26)	(−6.44)	(−0.08)
H-HHI	0.026**	0.142***	0.110***	0.270***	0.033**	0.343***
	(2.48)	(3.38)	(6.08)	(3.92)	(2.28)	(3.71)
EMR	0.004	0.047	0.039***	0.079	0.002	0.060
	(0.41)	(1.37)	(2.67)	(1.59)	(0.24)	(0.92)
H-HHI*EMR	−0.025**	−0.108**	−0.088***	−0.327***	−0.036**	−0.453***
	(−2.21)	(−2.16)	(−4.34)	(−4.10)	(−2.26)	(−4.46)
Cash	0.007	−0.020	−0.031**	0.033	0.004	0.083*
	(1.46)	(−0.95)	(−2.51)	(0.96)	(0.53)	(1.89)
Diversification	0.004	−0.012	−0.005	−0.005	0.008	−0.027
	(0.93)	(−0.62)	(−0.43)	(−0.16)	(1.18)	(−0.66)
TP	0.010	0.019	0.015	−0.067	0.008	−0.091
	(0.87)	(0.40)	(0.68)	(−0.99)	(0.61)	(−1.08)
Dividend	0.036***	0.132***	0.098***	0.231***	0.045***	0.361***
	(7.20)	(6.12)	(8.52)	(6.73)	(5.59)	(7.82)
CAPEXP	0.029	−0.991***	−0.103	−1.656***	−0.033	−1.453**
	(0.33)	(−2.97)	(−0.59)	(−3.33)	(−0.29)	(−2.12)
R&D	0.151	1.284	−0.137	3.270**	−0.058	5.297***
	(0.71)	(1.39)	(−0.29)	(2.17)	(−0.17)	(2.76)
MB	−0.000	0.015**	−0.003	−0.014	−0.004	−0.013
	(−0.06)	(2.32)	(−0.85)	(−1.50)	(−1.55)	(−1.07)

(*Continued on next page*)

Table 5 (*Continued*)

Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Size	0.003	−0.038***	−0.001	−0.066***	0.005	−0.073***
	(1.19)	(−4.44)	(−0.11)	(−5.08)	(1.59)	(−4.43)
Leverage	0.007***	0.031***	0.030***	0.075***	0.018***	0.121***
	(3.40)	(3.60)	(6.69)	(6.26)	(6.42)	(7.06)
Liquidity	0.070	0.212	0.427***	0.656**	0.203***	0.637*
	(1.53)	(1.04)	(3.73)	(2.22)	(3.00)	(1.70)
ROA	-	0.868***	-	1.337***	-	1.459***
		(4.15)		(4.79)		(4.23)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The variables here are: Buy-and-hold Abnormal Return ($BHAR_t$) and ROA change (ΔROA_t) in time t; t denotes the year right after mergers ($t = 1{-}3$); H-HHI, indicator variable which equals one if the industry HHI of acquirer above the median value of our sample; EMR, indicator variable which equals one if it is the first 20% of the acquisitions in the merger wave; FLR, indicator variable equal one if it is the middle 60% of the acquisitions in the merger wave; LMR, indicator variable which equals one if it is the last 20% of the acquisitions in the merger wave; Cash, indicator variable which equals one if the deal is processed with cash. Diversification, an indicator variable which equals one if the acquirer and target are from different industries. TP, indicator variable which equals one if the target is a publicly listed company; Dividend, indicator variable which equals one if the acquirer distributed the dividend in the current year; CAPEXP, represents the acquirer's capital expenditure to total assets in the current year; R&D, represents acquirer's research and development expense to total assets in the current year; MB, represents acquirer's market value to book value in the current year; Size, represents the acquirer's total assets (in log) in the current year; Leverage, represents the acquirer firm's total debt to total equity in the current year; Liquidity, represents acquirer operating cash flow to total assets in the current year; ROA, represents acquirer return on assets in the current year. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 7

The relationship between the industrial concentration and the long-term performance of late movers (LMR) in merger waves

Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.090***	0.063	−0.217***	0.184*	−0.155***	0.073
	(−5.18)	(1.01)	(−5.91)	(1.90)	(−6.45)	(0.60)
H-HHI	−0.003	−0.004	0.032	−0.138**	0.028**	−0.192**
	(−0.26)	(−0.09)	(1.56)	(−2.08)	(2.22)	(−2.31)
LMR	−0.001	0.031	0.020	−0.012	−0.002	−0.070
	(−0.08)	(0.93)	(1.50)	(−0.25)	(−0.26)	(−1.06)
*H-HHI*LMR*	−0.010	−0.024	0.017	0.154*	−0.023	0.234**
	(−0.73)	(−0.45)	(0.73)	(1.94)	(−1.38)	(2.15)
Cash	0.007	−0.023	−0.036***	0.024	0.003	0.071
	(1.36)	(−1.08)	(−2.87)	(0.71)	(0.34)	(1.60)

Table 7 (*Continued*)

Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Diversification	0.004	–0.013	–0.006	–0.008	0.007	–0.030
	(0.86)	(–0.66)	(–0.54)	(–0.25)	(1.12)	(–0.75)
TP	0.009	0.014	0.006	–0.082	0.007	–0.108
	(0.82)	(0.31)	(0.30)	(–1.21)	(0.48)	(–1.29)
Dividend	0.036***	0.133***	0.099***	0.227***	0.046***	0.355***
	(7.32)	(6.14)	(8.62)	(6.51)	(5.74)	(7.61)
CAPEXP	0.034	–0.999***	–0.105	–1.615***	–0.024	–1.397**
	(0.38)	(–2.97)	(–0.59)	(–3.23)	(–0.21)	(–2.03)
R&D	0.118	1.078	–0.214	3.093**	–0.051	5.298***
	(0.55)	(1.16)	(–0.45)	(2.06)	(–0.15)	(2.81)
MB	0.000	0.015**	–0.002	–0.014	–0.004	–0.014
	(0.01)	(2.46)	(–0.48)	(–1.51)	(–1.49)	(–1.17)
Size	0.003	–0.037***	0.001	–0.064***	0.006*	–0.070***
	(1.25)	(–4.31)	(0.10)	(–4.93)	(1.78)	(–4.26)
Leverage	0.008***	0.033***	0.031***	0.080***	0.018***	0.127***
	(3.53)	(3.73)	(6.70)	(6.72)	(6.53)	(7.47)
Liquidity	0.062	0.183	0.383***	0.550*	0.178***	0.454
	(1.31)	(0.89)	(3.30)	(1.81)	(2.63)	(1.19)
ROA	-	0.864***	-	1.405***	-	1.571***
		(4.06)		(4.68)		(4.26)
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1,172	1,190	1,147	1,170	1,095	1,130
Adj. R^2	0.287	0.253	0.554	0.242	0.429	0.239

Notes: The variables here are: Buy-and-hold Abnormal Return ($BHAR_t$) and ROA change (ΔROA_t) in time t; t denotes the year right after mergers ($t = 1$–3); H-HHI, indicator variable which equals one if the industry HHI of acquirer above the median value of our sample; EMR, indicator variable which equals one if it is the first 20% of the acquisitions in the merger wave; FLR, indicator variable equal one if it is the middle 60% of the acquisitions in the merger wave; LMR, indicator variable which equals one if it is the last 20% of the acquisitions in the merger wave; Cash, indicator variable which equals one if the deal is processed with cash. Diversification, an indicator variable which equals one if the acquirer and target are from different industries. TP, indicator variable which equals one if the target is a publicly listed company; Dividend, indicator variable which equals one if the acquirer distributed the dividend in the current year; CAPEXP, represents the acquirer's capital expenditure to total assets in the current year; R&D, represents acquirer's research and development expense to total assets in the current year; MB, represents acquirer's market value to book value in the current year; Size, represents the acquirer's total assets (in log) in the current year; Leverage, represents the acquirer firm's total debt to total equity in the current year; Liquidity, represents acquirer operating cash flow to total assets in the current year; ROA, represents acquirer return on assets in the current year. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

The Percentage of Large Companies and Small/Mid Enterprises (SME) in Different Stages of Merger Wave

Game theory recommends a copycat strategy, which indicates the best strategy for large firms, which leads by a wide margin, is to imitate the behaviour of the front runner and avoids risk so that they can keep the leading position in the game. Van Horen and Pieters (2013) consider that imitating good is usually viewed as the inferior good compared to the original version. However, the authors agree that imitating strategy can effectively lower uncertainty. Regarding the firm size, large companies can benefit from their leadership position within their industry. Therefore, maintaining leadership has a higher priority than striving for development, which the high risk is accompanied by (Coff, 1997). Accordingly, it is reasonable to conjecture that large firms in high concentration markets are willing to adopt the copycat strategy in the high-risk project, thus, the late mover advantage will be enlarged. If this phenomenon does exist within a merger wave, the percentage of large bidders in a wave should increase over time. We then divide each of the 15 merger waves in our sample into 10 equal time zones, using industrial HHI as weight, and compute the average percentage of large and small/mid firms in each time zone, respectively. The weighted average percentage of large bidders in each time zone is labelled as the average participation rate of large bidders (*APRL*) and the weighted average percentage of small/mid bidders in each time zone is labelled as the average participation rate of small/mid bidders (*APRSM*). The 10 *APRLs* and 10 *APRSMs* across the merger wave are then illustrated in Figure 1.
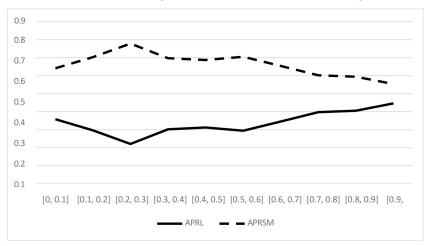

Figure 1. The distribution of the average participation rate of large and small/mid bidders across the merger wave.

Each of the 15 merger waves in our sample is firstly divided into 10 equal time zones. Using industrial HHI as weight, the weighted average percentage of large and small/mid firms in each time zone can be computed respectively. The weighted average percentage of large firms in each time zone is labelled as the average participation rate of large bidders (*APRL*) and the weighted average percentage of large firms in each time zone is labelled as the average participation rate of small/ mid bidders (*APRSM*).

It is noted in Figure 1 that, along with the time horizon of the merger wave, the *APRL* values gradually increase and the *APRSM* values slowly decrease. It suggests that SMEs tend to undertake merger projects earlier in merger waves, while most large firms choose to launch their bids later in those waves, in spite of a few who choose to act as early movers. It is partly because SMEs usually need to be pioneers or innovators of their industries for survival or growth, whereas large firms can just adopt copycat strategy to maintain their leading status in their industries. Overall, a large firm may enjoy late mover advantage in the merger wave if the industry in which its main business lies is less competitive, and also in practice a slowly rising percentage of large bidders across the wave can be found (Figure 1), it seems that our results suggest that large firms of high-HHI industries have the motive to be late movers in merger waves.

Strategies for Large Firms and SMEs

We have now learned that the appropriate strategy in merger wave may be different regarding the industrial concentration and firm size. In the following analysis, large companies and SMEs will be discussed individually and aim to explore the suitable time, respectively, of entering the merger wave.

Table 8 illustrates the effect of their different entry-timing choices on post-merger performance. In Table 8, it is noted that large early movers usually have positive financial accounting and market performance for 3 years after their mergers (see the coefficients of *EMR* in Panel A). These performances, however, turn out to be significantly negative if the large bidders are located in highly concentrated industries (see all coefficients of *H-HHI*EMR* in Panel A). In addition, all coefficients of *FLR* and *H-HHI*FLR* are not significant and mixed (see Panel B), implying that being the follower is a meaningless strategy to the large firm, no matter if it is in a concentrated market or competitive market. Finally, in Table 8 Panel C it is found that the coefficients of *LMR* are all negative and those of *H-HHI*LMR* are significantly positive since second year after the merger. These results regarding large *LMR* are nearly entirely reversed as compared to the results of large *EMR* in Panel A.

These findings suggest that late mover advantage is stronger in high concentration industries than in low concentration industries, only if the acquirer size is large enough. Therefore, for large firms, their optimal strategy is to take the early mover strategy in the competitive industry, alternatively, the late mover strategy is recommended in the high concentration market.

Table 9 reports the effect of different entry-timing choices on the post-merger performance of SMEs. It seems that, if they choose to be early movers in coming merger waves, they usually will have growing positive post-merger performance 3 years after their mergers (see all the coefficients of *EMR* in Table 9 Panel A). But the results turn significantly negative if they are located in high HHI industries (see the coefficients of *H-HHI*EMR*), similar to what happened to large bidders in Table 8, which provides evidence to strengthen our H2. On the other hand, it is noted that the coefficients of *H-HHI*FLR* are all significantly positive at least at the 5% level. Accordingly, unless SMEs operate in high-HHI industries, they should not choose to act as follower (*FLR*) in merger waves. Finally, SMEs are generally discouraged to adopt late mover strategy (Table 9). Compared to Table 8 that provides suggestions to large firms in the high concentration market to enter the merger in the last stage of the merger wave, Table 9 results indicate that small/mid firms should be followers, not early or late movers, in the high concentration market.

Table 8

The relationship of the entry-timings within merger waves and the long-term performance of large acquirers in concentrated industries

Panel A: The performance of large-scale EMR – moderated by HHI						
Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.098***	−0.154	0.014	0.119	0.072*	−0.102
	(−2.76)	(−0.85)	(0.36)	(0.35)	(1.79)	(−0.23)
EMR	0.018	0.040	0.025	0.010	0.015	0.232
	(1.22)	(0.56)	(1.31)	(0.08)	(1.23)	(1.44)
H-HHI	−0.002	0.035	0.000	0.045	−0.044***	−0.031
	(−0.17)	(0.47)	(0.01)	(0.40)	(−2.79)	(−0.23)
EMR*H-HHI	−0.009	−0.120	−0.052***	−0.325**	−0.041***	−0.574***
	(−0.52)	(−1.49)	(−3.30)	(−2.59)	(−2.75)	(−3.38)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	380	385	378	378	358	367
Adj. R^2	0.275	0.226	0.271	0.276	0.500	0.307

(*Continued on next page*)

Table 8 (*Continued*)

Panel B: The performance of large-scale FLR – moderated by HHI

Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.101***	−0.206	0.011	0.024	0.077*	−0.158
	(−2.74)	(−1.14)	(0.29)	(0.07)	(1.78)	(−0.34)
FLR	0.003	0.060	0.004	0.129*	−0.003	0.100
	(0.34)	(1.27)	(0.27)	(1.71)	(−0.31)	(1.10)
H-HHI	0.001	0.007	−0.018	−0.075	−0.064***	−0.225
	(0.10)	(0.09)	(−1.33)	(−0.58)	(−3.40)	(−1.25)
*FLR*H-HHI*	−0.008	−0.012	0.004	0.012	0.013	0.016
	(−0.59)	(−0.18)	(0.23)	(0.11)	(1.00)	(0.12)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	380	385	378	378	358	367
Adj. R^2	0.269	0.228	0.247	0.268	0.489	0.276

Panel C: The performance of large-scale LMR – moderated by HHI

Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.096***	Intercept	−0.096***	Intercept	−0.096***	Intercept
LMR	−0.015	−0.155**	−0.028*	−0.301***	−0.012	−0.396***
	(−1.65)	(−2.55)	(−1.90)	(−3.88)	(−1.21)	(−4.56)
H-HHI	−0.006	−0.028	−0.025*	−0.140	−0.062***	−0.323**
	(−0.52)	(−0.41)	(−1.74)	(−1.30)	(−3.70)	(−2.18)
*LMR*H-HHI*	0.015	0.119	0.044***	0.288***	0.028**	0.555***
	(1.25)	(1.50)	(2.72)	(2.84)	(2.05)	(4.04)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	380	385	378	378	358	367
Adj. R^2	0.274	0.241	0.267	0.279	0.492	0.313

Notes: This table reports the results of the OLS regression model of the large-scale acquirer whose market value is in the top 20% among its' given industry in the current quarter. The variables here are: Buy-and-hold Abnormal Return ($BHAR_t$) and ROA change (ΔROA_t) in time t; t denotes the year right after mergers ($t = 1$–3); H-HHI, indicator variable which equals one if the industry HHI of acquirer above the median value of our sample; EMR, indicator variable which equals one if it is the first 20% of the acquisitions in the merger wave; FLR, indicator variable equal one if it is the middle 60% of the acquisitions in the merger wave; LMR, indicator variable which equals one if it is the last 20% of the acquisitions in the merger wave; Cash, indicator variable which equals one if the deal is processed with cash. Diversification, an indicator variable which equals one if the acquirer and target are from different industries. TP, indicator variable which equals one if the

target is a publicly listed company; Dividend, indicator variable which equals one if the acquirer distributed the dividend in the current year; CAPEXP, represents the acquirer's capital expenditure to total assets in the current year; R&D, represents acquirer's research and development expense to total assets in the current year; MB, represents acquirer's market value to book value in the current year; Size, represents the acquirer's total assets (in log) in the current year; Leverage, represents the acquirer firm's total debt to total equity in the current year; Liquidity, represents acquirer operating cash flow to total assets in the current year; ROA, represents acquirer return on assets in the current year. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 9

The relationship of the entry-timings within merger waves and the long-term performance of small/mid acquirers in concentrated industries

Panel A: The performance of small/mid-scale EMR – moderated by HHI						
	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.083***	0.086	−0.215***	0.119	−0.195***	−0.013
	(−3.03)	(0.94)	(−3.44)	(0.82)	(−4.75)	(−0.07)
EMR	0.016	0.117**	0.128***	0.264***	0.048**	0.296**
	(1.19)	(2.21)	(5.03)	(3.08)	(2.44)	(2.56)
H-HHI	−0.004	0.057	0.034*	0.032	0.006	−0.007
	(−0.41)	(1.37)	(1.82)	(0.51)	(0.50)	(−0.09)
*EMR*H-HHI*	−0.024*	−0.057	−0.086***	−0.287***	−0.021	−0.382***
	(−1.69)	(−0.87)	(−2.96)	(−2.71)	(−1.07)	(−2.86)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	776	789	754	777	722	748
Adj. R²	0.365	0.305	0.645	0.315	0.514	0.338
Panel B: The performance of small/mid-scale FLR – moderated by HHI						
Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.072***	0.184*	−0.127**	0.277*	−0.155***	0.162
	(−2.65)	(1.90)	(−2.11)	(1.80)	(−3.79)	(0.85)
FLR	−0.010	−0.117***	−0.099***	−0.170**	−0.051***	−0.192**
	(−0.98)	(−2.78)	(−4.53)	(−2.48)	(−3.43)	(−2.21)
H-HHI	−0.034**	−0.035	−0.046*	−0.187*	−0.035**	−0.311**
	(−2.39)	(−0.59)	(−1.89)	(−1.94)	(−2.04)	(−2.51)
*FLR*H-HHI*	0.037***	0.115**	0.087***	0.233***	0.052***	0.335***
	(2.85)	(2.10)	(3.49)	(2.63)	(2.96)	(2.96)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes

Table 8 (*Continued*)

Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
N	776	789	754	777	722	748
Adj. R²	0.373	0.308	0.645	0.311	0.519	0.337

Panel C: The performance of small/mid-scale LMR – moderated by HHI

Variables	ΔROA_1	$BHAR_1$	ΔROA_2	$BHAR_2$	ΔROA_3	$BHAR_3$
Intercept	−0.079***	0.099	−0.192***	0.182	−0.196***	0.051
	(−2.90)	(1.06)	(−3.11)	(1.25)	(−4.84)	(0.28)
LMR	−0.005	0.101	0.051	−0.015	0.048***	−0.028
	(−0.31)	(1.56)	(1.52)	(−0.15)	(2.63)	(−0.23)
H-HHI	−0.004	0.063	0.021	−0.018	0.010	−0.064
	(−0.36)	(1.50)	(1.21)	(−0.29)	(0.91)	(−0.76)
*LMR*H-HHI*	−0.039*	−0.133*	−0.040	−0.024	−0.068***	−0.101
	(−1.82)	(−1.71)	(−1.12)	(−0.20)	(−2.78)	(−0.60)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	776	789	754	777	722	748
Adj. R²	0.373	0.303	0.635	0.302	0.514	0.328

Notes: This table reports the results of the OLS regression model of the small/mid-scale acquirer whose market value is not in the top 20% among its' given industry in the current quarter. The variables here are: Buy-and-hold Abnormal Return ($BHAR_t$) and ROA change (ΔROA_t) in time t; t denotes the year right after mergers (t = 1–3); H-HHI, indicator variable which equals one if the industry HHI of acquirer above the median value of our sample; EMR, indicator variable which equals one if it is the first 20% of the acquisitions in the merger wave; FLR, indicator variable equal one if it is the middle 60% of the acquisitions in the merger wave; LMR, indicator variable which equals one if it is the last 20% of the acquisitions in the merger wave; Cash, indicator variable which equals one if the deal is processed with cash. Diversification, an indicator variable which equals one if the acquirer and target are from different industries. TP, indicator variable which equals one if the target is a publicly listed company; Dividend, indicator variable which equals one if the acquirer distributed the dividend in the current year; CAPEXP, represents the acquirer's capital expenditure to total assets in the current year; R&D, represents acquirer's research and development expense to total assets in the current year; MB, represents acquirer's market value to book value in the current year; Size, represents the acquirer's total assets (in log) in the current year; Leverage, represents the acquirer firm's total debt to total equity in the current year; Liquidity, represents acquirer operating cash flow to total assets in the current year; ROA, represents acquirer return on assets in the current year. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

To examine the robustness of the results in the present study, we first redefined *H- HHI* dummy by letting it be 1 if the HHI of an acquirer's industry is in the top 30% of sampled firms, and 0 if it is in the bottom 30%. The above findings stand still. We then replaced the post-merger performance with the growth of sales, the growth of operating income, and industry-adjusted stock return, the above findings remain unaltered. The robustness of the results and findings discussed above is thus verified.

CONCLUSION

Both the early mover advantage and late mover advantage have been proposed and tested in literature for decades. The question as to when and for whom to use is most beneficial is still inconclusive. Using the U.S. merger and firm data during 2000–2019, the present study examines the relationship between the entry-timing and the post-merger performance of 1,376 bidders in 15 merger waves recognised. Our empirical results support the moderate role of the firm size and industrial concentration in the research on the early/late mover advantages in merger waves. Consistent with prior research, this study also confirms the early mover advantage in merger waves. However, there is a lack of sufficient evidence, in general, to support the existence of late mover advantage in waves. It is also found that industry concentration is a determinant of early mover advantage in merger wave. If the acquirer is in a competitive market, it is worth taking risks for competing for the industry share by being the first mover. Otherwise, moving ahead peers can only take the meaningless risk but enjoy no advantage if firms merely cannot improve their stage in the industry.

In addition, our research further examines this interaction effect under the different firm sizes of bidders and lists the appropriate strategy for them respectively in merger wave. Our research find that SMEs could benefit from the early mover strategy in merger waves if their industries are relatively less concentrated. Otherwise, such an advantage will be largely mitigated. Both their accounting and market performance will drop since the 1st year after the announcement of their mergers. To SMEs, it is optimal to choose to be followers which witness significantly positive post-merger performances in a merger wave. On the other hand, large companies are also discouraged from being early movers in merger waves if their industries are highly concentrated. But, the adoption of an adequate strategy, such as copycat strategy, will allow them to enjoy the late mover advantage and growing post-merger market performance.

NOTE

1.   Mean value is generally used to calculate the BHAR. We also use mean value in the robustness test, and similar results are obtained.

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