Research in International Business and Finance 48 (2019) 353–364

Contents lists available at ScienceDirect

Research in International Business and Finance

journal homepage: www.elsevier.com/locate/ribaf

The impact of fintech M&A on stock returns

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ARTICLE INFO

JEL classification:
G34
O32
F20

Keywords:
Financial technologies
Mergers and acquisitions
Stock returns
Event study
Cross-border M&A

ABSTRACT

Technological development and digitalization plays a crucial role in financial sector by allowing firms to create value in a rapidly changing environment. The acquisitions of firms related to financial technologies are one of the ways to obtain vital knowledge. In order to identify the fintech companies we are looking at firms that are involved in business activities in both the IT and financial sectors. By examining the growing role of fintech firms in the recent mergers and acquisitions from an investor point of view, this paper contributes to the existing literature by investigating the post-acquisition performance of the acquirer firms measured by abnormal returns. We discovered significant positive average abnormal return after acquisition of fintech companies in the short-term and negative average abnormal return in the long-term using event study methodology. The specifics of cross-border acquisitions, the level of the domestic market development of the acquirer, and other characteristics of M&A deals are considered in order to explain the reaction of investors to announcements of fintech firms' acquisitions. The determinants of corresponding M&A deals in emerging and developed markets were revealed.

1. Introduction

Researchers argue that M&A have a mixed short-term impact on company stock returns since investors may assess their expectation of M&A benefits differently after the announcement depending on characteristics of the deals (Agrawal et al., 1992). Berkovitch and Narayanan (1993) suggested that the reason for positive results is the synergy motives behind M&A when managers of targets and acquirers engage in a M&A transaction only if it maximizes shareholder wealth for both sides. The authors assumed takeovers can be motivated by the self-interest of the acquirer managers that might be responsible for value-reducing acquisitions. Other studies in M&A demonstrated that the returns of the acquiring company are negative or equal to zero (e.g. Fuller et al., 2002), while other papers found that the post-acquisition abnormal returns is positively insignificant (Beitel et al., 2004; Georgen and Renneboog, 2004).

Mixed research results on M&A performance may be explained by the different motives behind such deals. Many alliances and partnerships are established in order to obtain an access to external knowledge, which substantially contributes to firms' technological development (Hagedoorn and Schakenraad, 1994). In recent years, rapid technological development has gradually increased its influence on a vast number of sectors (Sears and Hoetker, 2014; Asimakopoulos and Whalley, 2017). Digitalization is changing the economic landscape. In order to cope with the transformation, firms must invest in activities that will create or improve their technological capabilities (Puranam et al., 2006; Kapoor and Lim, 2007; Hung and Tang, 2008). According to Kogut and Zander (1992), companies grow through the effective transfer of knowledge within and across firms. Ma and Liu (2017) described that some

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https://doi.org/10.1016/j.ribaf.2019.01.012
Received 11 September 2018; Received in revised form 23 January 2019; Accepted 28 January 2019
Available online 02 February 2019

M&A are aimed at obtaining technology by expanding into a new sector; others allow the acquirer to improve through an existing technology; a big acquirer, instead of investing in R&D, prefers to absorb the technological achievements of a smaller target firm. The motives behind the technology M&A may be very sector specific. According to Ranft and Lord (2002) the knowledge-intensive and the innovation-driven sectors depend on specialized skills and expertise and thus face some managerial problems which may be solved by implementation of successful M&A strategy. That is why it is especially interesting to study M&A in one of the KIBS (Knowledge intensive business services) sectors.

We focus our research on rapidly transforming financial sector. Digitalization spurred financial technologies development and led to emergence of the new segment of fintech firms. According to Financial Stability Board (2017),[1] fintech is technology-enabled innovation in financial services. Since the core technologies behind fintech (big data, artificial intelligence, distributed databases, cloud computing, cybersecurity solutions, etc.) came from IT sector we assume that companies may be considered as fintech firms if they have strong IT expertise and parts of their businesses activities are related to IT and software development for financial sector. This assumption will remove from the scope of our study those firms that provide innovative financial services but outsource software development. The motives behind the acquisition of such financial firms are more vague and post-acquisition investors' behavior may not be related to technology driven factors in which we are primarily interested in this research.

The merger and acquisitions between the financial and high-tech sectors enhance traditional financial services at both business and consumer levels (Kohers and Kohers, 2000; Ahuja and Katila, 2001; etc.). In 2017 acquisitions involving fintech companies increased to 336 transactions completed for a total of $18 billion.[2] Many financial companies are seeking to acquire fintech firms because they can potentially lower acquiring firms' expenses, improve business processes, solve complex IT problems, and reduce cybersecurity risks. Based on these arguments, we suggest that fintech M&A deals (those that are aimed at acquisition of financial technologies) may evoke a positive reaction from investors.

One of the reasons of earlier described mixed M&A performance might be the period of the onset of deals' effects. Loughran and Vijh (1997) showed that even though, in general, investors of target companies received high return in the short-term, over time their return is not significantly high. Consistently, Rosen (2006) found that the acquiring companies received high returns in the short-term, if there is high M&A activity on the market, while, in the long-run the profitability of the buying company falls. The first contribution of this paper is that it investigates a stock price response of an acquiring company upon an announcement about the acquisition of fintech firms studying both short- and long-term effects.

M&A transactions are very sensitive to the integration process, especially between companies from different countries (Shimizu et al., 2004). The effectiveness of the integration, due to corporate and sometimes cultural differences, can be crucial in overall effect of an acquisition (Zollo and Singh, 2004; DeLong, 2001). Hence, the second contribution of the research is that it studies the difference between domestic and international takeovers of fintech firms. M&A performances in emerging and developed markets were analyzed as well.

The reaction of investors about the news of a technology M&A transaction may depend on the parameters of the deal. Our third contribution is that we examine the factors that affect the post-acquisition stock returns and identify characteristics of fintech M&A deals with better performance.

The rest of the paper is organized as follows: the second section describes the hypotheses formation and methodology of the research on the short-term and long-term effects of fintech M&A. The third section outlines the research data. The fourth section comprises the empirical results of the analysis. Finally, the conclusions with theoretical and practical implications are presented.

2. Methodology of the research and formation of hypotheses

In order to identify whether the target company belongs to the fintech sector, we follow the argumentation in introduction session and specify several SIC codes related to both the financial and IT sector at the same time. The following two-digit SIC codes were used for the financial sector:

1. SIC code 60 – Depository Institutions,
2. SIC code 61 – Non-depository Credit Institutions,
3. SIC code 62 – Security and Commodity Brokers, Dealers, Exchanges, and Services,
4. SIC code 63 – Insurance Carriers,
5. SIC code 87 – Engineering, Accounting, Research, Management, and Related Services.

We assume that a company belongs to the fintech industry if it has SIC codes 60-67, 87-89, as well as SIC codes 7371-7374.

To measure the reaction of the market to a fintech M&A announcement, we use event the study method (MacKinlay, 1997) to calculate abnormal returns following the deal announcement. Detailed descriptions of the calculation of cumulative average abnormal returns (CARs) and buy-and-hold average abnormal returns (BHARs) are presented in Appendix A. For the estimation of CAR and BHAR, the market model, market adjusted model, and mean adjusted return model are used (Appendix A). More sophisticated multifactor models for estimation of adjusted stock returns (as in Narayan et al., 2017 for example) were not applied. Fintech M&A announcements cannot be considered as a pricing factor for the market and provide some additional information mostly for investors

[1] Financial Stability Board, Financial Stability Implications from FinTech (June 2017).
[2] KPMG, The Pulse of Fintech Q4 2017 (February, 2018).

of the acquiring company.

In previous studies, M&A create positive abnormal returns in the short term for the companies due to the technological benefits it can provide (Kohers and Kohers, 2000). Based on this assumption, investors positively react to the intention of the companies to improve their technological development. Our aim is to identify whether financial technology acquisition can stimulate investors to purchase the acquiring company stock in the short term. Therefore, based on previous studies, the first hypothesis (H1) can be presented as follows:

H1: the fintech M&A will positively affect the cumulative abnormal returns of the acquiring company in a short term ($CAR > 0$).

Some aspects of the short-term effects of fintech M&A were studied more closely. Companies from developed markets may have more resources and advanced infrastructure to successfully apply and adopt new technologies than firms from emerging markets. Since technology M&A are generally a very risky type of acquisition (McCarthy and Aalbers, 2015), we suggest that investors react cautiously to the acquisition of fintech companies in emerging countries and require an additional premium compared to developed markets: This explains the second hypothesis:

H2: the acquiring companies' stocks from developed countries will perform better during the takeover of technological targets in the short term ($CAR_{developed} > CAR_{emerging}$).

Literature on the effects of cross-border M&A deals provides mixed results that are market- and sector-specific. However, according to Chari et al. (2004) when a target company is located in a country with a comparatively lower level of development than the buyer company, the cross-border acquisition is more profitable. Kohli and Mann (2012) found that cross-border transactions outperform domestic acquisitions only when both acquiring and target companies operate in a technology-oriented sector. Yoon and Lee (2016) examined the cross-border performance of emerging firms and found that acquiring companies from technologically advanced sectors create a greater positive effect for investors in comparison to non-technological companies. Gubbi et al. (2010) argue that cross-border acquisition in emerging countries bring greater benefits to their acquirer. McCarthy and Aalbers (2015) advocate that M&A deals may suffer from institutional (political, economic, and regulatory) and cultural (lack of understanding, communicating) differences. Several studies on traditional M&A indicated that domestic acquisitions are more effective than cross-border deals (e.g., Georgen and Renneboog, 2004; Moeller and Schlingemann, 2005). Lusyana and Sherif (2016) studied the performance of acquiring companies and found that in the short run, technological takeovers bring a significant positive return, in particular, domestic technological acquisitions outperform cross-border deals. Further, while examining returns on the long run, they found that domestic acquisitions demonstrated significant positive abnormal returns and bring more value to the company-buyers than cross-border transactions. Several studies (Zhang and He, 2014) found that emerging countries encounter significant institutional barriers of host countries in technology-acquiring cross-border M&A deals. Despite the mixed research results, we tend to believe that firms from the developed countries should have advantages in the adoption and implementation of the technologies of a target company, if the target company is also operating on the same developed market. Due to similar reasons, emerging countries might face difficulties at both the institutional and cultural levels. Therefore, the reactions of investors to cross-border M&A for acquiring companies from emerging countries are more volatile. We can assume that the investors of acquiring companies from emerging countries are more likely to prefer domestic acquisition and vice versa for developed countries. These arguments lead to the following two hypotheses:

H3: The cross-border acquisition by acquiring companies will underperform domestic acquisition within developed countries ($CAR_{developed,domestic} < CAR_{developed,cross-border}$).

H4: The local acquisition of acquiring companies will outperform the international cross-border acquisition within emerging countries ($CAR_{emerging,domestic} > CAR_{emerging,cross-border}$).

Literature on cross-border acquisitions in the finance sector demonstrates that they do not increase the returns of acquiring companies. Indeed, the international banks have higher transaction costs, lower profitability, and higher information costs compared to local banks (Berger et al., 2000; Campa and Hernando, 2004). We further examine whether the acquiring companies from the financial technology sector provide lower abnormal return for their investors if they operate in different markets. The hypothesis can be stated as follows:

H5: In cross-border acquisitions, the cumulative abnormal returns of acquiring companies that are related to the fintech sector are higher than the cumulative abnormal returns of acquiring companies that are not related to fintech ($CAR_{cross-border,non-fintech} < CAR_{cross-border,fintech}$).

In addition, this study assumes that the larger stock price effect for the acquiring companies can be achieved by first-time takeovers of the technological target companies. Investors may react less dramatically to subsequent M&A. Thus, the companies without experience in merger and acquisitions tend to create relatively higher abnormal returns than those acquiring companies that had M&A deals before. Based on the above discussion, the next hypothesis is stated as follows:

H6: The cumulative abnormal returns of acquiring companies without experience will outperform the cumulative abnormal returns of acquiring companies with experience ($CAR_{withoutexperience} > CAR_{withexperience}$).

The long-term performance of fintech M&A was also studied in the paper. The existing literature suggests that acquisition demonstrates significant negative results (e.g., Loughran and Vijh, 1997; Rau and Vermaelen, 1998). According to Rau and Vermaelen (1998) long-term underperformance is caused by the acquiring companies' low book-to-market ratios, which lead managers to overestimate their abilities to manage the acquisitions. In line with this theory, Kohers and Kohers (2001) provided evidence on technology M&A where the acquiring companies perform poorly over the 3-year period, suggesting that some market inefficiency is present in technological transactions. Conn et al. (2005) found that in the long run, cross-border acquisitions outperform domestic takeovers in the UK, while acquisitions that involve technological companies in the long run perform better in cross-border merger and acquisitions. Generally, the long-term stock performance in the event study literature is measured by buy-and-hold abnormal

return (BHAR). Therefore, in order to examine whether the technological acquisition brings abnormal returns in the long run, we postulate the fifth hypothesis:

H7: The long-term abnormal returns of companies acquiring fintech firms will be negative (BHAR < 0).

Some other parameters of fintech M&A that may affect the abnormal return were also considered in this study. According to Asquith et al. (1983), the acquirer's abnormal returns are positively related to the relative size of the deal. Thus, the deal size can be considered a determinant of abnormal returns.

If the acquiring companies are overpaying for the target companies, then the size of the transaction will have a negative impact on abnormal performance. Moreover, companies are willing to overpay for the acquisition of the company because they believe that they will be able to manage it more effectively than the managers of the target company (Roll, 1986). At the same time, in the long run underestimated acquiring companies with high book-to market ratio experience an increase in profitability as opposed to overvalued companies (Lakonishok et al., 1994; Agrawal and Jaffe, 2000; Sudarsanam and Mahate, 2003). Thus, the market to book ratio is the factor that affects the abnormal return.

Specifically, for the fintech sector, it is important to determine whether the investment in R&D has an impact on the cumulative abnormal return. According to Dutta and Kumar (2009) R&D intensity has a significant positive effect on the abnormal returns of acquiring companies, which implies that investors view these kinds of acquisitions as a potential for growth and, thus, react positively to M&A. On the other hand, due to the high risk of the sector, takeovers may create serious disruption to the company's core business activities (McCarthy and Aalbers, 2015). Prior literature indicates mixed results regarding R&D intensity and M&A, thus it is important to consider this factor.

Another determinant that can affect abnormal returns and investor's reaction is the effective tax rate. Some governments are trying to stimulate technological innovation through tax incentives (KPMG, 2017).[3] In the majority of developed countries, corporate taxes have a substantial impact upon the wealth of the investors, thus the financial technology takeovers should be positively received by investors.

A dummy variable “Industry” that indicates whether the company belongs to the financial sector is also included in the analysis. Consideration of both financial and non-financial sectors in the same dataset can lead to biased results, as financial companies have their own specific characteristics of company valuation (Graham et al., 2002). Moreover, it was decided to distinguish between the specific segments of financial sector that affect cumulative abnormal returns using a specific dummy variable. Thus, it can help the shareholder identify which segments create greater value for the company.

To test the effects of the described variables on fintech M&A performance, the following regression model was employed:

$$CAR_i = \beta_0 + \beta_1 MB_i + \beta_2 lnTA_i + \beta_3 Tax_i + \beta_4 DealSize + \beta_5 RD_i + \beta_6 Industry_i + \sum_{j=1}^{4} \beta_j Dummy_j + \varepsilon_i, \quad (1)$$

where a description of model variables (1) are presented in the Table 1.

3. Data

The information about M&A transactions in this study was collected from the Zephyr (Bureau Van Dijk) database. The selected sample includes M&A activities with completed-confirmed, announced, and pending status during the period from January 2010 to February 2018. For the sampling data, we set the following criteria:

- M&A transactions with target companies in both the finance and IT sectors. According to classification of Zephyr that is: Computer, IT, and Internet services and Banking, Insurance, and Financial Services.
- The acquiring company must be a public company, which has shares listed on the stock exchange. At the same time, about 95% of the target companies are not listed.

The obtained dataset was screened and reduced by excluding deals from the sample if the target company does not relate directly to fintech sector. For instance, if a company is developing software and is not engaging in financial technology-related activities. Transactions involving several acquiring companies were also removed from the sample due to the lack of information about the number of shares acquired by each company.

The firms from developed and emerging countries were indicated in the sample. We pick the firms from the largest developed markets: USA, Canada, and Europe, and emerging markets: China and India.

The median value of the deal size for all countries are similar (as shown in Figure 1), with the exception of China, where the median is lower at $25 million. In the United States, there are outliers in the sample with very large transactions for the estimated period.

Note: this chart represents the first and third quantiles of deal sizes, the median size of the transaction (the line inside the box), as well as the outliers in the sample (dots).

According to the dataset about 40% of acquirers belong to the fintech sector. Such companies are not only investing in their own technology development, but prefer to expand through the purchase of other fintech firms. About half of the purchasing companies in the sample belong to the financial sector but there were only few acquirers from banking sector. Banks may prefer to invest in

[3] KPMG – The Pulse of Fintech Q4 2016. Global analysis of investment in fintech, 2017.

Table 1
The list of determinants.

Name	Description	Name	Description
Dummy 1	1 – target company related to "Money transfers and trade credit" section, 0 – otherwise	**MB**	The ratio of the capitalization to book value
Dummy 2	1 – target company related to "Brokers and dealers' services, trading exchange" section, 0 – otherwise	**lnTA**	Logarithm of acquiring company's total assets
Dummy 3	1 – target company related to "Accounting, research and advisory service" section, 0 – other	**DealSize**	The ratio of the transaction value to the market capitalization of the acquiring company
Dummy 4	1 – target company related to "Consumer credit" section, 0 – otherwise	**RD**	Company expenses for R&D
Industry	1 – target company related to finance sector, 0 – otherwise	**Tax**	Effective tax rate of the acquiring company

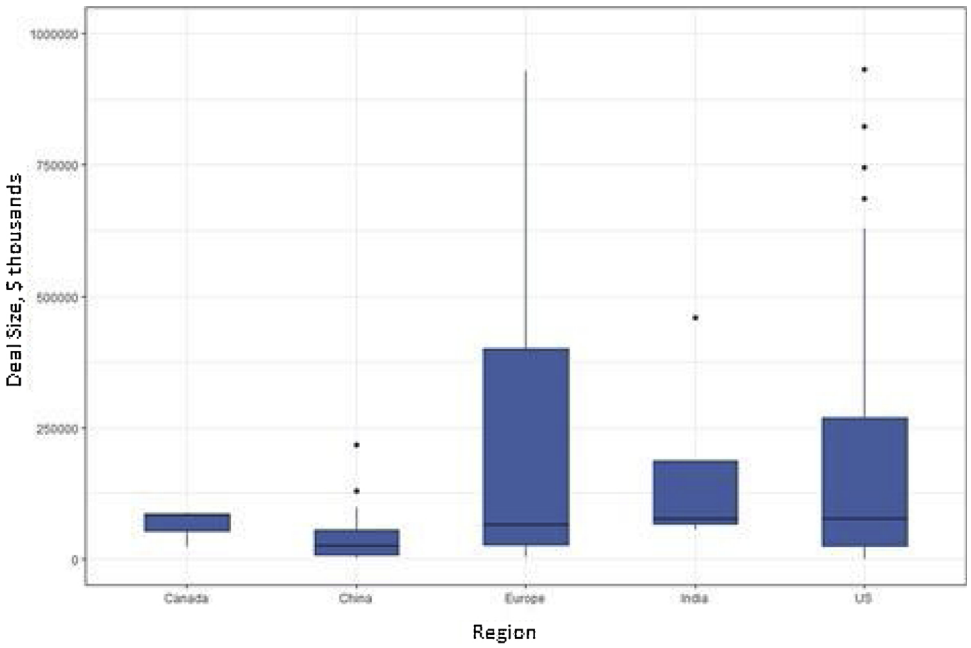

Figure 1. Distribution of M&A deal sizes by a country.
Note: This chart represents the first and third quantiles of deal sizes, the median size of the transaction (the line inside the box), as well as the outliers in the sample (dots).

development of their own fintech solutions which are completely compatible with the IT infrastructure. Retailers and oil-producing companies are among fintech acquirers as well.

As shown in the Table 2 the share of cross-border deals in the sample is the highest in Canada and Europe. But in the United States the majority of fintech M&As are domestic.

Data about companies' stock prices and fundamentals was obtained from Bloomberg L.P. Different event windows were

Table 2
Cross-border and domestic fintech M&A deals by country.

Country	Number of cross-border fintech M&As	Number of domestic fintech M&As	Share of cross-border deals
US	19	80	19%
Canada	6	2	75%
Europe	25	13	66%
China	8	13	38%
India	3	9	25%
All countries	**61**	**117**	**34%**

Table 3
The sample.

Year	Europe	India	Canada	China	US	Overall
2010	3	0	1	2	15	21
2011	5	3	0	3	8	19
2012	3	1	0	4	19	27
2013	1	2	2	2	18	25
2014	6	3	2	0	15	26
2015	9	0	2	4	10	25
2016	8	2	1	6	12	29
2017	3	1	0	0	2	6
						178

considered in order to collect information about stock prices for the event study procedure. In the related literature, various periods have been used: form 3 days up to 3 years (Dehning et al., 2003; Chen et al., 2007). The efficient market theory suggests using short event windows for the event study in M&As, since the long windows may be affected by a variety of factors (MacKinlay, 1997). However, we dealt with the disparity between countries and the fact that some markets may react more slowly than the others. Therefore, in this study we analyze an event window of 41 days that is 20 days before and 20 days after the announcement of acquisition. This window is long enough to avoid the impact of other economic factors and to capture the reaction of inefficient markets. In addition, the results were obtained using different event windows: [−10,10], [−3,3], [−1,1], [0,1].

We consider an estimation window of 180 days before the event window. This period allows us to approximate the distribution of returns by a normal distribution and at the same time mitigate the effect of other insignificant events.

The sample was screened to ensure that the event window includes only one M&A announcement. Finally, we removed observations if acquiring companies were delisted since the announcement. This sample selection procedure leads to Table 3 with distribution of 178 M&A deals by time period and geographical location.

In order to estimate the long-term effects using BHAR, the event window of 250 trading days was considered. Companies with missing data on stock returns during the event window were excluded from the consideration. The sample was further reduced to 160 companies in this case.

4. Empirical results

Table 4 presents the cumulative abnormal returns (CAR) for the acquiring companies for different event windows and event study models over the short-term period. The findings show that the fintech M&A brings significant abnormal returns to acquiring companies over the 21-trading days event window [−10,10] and below. We discovered only one negative insignificant result for the event window of 41-trading days, CARs for all three models in that event window were insignificant.

On the event window [−10,10], for the market model and the mean adjusted return model, CAR takes +1.25% and +1.93% (at 10% and 5% significance levels, respectively). The fact that there is no market reaction prior the M&A announcement can be seen from Figure 2. It can be also seen that in the period before the announcement day, the CAR remains at approximately the same level, but on the day of the announcement and for the next day, there is a sharp increase in abnormal return. From the second day, the CAR fluctuates approximately within the same range. This means that there was a quick reaction from investors on the day of the announcement and the day after. These results are consistent with a number of works that also found positive market reaction to the announcement of a deal in a short event window (e.g., Kohers and Kohers, 2001; Yoon and Lee, 2016). Specifically, within the event window [0,1] CAR is significant for all models at 1% level with cumulative average abnormal return for the market model of +1.02%. Thus, H1 (CAR > 0) cannot be rejected at a 1% level of significance. Overall, findings suggest that fintech takeovers bring positive abnormal returns for the acquiring company, implying that investors react favorably to such M&A announcements in the short-term period.

Table 5 reports the results of H2-H6 hypotheses' tests. Thus, the CAR for the event window [0,1] for companies from developed markets is much higher than for emerging market companies (H2). According to the test statistics, the results are significant at 1% level. This confirms the suggestion that developed markets acquisitions are considered by investors as less risky investments, since a

Table 4
CAR for different event windows.

Event window	Market model	Market adjusted model	The mean adjusted return model
CAR [−20,20]	0.14%	−0.24%	0.57%
CAR [−10,10]	1.25%*	1.06%	1.93%**
CAR [−3,3]	0.87% **	0.73%*	1.13%**
CAR [−1,1]	0.84% ***	0.81%***	0.92%***
CAR [0.1]	1.02%***	1.00%***	1.14%***

Notes: Significance of independent variables is marked as follows: * significant at 1%; ** significant at 5%; *** significant at 1%. This table shows the cumulative abnormal returns estimated by different models on several event windows for acquiring firms.

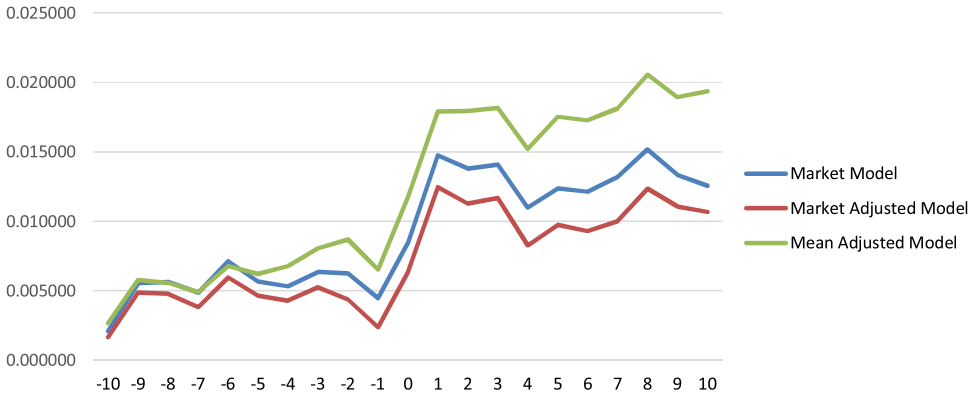

Figure 2. The cumulative average abnormal return on the window [−10,10].
Note: Figure 2 demonstrates the cumulative abnormal returns estimated by three models for 21 trading days.

Table 5
Hypotheses and results.

Hypotheses	Results		*t*-stat.	*P*-val.
H2: $CAR_{developed} > CAR_{emerging}$	$CAR_{developed}$	$CAR_{emerging}$	2.8927	0.0032
	1.08%	0.79%		
H3: $CAR_{developed,cross-border} > CAR_{developed,domestic}$	$CAR_{developed,cross-border,}$	$CAR_{developed,domestic}$	12.560	< 0.01
	1.58%	0.82%		
H4: $CAR_{emerging,domestic} > CAR_{emerging,cross-border}$	$CAR_{emerging,domestic}$	$CAR_{emerging,cross-border}$	4.9696	0.00012
	1.33%	−0.44%		
*H5**:$CAR_{cross-border,fintech} > CAR_{cross-border,non-fintech}$	$CAR_{cross-border,fintech}$	$CAR_{cross-border,non-fintech}$	9.7249	< 0.01
	2.05%	0.76%		
H6 $CAR_{cross-border,fintech} > CAR_{cross-border,non-fintech}$	$CAR_{withoutexp.}$ 1.19%	$CAR_{withexp.}$ 0.02%	11.9930	< 0.01

Notes: All presented results are obtained using the market model (Appendix A). CAR was estimated on the event window [0,1]. The formula (9) was used (Appendix A) to test the statistical significance of CAR. H5 was tested for the sample of firms from developed countries.

firm from those markets has comparatively more resources for the successful implementation of new technologies. Therefore, H2 cannot be rejected at a 1% significance level.

H3 implies that for the acquiring companies from developed countries domestic M&As result in higher stock returns and for the acquiring companies from emerging countries local deals are more profitable. According to the obtained results for developed countries, CAR in cross-border and local transactions is equal to +1.58% and +0.82%, respectively. Table 4 shows that for the companies from emerging markets local deals with +1.33% are more profitable, CAR for cross-border transactions is negative (−0.44%). Thus, H3 and H4 cannot be rejected at a significance level of less than 1%.

In order to test H5, we compare the CAR of fintech companies and CAR of non-fintech companies for international transactions on developed markets. The results indicate that the CAR of fintech companies in cross-border transactions is significantly higher with 2.05%, than for non-financial companies with 0.76%. Our results are consistent with the literature (Kohers and Kohers, 2000; Yoon and Lee, 2016) where the evidence of superior returns from technology M&A compared to non-technology M&A for companies from emerging countries in cross-border M&A was noted. Consequently, H5 cannot be rejected at a 1% level of significance.

The comparison of the CAR of the acquiring companies, which already participated in fintech M&A before and those who had not – demonstrated interesting results. The results indicate that the CAR of the acquiring companies without experience is +1.19%, whereas the CAR of the acquiring companies with experience in the acquisition of fintech companies is close to zero: +0.02%. Our assumption was that the investors do not believe that experienced firms can create value obtaining new technologies through M&A repeatedly. Hence, hypothesis H6 should not be rejected at a significance level of less than 1%.

The next step was to examine the long-term impact of the event on the stock price. For this purpose, BHAR was calculated within an event window of 1 year (250 trading days).

The results for all three models showed negative significant BHAR values (Table 6). This implies that fintech mergers and acquisitions decrease the value of the acquiring company in the long run. Consistent with other studies, in the long-term period the

Table 6
Average BHAR for event window [1,250].

Event window	Market model	Market adjusted model	The mean adjusted return model
BHAR [1,250]	−11.12% ***	−5.57% **	−14.36% ***

Notes: Significance of independent variables is marked as follows: * significant at 1%; ** significant at 5%; *** significant at 1%. The table shows long-term abnormal returns measured by BHAR.

Table 7
The correlation matrix for independent variables of the model (1).

	Dummy2	Dummy3	MB	lnTA	Tax	DealSize	RD
Dummy2	1	−0.386	−0.155	0.224	0.029	0.050	−0.095
Dummy3	−0.386	1	0.163	−0.252	−0.015	−0.102	0.253
MB	−0.155	0.163	1	−0.042	−0.208	−0.018	0.016
lnTA	0.224	−0.252	−0.042	1	0.037	−0.123	−0.365
Tax	0.029	−0.015	−0.208	0.037	1	0.089	0.188
DealSize	0.050	−0.102	−0.018	−0.123	0.089	1	0.122
RD	−0.095	0.253	0.016	−0.365	0.188	0.122	1

fintech M&A as an example of technology M&A demonstrated negative results, while in theory they should add value to the acquiring company. Firstly, according to Roll (1986), some managers and shareholders are prone to the hubris hypothesis where they tend to overpay for a target company and overrate their ability to manage the integration between companies properly. Secondly, according to Lakonishok et al. (1994) and Agrawal and Jaffe (2000), the investors of acquiring companies with high historical return and growth can positively accept overestimated transactions, and hence, over time, the market adjusts the price.

In order to test the dependence of abnormal return on other factors, we use three specifications of the model (1) with different combinations of the variables that describe the impact of M&A parameters (Table 1) on CAR during the event window [0,1]. The first specification was tested on the entire sample of 178 M&A deals. The second was tested on the companies from developed markets. Finally, the third model was tested on 28 companies from emerging countries. Because of the small size of the sample, we excluded dummy variables in latter cases.

The preliminary results showed that some of the dummy variables (payment method, transaction type, etc.), which are traditionally studied in M&A literature had no significant effect. Thus, those dummies were excluded since they will not cause model misspecification. In the regression model two significant dummy variables were used that indicate sector relatedness to “Brokers and dealers’ services, trading exchange” (Dummy 2), “Accounting, research and advisory service” (Dummy 3). The correlation matrix for independent variables is presented in Table 7.

According to the results of Breusch–Pagan test all three models show the absence of heteroscedasticity. The VIF indicators of the Models 1 and 2 exhibit values less than 2, in the third model it is less than 3. Hence, there is no evidence of multicollinearity in these models.

Table 8 shows that Models 1 and 2 have a higher significance of determinants, in comparison to Model 3. This result may be due to the exclusion of sector indicators and the small number of observations used for estimation of Model 3.

The results of the regression of all three models (Table 8) showed that R&D is a significant factor (at a 1% level of significance for Models 1 and 2, and at a 10% level for Model 3). This result indicates that spending on R&D has positive impact upon CAR for Models 1 and 2 at +0.289 and +0.303, respectively. The result of positive impact of spending on R&D is consistent with the work of Dutta and Kumar (2009), implying that investors respond positively to announcements of fintech M&A deals if the acquirer spends a considerable amount on R&D for the company.

The factor tax (effective tax rate) has a positive significant impact on the CAR. This indicator was chosen as a proxy variable for the regulation of the financial technology sector. The positive reaction of the effective tax rate may indicate that investors expect a decrease in the tax rate in the future for companies acquiring financial technologies. Recently several countries introduced tax incentives for companies that are investing in fintech start-ups and as a result,[4] the market reacts positively to announcements of M&A transactions.

The results show that the coefficient behind lnTA (log of total assets) is significantly negative for Models 1 and 2. This fact indicates that the smaller the acquirer, the greater its abnormal return after acquiring a fintech company. The result corresponds to other findings (e.g. Narayan et al., 2017) about size effects (higher returns volatility for smaller firms) after significant events.

The variable DealSize in Model 2 has a significant positive effect, while in Model 3, the value is negative and also significant. The negative influence may indicate that companies in developing countries are consistently overpaying for the acquisition of fintech companies.

The impact of sector factors on the cumulative average abnormal returns indicates that acquiring firms belonging to “Brokers and dealers’ services, trading exchange” adversely affects CAR for Models 1 and 2 (−0.017 and −0.02 respectively at a 10% significance

[4] Global Research & Development Incentives Group (PwC, April 2017).

Table 8
OLS regressions results.

	Dependent variable		
	CAR		
	Model 1	Model 2	Model 3
Dummy 2 (segment Brokers and dealers' services)	−0.017*	−0.020*	
	(0.010)	(0.011)	
Dummy 3 (segment Accounting, research and advisory service)	−0.024**		
	(0.011)		
Industry		0.018*	
		(0.009)	
MB	−0.001	−0.001*	0.003
	(0.001)	(0.001)	(0.003)
lnTA	−0.003*	−0.003*	−0.008
	(0.002)	(0.002)	(0.006)
Tax	0.0003*	0.0001*	0.002**
	(0.0003)	(0.0003)	(0.001)
DealSize	0.029	0.048*	−0.151*
	(0.025)	(0.025)	(0.085)
RD	0.289***	0.303***	−0.269*
	(0.036)	(0.033)	(0.150)
Constant	0.057*	0.044	0.075
	(0.030)	(0.032)	(0.077)
Observations	104	81	23
R^2	0.528	0.673	0.422
Adjusted R^2	0.494	0.642	0.251
Residual std. error	0.043 (df = 96)	0.038 (df = 73)	0.041 (df = 17)
F statistic	15.344 (df = 7; 96)	21.499 (df = 7; 73)	2.478 (df = 5; 17)

Notes: Significance of independent variables is marked as follows: * significant at 1%; ** significant at 5%; *** significant at 1%. The dependent variable is CAR estimated for the event window [0,1]. Model 1 is tested for the entire sample. Model 2 is tested for companies from developed markets. Model 3 is tested for companies from emerging markets.

levels). At the same time, acquiring firms belong to "Accounting, research and advisory services" negatively affects the CAR in Model 1 with −0.024 at a 5% significance level. Those segments of the finance sector may suffer more significantly (compared to other segments) from the development of disruptive financial technologies. For the firms from those sectors, fintech M&A might indicate significant business model transformation which can be cautiously received by investors.

For companies in developed countries, the "Industry" dummy variable has a significant positive impact (+0.018 at a 10% level of significance), that is, acquiring companies from the financial sector are more positively affected by fintech M&A than other companies. This effect may be due to the fact that it is much more effective for financial sector companies to integrate fintech companies into their own businesses.

5. Conclusion and Limitations

Consistent with some prior studies on technology M&A, we found evidence that there is positive abnormal returns for the stocks of the companies acquiring fintech firms in the short term. However, in the long run, fintech M&A does not create additional value for the acquiring firms which may indicate of initial investors overreaction on fintech M&A announcement.

Fintech M&A with acquiring companies from developed countries provides greater stock returns in comparison to the companies from emerging countries. This can be due to the fact that the companies from developed countries operate in an environment that helps to implement the target's technology. We found that deals in developed countries are even more beneficial for acquirers that are not related to the financial technology sector, implying that investors suggest that the access to advanced enabling technologies may accelerate the growth. We also discovered that buyers that previously had no experience in acquiring fintech companies outperformed companies with experience in fintech M&A.

The cross-border acquisitions revealed higher cumulative abnormal returns for acquirers from developed countries, indicating that the expansion strategy was positively received by investors. On the other hand, for acquiring firms from emerging countries, domestic transactions imply greater returns, while the international acquisitions might be considered riskier for investors. That conclusion is supported by arguments of Eun et al. (1996) and Seth et al. (2002) who discovered that the main reason for successful cross-border technological acquisitions are circumstances in which acquiring companies can expect that the knowledge of a target firms will be quickly adopted on their home markets.

We also examined the factors that significantly impact the performance of the fintech M&A. Interesting results about the influence of the effective tax rate were discovered. Traditionally, developed countries impose higher corporate tax rates. However, according to

recent report from the European Commission,[5] companies that operate in the technological sector pay less than half the rate of other sectors in EU. Moreover, in the United States, technological companies have paid taxes below the rate of all other sectors over the past decade. These examples explain why investors may react positively to the technological takeovers that could reduce the effective tax rate.

The level of acquiring companies' expenses on R&D also have favorable impact upon cumulative abnormal returns after fintech M &A. Despite the findings of several studies (e.g., Hitt et al., 1991), which demonstrated that traditional M&A transactions adversely affect the innovative R&D investments and values of acquiring firms, the major part of the literature on M&A revealed that R&D intensity positively impacts firm performance (Kohers and Kohers, 2000; King et al., 2008). This implies that the investors consider a relatively high level of investment in R&D of companies a potential factor for growth.

Among other factors, a significant positive effect occurred if an acquiring company belongs to the financial sector. In particular, the effect on cumulative abnormal return of buyers from developed countries suggests that companies from the financial sector gain more from fintech M&A than companies from other sectors. This result may be explained by the greater synergy effect of integration between core financial businesses and fintech services.

This study is limited by a lack of data on M&A deals, especially for firms in emerging countries such as China and India, which does not allow for making strong conclusions based on the results of empirical analysis. The proposed definition of fintech M&A may exclude some acquisitions potentially connected to financial technologies. But since the considered approach provide an explanation of which target firms are related to "fintech sector" the research can be useful for academia and practitioners trying to analyze the post-merger investors' behavior.

Acknowledgements

Contributions to this publication were supported within the framework of the Basic Research Program at the National Research University Higher School of Economics (HSE) and was funded within the framework of a subsidy granted to the HSE by the Government of the Russian Federation for the implementation of the Global Competitiveness Program.

Appendix A

The cumulative abnormal returns are calculated over the event period as follows:

$$CAR = \sum_{t=-T}^{T} AR_t \tag{a1}$$

To investigate the long-term performance, numerous studies suggested using the buy-and-hold returns (BHAR) approach (Mitchell and Stafford, 2000; Barber and Lyon, 1997). BHAR is based on the geometric mean and defined as:

$$BHAR_{i,T} = \prod_{t=1}^{T} (1 + R_{i,t}) - \prod_{t=1}^{T} (1 + E[R_{i,t}]), \tag{b2}$$

where $R_{i,t}$ – is the actual return on security i for time t; $E[R_{i,t}]$ – is the expected return on security i for time t.

In this research, we will be using statistical models for both CAR and BHAR, in particular, the market model, market adjusted model, and mean adjusted return model.

The mean adjusted return is the average return over the estimation period. In accordance with Brown and Warner (1985) each company's shares can use the average return as its own expected return:

$$\overline{R_i} = \frac{\sum_{T_2-1}^{t=T_1} R_{it}}{N} \tag{c3}$$

The market model is defined as following:

$$R_{it} = \alpha_i + \beta_i * R_{mt} + \varepsilon_{it}, \tag{d4}$$

R_{mt} – is the return on the market index; α_i, β_i – are the parameters of the model; ε_{it} – is an error term.

The parameters are then estimated and the expected return is calculated:

$$\widehat{R_{it}} = \widehat{\alpha_i} + \widehat{\beta_i} * R_{mt} \tag{e5}$$

The market model suggests that there are changes in the normal returns throughout the entire event window. The advantage of this model is that it allows one to exclude the profitability associated with the dynamics of the market, as well as reduce the variance of abnormal returns.

The adjusted market model assumes that $\widehat{\alpha_i} = 0$, $\widehat{\beta_i} = 1$, and this model is used when there are gaps in data for share price.

The standard statistic of abnormal return is:

[5] European Commission – A Fair and Efficient Tax System in the European Union for the Digital Single Market, Brussels, 2017.

$$t_{AR_t} = \frac{AR_t}{\hat{S}(AR_t)} \tag{f6}$$

where $\hat{S}(AR_t)$ is the estimate of standard deviation of the average abnormal returns, as follows:

$$\hat{S}(AR_t) = \sqrt{\frac{1}{N-1}\sum_{t=T_1}^{T_2-1}(AR_t - \overline{AR_t})^2} \tag{g7}$$

Since this study will include companies from different countries, the stock market index returns will be used as benchmarks for market models.

The statistical significance of abnormal returns after the announcement can be tested by the traditional *t*-test (Campbell and Lo, 1997 and MacKinlay, 1997). If the value of the *t*-statistic exceeds the critical value for a given level of significance, the null hypothesis H_0 is rejected, which demonstrates that the announcement had a significant effect on the stock price of the company in question (Brown and Warner, 1985).

The *t*-statistics for CAR is given as the following:

$$t_{CAR_{(a,b)}} = \frac{\sum_b^{t=a} AR_t}{\sqrt{b-a+1}\,\hat{S}(AR_t)}, \tag{h8}$$

where (a, b) – is the window in which average cumulative abnormal returns for all companies is calculated.

To compare the cumulative average abnormal returns of different samples, it is important to test the *t*-statistics between CARs (two samples with different variances):

$$t_{CAR_1-CAR_2} = \frac{CAR_1 - CAR_2}{\sqrt{\frac{S^2_{CAR_1}}{n_1} - \frac{S^2_{CAR_2}}{n_2}}}, \tag{i9}$$

where the number of degrees of freedom is aggregated in accordance with Eq. (14):

$$df = \frac{\left(\frac{S^2_{CAR_1}}{n_1} + \frac{S^2_{CAR_2}}{n_2}\right)^2}{\frac{(S^2_{CAR_1}/n_1)^2}{n_1-1} + \frac{(S^2_{CAR_2}/n_2)^2}{n_2-1}}, \tag{j10}$$

n_1, n_2 – the number of observations in the corresponding samples.

The *t*-statistics for BHAR is defined as follows:

$$t_{BHAR_T} = \frac{BHAR_T}{\sigma(BHAR_{i,T})/\sqrt{n}} \tag{k11}$$

where $\sigma(BHAR_{i,T})$ is the standard deviation of $BHAR_T$ for the sample n.

References

Agrawal, A., Jaffe, J.F., Mandelker, G.N., 1992. The post-merger performance of acquiring firms: a re-examination of an anomaly. The Journal of Finance 47 (4), 1605–1621.

Agrawal, A., Jaffe, J.F., 2000. The post-merger performance puzzle. Advances in Mergers and Acquisitions 1, 7–41.

Ahuja, G., Katila, R., 2001. Technological acquisitions and the innovation performance of acquiring firms: a longitudinal study. Strategic Management Journal 22 (3), 197–220.

Asimakopoulos, G., Whalley, J., 2017. Market leadership, technological progress and relative performance in the mobile telecommunications industry. Technological Forecasting and Social Change 123, 57–67.

Asquith, P., 1983. Merger bids, uncertainty, and stockholder returns. Journal of Financial Economics 11 (1–4), 51–83.

Barber, B.M., Lyon, J.D., 1997. Detecting long-run abnormal stock returns: the empirical power and specification of test statistics. Journal of Financial Economics 43, 341–372.

Beitel, P., Schiereck, D., Wahrenburg, M., 2004. Explaining M&A success in European banks. European Financial Management 1 (10), 109–139.

Berger, A., DeYoung, R., Genay, H., Udell, G., 2000. Globalisation of financial institutions: evidence from cross-border banking performance. Brookings-Wharton Papers on Financial Service 3, 23–120.

Berkovitch, E., Narayanan, M.P., 1993. Motives for takeovers: an empirical investigation. The Journal of Financial and Quantitative Analysis 28 (3), 347–362.

Campa, J.M., Hernando, I., 2004. Shareholder value creation in European M&As. European Financial Management 10 (1), 47–81.

Campbell, J.Y., Lo, A.W., MacKinlay, A.C., 1997. The Econometrics of Financial Markets.

Chari, A., Oimet, P.P., Tesar, L.L., 2004. Acquiring control in emerging markets: Evidence from the Stock Market. National Bureau of Economic Research NBER Working Paper, pp. 10872.

Chen, X., Harford, J., Li, K., 2007. Monitoring: which institutions matter? Journal of Financial Economics 86, 279–305.

Conn, R.L., Cosh, A., Guest, P.M., Hughes, A., 2005. The impact on UK acquirers of domestic cross-border, public and private acquisitions. Journal of Business Finance & Accounting 32 (5–6), 815–870.

Dehning, B., Richardson, V.J., Zmud, R.W., 2003. The value relevance of announcements of transformational information technology investments. MIS Quarterly 27 (4), 637–656.

DeLong, G.L., 2001. Stockholder gains from focusing versus diversifying bank mergers. Journal of Financial Economics 2 (59), 221–252.

Dutta, S., Kumar, V., 2009. Mergers and Acquisitions (M&AS) by R&D Intensive Firms. Journal of Risk and Financial Management 2 (1), 1–37.

Eun, C.S., Kolodny, R., Scheraga, C., 1996. Cross-border acquisitions and shareholder wealth: tests of the synergy and internalization hypotheses. Journal of Banking &

Finance 20 (9), 1559–1582.
Fuller, K., Netter, J., Stegemoller, M., 2002. What do returns to acquiring firms tell us? Evidence from firms that make many acquisitions. The Journal of Finance 57 (4), 1763–1793.
Georgen, M., Renneboog, L., 2004. Shareholder wealth effects of European domestic and cross-border takeover bids. European Financial Management 10 (1), 9–45.
Graham, J., Lemmon, M., Wolf, J., 2002. Does corporate diversification destroy value? The Journal of Finance 57 (2), 695–720.
Gubbi, S.R., Aulakh, P.S., Ray, S., Sarkar, M.B., Chittoor, R., 2010. Do international acquisitions by emerging-economy firms create shareholder value? The case of Indian firms. Journal of International Business Studies 41, 397–418.
Hagedoorn, J., Schakenraad, J., 1994. The effect of strategic technology alliances on company performance. Strategic Management Journal 15, 291–311.
Hitt, M.A., Hoskisson, R.E., Ireland, R.D., Harrison, J.S., 1991. Effects of acquisitions on R&D inputs and outputs. The Academy of Management Journal 34 (3), 693–706.
Hung, S.W., Tang, R.H., 2008. Factors affecting the choice of technology acquisition mode: an empirical analysis of the electronic firms of Japan, Korea and Taiwan. Technovation 28, 551–563.
Kapoor, R., Lim, K., 2007. The impact of acquisitions on the productivity of inventors at semiconductor firms: a synthesis of knowledge-based and incentive-based perspectives. Academy of Management Journal 50 (5), 1133–1155.
King, D.R., Slotegraaf, R., Kesner, I., 2008. Performance implications of firm resource interactions in the acquisition of R&D-intensive firms. Organization Science 19 (2), 327–340.
Kogut, B., Zander, U., 1992. Knowledge of the firm and the evolutionary theory of the multinational corporation. Journal of International Business Studies 24 (4), 625–645.
Kohers, N., Kohers, T., 2000. The value creation potential of high-tech mergers. Financial Analysts Journal 53, 40–48.
Kohers, N., Kohers, T., 2001. Takeovers of technology firms: expectations vs. reality. Financial Management 30 (3), 35–54.
Kohli, R., Mann, B.J.S., 2012. Analyzing determinants of value creation in domestic and cross border acquisitions in India. International Business Review 6 (21), 998–1016.
Lakonishok, J., Shleifer, A., Vishny, R.W., 1994. Contrarian investment, extrapolation, and risk. The Journal of Finance 49 (5), 1541–1578.
Loughran, T., Vijh, A.M., 1997. Do long-term investors benefit from corporate acquisitions? The Journal of Finance 52 (5), 1765–1790.
Lusyana, D., Sherif, M., 2016. Do mergers create value for high-tech firms? The hounds of dotcom bubble. Journal of High Technology Management Research 27 (2), 196–213.
Ma, C., Liu, Z., 2017. Effects of M&As on innovation performance: empirical evidence from Chinese listed manufacturing enterprises. Technology Analysis & Strategic Management 970–972.
McCarthy, K.J., Aalbers, H.L., 2015. Technological acquisitions: the impact of geography on post-acquisition innovative performance. Research Policy 45, 1818–1832.
MacKinlay, C.A., 1997. Event studies in economics and finance. Journal of Economic Literature 35 (1), 13–39.
Mitchell, M.L., Stafford, E., 2000. Managerial decisions and long term stock price performance. The Journal of Business 73 (3), 287–329.
Moeller, S.B., Schlingemann, F.P., 2005. Global diversification and bidder gains: a comparison between cross-border and domestic acquisitions. Journal of Banking & Finance 29 (3), 533–564.
Narayan, P.K., Ranjeeni, K., Bannigidadmath, D., 2017. New evidence of psychological barrier from the oil market. Journal of Behavioral Finance 18 (4), 457–469.
Puranam, P., Singh, H., Zollo, H., 2006. Organizing for innovation: managing the coordination-autonomy dilemma in technology acquisitions. Academy of Management Journal 49 (2), 263–280.
Ranft, A.L., Lord, M.D., 2002. Acquiring new technologies and capabilities: a grounded model of acquisition implementation. Organization Science 13 (4), 420–441.
Rau, P.R., Vermaelen, T., 1998. Glamour, value and the post-acquisition performance of acquiring firms. Journal of Financial Economics 49 (2), 223–253.
Roll, R., 1986. The hubris hypothesis of corporate takeovers. The Journal of Business 59 (2), 197–216.
Rosen, R.J., 2006. Merger momentum and investor sentiment: the stock market reaction to merger announcements. Journal of Business 79 (2), 987–1017.
Sears, J., Hoetker, G., 2014. Technological overlap, technological capabilities, and resource recombination in technological acquisitions. Strategic Management Journal 35, 48–67.
Seth, A., Song, K.P., Richardson Perrit, R., 2002. Value creation and destruction in cross-border acquisitions: an empirical analysis of foreign acquisition of U.S. firms. Strategic Management Journal 23, 921–940.
Shimizu, K., Hitt, M., Vaidyanath, D., Pisano, V., 2004. Theoretical foundations of cross-border mergers and acquisitions: a review of current research and recommendations for the future. Journal of International Management 10 (3), 307–353.
Sudarsanam, S., Mahate, A.A., 2003. Glamour acquirers method of payment and post-acquisition performance: the UK evidence. Journal of Business Finance & Accounting 30 (1–2), 299–341.
Yoon, H.D., Lee, J.J., 2016. Technology-acquiring cross-border M&As by emerging market firms: role of bilateral trade openness. Technology Analysis and Strategic Management 28 (3), 251–265.
Zhang, J., He, X., 2014. Economic nationalism and foreign acquisition completion: the case of China. International Business Review 23 (1), 212–227.
Zollo, M., Singh, H., 2004. Deliberate learning in corporate acquisitions: post-acquisition strategies and integration capability in US bank mergers. Strategic Management Journal 25 (13), 1233–1256.