

The impact of technological augmentation on post-acquisition performance: A
comparison between domestic and cross-border mergers and acquisitions (M&As)
from emerging economies firms^{*,**}

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Abstract

Despite a growing body of literature on the issue of M&As initiated by firms located in emerging economies (EE), there has been a lack of comparative research which takes into account the post-deal performance of cross-border vs domestic M&As in the context of EE. Built on the dependence theory and the matching sample approach analysis, this study aims to examine the performance between domestic and cross-border M&As made by EE acquirers, and investigate the factors influencing the difference in performance. Using a dataset of 202 cross-border M&As and 202 matched domestic M&As deals over the period of 2003-2011 in which acquirers are based in 7 emerging economies, and targets are in 42 countries consisting of both emerging and developed economies, our empirical results show that (i) the post-acquisition performance in R&D intensity, short-term profitability and expected long-term performance between cross-border and domestic M&As by firms from EE is different; (ii) cross-border acquirers see their R&D intensity increased more than domestic acquirers with similar characteristics. This technological augmentation is the major factor explaining an improvement in cross-border acquirer's expected long-term performance; and (iii) the increase in post-M&A R&D intensity of the cross-border acquirers comes mainly from the deals where targets are based in countries with relatively superior human capital and innovative capabilities than those of the acquirers, which eventually lead to a positive prospect for acquirer's long-term performance.

1. Introduction

In the past decades, emerging economies firms (EEFs) have been fast growing with ambitious and aggressive strategic moves and restructuring both in their home markets and host markets (Lebedev et al., 2015). Numerous studies have analysed the motivations and location choice of M&As by EEFs, and tried to understand the factors affecting performance of EEFs (Haleblian et al., 2009). Most of studies focus on single market context based in larger emerging economies such as China (Rui and Yip, 2008), Indian (Gubbi et al., 2010) and Russia (Bertrand and Betschinger, 2012), with mixed result on post-acquisition performance. Bhagat et al. (2011) report a positive return of EE acquirers using 698 cross-border M&As by EEFs during the period 1990-2008. However, researchers propose that firms may struggle to achieve wealth gains in cross-border M&As due to additional strategic, cultural and integration issues (Datta and Puia, 1995; Slangen, 2006; Geppert et al., 2013; Stahl and Voigt, 2008; Vaara et al., 2005). Aybar and Ficici (2009)'s study contradicts the assumption and suggest that cross-border M&As by EEFs do not generate wealth gains, as do developed economy firms. The inconclusive evidences suggest that M&As by EE firms need further academic scrutiny.

If the assumption that acquisition creates wealth gains holds, the contradicting evidences constrains our understanding how cross-border M&As differ from domestic deals in terms of their post-acquisition performance and key determinants of the heterogeneous outcome of acquisitions in the context of emerging economies acquirers, which is rarely addressed by previous work. To remedy these gaps in the literature, we examine the following research questions: *Do EEFs perform differently after cross-border M&As vis-à-vis domestic deals with similar characteristics? If so, what are the channels that the differences? To what extent do*

institutional environments of target's country, particular in terms of technology and human capital factors, affect the performance of EE firms engaging in cross-border M&As activities?

To address these research questions, we build our study on the resource dependence view in which organizations must rely on the environment to supply the resources required for organizational survival, and firms adopting M&As as the critical strategic options, enact to manage and minimize environmental uncertainty (Davis and Cobb, 2010) and enhance resource accumulation and enhancement (Pfeffer, 1987). This study proposes that the long-term expected performance, in contrast with short-term performance, of EE acquiring firms is different when their target firms are located domestically and internationally. Further, the performance is influenced by a variety of factors including the innovative capabilities of EE acquiring firms, the gap of technological and human capital factors with target's counties. Using a comprehensive dataset which consists of 202 cross-border M&As with 202 matched domestic M&As deals whereby acquiring firms are located in 7 emerging countries and target firms in 42 countries over the period of 2003-2011, we employ the matched sample analysis based on the difference-in-difference (DID) approach. In contrast to the event study which has been a popular method, the DID estimation allows us to capture long-term performance of M&As (Nicholson et al., 2016). In particular, our DID estimator with the matched domestic sample is capable of capturing the average causal effect of the research interest, and examining the interactive relationship between motivations and performance of cross-border M&As by using similar domestic deals as the control group. The geographically diverse sample also contribute to the research field in addition to existing studies mainly focusing on large emerging economies such as BRIC (Bertrand & Betschinger, 2012; Buckley et al., 2014; Gubbi et al., 2010).

The rest of this paper is organized as follows. After developing the theoretical background and hypotheses in Section 2, we define the key variables, model specifications and describe techniques used to estimate - The DID estimator with the matched sample in Section 3. Section 4 estimates the models and reports the empirical results. Finally, Section 5 discusses the academic and policy implications of the findings and presents concluding remarks.

2. Theory and Hypotheses

2.1 Theoretical Perspectives: Resource dependence theory

The traditional resource dependence theory by Pfeffer (1972) argues that organizations are neither self-contained nor self-sufficient so that they must rely on the environment to supply the resources required for organizational survival. The organizations' reliance on their environment for critical resources makes some degree of external constraints and control of organization behavior possible and inevitable to a large extent. The resource environment also acts in a dynamic way: organizations enter and exit; the supply of resources expands and contracts. As the result of changes in the structural characteristics of the environment, the degree of dependency and power of the organizations shifts.

Applied to the field of merger activity, this perspective is useful for explaining how any changes in the exchange relationship between the organization and the resource environment will influence the organization's behaviour and subsequent performance. Through mergers, firms may be able to manage the resources, and, through absorption and integration, to meet the change of the environment and to survive within the environment. To summarize, this perspective suggests that mergers are an attempt on the part of organizations to reduce uncertainty and manage their environments, which then claims that they are an important means for firms to manage resource

interdependencies. Extending from domestic M&As, this theory has become widely applied on emerging economies firms' M&A activities (Davis and Cobb, 2010; Hillman et al., 2009). Firms adopting M&As as the critical strategic options, enact to manage and minimize environmental uncertainty (Davis and Cobb, 2010) and enhance resource accumulation and enhancement (Pfeffer, 1987). Two dimensions of environmental uncertainty will affect the pathway of firms whose decision focus will be different. The first one is home country environmental conditions. Despite of fast economic growth in the big emerging economies, the World Bank warned of a “structural slowdown” which traditional export-led economic growth no longer sustains. Extending the resource dependence logic of M&As, we contend that facing external home market constraints a firm may invest overseas in order to increase its power by acquiring alternative sources of resources.

The second one is host country environmental conditions. Legitimacy is required by foreign firms in order to settle down locally. As institutions define the rules of the game, including the laws and regulations applied in the host country (Davis et al., 2000), foreign acquirers are faced restrictions or even national protectionism from host country government. Therefore, high legal restrictions or investment risk may impose additional costs to foreign acquirers. A firm is more likely to acquire and control resources and thereby alleviates resource dependences on the external environment in which it is embedded (Davis and Cobb, 2010; Dress and Heugens, 2013). When approaching acquired firms in host markets which could exhibit diverse institutional settings, EEFs' dependence on host counties is determined by the extent to which potential acquired firms control important resources or markets that are after by them. Better institutional environments, efficient financial markets and easy access to resources and assets, attract foreign acquisitions and have important implications for firm performance (Gao et

al., 2015; Holmes et al., 2013; Wang et al., 2012). That is, the magnitude of resource dependency on host markets predicts the likelihood and formation of cross-border M&As by EMFs, which in turn strengthen focal organizational autonomy and legitimacy (Pant and Ramachandran, 2012; Sherer and Lee, 2002), and lead to better post-acquisition performance.

2.2 Hypotheses development

2.2.1 Domestic vs cross-border post-M&A performance by EEFs

Domestic M&As are conventionally regarded as a means of achieving efficiency and synergies through corporate diversification, though empirical results are quite mixed (De Long, 2001; Cornett et al., 2003; Goergen and Renneboog, 2004). From emerging economy perspective, Wright et al. (2005) speculate that domestic firms competing within emerging economies must deal with high levels of environmental uncertainties which urges them to upgrade and reconfigure existing resources and capabilities and decide strategic focus. To deal with such a 'high velocity' environment of rapid political, economic and institutional changes, emerging economies firms put emphasis on strategic flexibility (Uhlenbruck et al., 2003) in applying existing resources to alternative courses of action and coordinating the use of resources.

Domestic M&As do provide the channel for these firms to take advantage of existing and new resources given on their managerial ability (Vaara et al., 2013), business relationship (Khanna and Palepu, 2000; Gaur et al., 2014), corporate governance (Yao, 2017) and their institutional embeddedness (Lin et al., 2009).

By acquiring assets in foreign markets, firms expect positive returns not only via managing resources dependencies through absorption and integration at a low-cost base (Pfeffer, 1972), as what domestic M&As can achieve. Moreover, given the commitment and cost it is

associated with, cross-border M&As are indeed top-level strategic move in firms' internationalization to explore new and complementary assets and knowledge to enhance its market control and position (Shimizu et al., 2004). Using a sample of firms based in the US making foreign acquisition, Morck and Yeung (1992) find that market reaction to announcement of international acquisitions is positively influenced by the degree of accumulated intangible assets by the acquiring firm. According to this finding, cross-border M&As contribute to firms' positive return when related acquisition is undertaken especially in high R&D intensive industries.

In the context of cross-border M&As by EEFs, a few scholars have also reported positive results of cross-border M&As by these firms (as aforementioned in Introduction), indicating that foreign acquisitions in developed countries are an efficient and fast way to acquire strategic or knowledge-based resources usually not available in the domestic market or in other emerging economies. Moreover, high-value front-end capabilities and resources available in developed markets, combined with the back-end low-cost capabilities from EEFs can create uniquely valuable resource combinations to achieve higher market valuation (Harrison et al., 2001). For example, Gubbi et al. (2010) examine 425 cross-border deals by Indian firms which did create value for their shareholders from 2000 to 2007. Similar results are found in Bhagat et al. (2011)'s work based on a sample of 678 Indian firms during 1991-2008 periods.

We expect that cross-border M&As perform better in R&D intensive sectors, given that they are more strategically motivated to seek new sets of intangible assets and knowledge. In terms of short term performance, since the outcomes of R&D investment take time before it brings any return, the short-term performance of the cross-border M&A acquirers from EE may decrease, compared to that of their domestic M&As after the deal. However, the financial market

will perceive that such investment is value adding and leads to an increase in long term performance of the EE acquirers. Therefore, we propose the following hypotheses:

Hypothesis 1(a): Firm and deal characteristics being similarly controlled, the post-deal R&D intensity level of cross-border EE acquiring firms is greater than those conducting domestic M&As.

Hypothesis 1(b): Firm and deal characteristics being similarly controlled, the post-deal short-term performance of cross-border EE acquiring firms is weaker than those conducting domestic M&As.

Hypothesis 1(c): Firm and deal characteristics being similarly controlled, the post-deal long-term expected performance of cross-border EE acquiring firms is greater than those conducting domestic M&As.

2.2.2 The channel of domestic vs cross-border post-M&A performance by EEFs

Among all diverse types of resource firms are dependent on and seeking, knowledge development and accumulation can certainly increase EMFs' intangible ownership advantages, which can be quite difficult to imitate by rivals. These will in turn lead to sustainable competitive advantages and overseas success. Moreover, emerging economies' thirst for knowledge indicates that these countries are undergoing economic transition. IMF (2015) urges the development of diverse high-productivity economy in these markets by improving education, promoting competition and designing regulation to develop high value-added service sectors. In order to

catch up with developed countries in terms of strategic asset creation, cross-border M&As may be used as an important approach for acquiring cutting-edge knowledge, which is still lagging far behind in the innovation stakes. A country's knowledge development largely depends on its investment in research and development (R&D), which in turn is argued to link to growth in productivity (Jones, 1995). Prior research has found that R&D investment alone can explain 89.2% of national innovative capacity which has a significant impact on achieving a high market share of high-technology markets are those that improve the strength of a firm's strategy, including to 'create synergy, capitalise on a firm's core competence, increase market power, provide the firm with complimentary resources/products/strengths, or finally to take advantage of a 'parenting advantage' (Hopkins, 1999). In international mergers, the strategic motives focus more on a firm's instant growth, synergy, and core competence in the knowledge-based economy.

International mergers, as a means of adding a new dimension to the instant growth, are regarded as the most important motive for the firms. By expanding abroad, firms can escape from the small domestic economy that cannot accommodate the growth of its corporate giants (Weston et al., 1990), attain the size necessary for improving their ability to compete (Kang, 1993) and achieve the economies of scale necessary for effective global competition (Palepu, 1986).

With the rise of a knowledge-based economy, cross-border M&As reflect particular motives that are different from those of domestic ones. The core competences are reflected in the fields of intangible skill, expertise or knowledge, and leverage the firm by expanding its use to additional industries where it may create a competitive advantage (Hopkins, 1999). Adle and Dumas (1975) already point out that 'multinationals' incentive for foreign acquisition depends upon the degree of competences in the foreign capital market. To possess advanced technology is

a vital factor in deciding the competitive advantage of a firm. Exploiting technological advantages, particular in R&D, drives the firms to acquire or be acquired. Khoury (1986) finds that the foreign firms investing in the U.S are characterised by a substantial technological base in addition to their financial strength, managerial depth and powerful marketing organisation. On the basis of Williamson's (1975) systems approach, which is advanced to create efficient innovation processes in an economy, whereby small firms specialise in early stages of the innovation process for subsequent acquisition by large firms specialising in late stages, Granstrand and Sjolander (1990) extend the approach to describe how large, typically multi-technology corporations build up and exploit their technological capability by purchasing small, technology-based firms in order to acquire their technology.

Firms with ambitious strategic growth objective to undertake acquire abroad face challenges in accessing resources to build their international operations (Wright et al., 2005). In this case, those EMFs with better ability to overcome weak resource munificence are more likely to enact to the overseas market more proactively (Lebedev et al., 2015; Hobdari et al., 2017). First, firms may benefit from highly qualified labor market, access to cutting edge research and peers of innovative entrepreneurial activities. Yip and McKern (2016) provide case studies of successful emerging economy firms who are developing their cutting-edge technological capabilities through continuous investment and innovation, which become the basis for creating world leading products and services to meet the challenges of a new era of global competition. In their recent paper, Deng and Yang (2015), focusing on the destinations of cross-border M&As by Chinese firms, find out the positive relationship between strategic assets measured by patents and the number of cross-border M&As in host markets. They follow up the logic of M&As based on resource dependence theory and articulate that M&As may help firms to control some important

sources of resources, thus not only streamlining operations but also enhancing their bargaining power relative to local firms, thus mitigating dependence uncertainties (Gaffney et al., 2013, Haleblan et al., 2009). Examining a historical longitudinal analysis of sixteen companies from India and China, Kotabe and Kothari (2016) confirm that emerging economy firms with remarkable innovation capabilities are able to introduce and market new products to host markets faster than their rivals. Despite of the lack of basic infrastructure and weak regulatory framework, these firms are forced to innovate and develop their technological capability to overcome institutional voids. Through cross-border M&As, they further diversify their vendor base, realize cost savings and retain flexibility to be more resilient to the changing business environment.

Based on the above discussion and hypotheses 1(a) -1(c), in our second estimation we proposed the following hypothesis on the channel of the expected long term financial performance of acquirers in EE initiating cross-border M&As:

Hypothesis 2 (a): The greater the level of post-deal R&D intensity of an EE acquiring firm, the more likely is the EE acquiring firm to increase its post-deal long-term expected performance. Firm and deal characteristics being similarly controlled, this effect is stronger for those conducting cross-border M&As than for those conducting domestic M&As.

2.2.3 County specific determinants of domestic vs cross-border M&As performance by EEFs

EEFs are quite likely to enter the markets which could offer a well-established institution and a stable investment environment with a low level of political risk and a large talent pool (Deng and Yang, 2015). Nicholson and Salaber (2013) compare 203 Indian and 63 Chinese

cross-border acquisitions and conclude that acquisitions into developed countries generate higher returns to shareholders.

To capture the implications of institutional environments on cross-border M&A performance, Morresi and Pezzi (2014) summarize determinants across country, industry and firm and deal levels. Institutional theorist proposes that firms are much more likely to acquire valued resources when resource acquisition conforms institutional norms and values (Ginsberg, 1994; Oliver, 1997). Vasconcellos and Kish (1998) examines cross-border acquisitions between US and European firms and concludes that the acquisition of technological and human resources favor international acquisitions, whereas factors such as information asymmetry, monopolistic power, and government restrictions and regulations do not favor such acquisitions. Using a sample of 8,010 cross-border M&As by US firms in 111 countries, Owen and Yawson (2010) advises that firms are more likely to make acquisitions in countries with a strong human development index, low country risk, high institutional quality, and good corporate governance. Choi et al. (2016) confirm the findings by expanding the observations to 7,492 deals hosted by 38 countries.

Looking into 1,358 deals by firms from 9 emerging economies, Deng and Yang (2015) contend that firms are more likely to make deals in countries with strategic assets. Further, firms tend to initiate more deals in developed countries to seek strategic assets and learn from good governance to have spillover effects to their home countries (Liu and Zou, 2008). Using the same dataset, Liou et al. (2016) address the rationale behind firms' preference of acquisition in developed economies due to the 'catch-up' motivation to enhance human capital in their home. These acquired foreign technological assets are known to contribute to the performance and competitive advantage of the firm (Tsang et al., 2008). In our third estimation, we further test the

institutional location advantage assumption by examining whether the gaps between human capital and innovative capabilities between countries where EE acquiring firms and their target firms are originated have implications on cross-border firm performance. Therefore, we propose the following hypotheses:

Hypothesis 3(a): The larger the gap of human capital quality between an EE acquirer's country and a target's country, the more likely is the EE acquiring firm to increase its expected post-M&A long-term performance. Firm and deal characteristics being similarly controlled, this effect is stronger for those conducting cross-border M&As than for those conducting domestic M&As.

Hypothesis 3(b): The larger the gap of innovative capability between an EE acquirer's country and a target's country, the more likely is the EE acquiring firm to increase its expected post-M&A long-term performance. Firm and deal characteristics being similarly controlled, this effect is stronger for those conducting cross-border M&As than for those conducting domestic M&As.

3. Research design

3.1 Data and sampling: A matching sample approach

The primary data sources used in our empirical analyses compile information on cross-border and domestic M&As originating from emerging market firms. The data on M&As by emerging market firms comes from Zephyr M&A dataset collected by the Bureau van Dijk. The initial

stage of data collection follows the next four steps. First, we collect the primary data on all completed M&A deals between 2003 and 2011. Second, we only retain from the primary data all completed M&A deals where a country of origin of acquiring firms is the following 7 emerging countries: China, India, Indonesia, Malaysia, Philippines, Thailand and Turkey. Third, to guarantee validity and consistency in comparison between cross-border and domestic M&As, we retain from the primary data all completed M&A deals where acquiring firms have information on total assets at least during one year before and one year after M&As. Fourth, for the same reason as above, we finally retain from the primary data all completed M&A deals where industry information is available for both acquiring and target firms.¹ This initial dataset consists of a total of completed 474 cross-border and 2,206 domestic M&A deals made by acquiring firms based on 7 emerging economies.

After obtaining the initial dataset of completed cross-border and domestic M&A deals originated by firms from emerging economies, we use the matched sample approach to investigate and compare the effect of cross-border and domestic M&As on their performance. The matched sample approach is based on the difference-in-difference (DID) estimation pioneered by Ashenfelter and Card (1985). DID provides an estimator concerning the average size of the ‘treatment’ effects as in randomized control experiments, using observational data. In a matched sample approach, each observation in the treatment group (cross-border M&A in our case) is paired with a control sample which has similar observable characteristics but is not exposed to the treatment effect (domestic M&A in our case). To illustrate the idea, consider the ‘true’ model of the effect of cross-border M&As on a generic outcome variable y :

¹ Due to the nature of data, we do not require target’s firm level information except for the industry code. Within the initial sample of 3889 observations, only 360 announcements are with listed target firms.

$$y_{it} = \alpha + \beta D_{it} + \gamma' z_{it} + \mu_i + \delta' w_{it} + \epsilon_{it} \quad (1)$$

where $D_{it} = 1$ if firm i undertook the cross-border M&A at $t - 1$, 0 otherwise. Here, this $t - 1$ specification is motivated by the fact where there exist internal and external lags for the effects of M&As. The vectors z_{it} and w_{it} , respectively, represent the time-varying observable and unobservable factors affecting outcome y . The time-invariant firm-specific fixed effect is captured by μ_i . The error term is denoted by ϵ_{it} . The parameter of interest is β . To estimate (1) one can collect a pseudo panel dataset where all of firms i have executed cross-border M&As at some year $s \in [s_m, s_M]$. However, since model (1) involves unobserved variables, it is not directly estimable. Given the structure of data, one can consider estimation of the feasible version of (1) based on the first-differenced model:

$$\Delta y_{it} = \beta \Delta D_{it} + \gamma' \Delta z_{it} + \Delta u_{it} \quad (2)$$

where $u_{it} = \delta' w_{it} + \epsilon_{it}$ and Δ represents the time difference between $t = s + 1$ and $t = s - 1$, where s denote the year of the M&A. Note that $\Delta D_{it} = 1$ by construction of the cross-border M&A dataset. Model (2) produces unbiased estimators as long as the composite disturbance term u_{it} and regressors are uncorrelated. This approach, however, is rather unsatisfactory in our case. First, the range of observable variables available in our dataset is not extensive because we focus on acquiring firms located in EE. Progressively more observations are lost as extra variables are required in the sample. Hence a sufficiently well-specified empirical model based on (2) would be left with only a handful of observations and thus estimators would be inaccurate. Second, more importantly, the decision to initiate and complete cross-border M&As is not random and is

likely to be correlated with the unobserved firm characteristics w_{it} (thus u_{it} too) such as management quality, business strategy, etc. Therefore, the feasible model (2) is likely to introduce estimation biases due to the omitted variables issues. This problem would be severe if only a few observable variables are available to include. A usual recommendation to such endogeneity is the use of instrument variable (IV) regressions. Unfortunately, it is rather difficult to find appropriate IVs given the limited availability of data in sample countries. Instead, we address this problem by adopting the matched sample approach (Rubin, 2006). Suppose that we have a set of ‘counterfactual’ firms indexed by j . They have the identical characteristics as the firms in our main dataset but have not performed cross-border M&As around $t = s$. Therefore, the counterfactual dataset requires $z_{jt} = z_{it}$, $w_{jt} = w_{it}$, and $\mu_j = \mu_i$ but $D_{js+1} = D_{js} = D_{js-1} = 0$. The differenced model (2) applied to this hypothetical counterfactual dataset yields

$$\Delta y_{jt} = \gamma' \Delta z_{jt} + \Delta u_{jt} \quad (2)'$$

When (2) and (2)' are combined, it is possible to recover the causal effect of cross-border M&As as follows:

$$E[\Delta y_{it} - \Delta y_{jt}] = \beta \quad (3)$$

In other words, given the cross-border M&A sample matched with the counterfactuals (domestic M&A for our case), one can obtain an unbiased estimator of β , simply by taking an average difference of changes in outcome variables across the two groups, without need to control for any covariates explicitly.

Once the matching is done properly, the control group takes care of the various observable and unobservable compounding effects. Thus, we can capture the average effect of the research interest, without explicitly including these variables and the proxies in regressions (see e.g. Heckman et al., 1997). Following existing studies in economics, finance and management (Bris and Cabolis, 2008; Ahern et al., 2015; Lim et al., 2016), we use completed domestic M&A deals during the similar time to our study period as the control group. We construct a matching sample based on size and industry. This approach is proven to yield well-specified powerful statistical tests (Barber and Lyon, 1996). The following four steps are used to find a domestic M&A for each cross-border counterpart: First, the domestic M&A is completed within ± 2 year of the cross-border M&A. Second, domestic acquiring firms which also engage in cross-border M&As are removed from domestic M&A observations. Third, the domestic acquiring (target) firm belongs to the same SIC code of the cross-border acquiring (target) firm. To match the industry code, we start with the 4 digit SIC code. If no domestic merger observation is found within the 4 digit industry code, we try the 3 digit SIC code. Sequentially, a matching by a lower digit industry code is attempted². Once the matching is done in n digit SIC code, all matching based on $(n - k)$ digit SIC codes ($k < n$) is ignored. Finally, both domestic and cross-border acquiring firms have similar size measured by total assets one accounting year prior to the M&A. We find a domestic acquirer whose total asset is between 50%-300% of the cross-border acquirer within the SIC codes. We retain the best matched observations and drop all observations unmatched in this process. This leaves us a total of 504 matched observations, a half of which is the cross-border (domestic) M&A, including acquiring firms from 7 emerging

² In order to avoid a spurious matching, we follow the steps in Kahle and Walkling (1996) to construct ‘one’ digit SIC code. They document that the first digit of SIC codes does not correspond to the 10 broad industry groups. In fact the US government uses information in the first two digits of SIC codes to classify 10 most broad economic activities. For instance, if the first two-digit SIC code are between 10 and 14, the firm is in mining industry. Similarly, two-digit SIC code between 70 and 89 means the service sector, etc.

countries and target firms from 42 countries.³ Table 1 verifies that our matching criterion has not introduced statistically significant bias in the size of comparable firms. In our final sample, the firms engage in a cross-border M&A is slightly larger in total assets (but statistically insignificant) than the matched domestic firms in the year prior to the M&A. Moreover, our matching process results in similar size between domestic and cross-border samples after the M&As too. The data for the firm level information is obtained from Oriana dataset collected by the Bureau van Dijk.

[Table 1 about here]

3.2 Empirical models

We first investigate the effects of the cross-border M&As relative to similar domestic M&As initiated by firms in EE on their performance. Let s denote the year of the M&A. For each cross-border M&A deal i , one domestic M&A case is matched as control group based on the process described above. In the emerging economy context, only few firms are listed and collecting comprehensive data on both cross-border and domestic M&As is difficult. Therefore, the effect of the M&A deal is measured over relatively short period, three-year window over $t = s - 1$ to $t = s + 1$. With the matched domestic M&A sample, the effects of a cross-border M&A relative to a similar domestic M&A on its performance, y_{it} can be estimated by the following model:

$$y_{it} = \alpha + \beta_1 D_{1,it} + \beta_2 D_{2,it} + \gamma D_{1,it} D_{2,it} + \epsilon_{it} \quad (4)$$

³ 42 countries include: Argentina, Australia, Belgium, Brazil, Bulgaria, Canada, China, Colombia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Hong Kong, India, Indonesia, Ireland, Italy, Japan, Malaysia, Mauritius, Mexico, Netherlands, New Zealand, Oman, Philippines, Portugal, Saudi Arabia, Singapore, South Africa, South Korea, Spain, Sri Lanka, Switzerland, Taiwan, Thailand, United Arab Emirates, United Kingdom, United States, Viet Nam and Sweden.

where $D_1=1$ if the observation is cross-border M&A, 0 otherwise (domestic M&A) and $D_2=1$ if the observation belongs to the post-M&A period, 0 otherwise (the pre-M&A period). The coefficient β_1 reflects the average difference in cross-border M&A vis-à-vis domestic M&A. The coefficient β_2 captures the average difference between pre- and post-M&A. Finally, $\gamma = (\bar{y}_{s+1}^C - \bar{y}_{s-1}^C) - (\bar{y}_{s+1}^D - \bar{y}_{s-1}^D)$ indicates the net effect of cross-border M&As relative to the domestic mergers where \bar{y}^C and \bar{y}^D denote the average value of their performance, y for cross-border M&A and domestic M&A respectively.

We use three performance variables. The first one is R&D intensity, which is measured by the ratio of expenditures by a firm on research and development (R&D) to the firm's total asset (in %) and denoted as *RDI*. R&D intensity captures the effect of M&As on acquiring firms' innovation capabilities which expand the breadth and depth of their product knowledge and technology. The other two variables are related to financial performance. Due to previously mentioned data limitations, we use two financial performance measures. First, to capture the effect of M&As on acquirers' short-term financial performance, we use return on equity (ROE), which is measured by the ratio of a firm's net profits to its book value of shareholders' equity (in %) and denoted as *ROE*. Since *ROE* is measured over a fixed horizon (usually a year), it is intuitive and obvious that it measures short-term past profitability. Second, to capture acquirers' long-term expected performance, we use the price-to-book ratio (P/B Ratio), which is measured by the ratio of market price of a firm's shares over its book value of equity and denoted as *PB*. In the absence of arbitrage opportunities, the asset price must equal to its expected future cash flows discounted by cost of capital (Cochrane, 2009). In other words, in well-functioning financial markets, asset prices reflect reasonably comprehensive information about long-term future

performance. Therefore, a firm's P/B ratio indicates the market's expectation about the firm's long-term performance.

After identifying the causal effect of cross-border M&As undertaken by firms in EE relative to domestic M&As on R&D intensity, short-term profitability, and long-term expected performance, we specify the following model to test the relationship among these three performance measures of acquiring firm i for both cross-border and matched domestic M&As at time s as assumed in the previous section:

$$\begin{aligned} \Delta PB_{is} = & \beta_0 D^D + \beta_1 D^C + \beta_{1D} \Delta RDI_{is} \times D^D + \beta_{2D} \Delta ROE_{is} \times D^D + \beta_{1C} \Delta RDI_{is} \times D^C + \\ & \beta_{2C} \Delta ROE_{is} \times D^C + \varepsilon_{is} \end{aligned} \quad (5)$$

where $\Delta PB_{is} = PB_{i,s+1} - PB_{i,s-1}$, $\Delta RDI_{is} = RDI_{i,s+1} - RDI_{i,s-1}$, $\Delta ROE_{is} = ROE_{i,s+1} - ROE_{i,s-1}$, $D^D = 1$ if the observation is cross-border M&A, 0 otherwise (domestic M&A), $D^C = 1$ if the observation is domestic M&A, 0 otherwise, and ε_{is} is an error term.

We finally examine the factors which explain the difference in post-M&A performance between cross-border and domestic M&As by formulating the following model:

$$z_i = x_i' \delta + w_i' \theta + \eta_i \quad (6)$$

where $z_i = (y_{i,s+1}^C - y_{i,s-1}^C) - (y_{i,s+1}^D - y_{i,s-1}^D)$ is the net effect of cross-border M&A relative to similar domestic M&A on acquirer's performance. The vector x_i is the acquirer and target country specific explanatory variables and vector w_i is the firm specific control variables. As

acquirer and target country specific explanatory variables, we firstly control for human capital gap between acquiring and target countries, which is measured by gap of the gross tertiary education enrolment ratio between two countries where acquiring and target firms are originated and denoted as EDU^{T-A} ($= EDU^T - EDU^A$). EDU^A and EDU^T are measured by the ratio of the number of students enrolled in tertiary education to the population of the age group that officially corresponds to tertiary education in acquiring and target firms' home countries respectively (in %). To capture regional innovative capability gap between acquirer and target countries, we also include the gap of patent application numbers between two countries where acquiring and target firms are based (in log) and it is denoted as PAT^{T-A} ($= PAT^T - PAT^A$). Finally, we use gross domestic product (GDP) per capita of the country where an acquiring firm and a target firm is based (in log) as a proxy of national productivity, denoted as $GDPPC^A$ and $GDPPC^T$ respectively.

As firm specific control variables, acquiring firm's sales turnover is used to control for the income generated by the firm's normal business activities. It is measured as the ratio of a firm's sales to its total assets (in %) and denoted as ST . To capture the overall value of a firm's workforce, we include a wage to sales ratio which is measured as the ratio of a firm's wages to its sales (in %) and denoted as WS . We also include a R&D to sales ratio to account for the effectiveness and efficiency of R&D expenditures. It is measured as the ratio of a firm's R&D expenses to its total sales (in %) and denoted as RDS . To take into account the nature of M&A deal further, we include three dummy variables. The first one is a deal type dummy variable that takes the value one if the cross-border M&A deal is a public takeover, and zero otherwise, denoted as $Dummy_{Deal\ Type}$. The second one is an industrial link dummy variable that takes the value one if the major industry of acquiring firm and target firm is the same under one digit SCI

code, and zero otherwise, denoted as $Dummy_{Industrial\ link}$. The last one is industry dummy variable that takes the value one if the acquiring firm's industry belongs to the high-tech industry, and zero otherwise. Table 2 and Table 3 present the summary statistics and the correlation matrix of the variables employed in our empirical regression based on Eqs. (4) and (6). The country level data are obtained from the World Bank.

[Table 2 and Table 3 about here]

4. Empirical results

4.1 The effect of cross-border vs domestic M&As on EE acquiring firms' performance

Table 4 reports the results of matching sample fixed effect regressions for Eq. (4) which intends to capture the net effect of cross-border M&As initiated by firms in EE relative to domestic M&As on R&D intensity, ROE and P/B ratio. As shown in the fourth row of Panel A which is estimated for full sample, the coefficients for both RDI and PB are positive and statistically significant ($\gamma = 0.429$ for RDI and $\gamma = 0.171$ for PB), indicating that EE firms' cross-border M&As, compared to the domestic M&As with similar characteristics increase the level of acquirers' product knowledge and technology through R&D expenditures, and long-term expected performance of the acquiring firms. However, the coefficient for the ROE is negative and statistically significant ($\gamma = -4.803$), indicating that acquirers' short-term profitability after the cross-border M&As decrease, comparing to that of matched domestic M&As. These findings together suggest that the acquirers originated from EE engaging in cross-border M&As seek innovative technologies unavailable in their own countries. As such, they facilitate further R&D

investment. Since the outcomes of R&D investment take time before it brings any return, the short-term profitability of the cross-border M&A acquirers may decrease, compared to that of matched domestic M&As after the deal. However, the financial market, on average, perceives that such investment is expected to add values and leads to an increase in long term return of the acquirers. Thus, investors are willing to pay higher P/B multiples. These results support Hypotheses 1(a), 1(b) and 1(c).

When we separate target firms' home countries in developed economies from those in developing economies following the World Bank classification in Panel B, the positive and the negative net effect of the cross-border M&As undertaken by acquirers from EE relative to the matched domestic M&As on *RDI* and *ROE* respectively are largely driven by those targeting firms in developed economies. As displayed in the fourth row of Panel B, the coefficients of *RDI* and *ROE* are statistically significant only with the subsample of target firms in developed economies ($\gamma = 0.483$ for *RDI* and $\gamma = -4.749$ for *ROE*), whereas the coefficients of *RDI* and *ROE* with the subsample of target firms in developing economies are statistically insignificant. These results further confirm the hypothesis that EE firms acquiring foreign firms located in developed countries are likely to be pursuing innovative technologies not available in home countries or other developing economies. As such, cross-border M&As targeting firms in developed economies lead to an increase in acquiring firms' R&D intensity level while a decrease in their short-term profitability. With regard to the net effect of the cross-border M&As on acquirers' *PB*, the coefficients of *PB* for both subsample of target firms in developed and developing economies are statistically insignificant although the coefficients are with the same signs as the result based on the full sample in Panel A.

[Table 4 about here]

4.2 The relationship between R&D intensity, short-term profitability, and long-term financial performance

Considering our discussions on the relationship between R&D intensity and long-term expected performance (Section 4.1), the long-term expected performance of acquirers in EE initiating cross-border M&As may be channeled through improving their innovative capabilities. We use the empirical model specified in Eq. (5) to measure potentially heterogeneous effects of augmented R&D intensities after domestic and cross-border M&As on the long-term expected performances. Since the dependent variable PB measures the ratio between the acquirer's stock and its book value, arguably, it is affected both by short-term profitability and long-term expected performances. To disentangle the compounding effects, we include changes in ROE to control for short-term profitability. Thus, the coefficient on ΔRDI measures its effect on the long-term performances.

Table 5 reports the results. It reveals that the *total* effect of ΔRDI_{iS} for the domestic M&A deals is negative and significant ($\beta = -1.545$). This means that the financial market participants view that an increase in R&D intensity associated with domestic M&A deals is negative news for the future earnings of the acquirers, thus they are willing to pay lower share prices relative to the book values (P/B). On the contrary, an increase in ΔRDI_{iS} which comes with cross-border M&A deals is seen as positive news ($\beta = 0.276$). But this is statistically insignificant at the 10% level (p-value=12%). However, the *net* effect of cross-border M&As over the domestic deals, reported in the diff column, is positive ($\beta = 1.821$) and significant at the 1% level. The results are broadly consistent with our expectation in section 4.1 and support

Hypothesis 2. An increase in ROE leads to a higher post-M&A P/B ratios regardless of the location of the targets. (0.037 for domestic, 0.058 for cross-border). This is statistically significant only with the cross-border M&As. However, the difference is insignificant.

[Table 5 about here]

4.3 Country specific determinants of post-M&As performance by EEFs

As hinted in the estimation results of Table 5, an increase of R&D intensity through cross-border M&As is an important driving force of increasing the level of expected long-term performance of the cross-border M&A acquirers. Eq. (6) is estimated with the net effect of a firm's cross-border M&A relative to similar domestic M&A on its R&D intensity as dependent variable ($\Delta RDI^{C-D} = (RDI_{s+1}^C - RDI_{s-1}^C) - (RDI_{s+1}^D - RDI_{s-1}^D)$). The estimation results are presented in Table 6 and our interpretation of estimation results will focus on Model (7) including all explanatory and control variables. Let us first look at the coefficients on acquirer and target country specific explanatory variables. The coefficients on EDU^{T-A} and PAT^{T-A} are positive and statistically significant ($\beta = 0.019$ for EDU^{T-A} and $\beta = 0.073$ for PAT^{T-A}), indicating that the larger gross tertiary education enrolment ratio gap and larger patent application numbers gap between two countries where acquiring and target firms of cross-border M&As are originated all contribute to an increase in the acquiring firms' expected long-term performance after the cross-border M&As. These results support Hypotheses 3(a) and 3(b).

With regard to the performance of firm specific control variables, all perform well in the regression, having the expected signs for all coefficients and being statistically significant. The positive and statistically significant coefficient of ST and RDS ($\beta = 0.010$ for ST and $\beta =$

0.126 for *RDS*) suggest that a higher sales turnover and a higher efficiency of R&D expenditure of an acquiring firm involving the cross-border M&A are all positively related to the level of its long-term performance predicted by financial market. On the contrary, the coefficient of *WS* is negative and statistically significant ($\beta = 0.010$), indicating that a higher level of labor cost of an acquiring firm relative to its sales is negatively related to the expected its long-term performance after initiating cross-border M&As. However, with regard to the home country of acquiring firms in EE and their target firm specific control variables, the coefficients of *GDPPC^A* and *GDPPC^T* are statistically insignificant.

[Table 6 about here]

5. Discussion and Conclusion

With a specific focus on the post-deal performance of cross-border vs domestic M&As in the context of EE, this paper contributes to the literature on M&A and emerging markets firms by investigating the importance of technological assets and technological acquisition for the post-acquisition performance of EEFs. Although there exists some empirical evidence on the determinants of post-acquisition performance by EMFs, evidence for the comparison between domestic and cross-border M&As is missing for these latecomers. Possible reasons lie in the difficulties in the access to the information on EMFs' acquisitions in home and host markets and the match between the two groups to do the comparison. This study has addressed this challenge and thus filled an important niche in the literature. This study has taken a thorough data mining process to get to a dataset of 202 cross-border M&As and 202 matched domestic M&As by firms

from 7 emerging countries, target firms from 42 countries over the period of 2003-2011. The use of difference-in-difference (DID) estimation allows us to capture the average effect of the research interest, and examine the interactive relationship between motivations and performance of cross-border M&As vis-à-vis in oppose to similar domestic deals.

The acquisition decision is determined by the expected returns from the acquisition and, hence, depends on the acquirer's capabilities to acquire strategic assets to build or enhance competitive advantage. However, such assets, such as technology, human capital and innovative capabilities can be mitigated by uncertainties surrounding the firms, especially when institutional environment plays in different ways. EMFs' dependence on home or host countries is determined by the extent to which potential acquired firms control important resources or markets that are after by them. That is, the magnitude of resource dependency on target leads to better post-acquisition performance. Through acquisitions, such resource dependency on targets are acquired and integrated with the existing resource pools.

The findings of this study suggest that technology acquisition, captured by the argumentation in post M&As relative to pre-M&As, is a significant factor for the long term expected performance of EEFs. As compared with tangible assets, technological assets are always considered sought-after resources and capabilities for firms. When it is time-consuming and costly for them to develop internally, firms always consider and adopt M&As as a speedy means to acquire and absorb from external targets, which in turn enhance their overall performance in the market. Literature on internationalisation of EMFs has no doubt in highlighting the importance of technological assets in internationalisation strategy but provides limited empirical evidence on to what extent, if it does, such technological acquisition contributes to EEFs' post-acquisition performance.

In the case where the acquisition target operates in a domestic emerging market its value for the acquirer can be acquired and augmented easily because resource dependency of the acquirer firm is less pronounced. The problem of resource dependency about acquisition targets is supposed to be more significant for operating in foreign markets because differences in the host and home institutional settings present many uncertainties. The results show that this is especially relevant for EEFs targets: domestic targets are less likely to contribute to positive post-acquisition performance than foreign targets. Their counterparts, enables EEFs to commit to the continuous development of innovative capabilities, as shown in a higher R&D intensity level and long term financial performance after acquisitions. An immediate implication for managers is to be aware of the short-term financial loss but also focus on technology acquisition and asset augmentation for better long-term performance.

This study is not without limitations. A number of factors can be attributed to the post-acquisition performance, as discussed in M&A and internationalisation of firms' literature, such as cultural difference, firm experiences and managerial capabilities and networks, so on. It would be desirable to extend the examinations of such factors on our data set. Another drawback of this dataset, as of any, is the limited available information on acquisition partners and their R&D activities. The information at hand does not allow digging deeper into the different dimensions of technologies. In particular, it is also not possible to draw a more distinct line between technology and market-related acquisitions, which would be desirable given a large body of literature pointing at the different developments of technological and industry-specific assets for firms. Finally, previous empirical findings show that technological relatedness is an important criterion for the acquisition performance, given the potential to maximize the absorptive capability EMFs

have. Distinguishing between the importance of technological relatedness for EMFs will provide implications to manage their strategic decisions and operations.

Table 1. The average total asset size of acquiring firms: pre- and post- M&A (in USD millions)

A. Initial Sample			
	Domestic (1)	Cross-border (2)	Diff [(2) – (1)]
Pre M&A	1273.0	1437.0	164.0 (0.76)
Post M&A	1945.9	2161.4	215.5 (0.69)
(Post M&A – Pre M&A)	672.9	724.4	51.5 (0.45)
N	2206	474	
B. Matching Sample			
	Domestic (1)	Cross-border (2)	Diff [(2) – (1)]
Pre M&A	961.4	1011.2	49.9 (0.24)
Post M&A	1631.1	1583.0	-48.2 (-0.15)
(Post M&A – Pre M&A)	669.7	571.8	-98.1 (-0.26)
N	252	252	

Notes: The numbers in parentheses are robust t-statistics.

Table 2. Descriptive statistics and correlation matrix for variables used in Eq. (4)

Panel A. Descriptive statistics						
	Count	Mean	S.D.	Min	Max	Remarks
RDI	1008	0.47	2.38	0	51.1	R&D Intensity= R&D expenditure / Total assets * 100
ROE	1008	18.39	29.96	-286.6	203.7	Return On Equity = Net income/equity * 100
PB	456	1.98	2.14	0	24.5	P/B ratio = Market price of stock/ Book equity per share

Panel B. Correlation matrix			
	(1)	(2)	(3)
(1) RDI	1		
(2) ROE	0.0037	1	
(3) PB	-0.035	0.26**	1

Significance levels: * p<0.10, ** p<0.05 and *** p<0.01

Table 3. Descriptive statistics and correlation matrix for variables used in Eq. (5)

Panel A. Descriptive Statistics						
	Count	Mean	S.D.	Min.	Max.	Remarks
ΔRDI^{C-D}	252	0.43	3.41	-3.12	52.0	$(RDI_{s+1}^C - RDI_{s-1}^C) - (RDI_{s+1}^D - RDI_{s-1}^D)$
EDU^{T-A}	182	40.73	25.68	-18.7	77.5	Gross tertiary education enrolment gap between acquirer and target countries
PAT^{T-A}	237	-0.10	4.77	-15.3	9.82	Total patent application number gap between acquirer and target countries
NPM	252	12.17	31.00	-152.7	334.5	Acquiring firm's net profit margin = net profit/ sales
ST	252	88.09	50.52	1.73	364.4	Acquiring firm's sales turnover = sales/total assets * 100
WS	224	16.23	15.69	0.78	78.3	Acquiring firm's wage to sales ratio = wages/sales * 100
RDS	245	0.50	2.43	0	33.2	Acquiring firm's R&D to sales ratio = R&D/ sales * 100
$Dummy_{Deal Type}$	252	0.03	0.18	0	1	Dummy=1 if the cross-border M&A is public takeover
$Dummy_{Industry Link}$	252	0.73	0.44	0	1	Dummy=1 if the cross-border M&A is horizontal (SIC of acquirer = target's, in 1 digit)
$GDPPC^A$	252	7.43	0.86	6.68	8.78	Acquirer country's GDP per capita (USD) in log
$GDPPC^T$	250	10.04	1.01	6.53	11.0	Target country's GDP per capita (USD) in log

Panel B. Correlation matrix								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ΔRDI^{C-D}	1							
(2) EDU^{T-A}	0.097	1						
(3) PAT^{T-A}	0.087	0.21***	1					
(4) $GDPPC^A$	-0.084	-0.73***	0.089	1				
(5) $GDPPC^T$	0.042	0.74***	0.11*	-0.26***	1			
(6) ST	0.083	-0.17**	0.098	-0.067	-0.13**	1		
(7) WS	-0.021	0.29**	0.21***	-0.15**	0.24***	0.017	1	
(8) RDS	0.12*	0.13*	0.074	-0.12+	0.060	-0.051	0.047	1

Significance levels: * p<0.10, ** p<0.05 and *** p<0.01; Explanatory variables are as of t=s-1 where s denotes the year of M&A to avoid spurious causality.

Table 4. The net effect of cross-border M&As relative to domestic M&As on firm performance (*RDI*, *ROE* and *PB*)

Panel A. Full sample

	<i>RDI</i>	<i>ROE</i>	<i>PB</i>
All M&As ($M\&A_{s+1}^{C+D} - M\&A_{s-1}^{C+D}$)	0.072*** (3.29)	-2.782*** (5.76)	-0.390** (2.25)
(1) Cross-border M&A ($M\&A_{s+1}^C - M\&A_{s-1}^C$)	0.286** (2.46)	-5.183*** (6.76)	-0.304 (1.65)
(2) Domestic M&A ($M\&A_{s+1}^D - M\&A_{s-1}^D$)	-0.143 (1.53)	-0.380 (0.28)	-0.475* (2.89)
(3) Net effect of cross-border M&A [(1) – (2)] {($M\&A_{s+1}^C - M\&A_{s-1}^C$) – ($M\&A_{s+1}^D - M\&A_{s-1}^D$)}	0.429** (2.05)	-4.803** (2.43)	0.171*** (3.49)
<i>N</i>	1,008	692	140

Panel B. Subsample: Targets in Emerging Economies vs. Developed Economies

	<i>RDI</i>		<i>ROE</i>		<i>PB</i>	
	Emerging Economies	Developed Economies	Emerging Economies	Developed Economies	Emerging Economies	Developed Economies
All M&As ($M\&A_{s+1}^{C+D} - M\&A_{s-1}^{C+D}$)	0.037 (0.88)	0.080*** (3.67)	-6.004* (1.73)	-2.022*** (6.11)	0.044 (0.48)	-0.518* (2.05)
(1) Cross-border M&A ($M\&A_{s+1}^C - M\&A_{s-1}^C$)	0.140 (1.26)	0.322*** (2.75)	-8.521** (2.34)	-4.396*** (3.73)	0.335 (1.40)	-0.494* (2.11)
(2) Domestic M&A ($M\&A_{s+1}^D - M\&A_{s-1}^D$)	-0.066 (1.89)	-0.161 (1.55)	-3.488 (0.71)	0.352 (0.60)	-0.248 (1.36)	-0.542 (1.95)
(3) Net effect of cross-border M&A [(1) – (2)] {($M\&A_{s+1}^C - M\&A_{s-1}^C$) – ($M\&A_{s+1}^D - M\&A_{s-1}^D$)}	0.205 (1.40)	0.483** (2.22)	-5.033 (0.93)	-4.749** (2.62)	0.584 (1.51)	0.048 (0.60)
<i>N</i>	196	812	132	560	32	108

Significance levels: * p<0.10, ** p<0.05 and *** p<0.01

Table 5. What drives changes in P/B ratio?

DV = ΔPB	Variable	Domestic (D^D)	Cross-border (D^C)	Diff (2)-(1)
	ΔRDI	-1.545*** (-5.473)	0.276 (1.624)	1.821*** (11.757)
	ΔROE	0.037 (0.718)	0.058* (2.588)	0.020 (0.620)
	Constant	-0.505+ (-1.887)	0.160 (0.429)	0.160 (0.429)

N= 38; Constant suppressed. Robust t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; D^C is a dummy variable which takes the value of 1 if the observation is from the firm which has finished cross-border M&A and zero otherwise.

Table 6. What explains changes in R&D intensity? (DV = ΔRDI^{C-D})

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>EDU^{T-A}</i>	0.015*** (7.08)		0.035*** (3.10)		0.033*** (4.96)		0.019*** (2.14)
<i>PAT^{T-A}</i>		0.065*** (2.47)		0.078 (1.50)		0.091*** (2.99)	0.073** (1.88)
<i>GDPPC^A</i>					0.013 (0.06)	-0.591*** (-2.24)	-0.356 (-0.64)
<i>GDPPC^T</i>					0.091 (0.58)	0.359*** (2.15)	0.254 (1.15)
<i>ST</i>			0.010** (1.75)	0.008 (1.35)	0.010** (1.95)	0.008 (1.38)	0.010** (1.92)
<i>WS</i>			-0.017*** (-2.49)	-0.009 (-0.93)	-0.018*** (-2.62)	-0.014 (-1.67)	-0.022*** (-3.21)
<i>RDS</i>			0.132*** (14.72)	0.168*** (17.89)	0.132*** (12.19)	0.156*** (11.51)	0.126*** (14.39)
<i>Dummy_{Deal Type}</i>			-0.435 (-1.23)	0.065 (0.24)	-0.440 (-1.09)	-0.127 (-0.68)	-0.428 (-1.28)
<i>Dummy_{Industry Link}</i>			0.273 (1.00)	0.387*** (2.51)	0.293 (1.11)	0.026 (0.21)	0.184 (0.69)
<i>Dummy_{High-Tech Industry}</i>			-0.494 (-1.39)	-0.043 (-0.26)	-0.466 (-1.21)	-0.126 (-0.81)	-0.367 (-0.96)
N	182	234	162	208	162	208	152

Note: Robust t statistics in parentheses, * p<0.10, ** p<0.05, *** p<0.01. Models (3) - (7) include year fixed effects. Constants are suppressed.

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