Mergers and Acquisitions and R&D:
An Exploratory Analysis of the Brazilian Market

Henrique Machado Barros
Dublin City University, Business School, Ireland
henrique.barros@dcu.ie

Maria Victoria da Silva Costa
Centro Universitario FEI, São Paulo, Brazil
victoria.feisp@hotmail.com

Abstract

Purpose

The purpose of this research is twofold. First, it explores whether acquirers' research and development (R&D) expenditures change according to the acquisition strategy in a less developed economy. Second, it investigates whether the change (if any) varies according to the acquirer's ownership (i.e., domestic or foreign).

Research Method

This paper uses only simple statistics (i.e., average) to analyse 455 observations of acquiring firms' R&D expenditures from 2008 to 2016. We investigate the pattern of R&D expenditures from one year before to three years after the acquisition.

Findings

The results reveal that when efficiency gains are feasible (i.e., related acquisitions or domestic acquisitions), a reduction in R&D expenditures is observed. In turn, when M&As allow entry into new markets (i.e., unrelated acquisitions or cross-border acquisitions), the absolute R&D expenditure over the 3 years after the acquisition does not decrease (in comparison to the year before the acquisition).

Research limitations

Without a stronger statistical analysis, our claims are not unequivocal and hence demand further scrutiny. Also, our sample encompasses only firms with positive R&D expenditures.

Practical implications

From a managerial perspective, this research allows managers to anticipate that even if efficiency gains are feasible when acquisitions allow access to novel markets, an increase or stability of R&D expenditure is needed to tap into opportunities available.

Originality/value

This is one of the few efforts to uncover the relationship between M&As and innovation in a less economically developed economy. All in all, this paper reinforces that not all M&As are the same.

Keywords: Mergers and Acquisitions; innovation; research and development; less developed countries; emerging markets.

Introduction

The generation of innovations by firms has been, less and less, the result of efforts employed only within their own organisational boundaries. Firms have accelerated the development of their innovation activities through access to external knowledge and one of the ways through which they access new knowledge is by acquiring other firms (Blonigen and Taylor 2000). In fact, the specialised literature recognises that acquisitions can be a quick way for a firm to explore new knowledge and grow (Desyllas and Hughes 2008). This literature even suggests that Mergers and Acquisitions (M&As) are one of the most effective responses to the need to quickly integrate innovative elements into a business model (Cefis 2010).

One of the research streams on M&As has shed some light on the relationship between acquisitions and innovation (Hall 1990). According to Dezi et al. (2018), the relationship between M&As and innovation has been documented in the literature but the effect of M&As on innovation is still controversial, requiring further understanding. In a way, this reflects the fact that buying another company involves a high degree of uncertainty due to the challenges of integrating the acquired company (Steigenberger 2016). The risks of M&As derive from the difficulty in predicting the results of such transactions. In innovation-driven M&As, it is necessary that the acquiring company has a sufficiently developed absorptive capacity to take advantage of the acquired company's knowledge base (Odagiri 2003).

The compatibility between companies reflects to some extent the acquisition strategy adopted by the acquiring firm. Compatibility derives from the acquiring company's decision to follow an acquisition strategy aimed (or not) at related businesses, when acquiring and acquired companies have similar, or close, economic activities/ knowledge bases (Furrer 2015). It is expected that post-acquisition innovation efforts are impacted by the acquisition strategy since each acquisition strategy amalgamates knowledge bases (from the acquirer and the acquired firms) with higher or lower similarities. Companies with related knowledge bases allow the management of technology assets to be more easily integrated (Hussinger 2010).

To date empirical evidence suggests that related acquisitions positively impact the economic performance of the acquisition (King et al. 2004). While the effect of acquisition strategy (i.e., related vs. unrelated) on economic performance has already been investigated (e.g., Homberg et al., 2009), the same cannot be said about the effect of the acquisition strategy on innovation. As Cefis et al. (2020, p.21) observe, “little is known about under which conditions related and unrelated acquisitions can lead to success in post-acquisition innovative performance”. The authors have shed some light on those conditions, but their focus was on innovation performance; the effect of acquisition strategy on other aspects of innovation (e.g.

research and development expenses) needs further understanding. It does not mean that the relationship between M&As and R&D has not been studied (e.g. Szücs 2014) but the extent that acquisition strategies affect R&D deserves more investigation (Cassiman et al. 2011).

Moreover, the literature on innovation and M&As tend to focus on either high-tech industries (e.g., Cloodt et al. 2006) or firms in more economically developed countries (e.g., Desyllas and Hughes 2008). Our knowledge about innovation and M&As in less developed economies (LDEs) is even scanter (Kinateder et al. 2017). Less developed economies are characterised by less advanced innovation capabilities of their local (i.e., domestic) firms (Alnafrah 2019). This lack of innovation capabilities may put more pressure on those firms to acquire external knowledge as a means of strengthening their own innovation capabilities. However, by operating in a less sophisticated innovation context and in a business setting where institutions are not particularly strong, acquiring firms may struggle to pick the "right" target. Not only absorptive capacities of (domestic) acquiring firms in LDEs are more limited (Villajos 2020) but also the availability and quality of information to support acquisitions are questionable (Ferreira et al. 2017). The former is more relevant to domestic firms, as foreign-owned subsidiaries may resort to their corporate network to tap into corporate absorptive capacity (Kottaridi et al. 2011; Zeng et al. 2019). The latter may affect foreign-owned firms more strongly since local firms are more likely to be used to deal with information asymmetry in that context (Reddy and Fabian 2020; Luypaert and Van Caneghem 2017). Thus, we suspect domestic and foreign-owned firms may respond differently to post-acquisition R&D efforts.

Therefore, the purpose of this research is twofold. Firstly, it explores whether post-acquisition R&D changes due to the acquisition strategy in a less developed economy. Secondly, it tests whether firm ownership (i.e. domestic vs foreign) in a less developed economy relates to changes in post-acquisition R&D efforts. More specifically, the work aims to compare R&D efforts of acquiring firms. In particular, it investigates how R&D expenses vary according to the acquisition strategy adopted and the acquiring firm's ownership type. To this end, data on acquisitions in Brazil were collected over a period of 5 years (2009-2013) in which information on research and development (R&D) expenditures was available from one year before the acquisition to three years after the acquisitions. So, our sample encompasses information on R&D from 2008 to 2016 and our analysis was based on 455 observations for which R&D expenses before and after the acquisition were compared.

Literature Review

The phenomenon of Mergers and Acquisitions (M&As) has reached unprecedented levels. According to JP Morgan, M&As reached the amount of 5.9 trillion dollars in 2021 (JP Morgan 2022). According to this latest report, the need for innovation is one of the most relevant determinants of M&A activity. The relevance of M&As has long attracted the attention of academics whose initial focus was on understanding whether acquisitions added value to the acquiring company (King et al. 2004). A company resulting from an acquisition is expected to exploit a dominant position in a given market, increasing consumer prices or achieving a superior bargaining position with suppliers and distributors (Caves 1989). So, one could expect M&As to increase financial performance. The evidence, however, has shown that in most cases acquisitions do not increase the market value of the acquiring company; M&As are more beneficial for the economic performance of acquired companies (King et al. 2004). This literature has concluded that not only this type of operation is relatively complex, but also that there might be motivations for the acquisition that are not oriented to shareholder value creation (Croci et al. 2017).

Haleblian et al. (2009) summarise the possible antecedents of acquisition activities, namely: value creation, managerial self-interest, contextual factors and the specific characteristics of the acquiring company. According to the authors, value creation can be derived, for example, from the greater market share of the acquiring firm after the M&A. The authors also highlight that managerial self-interest can induce the pursuit of other firms. Contextual factors can affect firms' propensity to engage in M&As as well. For example, countries with greater shareholder protection and higher accounting standards have a greater incidence of M&A activity (Rossi and Volpin 2004). Also, acquisitions are more likely to happen when firms are geographically close and with organisational structures similar to those of their previous acquisitions (Haleblian et al. 2009).

The specialised literature documents that one reason why acquisitions do not achieve their objectives is the inefficient implementation of integration. Acquisitions demand the reconfiguration of resources to exploit potential synergies between firms (acquired and acquirer), but the loss of autonomy that normally accompanies integration can be detrimental to the economic performance of the firm (Graebner 2004). In addition, a high integration speed can be harmful if companies have different management styles (Homburg and Bucerius 2006). The circumstantial nature of the integration makes it critical for the realisation of the economic benefits of the operation and the characteristics of acquiring companies may explain the variability of results of acquisitions. In particular, the returns from M&As depend on firms'

absorptive capacity; that is, their ability to recognise the value of new external information, assimilate it and apply it for commercial purposes (Cohen and Levinthal 1990). Firms' absorptive capacity has two dimensions, namely: potential and realised (Zahra and George 2002). While the first dimension helps in identifying the target company best suited to the buyer's strategic objectives, the second dimension helps in making better use of the operation (Valentini and Di Guardo 2012).

In the context of acquisitions, firms with superior absorptive capacity are better able (in relation to rivals) to prospect the corporate market and select the most "appropriate" (i.e., more aligned with their strategic objectives) targets for the acquisition. That is, superior absorptive capacity favours the firm by allowing acquisitions of more suitable target companies or by discouraging inappropriate acquisitions. The study by Desyllas and Hughes (2010), in fact, corroborates that companies with a large knowledge base can better capture, process and understand external market information and, thus, can better select their acquisition targets. Superior absorptive capacity can also be beneficial in the post-acquisition phase. In this case, the realisation of the benefits of acquisition occurs when the acquirer exploits acquired resources during the integration stage. Acquirers with higher absorptive capacity will be relatively better able to implement the acquired resources and fully exploit the innovation potential of the acquired knowledge base (Moura et al. 2022). Most importantly, firms are more successful with M&As when they develop M&A capability and this is possible through learning by doing. That is, learning from M&As helps in building up an M&A capability, which in turn improves the firm's overall M&A performance (Trichterborn et al. 2016).

As for the effects of mergers and acquisitions on innovation, by increasing their size companies benefit from economies of scale as well as from economies of scope. This allows companies to obtain efficiency gains and can execute more expensive and complex innovation projects (Röller et al. 2006). In fact, there is evidence that M&A activities increase the acquiring company's ability to innovate as they rejuvenate organisations (e.g., Cloodt et al. 2006). That is, in the context of rapid technological transformations, the acquisition of innovative companies is a strategy aimed at filling gaps in the acquirer's knowledge base and this is done by integrating the acquired company's knowledge assets (Hussinger 2010). The search for external knowledge can be explained by the fact that competitive advantage increasingly depends on the continuous development of innovation (Valentini and Di Guardo 2012) and the acquisition of technology assets may enhance a firm's innovation capacity. Technological acquisitions can lead to the generation of radical innovations. In turn, non-

technological acquisitions are not even capable of promoting the generation of incremental innovations (Wagner 2011).

However, it is also documented that acquisitions are negatively associated with innovation, as the need to integrate firms makes managers less involved with innovation activities (Hitt et al. 1996). A dominant position in the product market can reduce the incentives for the parties involved to invest in research and development (R&D) due to the lower level of competition entailed by M&As (Arrow 1962). In addition, acquisitions can negatively impact innovation because the financial resources available to innovation can be committed to the acquisition operation (Hall 1990). That is, the benefit of M&As to innovation is not straightforward because knowledge is not easily transferred (Szulanski 1996). As the knowledge base is difficult to transfer, the integration process becomes critical in order to enable the effective transfer of knowledge between companies. Thus, many acquisitions, especially those involving technology-based companies, are qualified as symbiotic when capable of providing knowledge transfer (Graebner 2004).

Knowledge transfer can be facilitated to the extent that there is a proximity between the knowledge bases of the acquired and acquiring companies (Hussinger 2010). The integration of very different knowledge bases requires managers to monitor a wide variety of resources and may deplete their information processing capacity (Hill and Hoskisson, 1987). In addition, differences between knowledge bases can prevent a company from understanding, absorbing and assimilating new knowledge from another company (Vermeulen and Barkema 2001). So, new knowledge is more easily assimilated, and quickly implemented, when companies share knowledge of similar content and structure (Darr and Kurtzberg 2000). Therefore, it is expected that the innovation effort subsequent to the acquisition will be impacted by the acquisition strategy. Where the integration of knowledge with which the companies are familiar (i.e., related acquisition) can make the resulting company commit more resources to innovation. to take advantage of available knowledge. This phenomenon, however, has not yet been well explored in the existing literature (e.g. Hussinger 2010) and this has directed the efforts of the present research to shed more light on the relationship between acquisitions and innovation. In particular, the aim of this work is to assess how research and development (R&D) expenditures behave before and after acquisitions and whether this behaviour depends on the acquisition strategy (i.e., related vs. unrelated) of the acquiring firm.

By the same token, post-acquisition R&D expenses may be affected by the ownership of the company. Zhu et al. (2011) have shown that domestic and foreign firms have different motives to acquire firms in emerging markets. While the former is more concerned about

improving the target firms' operating performance (i.e., the market for corporate control), the latter uses acquisition for entering a new market (i.e., strategic market entry). That is, domestic acquirers are familiar with the local market and hence have superior information compared to foreign acquirers. So, they use their better-informed position to identify poorly managed targets. In turn, foreign acquirers deal with more severe information asymmetries and cultural issues which create an incentive for them to acquire a firm in the host country as a means of entering a new market. In addition, due to their own nature, foreign and domestic firms may present different approaches to R&D expenditures when they buy other firms in a LDE. Foreign acquirers may relocate R&D facilities to the corporate headquarters either to obtain efficiency gains (Bertrand and Zuniga 2006) or to better appropriate the returns from innovation, as centralising R&D prevents knowledge spillovers in the host country (Sanna-Randaccio and Veugelers 2007). Even if domestic firms are concerned about efficiency and appropriability issues, they are less likely to be able to relocate R&D abroad. Most importantly, their country of origin is where the domestic firm is used to run its business. When the host country is a less economically advanced country the different effects of M&As on R&D expenses may be even more pronounced according to the ownership of the acquiring firm. Foreign-owned acquiring firms are less likely to be interested in the R&D efforts of the target since they possess more advanced innovation capabilities abroad (Alnafrah 2019). Domestic firms, in turn, may benefit from local acquisitions to tap into new knowledge that might be critical to strengthening their innovation capabilities. It is true, however, that domestic firms may also streamline their R&D efforts to obtain economies of scale and economies of scope during integration. But they are less likely to fully ignore the innovation capabilities of target companies because domestic acquirers are not expected to possess superior innovation capabilities. So, overall, we suspect that the R&D efforts of domestic and foreign-owned firms respond differently to acquisition.

Research Method

The data collected for this work were obtained from the S&P Capital IQ database. The sample consisted of companies that made acquisitions in Brazil from 2009 to 2013 and that had information on their business activities (namely, their Standard Industrial Classification code – SIC code) and on research and development (R&D) expenses from 2008 to 2016. The latter was needed because the averages of R&D expenditure of the acquiring companies were calculated one year before the acquisition, in the year of the acquisition, one year after the acquisition, two years after the acquisition and 3 years after the acquisition.

The SIC code has a number of digits that is proportional to the degree of specificity of the economic activity. Therefore, the more digits the SIC code presents, the greater the degree of specificity of the economic activity. Typically, the SIC code has 4 digits. So, in order to identify whether the acquiring and acquired companies operated in the same (or different) sector, a relationship was established between the 4-digit SIC codes of the acquirers and those of the target firms. The similarity (difference) between the SIC codes of the acquiring company and the acquired company allows qualifying the acquisition strategy as related (unrelated).

Then, the analysis of the sample was focused on research and development (R&D) expenditures. R&D expenses were compared at different times, before and after the M&A transaction, and depending on either the acquisition strategy (i.e., related vs. unrelated) or the type of ownership of the acquiring company (i.e., domestic vs foreign). In particular, the average R&D expenditure of acquiring firms was calculated at different moments and according to the acquisition strategy and ownership of the acquiring firm.

The database reports 411 acquisitions with SIC codes available within the 2008 to 2016 timeframe. However, as our approach was to analyse R&D expenses over a 5-year period (from the year before the acquisition to three years after the acquisition) the sample was constrained to 255 acquisitions within the 2009-2013 window. However, most acquisitions reported zero R&D expenses. This could be really no R&D but it could also be missing data that the database input zero. So, for the purposes of this exploratory analysis, we focused only on acquisitions for which R&D expenses were available and positive for the whole 5-year period. This led to a further reduction of our sample and we ended up with 91 acquisitions and 455 observations, where related and unrelated acquisitions were 37% and 63%, respectively. Also, domestic and foreign acquisitions accounted for 31% and 69%, respectively, of the sample of acquisitions.

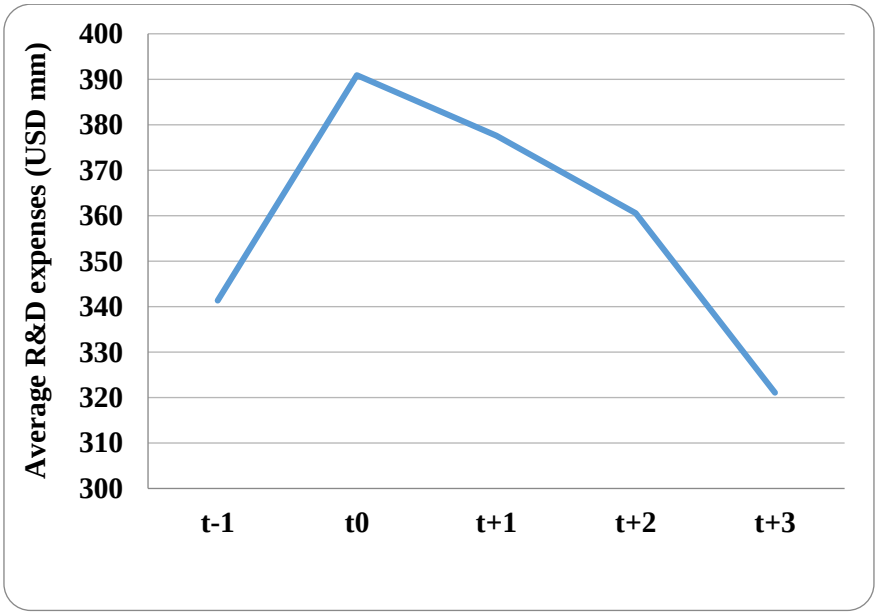
Findings and Discussion

Our initial analysis suggests that the impact of M&As on R&D expenditures may not be considerable. It is possible to notice in Figure 1 an increase in R&D expenditure when acquisitions take place but a decline afterwards. In the third year after the acquisition, the average R&D expense was 6% lower than the average R&D expense in the year just before the acquisition. So, the overall picture for post-acquisition R&D in less economically developed economies (LDEs) is that the external sourcing of innovation through M&As might not be prevalent. The average behaviour of acquiring firms in LDEs indicates that they do not put more effort into R&D to leverage the technology assets of target firms. The increase in R&D at the year of the acquisition may be just an additive effect of a yet-to-be-integrated acquired

firm. Insofar as the integration of the target firm takes place, efficiency gains are pursued and/or firm resources are allocated to the integration process. As a result, R&D effort is reduced.

In large part, the strategic management literature suggests that acquisitions are mechanisms for the company to increase its resource base without the costly process of internal generation of the same resources (Barney 1991). Acquisitions can be used as a means for the acquiring company to renew and revitalize its knowledge base, avoiding the inertia of limited exploitation of existing internal knowledge (Capron et al. 1998). A larger company can benefit from both the indivisibility of innovation projects (Cassiman et al. 2005) and the greater internal flow of resources to support R&D activities (Cincera et al. 2016). Thus, the larger size of the firm after the acquisition can provide an increase in the productivity of R&D since the fixed R&D costs are distributed over the larger production capacity of the resulting company. Furthermore, higher R&D productivity and greater specialization in innovation management can generate economies of scale and scope by allowing the firm to explore opportunities for cost reduction and risk sharing when carrying out numerous R&D projects within the same organizational boundary (Henderson and Cockburn 1996). That is, as firms become larger, they can benefit from economies of scale and scope related to R&D activities and this may explain why R&D spending declines after acquisitions.

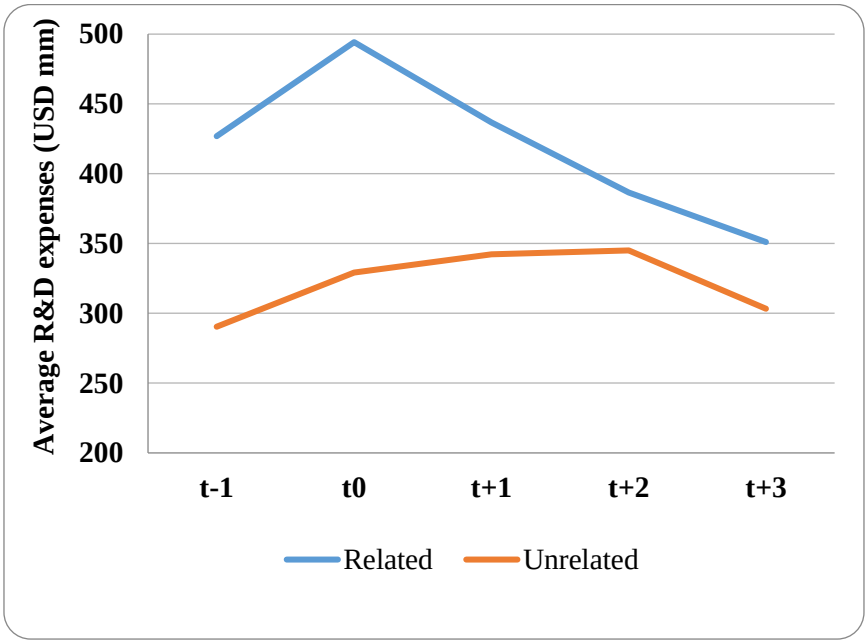
Figure 1. Average R&D expenditure around the year of the acquisition [a]



[a] t0 denotes the year of the acquisition.

Our suspicion, however, was that the overall pattern could change depending on the acquisition strategy. In fact, Figure 2 reveals that not only a decline in R&D expenditure is observed for related acquisitions but also that this decline is much faster for this acquisition strategy. The similarity of knowledge bases between acquirer and target seems to ease efficiency gains from R&D. Just after the year of acquisition, related acquirers reduced their R&D expenditure to the same level as it was before the acquisition, with a steep downward trend over the next two years, showing an almost 18% decline in the third year (as compared to the year just before the acquisition). On the other hand, unrelated acquirers increased their R&D expenditure over the following years (in comparison to the year before the acquisition). The level of R&D in the second year after the acquisition was detected to be nearly 19% higher than the level of R&D before the acquisition. Even if a decline in R&D is observed in the third year after the acquisition, its level is about the same as the R&D level in the year before the acquisition (i.e., just 4% higher).

Figure 2. Average R&D expenditure around the year of the acquisition, by acquisition strategy [a]



[a] t0 denotes the year of the acquisition.

It is also noticeable that related acquirers present an average R&D level higher than the average R&D level of unrelated acquirers. What the exploratory analysis of the present research suggests is that not only can the acquisition strategy impact R&D expenses but that the R&D expenses that precede the acquisition may determine the acquisition strategy. The

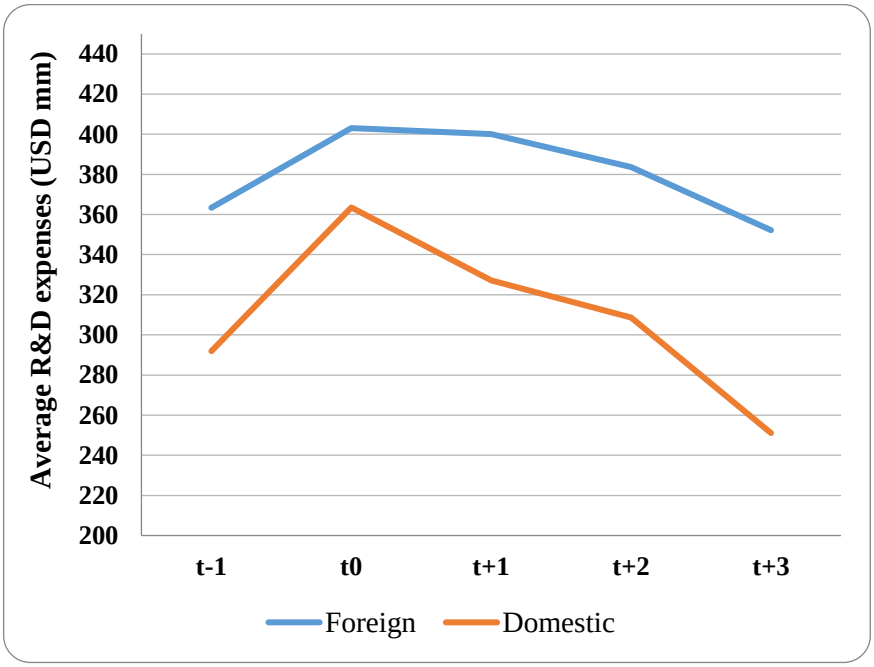
fact that companies that followed the related acquisition strategy were putting more effort into R&D prior to the acquisition (as compared to unrelated acquirers) is revealing. One could expect that firms with higher absorptive capacity would be more capable of looking for alternatives further away from their existing knowledge base (Valentini and Di Guardo 2012). However, Bena and Li (2014) identified that synergies obtained from combining innovation capabilities are a determinant of corporate acquisitions. As technological relatedness is associated with improved innovation output (Ahuja and Katila 2001), firms with larger R&D expenses are more likely to identify potential synergies between knowledge bases to improve their innovation performance. In addition, Homberg et al. (2009) corroborate that the combination of business similarity (i.e., economic activity) with greater innovation efforts enhances the creation of synergies in the market for corporate control.

It is also interesting to notice that the landscape of R&D of each group of firms did not change after the acquisition. That is, the group of firms that opted for the related acquisition strategy had, before the acquisition, an average R&D expenditure higher than the group of firms that opted for the unrelated acquisition and this pattern is persistent after the acquisition (i.e., the difference in the average R&D expense between related and unrelated acquirers remained to favour related acquirers). It is true, however, that the gap in R&D expenditures between related and unrelated acquirers reduced substantially (from 47% higher for related acquirers in the year before the acquisition to 16% higher in the third year after the acquisition). While related acquirers seem to find incentives and opportunities to reduce R&D expenses, unrelated acquires need to keep pace with their pre-acquisition R&D expenditure.

The decline in R&D for related acquirers reinforces that relatedness eases the post-acquisition integration process (Larsson and Finkelstein 1999). At the same time, higher R&D investments of related acquirers enhance the integration potential of an acquisition (Cefis et al. 2020). In turn, our findings suggest that the pursuit of opportunities in different market (and technology) domains demands further effort from acquirers to explore existing opportunities. Unrelated acquirers do not benefit from reduced product market competition (Bloom et al. 2013) when they enter new markets and, hence, need to keep their R&D effort to sustain their offerings. The post-acquisition increase (or stability, at minimum) in R&D expenses of unrelated acquirers also suggests that they need to make more effort (as compared to related acquirers) to pursue resource reconfiguration aimed at integrating the novel knowledge base into the existing knowledge base (Arora and Gambardella 1990). Moreover, acquisitions of unrelated businesses may offer novel resources to enable the deployment of the acquirer's own resources to explore opportunities elsewhere (Puranam et al. 2006). Also, the potential of

unrelated acquisitions for exploratory endeavours might be limited in LDEs due to the constrained innovation capabilities of local firms (Archibugi et al. 2009). Thus, a post-acquisition increase/ stability in the level of R&D might be due to the need of the unrelated acquirer to develop stronger innovation capabilities in the acquired firm.

Figure 3. Average R&D expenditure around the year of the acquisition, by type of ownership [a]



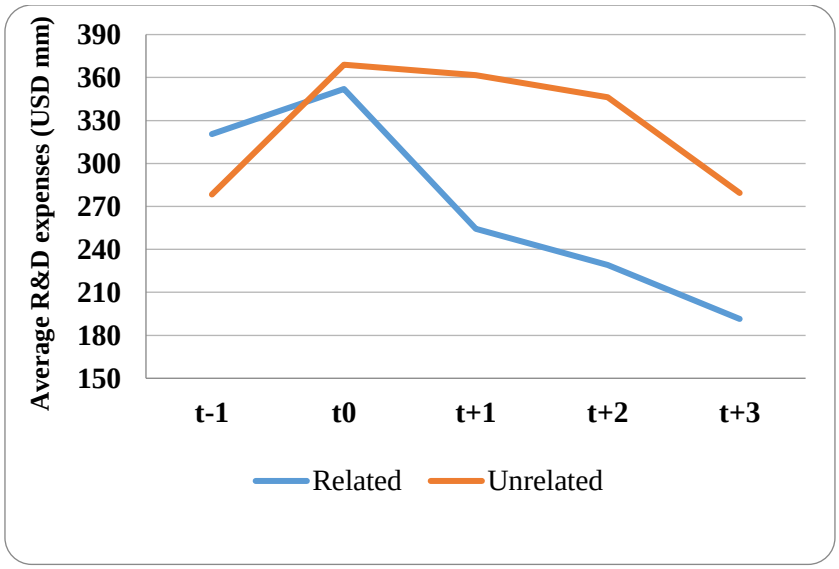
[a] t0 denotes the year of the acquisition.

Our study also advocates that post-acquisition R&D expenses vary according to the ownership of the acquirer and our findings (Figure 3) seem to corroborate our suspicion. In the third year after the acquisition, domestic acquirers presented a 14% decline in R&D expenses as compared to the level of R&D in the immediate year that preceded the acquisition. Yet, foreign acquirers did not present a significant difference (i.e., 3%) in R&D expenses between the third year after the acquisition and the year before the acquisition (though, in comparison to the year before the acquisition, an increase seems to happen over the two years after the acquisition). Our findings suggest that the market for corporate control that drives domestic acquirers (Zhu et al. 2011) also spans across R&D activities. The more pronounced decrease in the R&D expenditure of domestic firms after the acquisition reveals that efficiency gains might be more prevalent than knowledge sourcing. So, even if acquired firms possess a knowledge base that could be further exploited, domestic acquirers do not seem to understand

that the exploitation of the acquired knowledge base demands considerable effort. By being more concerned about entering a new market and by possessing superior innovative capabilities (in comparison to the acquired firm in an LDE), foreign firms do not seem to focus on efficiency gains but rather on the further development of new offerings to their new market.

Efficiency gains of domestic acquirers are even more noticeable when they opt for the related acquisition strategy. As Figure 4 indicates, the new market entry reasoning also applies to domestic acquirers when they go for unrelated acquisitions. That is, domestic acquirers do not reduce resources to R&D when they enter new unrelated markets. Most importantly, after the acquisition, domestic-unrelated acquirers exceed domestic-related acquirers in their R&D expenses. While in the year before the acquisition domestic-related acquirers present an average R&D expenditure 15% higher than domestic-unrelated acquirers, the latter presents an average R&D expenditure 46% higher than the former in the third year after the acquisition. These findings reinforce earlier results that entering new markets are central to the continuity of R&D expenditures. Either unrelated or foreign acquisitions present potential opportunities to be exploited/explored that justify the persistence of the R&D expenditure.

Figure 4. Average R&D expenditure of domestic acquirers around the year of the acquisition, by acquisition strategy [a]



[a] t0 denotes the year of the acquisition.

Conclusions

The purpose of this paper is to unravel the relationship between acquisitions (M&As) and innovation input (i.e., research and development – R&D) in a less developed economy (e.g. Brazil). In particular, this research explores whether acquirers' R&D expenditures change according to both the acquisition strategy and the acquirer's ownership (i.e., domestic *vs* foreign). To explore this relationship data from M&As and R&D were used. This paper analyses 455 R&D observations within the 2008-2016 period with respect to M&As that happened from 2009 to 2013.

The results indicate that when efficiency gains are feasible (i.e., related acquisitions or domestic acquisitions), a reduction in R&D expenditures is observed. In turn, when M&As allow entry into new markets (i.e., unrelated acquisitions or cross-border acquisitions), the absolute R&D expenditure over the 3 years after the acquisition does not decrease (in comparison to the year before the acquisition). Overall, our results reinforce that not all M&As are alike and that the effects on innovation may depend on certain attributes of the acquisition and the acquirer.

This research extends our knowledge about M&As and R&D to a less economically developed context. From a theoretical standpoint, this paper suggests that the effects of M&As on innovation inputs are conditional on the underlying motivations for the acquisition. From a managerial perspective, this research allows managers to anticipate that even if efficiency gains are feasible, when acquisitions allow access to novel markets, an increase or stability of R&D expenditure is needed to tap into opportunities available. From a public policy viewpoint, even if our results are not about innovation performance, they indicate that where M&As may increase competition, more knowledge is likely to emerge and hence this type of M&A should be favoured.

Nevertheless, the paper is not free of limitations. From the outset, the preliminary and exploratory nature of this research endeavour makes its analysis somewhat naïve. Without a stronger statistical analysis, our claims are not unequivocal and hence demand further scrutiny. Moreover, our focus is just on a single country with a large home market. Also, our sample encompasses only firms with positive R&D expenditures. Last, our data do not allow us to assess R&D expenditures in the host country only. Future research efforts should consider other attributes (e.g., relationship to the target, acquirers' governance structure) and contexts (e.g., countries; industries) of M&As as well as the use of more sophisticated statistical approaches (e.g., GMM; diff-in-diff).

References

Ahuja, G. and Katila, R. (2001). Technological Acquisitions and the Innovation Performance of Acquiring Firms: A Longitudinal Study. *Strategic Management Journal*, 22(3), pp.197–220. Available from: http://www.jstor.org/stable/3094458.

Alnafrah, I. (2019). Dynamic structural comparison of BRICS national innovation systems based on machine learning techniques. *International Journal of Technological Learning, Innovation and Development*, 11(3), p.265.

Archibugi, D., Denni, M. and Filippetti, A. (2009). The technological capabilities of nations: The state of the art of synthetic indicators. *Technological Forecasting and Social Change*, 76(7), pp.917–931.

Arora, A. and Gambardella, A. (1990). Complementarity and External Linkages: The Strategies of the Large Firms in Biotechnology. *The Journal of Industrial Economics*, 38(4), p.361.

Barney, J.B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), pp.99–120.

Bertrand, O. and Zuniga, P. (2006). R&D and M&A: Are cross-border M&A different? An investigation on OECD countries. *International Journal of Industrial Organization*, 24(2), pp.401–423. Available from: http://www.sciencedirect.com/science/article/pii/S0167718705001049.

Blonigen, B.A. and Taylor, C.T. (2000). R&D Intensity and Acquisitions in High-Technology Industries: Evidence from the US Electronic and Electrical Equipment Industries. *The Journal of Industrial Economics*, 48(1), pp.47–70. Available from: http://dx.doi.org/10.1111/1467-6451.00112.

Bloom, N., Schankerman, M. and van Reenen, J. (2013). Identifying Technology Spillovers and Product Market Rivalry. *Econometrica*, 81(4), pp.1347–1393. Available from: http://dx.doi.org/10.3982/ECTA9466.

Capron, L., Dussauge, P. and Mitchell, W. (1998). Resource Redeployment Following Horizontal Acquisitions in Europe and North America, 1988-1992. *Strategic Management Journal*, 19(7), pp.631–661.

Cassiman, B., Colombo, M.G., Garrone, P. and Veugelers, R. (2005). The impact of M&A on the R&D process: An empirical analysis of the role of technological- and market-relatedness. *Research Policy*, 34(2), pp.195–220. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0048733305000090.

Cassiman, B., Colombo, M.G. and Rabbiosi, L. (2011). M&A and Innovation: The Role of Relatedness between Target and Acquirer. In: *Managing Innovation Driven Companies*. London: Palgrave Macmillan UK, pp.56–67.

Caves, R.E. (1989). Mergers, takeovers, and economic efficiency: Foresight vs. hindsight. *International Journal of Industrial Organization*, 7(1), pp.151–174. Available from: http://linkinghub.elsevier.com/retrieve/pii/0167718789900519.

Cefis, E. (2010). The impact of M&A on technology sourcing strategies. *Economics of Innovation & New Technology*, 19(1), pp.27–51.

Cefis, E., Marsili, O. and Rigamonti, D. (2020). In and Out of Balance: Industry Relatedness, Learning Capabilities and Post-Acquisition Innovative Performance. *Journal of Management Studies*, 57(2), pp.210–245.

Cincera, M., Ravet, J. and Veugelers, R. (2016). The sensitivity of R&D investments to cash flows: comparing young and old EU and US leading innovators. *Economics of Innovation and New Technology*, 25(3), pp.304–320. Available from: https://doi.org/10.1080/10438599.2015.1076201.

Cloodt, M., Hagedoorn, J. and van Kranenburg, H. (2006). Mergers and acquisitions: Their effect on the innovative performance of companies in high-tech industries. *Research Policy*, 35(5), pp.642–654. Available from: http://www.sciencedirect.com/science/article/pii/S004873330600045X.

Cohen, W.M. and Levinthal, D.A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35(1), pp.128–152.

Croci, E., Pantzalis, C., Park, J.C. and Petmezas, D. (2017). The role of corporate political strategies in M&As. *Journal of Corporate Finance*, 43, pp.260–287. Available from: http://www.sciencedirect.com/science/article/pii/S0929119917300561.

Darr, E.D. and Kurtzberg, T.R. (2000). An Investigation of Partner Similarity Dimensions on Knowledge Transfer. *Organizational Behavior and Human Decision Processes*, 82(1), pp.28–44.

Desyllas, P. and Hughes, A. (2010). Do high technology acquirers become more innovative?. *Research Policy*, 39(8), pp.1105–1121. Available from: http://www.sciencedirect.com/science/article/pii/S0048733310001290.

Desyllas, P. and Hughes, A. (2008). Sourcing technological knowledge through corporate acquisition: Evidence from an international sample of high technology firms. *The Journal of High Technology Management Research*, 18(2), pp.157–172. Available from: http://linkinghub.elsevier.com/retrieve/pii/S1047831007000338.

Dezi, L., Battisti, E., Ferraris, A. and Papa, A. (2018). The link between mergers and acquisitions and innovation. *Management Research Review*, 41(6), pp.716–752. Available from: https://www.emeraldinsight.com/doi/10.1108/MRR-07-2017-0213.

Ferreira, M.P., Borini, F., Vicente, S. and Almeida, M.R. (2017). The pre-acquisition process. *International Journal of Emerging Markets*, 12(2), pp.400–414.

Furrer, O. (2015). *Corporate level strategy: Theory and applications*. 2nd ed. Abingdon, OXF: Routledge.

Graebner, M.E. (2004). Momentum and serendipity: How acquired leaders create value in the integration of technology firms. *Strategic Management Journal*, 25(8–9), pp.751–777.

Gupta, S., Yadav, S.S. and Jain, P.K. (2022). Absorptive capacities, FDI and economic growth in a developing economy: a study in the Indian context. *Journal of Advances*

in Management Research, ahead-of-print. Available from: https://doi.org/10.1108/JAMR-12-2021-0370.

Haleblian, J., Devers, C.E., McNamara, G., Carpenter, M.A. and Davison, R.B. (2009). Taking Stock of What We Know About Mergers and Acquisitions: A Review and Research Agenda. *Journal of Management*, 35(3), pp.469–502.

Hall, B.H. (1990). The Impact of Corporate Restructuring on Industrial Research and Development. *Brookings Papers on Economic Activity. Microeconomics*, 1990, pp.85–124. Available from: http://www.jstor.org/stable/2534781.

Henderson, R.M. and Cockburn, I. (1996). Scale, scope, and spillovers: The determinants of research productivity in drug discovery. *RAND Journal of Economics*, 27(1), pp.32–59.

Hitt, M.A., Hoskisson, R.E., Johnson, R.A. and Moesel, D.D. (1996). The Market for Corporate Control and Firm Innovation. *Academy of Management Journal*, 39(5), pp.1084–1119.

Homberg, F., Rost, K. and Osterloh, M. (2009). Do synergies exist in related acquisitions? A meta-analysis of acquisition studies. *Review of Managerial Science*, 3(2), pp.75–116.

Homburg, C. and Bucerius, M. (2006). Is speed of integration really a success factor of mergers and acquisitions? An analysis of the role of internal and external relatedness. *Strategic Management Journal*, 27(4), pp.347–367.

Hussinger, K. (2010). On the importance of technological relatedness: SMEs versus large acquisition targets. *Technovation*, 30(1), pp.57–64. Available from: http://www.sciencedirect.com/science/article/pii/S0166497209001102.

Kinateder, H., Fabich, M. and Wagner, N. (2017). Domestic mergers and acquisitions in BRICS countries: Acquirers and targets. *Emerging Markets Review*, 32, pp.190–199.

King, D.R., Dalton, D.R., Daily, C.M. and Covin, J.G. (2004). Meta-analyses of post-acquisition performance: Indications of unidentified moderators. *Strategic Management Journal*, 25(2), pp.187–200.

Kottaridi, C., Papanastassiou, M., Pitelis, C.N. and Thomakos, D.D. (2011). Multinational Enterprise and Subsidiaries' Absorptive Capacity and Global Knowledge Sourcing. In: Nijkamp, P. and Siedschlag, I., eds. *Innovation, Growth and Competitiveness. Advances in Spatial Science*. Springer: Springer, pp.259–277.

Larsson, R. and Finkelstein, S. (1999). Integrating Strategic, Organizational, and Human Resource Perspectives on Mergers and Acquisitions: A Case Survey of Synergy Realization. *Organization Science*, 10(1), pp.1–26.

Luypaert, M. and van Caneghem, T. (2017). Exploring the Double-Sided Effect of Information Asymmetry and Uncertainty in Mergers and Acquisitions. *Financial Management*, 46(4), pp.873–917.

Moura, S.T.G., Falaster, C. and Silva-Rêgo, B. (2022). Cultural distance and post-acquisition performance: the role of absorptive capacity. *International Journal of Emerging*

Markets, ahead-of-print. Available from: https://doi.org/10.1108/IJOEM-08-2021-1251

Odagiri, H. (2003). Transaction costs and capabilities as determinants of the R&D boundaries of the firm: a case study of the ten largest pharmaceutical firms in Japan. *Managerial and Decision Economics*, 24(2-3), pp.187–211. Available from: https://doi.org/10.1002/mde.1083.

Puranam, P., Singh, H. and Zollo, M. (2006). Organizing for Innovation: Managing the Coordination-Autonomy Dilemma in Technology Acquisitions. *Academy of Management Journal*, 49(2), pp.263–280.

Reddy, R.K. and Fabian, F. (2020). Information Asymmetry and Host Country Institutions in Cross-Border Acquisitions. *Management International Review*, 60(6), pp.909–938.

Röller, L.-H., Stennek, J. and Verboven, F. (2006). Efficiency Gains from Mergers. In: Uzkovitz, F. and Meiklejohn, R., eds. *European Merger Control: Do We Need an Efficiency Defence?*. Cheltenham, UK: Edward Elgar, pp.84–201.

Rossi, S. and Volpin, P.F. (2004). Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics*, 74(2), pp.277–304. Available from: http://www.sciencedirect.com/science/article/pii/S0304405X04000674.

Sanna-Randaccio, F. and Veugelers, R. (2007). Multinational knowledge spillovers with decentralised R&D: a game-theoretic approach. *Journal of International Business Studies*, 38(1), pp.47–63.

Steigenberger, N. (2016). The Challenge of Integration: A Review of the M&A Integration Literature. *International Journal of Management Reviews*, 1 March 2016, p.n/a-n/a. Available from: http://dx.doi.org/10.1111/ijmr.12099.

Szücs, F. (2014). M&A and R&D: Asymmetric Effects on acquirers and targets?. *Research Policy*, 43(7), pp.1264–1273.

Trichterborn, A., Zu Knyphausen-Aufseß, D. and Schweizer, L. (2016). How to improve acquisition performance: The role of a dedicated M&A function, M&A learning process, and M&A capability. *Strategic Management Journal*, 37(4), pp.763–773. Available from: http://dx.doi.org/10.1002/smj.2364.

Valentini, G. and di Guardo, M.C. (2012). M&A and the profile of inventive activity. *Strategic Organization*, 10(4), pp.384–405. Available from: http://soq.sagepub.com/cgi/content/abstract/10/4/384.

Vermeulen, F. and Barkema, H. (2001). Learning Through Acquisitions. *Academy of Management Journal*, 44(3), pp.457–476. Available from: http://journals.aom.org/doi/10.5465/3069364.

Villajos, J.M.O. (2020). A comparative approach to national innovative capacity in the long-run: Spain between Europe and Latin America. *International Journal of Technological Learning, Innovation and Development*, 12(1), pp.71-91.

Wagner, M. (2011). Acquisition as a means for external technology sourcing: Complementary, substitutive or both? *Journal of Engineering and Technology*

Management, 28(4), pp.283–299. Available from: http://www.sciencedirect.com/science/article/pii/S0923474811000300.

Zahra, S.A. and George, G. (2002). Absorptive Capacity: A Review, Reconceptualization, and Extension. *Academy of Management Review*, 27(2), pp.185–203.

Zeng, J., Glaister, K.W. and Darwish, T. (2019). Processes Underlying MNE Subsidiary Absorptive Capacity: Evidence from Emerging Markets. *Management International Review*, 59(6), pp.949–979.

Zhu, P., Jog, V. and Otchere, I. (2011). Partial acquisitions in emerging markets: A test of the strategic market entry and corporate control hypotheses. *Journal of Corporate Finance*, 17(2), pp.288–305.