



National
College *of*
Ireland

**The impact of cross-border mergers and
acquisitions on European companies'
innovation outcomes**

By

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Thesis presented to National College of Ireland, as part requirement for the
degree of Masters of International Business.

August, 2018

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ACKNOWLEDGEMENTS

First of all I would like to express my gratitude to all the lecturers of the National College of Ireland that during two years shared all their knowledge and enthusiasm that inspired and helped me to throughout this research project.

I would also like to thank my supervisor, Dr Robert MacDonald for all the support and guidance during the process of writing this dissertation.

For all my colleagues of the MSc International Business, especially Tirso Perez, Jqiao Wei Chen (Vivi), Lena Spreckelmeyer and Niall Boland, thank you for all the companionship and support along this journey.

Last but not least, I would like to thank my parents, husband and friends for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them.

Thank you.

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ABBREVIATIONS AND ACRONYMS

M&A – Mergers and Acquisitions

IMMA – Institute for Mergers, Acquisitions and Alliances

UK – United Kingdom

LBO – Leveraged Buyouts

MENA – Middle East and Africa

EU – European Union

R&D – Research & Development

IP – Intellectual Property

GBP – British Pound

EUR – Euro

WIPO – World Intellectual Property Organization

ABSTRACT

Background

Globalization has changed the competitive environment where companies develop their businesses. The need of competing in a global scale has been challenging them to be more innovative to adapt themselves to this new reality, attract the attention of its consumers and generate growth.

Cross-border mergers and acquisitions and innovation have been key factors for companies to be competitive and different studies have analysed the relationship between them along the time.

Knowing that M&A activity is cyclical and is deeply dependent on economic expansion, regulatory changes and new technologies development (Cretin et al, 2015), this study aims to explore the relationship of cross-border mergers and acquisitions and companies' innovation outcomes in Europe between 2008 and 2017, period after the global financial crisis.

Methods

The present research was a cross sectional study to examine how the two considered variables - number of cross-border M&A and number of patents applications - measured in the same period of time (between 2008 and 2017) are associated to each other in four different European countries: United Kingdom, Germany, Austria and Switzerland.

The data was collected from reports published by the Institute for Mergers, Acquisitions and Alliances (IMAA) and the European Patent Office.

Results

The results show that a correlation between the number of M&A and the number of patents applications can be identified in most of the studied countries in the period between 2008 and 2017. It is possible to identify a positive correlation between the number of cross-border M&A and the number of patents applications in United Kingdom. However, in Germany and Switzerland, the results show a negative correlation between variables.

Discussion

The results confirm previous empirical studies that revealed a existing correlation between cross-border M&A and companies' innovation. However, the impact of cross-border M&A can differ across different countries in Europe: in United Kingdom cross-border M&A have a positive impact on the number of companies' patents applications, while in Germany and Switzerland this impact is negative. Finally, this study also identified the case of Austria, where there is a null impact. Yet, further studies need to be undertaken in order to confirm the statistical relevance of the analysis in all cases.

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CHAPTER 1: INTRODUCTION

1. Introduction

Globalization has changed the competitive environment where companies develop their businesses. The reduction of the barriers for trade, the lower costs of transportation and the innovation of communication systems, have been changing the world economy with impacts on competition at an international level. This in parallel with the rise of technology and a worldwide organization of capital markets, which helps to increase of efficiency and specialization of industry, the number of companies operating in the global market and the number of mergers and acquisitions worldwide (Wiersma and Bowen, 2007).

In this context, innovation is considered one of the most important factors for competitiveness. Firms, research institutions, colleges and even countries are challenged to become more and more competitive and focused on innovation with the objective of generating economic growth (Pellicer et al, 2010).

Innovation gives the chance to companies to have a fastest growth and be one step forward of their competitors, which influence the corporate decisions at several levels (Sáen et al, 2009).

On the other hand, cross-border M&A seem to be an option to grow and to compete in this new global market. By being pushed to have the best technology and expertise, companies tend to acquire the assets they need to gain the desired competitive level (Deloitte, 2018).

After a period of economic recession due to the 2008 world financial crisis, M&A activity is going through a positive moment of growth (Cretin et al, 2015). In 2016, cross-border M&A registered an increase of 20% in terms of company value (Deloitte, 2018), with new deals happening in both United States and Europe.

In this context, does the the number of cross-border M&A influence the innovation activities of the companies? How can this type of transactions impact the companies' innovative outcomes? Is cross-border M&A activity a driver for companies' to produce more innovative outcomes? By analysing the number of patents applications submitted by companies in Europe between 2008 and 2017, this study aims to assess what is the impact of cross-border M&A on firms' innovation outcomes.

CHAPTER 2: LITERATURE REVIEW

2. Literature Review

2.1 Globalization and world economy

The current processes of globalization, especially the competitive new conditions that companies face due to the open markets and globalized industries is an important factor to take in consideration when studying companies' strategic decisions nowadays. (Wiersma and Bowen, 2007).

The impact of globalization is clear if we look at the growth and influence of technology, which increases mobility and available capital to support cross-border economic transactions not only between people, but also goods and raw materials (Sassen, 2005).

In fact, the increased number of transnational companies along the years since the 60's show how internationalization started to be part of company's corporate strategy, registering 7,276 companies in 1968, 37,700 in 1990 and 69,727 in 2004 (Wiersma and Bowen, 2007).

This new global market was explored by Sassen (2015), who, by applying a sociological analysis, created a model to explain this new reality that changed completely the way the world is structure. By analysing the existing data and the theorization on of the concept of global cities, the research introduced a new national, regional and global categorization scale to the international economic context that contributed to a better understanding of the internationalization decisions of the companies.

In accordance with previous empirical studies such as Abbott (1996) and Abu-Lughod (1999), Sassen (2015) explored this new reality and identified a clear need for companies to change the way they do business and the way they are managed, thanks to the the opening of the national economies to foreign investments or companies and the introduction of new national players in this global competitive space. A new concept of cross-border networked economy arose, not only bringing new industries - specialized services, multimedia sector and telecommunications - but also creating opportunities for companies that adapted themselves through a different modus operandi.

Despite agreeing with the fact that being connected in a global network brought a high level of development and advantages for countries and companies, Sassen (2015) raises however concerns about inadequacy and inequality among this new global market. This is an important point to take in consideration in this study as it can explain the motivations of the companies in some of their strategic decisions.

In fact, this negative side of the global market has been explored before by Levitt (1983), who referred that even if the opportunities of a global market include the access to new markets, the ability to get new resources, new knowledge or be part of global networks, there are also challenges to be considered. These challenges are normally related to competition, not only from new companies entering markets already explored by other companies, but also from competitors reducing prices by using global economies of scale or expanding for new markets (Levitt, 1983).

This creates a new reality for companies (Levitt, 1983), that forces them to make changes in their corporate strategy, which can include the decision of moving beyond their domestic market (Wiersema and Bowen, 2007). On the other hand, companies also opt to invest in M&A processes to get new skills, technology and resources and become more competitive and to increase its innovative activities to become pioneer in these new markets created by this global reality (Dogan, 2016), which will be the focus of the present research along the way.

2.2 Mergers and acquisitions

As mentioned previously in this study, as a result of the international development in recent years, mergers and acquisitions have become advantageous options for business development and growth. They are considered one of the most important strategies for corporate development, external growth and to gain market share (Jagerma, 2005).

Jagerma (2005) defines acquisitions as the process of combination of two different companies, where the result is the takeover and control by one of the companies, not necessarily by agreement. On the other hand, mergers

refer to the combination of two similar companies, with mutual consent and with the same level of control as a result. (Jagerma, 2005).

Roberts et al (2016) defined mergers and acquisitions combined as the process of building a new firm by the union of two or more different companies. The main difference between a merger and an acquisition is that in a merger there is normally a negotiation process before the transaction happens. On the other hand, in the acquisition, this negotiation process is not mandatory. (Roberts et al, 2016).

M&A processes have been studied by different authors, which generated different points of view on the topic. Rossi et al (2013) reviewed empirical several studies and concluded that there are four main lines of study regarding mergers and acquisitions: industrial organization, financial economics, strategic management and organizational behavior.

The industrial organization line of investigation focused on the idea of an existing correlation between mergers and acquisitions and market structure, because market influence company's conduct, which will then determine the market performance.

On the other hand, financial economics vision focused on the analysis of the actual return obtained by companies' with mergers and acquisitions activities in the context of the economic market.

The strategic management approach focus on the process and motives of mergers and acquisitions and its impact in performance.

Finally, the organizational behavior line of investigation defended the idea that the success of mergers and acquisitions depends on the levels of integration, focusing on several factors such as the cultural adaptation, conflicts before and after acquisitions and human resources management in this contexts.

These different schools of investigation motivated several theoretical concepts in different fields like management, economics, finance, organizational culture and human resources management.

In a management context, studies were focused on diversification as main motive of mergers and acquisitions and its impacts in performance. Economics field studied economies of scale and market power has motivations for companies to merge or acquire other firms. On the other

hand, finance studies are normally related to the impact of mergers and acquisitions in stock market results, and organizational culture has been focused on the integration process within mergers and acquisitions, analysing cultural differences and conflicts management. In this context, human resources management field has been interested to analyze psychological issues, communication skills and advantages and career impact of mergers and acquisitions (Larsson and Finkelstein, 1999).

Independently of the area of study, every empirical research about M&A agrees on the fact that these transactions can bring benefits and are considerable growth options for different kind of companies, perspective that is accepted and shared by the present study.

In fact, Shimizu et al (2004) showed that mergers and acquisitions has been a strategy carried on by several companies as an alternative to expansion motivated by the technological development and globalization, especially since the decade of the 1990s.

In concordance, Pitts (as cited in Hitt et al 1990), explored the idea that internal growth and growth through acquisitions can be good options for companies, which was reinforced by Lamont and Anderson (as cited in Hitt et al, 1990), who also found out that multinational companies look at M&A as a very strong option for their growth strategy.

However, the literature also mentions that these transaction are complex and there are different factors that impact M&A's activities. Such factors can include the differences between several market structures and the way they are organized (Shelton cited in Rossi et al 2013), the levels of integration (Meglio, cited Rossi et al 2013) and the cultural differences (Larsson and Lubatkin cited in Rossi et al 2013). The present study considers these factors as relevant for the future analysis of the results as they can influence and generate differences and create tendencies among the M&A processes across Europe.

The importance of these factors is clear if we look at another important perspective to be considered in this study, which is the idea that M&A activity is normally cyclical and shows a pattern characterized by an increasing wave after a period of inactivity (Nouwen, 2011).

The study of M&A waves, regularly includes five different periods starting from 1890 until 2003, each own with different drivers and characteristics (Nouwen, 2011).

Martynova and Renneboog (2005) studied these five waves and identified a set of key drivers that started the different cycles such as: economic recovery, capital markets in a rising tendency, regulatory changes by the countries, innovation in different industries and advances in technology and the fact that companies were forced to adapt themselves to ongoing economic changes.

The first wave happened in the end of the 19th century with the extreme disruption in technology, economy and financial markets, which also brought drastic changes in regulation, leading to the creation of monopolistic companies among the most important areas of the economy. This wave ended between 1903 and 1905 with a period of crisis in the capital markets worldwide (Cretin, 2015).

With the end of the First World War, the second wave started and lasted until 1929. This wave was based on the improvements of antitrust legislation, which helped the consolidation of small companies (Martynova and Renneboog, 2005).

The third wave started after the Great Depression and Second World War and it was driven by the horizontal diversification¹ transactions which led to expansion of big companies across different industries with the intention of generating profits outside their original market. This wave ended in 1973 due the oil economic crises (Martynova and Renneboog, 2005).

In the beginning of the 1980s, the new antitrust legislation, the reduction of financial markets, the technological advances of the electronics sector and the creation of new financial instruments in the stock market led to the creation of a new wave of M&A. This wave was characterized by big investors buying shares in financially inefficient corporations to gain significant power to make changes and ended with the so called Black

¹ Horizontal diversification refers to a firm's corporate strategy of entering a new market or industry where the firm doesn't currently operates to generate extra profits.

Monday, in October 1987, when stock markets around the world crashed (Cretin, 2015).

Finally, the fifth wave began in 1993 with the technological innovation, decrease of regulation, privatization of several companies. This wave was the first time that European markets became as strong as United State and when the M&A activities in Asia started to be representative. Also in this wave, it was possible to see the intensification of cross-border M&A processes due to the globalization impact in trade. The boom of the Internet ended this wave in 2000 (Cretin, 2015).

However, some authors such as Sudarsanam (2003) identified a sixth wave of M&A activity, starting in 2003 and based on the rise of leveraged buyouts (LBO)² and ending in 2008 with the world economic crisis.

The study of the M&A wave is important for this study as it helps to understand the factors that influence this type of transactions along the years and help to identify similarities to the current conditions of the global market during the period straight after the 2008 world economic crisis and 2017, which is the focus of the present research.

In fact, in concordance with the present research, recent studies such as Smayra et al (2017) and Steger and Kummer (2017) identified a seventh wave of M&A activity worldwide based on the recovery of the global telecom industry, after the slowdown in 2008 and 2009. The research refers to an annual number of around 500 M&A deals, worthing US\$240 billion in 2014 with high value deals such as Verizon's acquisition of 45% of Vodafone's wireless business, which was worth \$130 billion. In 2015 and 2016, the M&A transactions registered values of \$86 billion and \$112 billion, respectively, with North America and Europe as the most active regions. On the other hand, Asia represented 18% of the total global M&A transactions and Middle East and Africa (MENA) started to get noticed, representing 1% of the total deals.

² A leveraged buyout (LBO) is the transaction made by a private equity fund to buy a company financed mainly by debt. (Vernimmen, 2017).

2.3 Cross-border mergers and acquisitions

In the context of M&A processes, cross-border acquisitions represent the worldwide majority of foreign direct investment and promotes the transfer of important technologic and financial assets, human capital and know-how from a domestic to a foreign company (Hitt and Pisano, 2003).

For example, 40 percent of the acquisitions processes made by companies in 1999 and 2000 were cross-border and \$3.4 trillion of mergers in 2014 happened on a global scale (Patel and King, 2016). In 2016, cross-border mergers and acquisitions registered an increase of 20% in terms of value, which represented three consecutive years growing since the last declined in 2012 (OECD, 2017).

In fact, cross-border M&As have been explored by different empirical studies to help understanding the determinants of this type of activities: Di Giovanni (2005) and Head and Ries (2007) used Tobit and the Poisson maximum likelihood method to explore the importance of considering the cultural and geographical proximity when considering this strategic transaction. Berger et al. (2004), on the other hand focused on the study of cross-border M&A in the financial sector by applying the same Tobit method, while Goerg et al (2006), Focarelli and Pozzolo (2008) applied a binomial regression model to study M&A in different sectors such as manufacturing and insurance.

The new global environment dictated by the rapid development of technology, decreases product life cycles, expand customers' demands, increases global competition and the companies' capacity of creating and maintaining business across borders becomes a determinant factor of competitiveness (Zonta and Amal, 2018).

Motivated by technology advances at a global scale (Patel and King, 2016), these types of deal can generate great returns in terms of company's performance and benefits for home and host countries by revitalizing firms and economies, creating jobs, restructuring processes and integrating new technology (Kang & Johansson, 2000).

Coeurdacier et al (2009), in a study conducted by the European Central Bank analyzed the acquiring activities of ten companies across 31 countries over the period of 1985 and 2004 and found some key drivers of the cross-

border M&A: first, the help given by The European Economic and Monetary Union (EMU) on the restructuring of the capitals within different sectors was an important factor for these transactions at the time; the adoption of the Single European Market Act by countries joining the European Union (EU) facilitated the intensity of mergers and acquisitions; as well as the reductions of the corporate tax rates and regulations by the countries. Finally, in concordance with previous research about the topic, the study also identified physical and cultural proximities between countries as an important factor for this type of deals.

By theory, cross-border M&A happen for the same reasons as domestic ones: to generate value by the mix of two or more firms. However, when looking at cross border deals, there are other factors to be considered that domestic transactions don't necessarily take in consideration: cultural differences and geographic differences can increase the costs of a M&A process; governance characteristics and rules of different countries can influence the decisions or international stock market and different currencies that can influence the price of the transactions (Erel et al, 2012).

Shimizu et al (2004) explored the idea that cross border M&A is a mode of entry or diversification in a foreign market, a dynamic learning process and as a value-creating strategy. This position was then supported and explored by Lee (2011), who added that companies look for technological expertise with these type of transactions.

To reach the purpose of the research, the present study agrees with the idea that cross-border M&A have been the strategic move for companies that want to acquire new technology and to increase innovation. Concept that was also explored by Kengelbach et al (2016), who added the importance of the personalization of products through innovation to influence the customer's journey and ensure a great customer experience.

This idea gets even more clear if we look at the example of the digital technologies field that has become popular through the introduction of new technologies acquired by M&A processes. Deals like the northern american company Google buying the Taiwanese mobile technology company HTC to add new technology to its business and become competitive in the mobile market, are examples to be considered (Ackroyd, 2017).

However, it is important to understand the most common intentions behind cross-border M&A. The results of previous empirical research can be summarized as follows:

2.3.1 Entry mode

Mergers and acquisitions can help companies to enter new markets or industries in an easier way, avoiding the risk and expensive processes of establishing a global operation from the scratch in a different environment and culture (Ahammad and Glaister, 2010). In fact, cross border mergers and acquisitions can facilitate the access to local suppliers, customers, local human capital and marketing channels (Hitt and Pisano, 2003). Besides that, cross-border mergers and acquisitions can also help to expand the market of a company by increasing the options its products in an already mature market in terms of sales (Datta and Puia, 1995).

This tendency can be seen if we look the business relationship between french and czech companies over the last few years. French companies have been making strong investments in the Czech Republic, becoming the fifth biggest investors and the most important employers in the central european country. In the financial sector for example, the two most well known French commercial banks, Société Générale SA and Credit Agricole SA acquired Czech companies to start offering services to local customers but also to expand their services to international customer in the entire Central European region (Thivant and Machková, 2017).

2.3.2 Access to resources, know-how and technology

Mergers and acquisitions can sometimes be seen as a valuable option for learning and to access to new capacities or resources (Jagerma, 2005). The literature suggests that these deals can empower companies with alternative know how and skills they couldn't have before the transaction (Vermeulen and Barkerma, 2001). Besides the learning process, mergers and acquisitions are usually seen as an opportunity to get new and critical technology on board, especially in such a competitive and innovative actual

global environment (Ohmae, 1989). In fact, the decision of acquiring other companies to gain new technology and capabilities is a well-known strategy adopted by several companies and considered as an important factor for M&A literature. However, it is also important to mention that the acquired companies are normally young, with less resources and low levels of cash flow in long term prospects (Rossi, Tarba & Raviv, 2013).

Taking the international tech industry as an example, companies attain higher levels of innovation and R&D spending due to the different products they offer, so they tend to buy technology instead of building it with their current internal resources (Chiang, 2010).

In 2017, the giant of social network Facebook announced the acquisition of Owlchemy Labs, a smaller company that creates virtual reality games. This transaction allowed Facebook to get the expertise in a very complex and technical area such as VR and start exploring that side of its business (Desjardins, 2018).

2.3.3 Product diversification

Besides the seek for new technology, the literature also mentions M&A as a strategic decision to achieve product diversification. In fact, according to prior research, an acquisition drive by diversification can increase the productivity of capital when the skills of the acquired companies are applied to the competitive gaps of the buyer. It can also considerably reduce the average activity costs due to scale effects by rationalizing production, managerial resources and technological innovation, and can also help to reduce risks, especially in cases of related product markets (Salter & Weinhold, 1978).

Product diversification refers to the way companies expand their business by exploring new market opportunities and potentials by adding new products to its portfolios, adopting different pricing strategies, improvements of the core product or new marketing activities. This strategic option has been used by several companies for entering new markets and reinforcing their presence in a global competitive environment (Qiu, 2014). In fact, product diversification imply that a company is acting in more than one industry or selling more than one product line (Su and Tsand, 2015).

This type of strategy has been used along the decades by large international companies in countries like United States, Europe and Asia (Hitt et al, 1997) motivated by their different strategic needs, which can include their policy of growth or their need to increase their competitive advantage in the market as a reaction to the pressures of the international competition (Qiu, 2014).

To react to the actual competitive reality, companies have been using diversification strategies that allows them to be entering new markets, reinforce their presence in this global competitive environment (Qiu, 2014) and decrease the risk (Pandya and Rao, 1998). To achieve diversification, companies tend to invest in R&D to develop new products, services or processes, or to acquire other companies (Chiang, 2010).

For instance, if we look at some of the most recent examples: the American based Adobe Systems acquired the conversational marketing technology provider Neolane to add critical cross-channel campaign management capabilities to the Adobe Experience Cloud (Adobe, 2013). In other hand, Google acquired the Taiwanese company HTC to enter the smartphone market. Another example is Intel that acquired the Israel based Mobileye to extend its business to the automotive industry (Mercer, 2017).

Research suggests that product diversification comes from the fact that customers expect different options and high-quality products, which leads to the need of new product development and innovation of processes (Hitt et. al., 1997).

2.3.4 International diversification

Literature arguments that the geographic diversification is a valuable strategy for companies and can be achieved by cross-border mergers and acquisitions (Seth, 1990), not only in terms of expanding the business options but also because by spreading its activities geographically, companies achieve a lower level of vulnerability (Jagerma, 2005).

On the other hand, international diversification leads to innovation, leading to the investment in new products and processes, which created advantages that are difficult to be imitated by the competitors (Hitt et al., 1997).

As mentioned before, being exposed to different realities and environments, companies increase their knowledge base and their technology capabilities, becoming more productive and consequently more competitive due to its global position (Barkema and Vermeulen, 1998). In fact, several studies show that there positive outcomes of internationally diversify because international diversification can produce economies of scale, scope, and experience. This means that this diversification is able to increase companies' returns (Hitt et al, 1997).

2.3.5 Market power

Trough cross-border mergers and acquisitions, companies can increase its market power, which refers to the capacity of selling products at a competitive price, with an also competitive manufacturing and distribution system regarding costs and service, comparing to other players in the same market. By acquiring other companies, the buyers can beneficiate of the position already established by the purchased company, as well as the suppliers and distributors. This benefit will allow the buyer company to control or influence prices practiced in the market, marketing activities and control to other parts of the value chain (Hitt et al., 2001).

Recently, the giant groceries UK based company Sainsbury's announced the acquisition of the catalogue based retailer Argos. This decision was motivated by the intentions of increasing the instore shopping market share, currently led by the competitor Tesco, and to reinvent Argos' business to compete directly with Amazon and consequently increase the online shopping market share (Hope, 2016).

In fact, one of the most considered theories around M&A is the Monopoly Theory, which says that firms look at M&A as a way to achieve market power, not only by reinforcing its own sales performance but also by limiting competitors' activities (which can lead to episodes of corporate cannibalism, when a company buys another competitor company to stop its growth) or by creating barriers to new entrants in the market (Trautwein, 1990).

2.3.6 Improve target management

Previous literature explores the idea that mergers and acquisitions are regularly used to improve or maximize the value of a target company. Some deals are motivated by the belief that the management capabilities of the buyer are capable to improve target's company performance and increase the chances to succeed under its control (Gaughan, 1991).

2.3.7 Synergy

Mergers and acquisitions with a synergy purpose happens when there is the belief that the combined value of both companies will be better than the value of both individual companies (Seth et. al, 2000). In these cases, the gain of combining operations, marketing efforts, research, development or costs brings higher benefits in terms of operational efficiency, market power or even profitability than keeping with two different individual organizations (Bradley et al, 1988).

According to the literature, these synergies can be of two types: operational, which refer to the cases when there are economies of scale and scope, and informational, when the value of the combination of the two companies is higher than the two separated parties (Goergen and Renneboog, 2004).

2.3.8 Managerial motives

Existing literature defend that managers can be motivated to follow a mergers and acquisition path by their own personal ambitions (Seth et. al., 2000). In fact, the empire building theory is very common in the research of the topic and refers to the seek of empowering or increasing the size and scope of an individual within an organization (Trautwein, 1990). Even if this theory has been mentioned by the literature as one of the reasons for domestic mergers and acquisitions, it can also happen in cross-border deals (Seth et. al., 2000).

2.4 M&A downside

The existing literature about M&A is very vast, however there is a clear focus on the positive side of this type of deals and the motivations behind the decisions to select them as growing strategy. Even if this study found different positive aspects of M&A assumes that, in fact, M&A have several benefits for companies, it is also important to consider the challenges and difficulties around these transactions, which were studied by some authors in previous research.

Looking at cross-border M&A research, the idea that acquisitions can face challenges because of the lack of knowledge about its target is constantly explored. Zaheer (1995) or Johnson and Vahlne (1977) are some examples of authors that focused on the idea that M&A can be difficult when the acquire company has little experience in international markets or are incapable to assess the value that the target firm can bring.

On the other hand, Porter (1990) mentioned that an international diversification strategy needs a high level of coordination and leads to distribution of the operational costs, followed by other aspects like several trade barriers, logistics costs and processes, cultural diversity and other country differences.

Furthermore, Hitt et al (1997) studied the downside of the international diversification processes. This study concluded that even if international diversification is positive for companies, this can also be negative when the companies internalize their activities too much. This because the processes and distributed operations become more complex and difficult to manage

Besides that, other authors like Jensen (as cited in Hitt et al, 1990) showed that M&A are directly linked with an intensification of trade-offs, as well as Fowler and Schmidt (as cited in Hitt et al, 1990) studied the effects of M&A on companies' performance, finding that in some cases there is a decrease of performance after a tender offer acquisition.

On the other hand, Opkins (as cited in Hitt et al, 1990) discovered that M&A can also affect market position not only in a positive way (as mentioned previously in this study) but in some cases can actually decline the market

position and reduce the market share, especially if companies involved in horizontal acquisitions³ processes.

Another negative aspect mentioned by the literature is the fact that companies that choose to acquire other firms, invest less in R&D (Hitt et al, 1990).

The negative sides of cross-border M&A transactions are important for the present study as they can help to understand potential correlations between the number of deals and the registered innovation outcomes in Europe between the studied period. In this case, the idea explored by Hitt et al (1990), which mentions the decrease of the R&D investment by companies involved in M&A activities, is an important point to have in consideration when analysing the collected data.

2.5 Innovation

By definition, innovation tend to be explained as the process used by companies that includes producing new products, new processes or systems with the major objective of adapting themselves to the constantly changing markets, new technologies and current levels of global competition (Lawson and Samson, 2001).

In fact, in the context of today's globalized world, the fastest development of technology and communications, the reductions of tariff barriers, transportation costs and the high levels of international investments, innovation is considered one of the most important factors for competitiveness. Firms, research institutions, colleges and even countries are challenged to become more and more competitive and more focused on innovation with the objective of generating economic growth (Pellicer et al, 2010).

There is a vast research work done around the importance of innovation for business that goes back to the rise of the concept of the knowledge

³ Horizontal acquisitions happen when a company buys another company operating in the same industry (Roberts et al, 2016).

economy⁴. This new reality, plus the global competition and the technological advance has put innovation in the center of attention of companies to guarantee their competitiveness (Lawson and Samson, 2001).

In fact, innovation gives the chance to companies to have a fastest growth and be one step forward of their competitors, which influence the corporate decisions at several levels (Sáen et al, 2009).

The positive relationship between competition and innovation was demonstrated by different empirical studies such as Dasgupta and Stiglitz (1980), Porter (1990) and Van de Klundert (1997), concluding that, by comparing themselves with other players in the market, companies are pushed to improve the cost and functionality of their products and services. Furthermore, competition also increases the demand of competing companies, which makes more innovative companies more attractive to the consumers. On the other hand, the more competitive is the market, the higher is the risk of failure, so companies are pushed to keep innovating to ensure their survival.

However, these authors didn't consider the approach explored by Cohen (1989) which contradicts this positive relationship between competition and innovation. This study revealed companies decrease the investment in innovation in a very competitive market because the gains of its investments are quickly consumed. This view also defends that bigger companies with monopoly power have better conditions to invest in innovative projects, which weakens smaller companies' efforts to be more innovative.

Nevertheless, most of the empirical research until the date agrees with the positive impact of innovation on competitiveness of companies. In fact, innovative companies have normally higher market shares, higher profitability and greater resilience in periods of economic stagnation (Atun, 2006).

However, there are other factors to take in consideration when exploring companies' innovation activities in a more country-level. Blind (2011) showed that regulatory and financing conditions of the country where the companies

⁴ Knowledge economy is based on the use of knowledge to generate tangible values in corporate transactions (Burton-Jones, 2001).

operate, influence the decision of the companies and industries in general to innovate.

In this context, Intellectual Property (IP) protection appears as an important factor to maintain companies' competitiveness and recover investment in innovation, due to the fact that information circulates and the innovative processes diffuse quicker nowadays. This leads to the risk of imitation of innovations by the competitors, which increases the companies' need of patenting their new products or services (Atun, 2006).

In fact, previous empirical research such as Scotchmer (1991) and Walsh (2003) studied the benefits of patenting concluding that it increases the chances of smaller companies to succeed by increasing their competitive position in the market and its negotiation power, facilitates the negotiations for licencing or collaborations and also make them more attractive to potential investors.

However, this approach was contradicted by other authors that defended that high intensity of rules in terms of innovation protection can actually reduce the investment on innovative activities by companies (Atun, 2006).

In brief, different studies show that innovation is directly connected to profitability, increases companies' market share, economic productivity and patenting is the most commonly used measure of innovation output. IP and patents have a monetary value which adds value to the companies and currently gets the attention of investors and shareholders (Atun, 2006).

2.5.1 M&A and innovation activities

Besides the motivations regularly associated with M&A already mentioned in this study, this kind of strategic approach is also a good option for companies to get innovative capabilities. In fact, different sources of literature have been focused on exploring the idea that M&A can contribute to the knowledge acquisition process of the companies and consequently for the intensification of their innovative activities (De Man and Duysters, 2003).

In fact, as technical know how is acquired by long term exposure to the technology and by experience, it is normally difficult to be transmitted from one person to another, which also difficulties the transmission from one

company to another (Larsson et al, 1998). In this context, companies can decide to acquire another firm to overcome this transmission barrier and avoid high costs (Bresman et al, 1999).

Another important contribution of M&A to the innovative activities of the companies is the fact that they can increase the R&D budget of the firms involved in the transaction. As mentioned before, M&A can help companies to create economies of scale, which also helps them to embrace bigger R&D projects by merging the two companies efforts. Larger budgets can lead to more disposition of the companies to R&D projects, consequently to more attention given to innovation, which brings more advanced technology developed (Gerpott, 1995).

Going back to the knowledge transfer concept explored by literature, the merge of two companies can lead to complementary knowledge transmitted between companies, which builds more new mutual strength for the development of new innovative outcomes (Gerpott, 1995).

Finally, the management of innovation is a difficult process and requires that the companies have experience and internal resources. The literature shows that with M&A companies can benefit from the exposure of differentiated management techniques and from the best practices sharing, which will increase the R&D productivity. (De Man and Duysters, 2003).

There are a different number of authors exploring the topic of the impact of M&A in innovation activities. The literature findings can be summarized as follows:

Hagedoorn and Duysters (2002) shows that the innovative performance of a company is reduced when this company acquires a smaller one, defending that M&A should happen between companies with the same size.

On the other hand, Ahuja and Katila (2001) found that large companies should acquire smaller firms to increase their innovative performance.

At the same time, Cloudt et al (2006) explores the idea of the negative impact on the innovative performance of the acquirer companies after the M&A process. This approach defends that, especially in technological M&A, the relatedness of the acquired knowledge base is important because it creates positive effects in the first couple of years but then it can become obsolete in the long term, which leads the author to show that M&A should

happen between companies with not too unrelated but also not too similar knowledge bases.

Regarding cross-border M&A and innovation, Stiebale (2014) shows that cross-border M&A can have a positive impact on companies' innovative activity by transferring new technology, different ways of operating or improving market access but on the other hand, some authors found out that there are negative impacts of cross-border M&A on innovation activities. This because companies can reduce competition after the process or lack in financing sources to cover the higher costs of international R&D (Stiebale, 2014).

However, the research on the impact of cross-border M&A on innovation outcomes also supports the negative effects of this type of transactions on R&D or innovative outputs or patents. This can be explained by the fact that, in some cases, companies replace innovation by M&A. On the other hand, acquired firms can lose their innovation expertise during the M&A process, which leads to a decrease of the number of patents. In fact, recent studies show that the reduction of the number of patents after a M&A process could mean that the acquiring companies are not using the new technology they obtained or that they are not getting any competitive enough technology in these transactions (Hitt et al, 1991).

CHAPTER 3: RESEARCH METHODS

3. Research Methods

3.1. Research Question

This study has the main objective of answering the research question: what is the impact of cross-border M&A on firms' innovation outcomes?

3.2. Aims

1. To assess if there is a correlation between the number of M&A and the number of patents applications registered in Europe between 2008 and 2017;
2. Analyze the collected data to understand what kind of impact cross-border M&A have on companies' innovation outcomes;
3. To assess potential differences of this impact across different countries in Europe that can contribute to future research on the topic.

3.3. Methodology

The present research was a cross sectional study to examine how the two considered variables - number of cross-border M&A and number of patents applications - measured in the same period of time - between 2008 and 2017 - are associated to each other.

A cross-sectional study comprises data collection on different variables at a specific point in time to investigate the relationship between them, with the objective of finding a potential correlation.

There are two types of cross-sectional studies: Descriptive, purely used to assess frequency and distribution, or Analytical, used to investigate the association between the variables.

For this study, the variables were analyzed taking in consideration a study sample which included four different European countries: United Kingdom, Germany, Austria and Switzerland. The selection of the countries was based on the available data during the collection phase of this study and also the

different levels of intensity of M&A registered in each country, which was considered to be an interesting balance to be analysed: United Kingdom registered more than 100.000 M&A since 1985, with a value of almost 5.7 billion GBP. Since 1991, Germany registered close to 50.000 M&A, with a known value of almost 2.900 billion euros. On the other hand, Austria registered more than 6,900 M&A since 1991, with a value of 200 billion euros, while Switzerland registered more than 14,400 M&A deals, with a total value of almost 1.300 billion euros.

Different data sources were used to build the analysis sample of this study: data on cross-border acquisitions in United Kingdom, Germany, Austria and Switzerland was gathered from the statistics reports published by the Institute of Mergers, Acquisitions and Alliances (IMAA), which provides selected, regularly updated M&A statistics worldwide of various countries and industries. The selected report includes information on national and cross-border M&A from (outbound) and into (inbound) both countries during the period between 1985 and 2018. This report also includes the number of deals, its value and top operations registered in the same period.

As mentioned previously, regarding the time period to be analysed, this study considered the post 2008 world financial crisis, considered by Smayra et al (2017) and Steger and Kummer (2017) the seventh wave of M&A activities. Therefore, the present research focused on the period between 2008 and 2017.

On the other hand, data on patents applications was extracted from the reports compiled by the European Patent Office, which supports innovation, competitiveness and economic growth across Europe by offering patent protection across 42 countries. The analyzed report includes the number of patents applications and granted by EPO registered in United Kingdom and Germany during the period between 2018 and 2017.

There are different pros and cons of using patents as indicator of innovation activities in both countries: patents were used in previous research as indicator of innovation, it is considered an output of R&D investment and activities, and it is an easier way to collect data because it does not need any extra research on new products or processes developed by companies (Stiebal, 2014).

The cons of using patents as indicator of innovation activities are the fact that not every new product, invention or idea gets a patent and also that companies can be innovative in more broad areas of its operations, such as strategy or internal processes (Ziedonis, 2004).

However, as mentioned previously in the present research, many previous studies have explored the impact of innovation on the economic growth and competitiveness of companies by using R&D investment or patents as measure for innovation activities (Atun, 2006). For example, Porter and Ketels (2003) used the annual growth rate of US-registered patents as an indicator of innovation output to analyse the United Kingdom competitiveness.

Therefore, due to time and access to other data sources constraints, the present study considers that patents are a relevant and useful indicator that can contribute to answer the pursued research question.

The main outputs extracted from both reports were the number of M&A registered in the UK, Germany, Austria and Switzerland and the patents applications submitted to EPO in the same countries, between 2008 and 2017. The reason behind the choice of patents applications and not patents granted was the fact that this study considers that patents applications are a better indicator of companies' intentions to register its innovations and, consequently, gives a clearer idea of its innovative activities.

3.4 Data Analysis and Interpretation

Data collected was analysed using two major statistical instruments: Pearson correlation test (r) and statistical hypothesis test (p value).

3.5 Hipotesis

- There is a positive correlation between cross-border M&A and innovation outcomes;
- There is a negative correlation between M&A and patents applications;
- There is no correlation between both studied variables.

CHAPTER 4: RESULTS

4. Results

4.1. Descriptive Analysis

4.1.1. United Kingdom

United Kingdom has registered more than 103.070 mergers and acquisitions since 1985, with a total value of 5.688 billion GBP. In 2017, the country registered a number of 3.916 M&A deals, with a value of 326 billion GBP, which represents a growth of more than 7% in number of deals, compared to 2006. According to the data, the year with a highest number of M&A deals was 2000, registering more than 5.100 transactions (IMAA, 2018).

The industry with the most intense M&A activity in the UK in the last couple of years has been the financial sector, which represents 16.6% of the total deals, followed by energy sector and materials industry (IMAA, 2018).

Regarding cross-border M&A (Inbound), these represent 20.9% (Graphic 1) of the total number of M&A registered in the UK since 1985 and has been keeping a growing tendency since then. Most recently, in 2017, 1.355 foreign companies have made M&A deals in the UK, with a total value of 277.95 billion GBP.

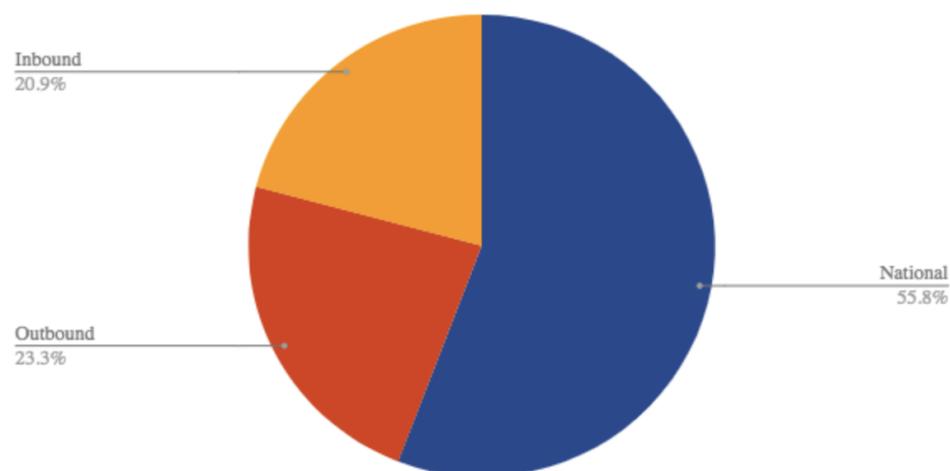


Figure 1 - Cross Border M&A in the United Kingdom (1985-2017) by number of transactions.

Source: IMAA, 2018

These M&A deals include companies mostly from United States, Germany, France and Ireland (IMAA, 2018).

Figure 2 shows the evolution of the number of cross-border M&A in the UK during the time period considered by this study (2008-2017). The collected data shows an intense moment of cross-border M&A activity in 2008, followed by a drastic decrease in 2009, which registered the lowest number of 1003 deals. In 2010, the number of cross-border M&A increased to then fall slightly again in 2013. From 2013 onwards the number of this type of deals has been having a growing tendency, reaching the highest volume of transactions in 2016, with 1429 deals registered.

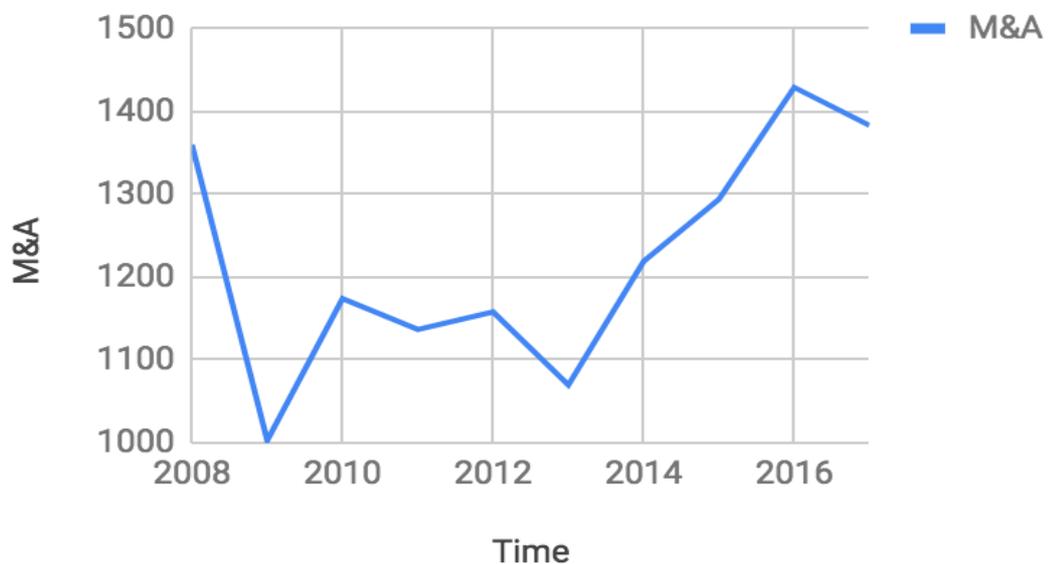


Figure 2 - Number of cross-border M&A in United Kingdom (2008-2017)

The data shows an irregular evolution of the number of cross-border M&A in the UK between the period of 2008 and 2013, with ups and downs in the number of deals along the years. As mentioned before, the biggest decrease happened from 2008 to 2009, registering a 26.3% of reduction of number of transactions. On the other hand, it was possible to see a regular positive evolution in between 2013 and 2016, registering growths of 13.0%, 6.15% and 10.4%.

In terms of patents applications, an initial analysis of the collected data showed a similar irregular evolution to what was verified in the case of cross-border M&A in the UK.

Figure 3 shows the evolution of the number of patents applications in the UK between 2008 and 2017, where it is possible to see this irregular tendency of the curve. As it happened with cross-border M&A, the number of patents reduced between 2008 and 2009, registering a 3.6% of decrease during that period. However, the biggest reduction happened between 2010 and 2011, with 11.8% of decrease of the number of patents applications.

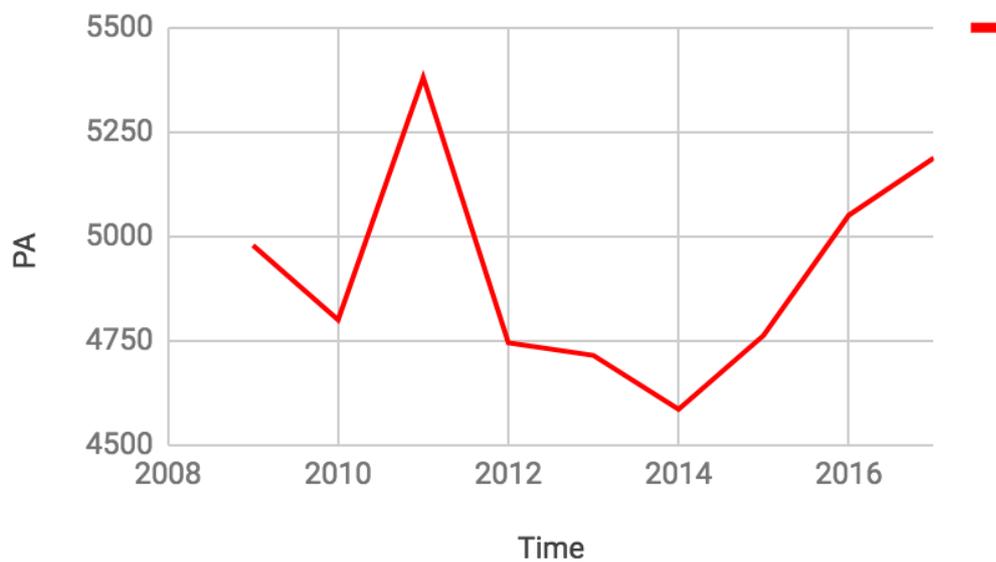


Figure 3 - Number of patents applications in United Kingdom (2008-2017)

On the other hand, it was interesting to notice that the number of patents increased every time the number of cross-border M&A also increased and vice versa (as Figure 4 shows). The exceptions of this tendency are the time periods between 2011 and 2012 and most recently between 2016 and 2017, where the number of patents applications decreased 0.6% in the first case, against the increase of cross-border M&A, and increased 2.4% in the second, contradicting the reduction in cross-border M&A number of deals.

M&A and PA UK

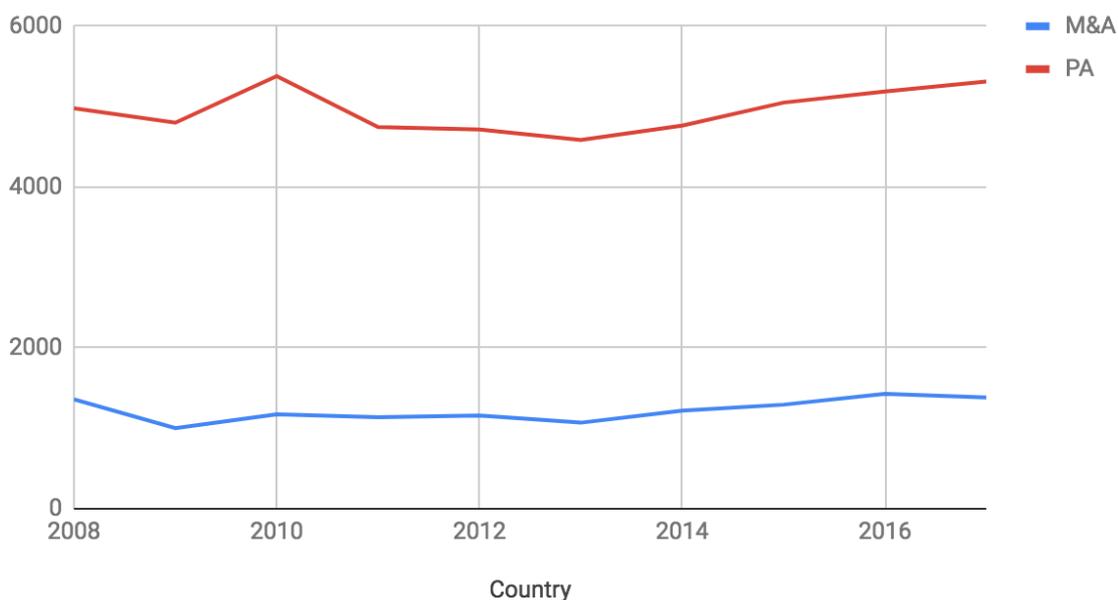


Figure 4 - Evolution of cross-border M&A and Patents applications in the UK (2008-2017).

4.1.2. Germany

Germany registered more than 49.900 M&A deals since 1991, with a value of 2.900 billion Euros (IMAA, 2018).

The period between 1999 and 2000 was the most intense in terms of number of transactions, with more than 3.000 M&A deals and a total value of more than 484 billion Euros. (IMAA, 2018).

Industrials is the industry with the highest volume of transactions, which represent 19.2% of the total number of 6700 transactions, followed by high technology, with 5454 transactions and representing 15.6% of the total. Consumer products comes next, representing 9.7% of all deals.

Regarding cross border M&A, Germany registered 878 deals in 2016, with an increase of the value of the deals by more than 45%, when compared to the previous year. Among these deals are included companies mainly from the United States, United Kingdom, Switzerland and France. (IMAA, 2018)

In *Figure 5* it is possible to see the evolution of the number of cross-border M&A in Germany between 2008 and 2017. The data shows a growing tendency from 2009 onwards, after a period with the lowest of number of cross-border M&A (as it happened in the United Kingdom), with 504 transactions registered. On the other hand, 2016 was the year with the highest volume of deals, registering 878 cross-border M&A transactions.

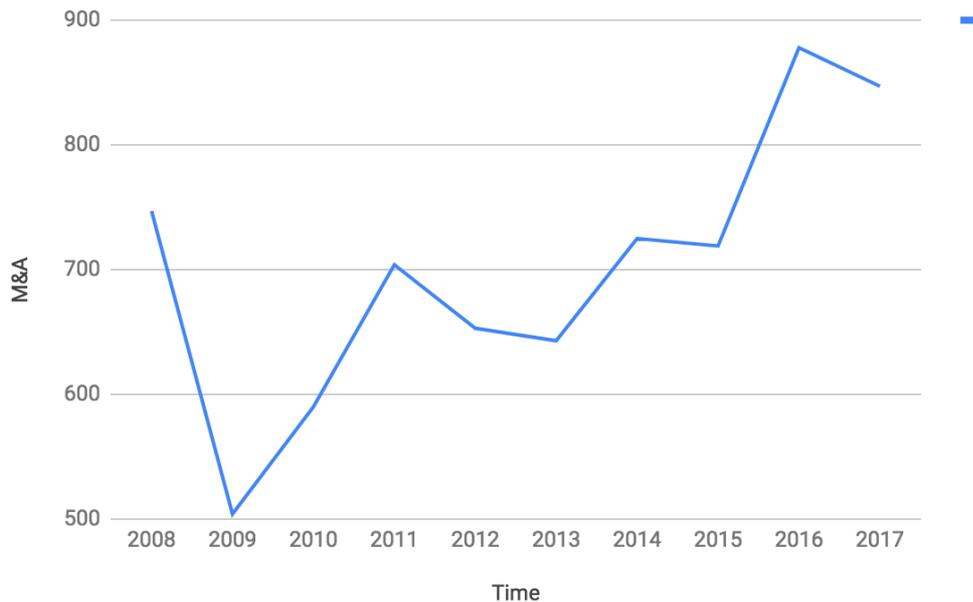


Figure 5 - Number of cross-border M&A in Germany (2008-2017)

Looking at patents applications in Germany, it is possible to see an irregular evolution with constant ups and downs along the years. *Figure 6* shows several peaks, especially in 2009, which, as it happened with the number of cross-border M&A deals, registered the lowest volume of patents, with 25118 applications. This was followed by two high peaks between 2010 and 2013, with 27328 and 26510 patents applications, respectively. On the other hand, between 2013 and 2015 it is possible to see a drastic decreasing tendency, which only started to be opposed in the last two years (2016 and 2017).

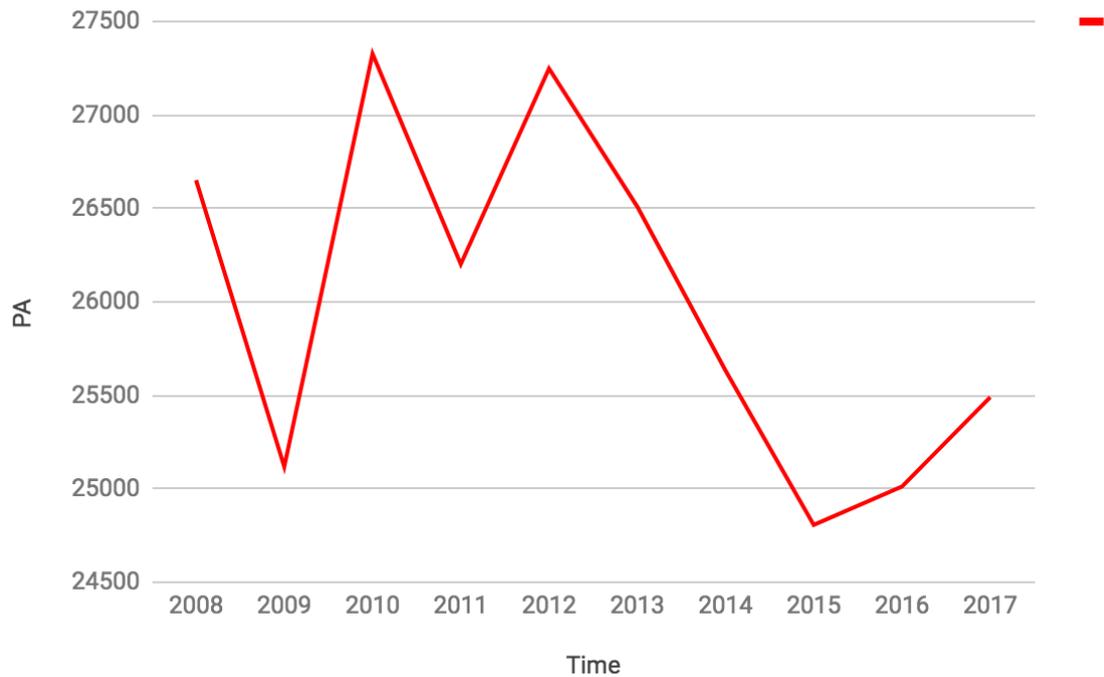


Figure 6 - Number of patents applications in Germany (2008-2017)

Looking at both figures, despite some similar movements, there is a clear contrary relationship between the two variables in Germany. Good examples of this relationship are the years of 2011, which registered an increase of cross-border M&A and a decrease of patents applications, and 2013, which registered an increase of patents applications and a decrease of cross-border M&A.

4.1.3 Austria

Austria registered more than 6.900 M&A deals since 1991, which in total represented a value of 200 billion euros. Most recently, in 2016, over 138 deals with a total value of more than 8 billion euros were made.

Regarding the different industries, Industrials is the one with the highest number of transactions, representing 19.2% of the total number of deals,

followed by High Technology and Materials, which represent 12.1% and 11.9% of the number of deals, respectively.

In terms of cross-border M&A, the majority of the deals come from Germany, representing 38.8% of the total number of deals, followed by United States (IMAA, 2018).

Figure 7 shows the evolution of cross-border M&A in Austria during the studied period between 2008 and 2017. It is possible to see that, as it happened in previous analysed countries, there was a decrease in the number of deals in 2009, with 93 transactions, followed by an increase tendency until 2014, when the number of deals went down again, registering a number of 99 transactions. Alongside with what happened with other countries, the overall evolution is very irregular, with ups and downs along the years. The highest peak in the number of cross-border M&A deals happened in 2016, with 163 transactions registered. However, this increasing tendency is now being thwarted by a significant decrease in 2017, with 138 deals registered.

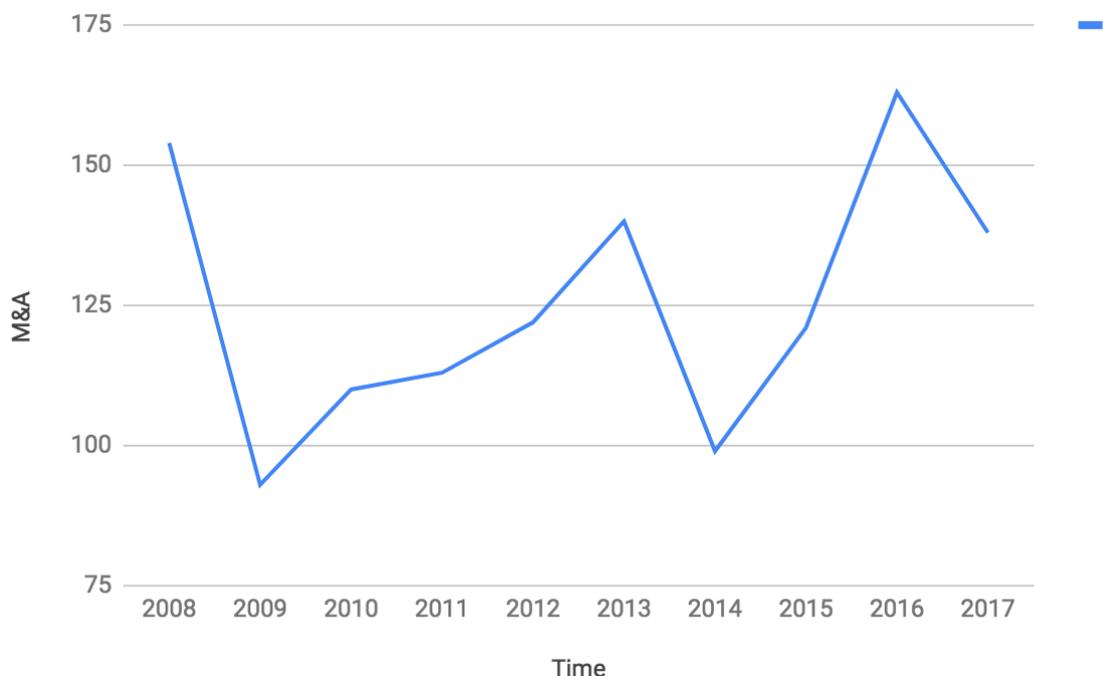


Figure 7 - Number of cross-border M&A in Austria (2008-2017)

On the other hand, the number of patents applications in Austria kept increasing since 2008, when the country registered the lowest number of applications - 1487. This tendency is still being noticed, as 2017 was the year with the highest volume, registering 2213 applications. Figure 8 shows clearly this growing tendency in Austria and helps to understand that there is no apparent correlation between both variables.

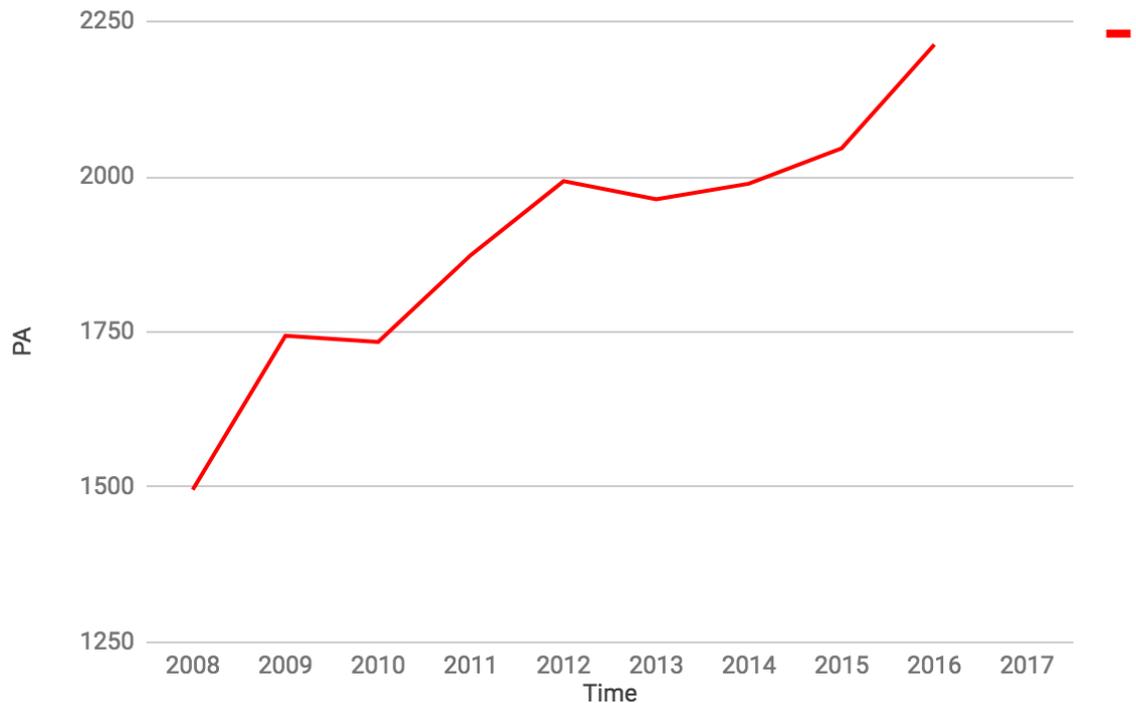


Figure 8 - Number of patents applications in Austria (2008-2017)

4.1.4 Switzerland

More than 14.400 M&A deals were registered in Switzerland since 1991, which represents a total value of 1300 billion euros. 2007 and 2008 were the best years in terms of transactions, with 132 billion euros registered in 2007 and 1.000 transactions in 2008.

The industry with the highest volume of deals is Industrials, representing 18.7% of the total number of transactions, followed by High Technology, which represents 12.3%. The financial sector has also been strong in terms of number of deals, representing 11.6% of the total.

In terms of countries, Germany, United States, France and UK are the most common origins of the majority of the deals.

Figure 9 shows the evolution of cross-border M&A deals in Switzerland between the period of 2008 and 2017. The data shows three very strong moments in terms of number of transactions in 2008, 2012 and 2017. In fact, despite the this evolution being irregular along the time, the number of transactions stayed around the 200 deals along the time, even in 2010, which registered the lowest volume of transactions - 203. The highest peak in terms of number of deals was registered in 2016, with 276 cross-border M&A transactions announced.

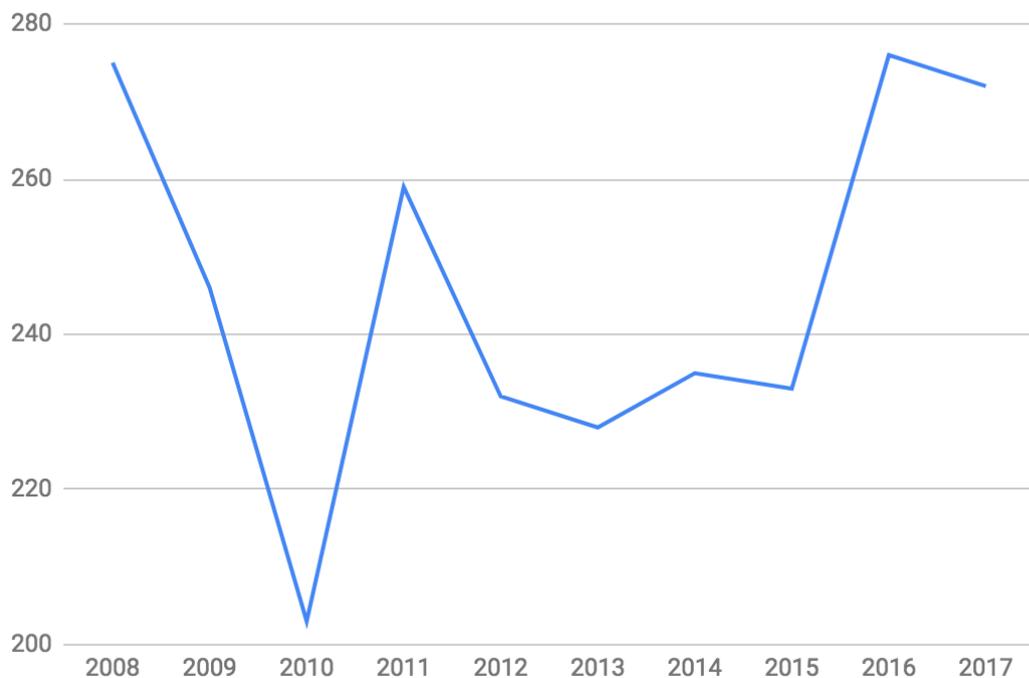


Figure 9 - Number of cross-border M&A in Switzerland (2008-2017)

On the other hand, *figure 10* shows the number of patents applications in Switzerland between the studied period of 2008 and 2017. The evolution is clearly growing along the time, despite slightly decreases in 2009 and 2011, with 5887 and 6553 applications, respectively.

The highest number of patents applications was registered in 2017, with 7283 applications.

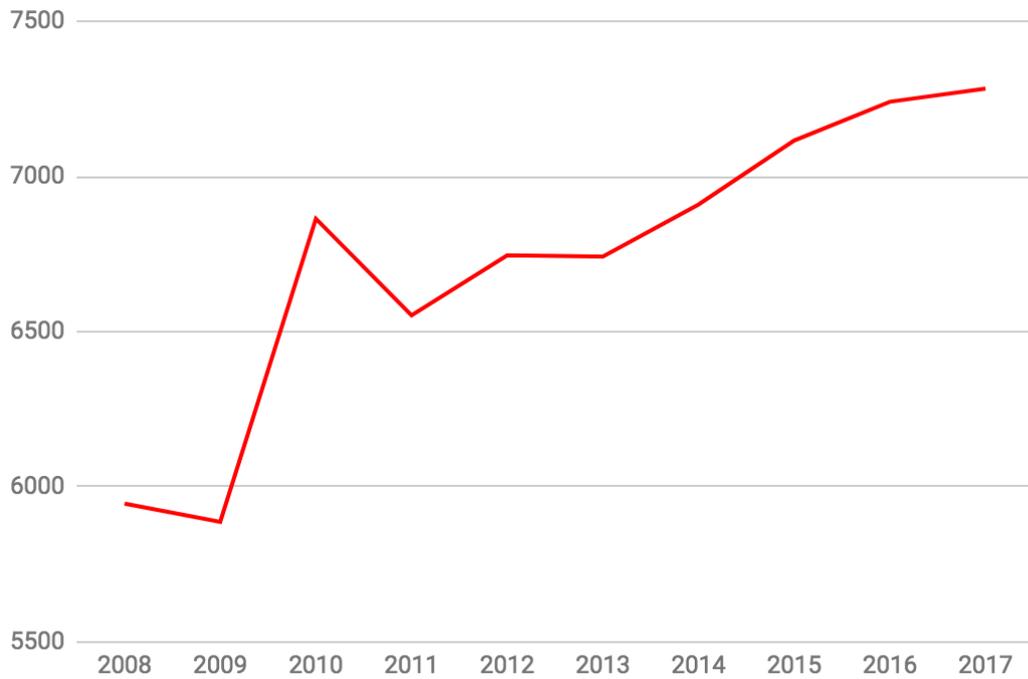


Figure 10 - Number of patents applications in Switzerland (2008-2017)

Comparing both variables, it is easy to see a contrary relationship. For example in 2010, the number of patents applications went up, registering 6864 new applications, however the number of cross-border M&A went down, representing the lowest volume of transactions along the entire studied period. The same happened between 2012 and 2015, when the number of patents applications kept growing, while the number of cross-border M&A decreased compared to previous years.

4.2. Findings

To confirm the relationship between the two considered variables with the aim of answering the research question of this study, a correlation analysis was made.

Table 1 shows the results of the correlation analysis for mergers and acquisitions (M&A) predicting patents applications by companies' in the three studied european countries.

The results show that there is a correlation (*Pearson r*) between the number of M&A and the number of patents applications in most of the studied countries in the period between 2008 and 2017, except in Austria. This conclusion, confirms the first aim of the present research which consisted in assessing if there is correlation between the number of M&A and the number of patents applications registered in Europe between 2008 and 2017.

On the other hand, confirming the second objective of this study which consisted in understanding what kind of impact cross-border M&A have on companies' innovation outcomes, it is possible to see a positive correlation between the number of cross-border M&A and the number of patents applications in United Kingdom [$r=0.0635$]. In Germany and Switzerland, the results show a negative correlation between variables. This conclusion is also aligned with Porter (1990), Stiebale (2014) and Hitt et al (1991), which say that there is positive and negative impacts of cross-border M&A on companies'.

However, the results also show that there is no statistical significance (*p value*) between the number of M&A and the number of patents applications in most of the studied countries, except in the United Kingdom, where the effect is actually statistically significant [$p=0.049$]. In order to confirm the statistical significance of the other countries, a further study with a more comprehensive dataset would be necessary.

With this results it was also possible to assess differences of this impact across the different countries, which helped to answer the third objective of the present research. The differences between United Kingdom, Germany, Austria and Switzerland potentially reflect the idea exposed in the literature review and explored by different authors such as Erel et al (2012) that the decisions of investing in cross-border M&A are influenced by cultural differences, geographic differences, governance characteristics and rules of different countries.

The conclusion regarding the results of Austria, which revealed that there is neither correlation or statically significance between the two variables, helps

to answer to the third hipoteses of this study. However, it was not possible to find any empirical study considering this hipoteses, therefore the present study considers that more research is necessary to assess the reasons behind this result.

Table 1 - Summary of Correlation Analysis for M&A predicting patents applications.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Pearson r^c	Statistical p-value ^d
United Kingdom												
M&A ^a	1360	1003	1174	1137	1158	1070	1219	1294	1429	1383	0.635	0.049
PA ^b	4979	4801	5381	4746	4716	4587	4764	5051	5188	5313		
Germany												
M&A	747	504	590	704	653	643	725	719	878	747	-0.337	0.341
PA	847	26652	25118	27328	26202	27249	26510	25633	24807	25012		
Austria												
M&A	154	93	110	113	122	140	99	121	163	154	0.295	0.408
PA	138	1487	1496	1744	1734	1874	1993	1964	1989	2046		
Switzerland												
M&A	275	246	203	259	232	228	235	233	276	275	-0.81	0.824
PA	272	5946	5887	6864	6553	6746	6742	6910	7116	7241		

^aMerges & Acquisitions; ^bPatens applications; ^ccorrelation coefficient following Pearson correlation; ^dthe significance value.

The results of the present research can be summarized as follows:

4.2.1 United Kingdom

The results of the analysis of the data, show a strong relationship between the number of M&A and the number of patents applications in the United Kingdom. This correlation is positive: when the number of cross-border M&A increases, the number of patents application also increases [$r=0.635$; $p=0.049$].

4.2.2 Germany

On the other hand, the results of the same analysis show a negative correlation between the number of cross-border M&A and patents applications in Germany [$r=-0.337$]. In fact, the statistical tests show that when first variable increases, the second one decreases. Furthermore, this analysis also shows that there is no statistically significance between both variables [$p=0.341$] on the case of Germany.

4.2.3 Austria

Looking at Austria results, there is a weak relationship between the number of cross-border M&A and companies' patents applications [$r=0.295$]. The results also show that this correlation is not statistically significant [$p=0.408$].

4.2.4 Switzerland

As it happens in Germany, the results show that there is a negative correlation between cross-border M&A and patents applications in Switzerland [$r=-0.81$]: when the number of cross-border M&A increase, the number of patents applications decrease. Furthermore, the analysis shows that there is no statistical significance between variables [$p=0.824$].

|

CHAPTER 5: DISCUSSION

5. Discussion

The overall goal of this research project was to analyse the impact of cross-border M&A on companies' innovation activities and outcomes. By understanding this impact, this research can be a tool for a better understanding of firms' strategic decisions and contribute for relevant future research in the international business field.

As already mentioned, there is a vast number of literature on the impact of cross-border M&A on companies' innovation outcomes and, taking in consideration that cross-border M&A increased 20% in value worldwide in 2016 and 30% in Europe comparing to the previous year, it is important to understand the impact these transactions can have on companies' innovation (OECD, 2017).

The results of the present research replicated in many ways previous findings already mentioned in relation to the impact of cross-border M&A on firms' innovation outcomes. The positive and negative impacts of cross-border M&A showed by different authors such as Porter (1990), Stiebale (2014) and Hitt et al (1991) were especially evident when looking at the different results of the studied countries: in the United Kingdom there is a positive correlation between the number of cross-border M&A and the number of patents applications, with the second one increasing alongside the first one. This tendency can reflect the positive impact mentioned by the literature. On the other hand, in Germany and Switzerland, the correlation is negative, showing that when the number of cross-border M&A grows, the number of patents applications decreases and vice versa, in both countries. Finally, in Austria the results are not conclusive, as there is no relationship between cross-border M&A and patents applications. In this country, both variables have totally different evolutions and it was not possible to find any kind of correlation, which was not considered by previous literature to the date. Every analysed research considered a relationship between both variables - either positive or negative - but didn't consider the possibility of a totally inexistent connection between them.

Therefore the results confirm the hypotheses suggested by this research. However, they are different depending on the country being analyzed: as

mentioned previously, the data regarding United Kingdom confirms the hypothesis that cross-border M&A do have a positive impact on companies' innovation outcomes. This result agrees with the idea explored by the literature that says that M&A can facilitate the innovation activities because it also facilitates the knowledge transmission between companies (Bresman et al, 1999), can generate more attention to innovation because it unites the strengths and budgets of two or more companies (Gerpott, 1995) and also can ensure more exposure to new technology, new management techniques and different practices (De Man and Duysters, 2003).

This conclusion would be an interesting starting point to be considered in future research to analyse the reasons behind this positive impact in the United Kingdom, a potential relationship between this tendency and the country's politics, legislation or financing sources for innovation projects. On the other hand, could be also interesting to analyse if the this positive impact is related to the characteristics of the acquiring companies' or the target companies in the United Kingdom or the reason behind the M&A decision. In fact, existing literature shows that the impact of M&A in innovation can depend on the growth strategy model and intentions behind the M&A process by the acquiring company (De Man and Duysters, 2003).

The results in the United Kingdom are very interesting, especially taking in consideration that previous research by Porter and Ketels (2003) identified a gap in R&D and innovation investment in this country in 2002. This study revealed that the innovation levels of UK at the time were not sufficient to generate growth, especially compared to other countries in Europe.

The findings of the present study regarding the innovation activities in the UK can be a reflex of the recent investment made by the government of the country. In fact, the UK Government announced in 2009 a venture capital fund with the objective of investing in innovative businesses with growth opportunity, creating jobs and drive economic growth (CEEDR, 2012). Taking in consideration that, as showed by Blind (2011), regulatory and financing conditions of the country influence innovation activities, this new Innovation Investment Fund (UKIIF) may have contributed to capturing new investments, encouraged companies to innovate and attracted foreigner firms to target UK based companies.

Despite this positive impact confirmed in the United Kingdom, it is also important to look at the results from Germany and Switzerland, where the analysis showed an inverse relationship between the number of cross-border M&A and the number of patents applications, which confirms the second hypothesis formulated by this research of a negative impact of cross-border M&A on companies' innovation outcomes. As mentioned before, according to the analysis, when the number of cross-border M&A increase, the number of patents applications decrease, which can be translated by the idea explored by literature that M&A can have a negative impact on innovation activities of companies for many different reasons such as the fact that sometimes companies replace innovation by M&A (Hitt et al, 1991), they lack in resources available for international R&D projects after the transaction (Stiebale, 2014) or the acquiring company is not getting any competitive benefit from the acquired technology (Hitt et al, 199).

This results verified in Germany and Switzerland would be an interesting topic to be deeply explored in future research: the reasons behind this negative impact, the similarities between both countries and the characteristics of the acquiring companies involved in the M&A processes. Another important factor to be considered in future research would be the country of origin of the acquiring companies. In fact, data published by the Institute for Mergers, Acquisitions and Alliances (AMAA) show that there is a connection between both countries on M&A deals, with Germany appearing as the first origin of the most regular acquires in Switzerland and Switzerland as the third origin of companies buying firms in Germany (AMAA, 2018).

Regarding Germany, these results can be justified by the fact that Germany is one of the most innovative countries in Europe, together with Sweden and Denmark. In fact, the German government has implemented in 2006 a new strategy to incentivize the development of new technologies and create a strong innovation policy across the country. This included subsidies to R&D projects for innovative projects run by companies to facilitate the creation of new products and services.

Another important fact can be the number of SMB businesses, which constitute 99.6% of the companies in Germany and are at the front of the innovation activities in the country (Legislative Council Secretariat, 2015).

Other factors that may contribute to these results in Germany are the market saturation and the fact that the country changed the rules for foreign companies to buy German based firms. The German Economic Ministry created new tools to analyze the transactions that can raise concerns to the national interests of the country (Von Wallwitz and Wunderlick, 2018). Therefore, among other potential reasons, in moments of higher innovative intensity, the regulations of cross-border M&A may be tightened to maintain the know-how and strategic innovative assets in Germany, which can potentially explain the negative correlation between cross-border M&A and patents applications.

In Switzerland, the results of this study were similar to what was registered in Germany, which can be explained by the economic, cultural and geographic proximity between both countries, as defended by authors such as Erel et al (2012). In fact, Switzerland is top in the world when it comes to innovation, according to an index by the World Intellectual Property Organization (WIPO) and as mentioned previously, M&A activities in Switzerland increased along the years. Germany is the first country on the list of origins of acquirers of Swiss companies and Switzerland has been intensifying the acquisitions in Germany as well (Deloitte, 2018).

5.1 Limitations

The present research can be a useful contribute to the international business field, however it is important to mention a number of key limitations that can limit the results.

First of all, the study sample of four countries was limited due to the fact that there was not enough free access sources of information available about other countries, which can lead to a superficial analysis of the topic.

On the other hand, even if this study tried to focus on Europe to analyse the impact of cross-border M&A on companies' innovation outcome, this does not give a global overview of this influence.

This research used patents applications as representative information about companies' innovation activities, however, as mentioned previously, even if patents were used by other authors, the present study doesn't consider that

not every new product, invention or idea gets a patent and companies can also innovate in terms of strategy or internal processes (Ziedonis, 2004).

Another limitation of the present research was the time constraints, which didn't allow a more exhaustive data collection.

Although this study found a correlation between cross-border M&A and companies' innovation activities, the data used was not able to give any input on the reasons behind this relationship. The data only considered the evolution of the number of cross-border M&A and patents applications along the time and did not consider other factors that can influence the relationship between both variables. For this reason, additional studies need to be developed with deeper insights from M&A processes such as data from specific companies, inputs from managers involved in cross-border M&A processes or financial results of these transactions.

CHAPTER 6: CONCLUSION

6. Conclusion

After the 2008 global economic crisis, markets around the world started a period of positive recovery over the last ten years: a new wave of M&A activity started to rise led by the global telecom industry and regions like Asia and Middle East used the slowdown of the European and North American economies to get even more noticed (Smayra et al, 2017). Furthermore, cross-border M&A registered an increase of 20% in terms of value in 2016, which represented three consecutive years growing.

On the other hand, innovation appear as mandatory strategy to compete in the current global and competitive market, helping companies to grow, get more attention from consumers and generate profit (Lawson and Samson, 2001).

All over the world, countries and industries create new incentives to encourage the investment in innovation (Deloitte, 2018) and companies increase the investment in Intellectual Property (IP) protection appears to keep innovating and reduce the risk of replacement in the competitive market (Atun, 2006).

Previous empirical research identified a relationship between cross-border M&A and companies' innovation, showing that this relationship can be either positive or negative, dependent on different factors.

By analysing the number of cross-border M&A and the number of patents applications in four different countries – United Kingdom, Germany, Australia and Switzerland – in the period after the 2008 global economic crisis (2008-2017), the results of the present study confirmed that cross-border M&A can have an impact on companies' innovation activities, either positive or negative, depending on the country being analysed. However, as mentioned before, the results of the statistical analysis (p value) were significant only when analysing the UK cross-border M&A and patents application relation. Therefore, a more comprehensive study with more data would be necessary. These results are a positive contribute to the international business field of studies, but also for a more country-level study of the conditions given by national economies to innovation.

In fact, future research on the characteristics of each country (e.g.: legislation, economic and corporate characteristics, financing instruments for innovation, levels of IP investment) that lead to the negative or positive correlation of cross-border M&A and innovation would be an important asset to this study.

Taking in consideration the results of Austria, which showed a null correlation between cross-border M&A and innovation, more research would be needed to get to a more conclusive outcome.

Finally, another recommendation for future research would be to explore more company-level data: characteristics of acquirer and target firms involved in cross-border M&A in the four countries during that period, investment in IP after the acquisition process, for example, could help to add new inputs to the verified results of the present study.

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