Impact of Intellectual Property Rights on Activity of Cross-Border Mergers and Acquisitions

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Abstract

We studied the impact of the IPR (intellectual property rights) protection in the target and acquirer countries on the intensity of inbound cross-border M&As (mergers and acquisitions) in the target countries on a sample of 509 216 cross-border and domestic M&As in 64 developed and developing countries over 1985–2017. Our results show that better IPR protection in the target countries has a positive impact on M&A activity for the targets from the emerging and developed markets. We also discovered an inversed U-shaped relationship between the IPR protection in target countries and cross-border M&A activity at the post-TRIPS period after the global increase in IPR protection. Our results also show that acquirers from developed countries make fewer cross-border M&A deals when IPR protection improves in their own countries. The opposite happens when IPR protection improves in the countries of the emerging acquirers, who acquire targets from developed countries. IPR protection in the emerging targets motivates developed acquirers to make more international M&A deals, while the opposite happens when developed acquirers seek to purchase targets from developed markets.

Keywords: intellectual property rights, cross-border mergers and acquisitions, gravity model, international comparison, world economy

Introduction

Economies are becoming more innovative, the importance of intellectual capital is increasing, and cross-border mergers and acquisitions (M&A) are growing increasingly more tied to intellectual property with each year. In modern economy, acquirers are usually as interested in exporting their intellectual property (technologies, patents, trademarks and others) to foreign target companies, as in importing it from target firms. Thus, when entering foreign markets, acquirers are specifically concerned about intellectual property rights (IPR) protection in target countries. Intellectual property assets can be a significant part of the target's value, they affect the acquirers' decisions and can be a driving force behind both cross-border and domestic M&A deals [1].

The issue of IPR protection is in the center of the policy and free trade agreement discussions around the world due to the complexity of its influence on national economies. While some authors state that strong IPR protection is crucial because it reduces the probability of imitation or theft and encourages companies to invest in research and innovation [2–5], others think that strong IPR protection discourages innovation and decreases economic growth [6–9].

Some aspects of the connection between IPR and M&A were covered in only two papers by Campi et al. and Alimov and Officer [1; 10]. Based on a sample of domestic and cross-border M&A deals both in developed and emerging capital markets, the authors found a positive influence of IPR protection on cross-border inbound M&A activity in target countries. Alimov and Officer also noticed that IPR protection has a higher influence on M&A activity in the industries that are more intellectual capital-intensive and where IPR are more important for production. This influence is stronger when the target country has weaker IPR protection than the acquirer country. Besides, the increase in the Patent Index of a target country is positively associated with the synergy gains of cross-border M&A [10].

Our research makes several contributions to the existing academic literature. First, we compare the impact of IPR protection on inbound M&As for developed and emerging target countries separately since IPR protection differs significantly in these markets. Second, we check for the existence of an optimal level of IPR protection in terms of inbound M&As for different target countries. Third, we find new logics of bilateral M&A flows depending on the type of target and acquirer countries. Fourth, we try to find new proxies to measure the IPR protection level. Finally, our empirical analysis covers the period until 2017, meaning that we are examining a more recent period in contrast to preceding studies.

This research is interdisciplinary and integrates macroeconomics, international trade, and corporate finance. To test the proposed hypotheses about the impact of IPR protection in the target and acquirer countries on the intensity of inbound cross-border M&As in the target countries, we used the regression analysis in form of panel data with fixed effects, built on the basis of ordinary least squares. We suggested two models and gathered a dataset of more than 500 000 M&A deals conducted in 64 countries between 1985 and 2017.

This study is organized as follows. Review of literature on the connection between IPR and M&A and Hypotheses are presented in Section 2. Methodology is proposed in Section 3. Section 4 presents the data description and summary statistics. The empirical results about the connection of IPR protection and inbound M&A in target countries are contained in Section 5. Section 6 comprises robustness checks, and conclusions are presented in Section 7.

Literature review & hypotheses

Cross-border M&A deals increasingly involve intellectual property (IP) because it is important for the acquirers to protect their IP when they buy the targets in foreign markets and export technologies, trademarks and other IP to improve the targets' performance.

The most common reason for cross-border and domestic M&A is the increase in business value, which is usually reached through synergies [11]. Several research studies note that highly valued companies tend to purchase lower valued ones due to misvaluation [12–14], and the companies from wealthier countries tend to purchase firms from poorer countries due to the lower cost of capital [11; 15]. Ahern et al. state that cross-border M&A can potentially generate greater value than domestic deals due to a larger pool of potential partners, greater growth potential, potentially more efficient distribution systems or improvement of managerial problems, which results in greater synergies. At the same time, the risks of cross-border M&A are also higher due to cultural and legal differences, political reasons and other factors [16].

The value of IP in the foreign country for the acquirer depends on how well it is protected there: the value is higher if the regulations make it hard to copy and steal IP. Besides, IPR protection has a complex impact on the economies, balancing the costs and benefits of protection, and placing it in the focus of discussions nowadays. Since the importance of IPR protection in international M&A deals is increasing, it is important to understand the impact of IPR protection on cross-border M&A activity on the emerging and developed markets.

One of the basic research studies about the effect of IPR on cross-border M&A was conducted by Alimov and Officer. The authors study a set of 50 largest countries in terms of M&A from 1985 to 2012 and find that there is an increase in cross-border inbound M&A after a country reinforces its IPR. This finding can be intuitively explained: the investors can benefit from owning intellectual property abroad only if it is protected and there is a low risk of its copying or imitation. In addition, IPR have an influence on M&A activity only in the industries that are more intellectual capital-intensive and where IPR are have a greater significance for production. Moreover, this influence is stronger when the target country has weaker IPR protection than the acquirer country, which means that investors

are more concerned with IPR protection when they buy companies from emerging countries with less developed IPR protection than in their own countries. Besides, the authors found that an increase in the Patent Index of a target country is positively associated with the synergy gains of cross-border M&A. It is explained by the fact that better protected intellectual capital of the target is more valuable for the investors from other countries [10].

Another research study of the direct connection between IRP and M&A was recently conducted by Campi et al. The authors estimate the extended gravity model to study the bilateral number of M&A for both developed and emerging countries during the post-TRIPS period of 1995–2010. They find that IPR and law enforcement have a positive influence on cross-border M&A in all sectors regardless of their technological content, but IPR is more important in high-technology sectors. In addition, the reinforcement of IPR stimulates a greater increase in M&A in emerging countries than in developed ones [1].

Same as Campi et al. and Alimov and Officer, many researchers note that it is important to consider country characteristics when investigating cross-border M&A and FDI [1; 10]. Erel et al. find that different factors can have smaller or larger impact on inbound M&A depending on the level of a country's development. More specifically, they prove that stock and currency return differences between target and acquirer countries have a bigger impact if the acquiring country is wealthier [11]. Hsu and Tiao also mention that different country characteristics may have a significant influence on inward FDI and, hence, cross-border M&A [17].

IPR protection is a part of institutional conditions in the countries, and these conditions affect the inbound cross-border M&A. Countries with civil legal origin, higher investor protection, weak enforcement of insider trading laws, less developed stock markets, better accounting standards and stronger shareholder protection are more attractive in terms of cross-border M&A [14; 18; 19]. Hostile deals and higher premiums are more common in target countries with better shareholder protection because strong protection of minority shareholders makes control more contestable, while all-stock deals are more common in acquiring countries with better shareholder protection [14]. Cross-border M&A activity worldwide is higher when the target country has a weaker legal environment [18].

Medium and high levels of foreign institutional ownership increase the intensity of cross-border M&A, and this effect is stronger in the countries in less developed markets with weak legal institutions. The reason for this is the role of foreign investors, who build bridges between target and bidder companies and reduce transaction costs, bargaining costs, and information asymmetry between them. Such investors are even more important when the market barriers are high [18].

Therefore, IPR protection is an important factor in cross-border M&A activity, and is likely to be positively related to inbound M&A, especially in emerging countries and intellectual capital-intensive industries. However, IPR protection is not the only factor that has an influence on cross-border M&A activity, and it is important to consider other factors as well.

Based on the literature review, it is possible to introduce certain hypotheses about the influence of IPR protection on inbound cross-border M&A activity in the developed and emerging countries.

Hypothesis 1: IPR protection has a positive impact on inward cross-border M&A.

Strengthening of IPR through intellectual property reforms should increase the inbound cross-border M&A because, as it is described above, the investors can benefit from owning intellectual property abroad only if it is protected and there is a low risk of its copying or imitation [1; 10]. Intellectual property rights can be measured though the Property Rights index developed by Ginarte and Park, which is the most common index used in research studies [20]. In addition, there is the International Property Rights Index developed by the Property Rights Alliance.

Hypothesis 2: IPR protection has a stronger positive impact on inbound cross-border M&A in the emerging countries than in the developed ones.

Institutional factors have a bigger impact on the intensity of cross-border M&A in the countries from less developed markets with weak legal institutions [18]. IPR are one of the institutional factors, so they are expected to have a stronger positive influence on inbound cross-border M&A [10; 18]. The emerging countries have a lower level of IPR protection, while the developed countries have high IPR protection, so the marginal increase in IPR protection has a bigger impact for emerging countries [17; 21].

Hypothesis 3: IPR protection has an optimal level for inbound cross-border M&A in the emerging and developed markets.

On the one hand, stronger IPR protection can have a positive effect on international investments because it decreases the threat of imitation by local companies and provides high returns to the R&D investments of foreign companies, which makes a host country more attractive for foreign investors [17]. On the other hand, stronger IPR protection can decrease international investments if it results in an increase in monopoly power of foreign businesses. Therefore, patent protection has a negative effect on social welfare and inbound investments when protection is excessive, and a positive effect after a certain level of IPR strength is reached. There should be an optimal level of IPR protection, which balances the costs and benefits of protection [3; 7; 19–23]. This level should be lower for emerging countries due to their smaller markets and lower technological capabilities [3; 17].

Hypothesis 4: IPR protection has a stronger positive impact on inbound cross-border M&A if the target country has weaker IPR protection than the acquirer country.

Different factors can have smaller or larger impact on inbound M&A depending on the level of countries' devel-

opment [11; 17]. Investors are more concerned with IPR protection when they buy companies from emerging countries with less developed IPR protection than in their own country [10].

Methodology

There are several models that should be used to check the proposed hypotheses about the relationship between the strength of IPR protection in the countries and the intensity of inbound cross-border M&A. The basic idea is to use the OLS panel regressions with fixed effects for countries or country-pairs and years where appropriate [4; 10; 24].

Fixed effects models remove permanent country-level characteristics, which can be correlated with cross-border M&A activity and ensure that the estimated influence of IPR protection on cross-border M&A is identified from within-country variation in intellectual property protection over time, rather than from simple cross-country correlations. Thus, fixed effects models capture the variation in shocks to IPR within the same countries and help to address the omitted variables problem [10; 11; 14; 16–18; 25; 26]. The regressions also include the institutional, economic and financial characteristics of the countries.

We use two different datasets. The first sample is for target countries with the information about the number and volume of cross-border inbound M&A to target countries. Another sample is for country-pairs, where information about M&A activity is collected for target countries from each specific acquirer country. It is done to capture the information not only about target countries, as in the first dataset, but also about acquirer countries. Mainly, it helps to check if IPR protection in an acquirer country has an impact on cross-border inbound M&A to target countries.

The dependent variable at the country level is the logarithm of one plus the total number of cross-border M&A in a target country, and at the country-pair level, it is the logarithm of one plus the total number of cross-border M&A in a target country by each specific acquirer country [10; 11]. The number of M&A deals is a better proxy of general M&A activity in the countries than deal volume, since only about one-third of the deals have a disclosed value and the value is mostly disclosed for the deals in the developed countries, which can make the results biased [1; 10].

The key independent variable of interest is the strength of patent rights protection, which is measured through the Index of Patent Strength of Ginarte and Park. This index is used by many authors to investigate the influence of IPR on innovation, FDI, M&A, trade, technology diffusion and other economic variables [2; 3; 8; 10; 17; 23; 26–28], and was developed by Ginarte and Park [20] and updated in Park [29] for more than a hundred countries since 1960.

The index is measured once every 5 years and consists of five components, which have several conditions. If these conditions are satisfied, the level of protection is high in that category. Each condition is binary, and each category

takes the value from 0 to 1. Therefore, the general index can fluctuate between 0 and 5. The five components are the following: extent of coverage (represents patentability of different inventions, or how many categories of inventions can be patented), membership in international patent agreements (shows the adoption of certain IP laws), provisions for loss of protection (refers to less than exclusive use of protection, or the probability of losing patent rights due to obligatory requirements), enforcement mechanisms (refers to mechanisms that aid in enforcing patent rights), duration of protection (shows the term of patent protection) [10; 20].

There is also the Index of Property Rights Protection, which is a part of the International Property Rights Index developed by the Property Rights Alliance since 2007. Index of Property Rights Protection includes protection of intellectual property rights, patent protection and copyright piracy components. The International Property Rights Index also includes the Legal and Political Environment Index (judicial independence, rule of law, political stability and control of corruption) and Physical Property Rights Index (protection of physical property rights, registering property and ease of access to loans). This index includes not only the property rights aspects, but also the institutional aspects, it is more common in the non-academic sphere and it is easier to get an access to it.

The Index is created with five-year intervals, so it is possible to use the three to five-year averaged values of the Index [19], or each year should be matched to the closest index [10]. For example, the Index for 2010 is used for 2012, but for 2013, it is the Index for 2015. In this research we adhere to the second method, which makes it possible to extend the research period until 2017.

The models include the country fixed effects, which absorb permanent country characteristics, so only variables that change over time should be included. Control variables should be lagged by one year to avoid endogeneity problem [10; 26]. The description of all the variables, including control variables, is available in *Appendix 1*.

The basic model for countries is an OLS panel regression with fixed effects for target countries and years. The model is as follows:

$$Log\left(1 + Cross - border\, M \& A_{tgt,t}\right) =$$
$$= +\beta_1 \times Patent\, Index_{tgt,t-1} +$$
$$+ \beta_n \times Controls\, for\, countries_{tgt,t-1} + \omega_{tgt} + \mu_t + \varepsilon_{tgt,t}, \quad (1)$$

where *tgt* stands for target countries, t stands for the year, ω_{tgt} is a country fixed-effect, μ_t is a year fixed-effect. Control variables are the following: logarithm of one plus target GDP per capita, GDP growth, market return, trade openness, financial market development and credit market development, exchange rate (to UDS), logarithm of one plus the number of domestic deals.

The basic model for country-pairs is an OLS regression with fixed effects for target and acquirer countries and years. The model is as follows:

$$Log\left(1 + Cross - border\, M\,\&\,A\,in\,country - pairs_{tgt,acq,t}\right) = \alpha + \beta_1 \times Patent\,Index_{tgt,t-1} +$$
$$+\beta_2 \times Patent\,Index_{acq,t-1} + \beta_n \times Controls\,for\,country - pairs_{tgt-acq,t-1} + \omega_{tgt} + \omega_{acq} + \mu_t + \varepsilon_{tgt,acq,t}, \quad (2)$$

where tgt stands for target countries, acq stands for acquirer countries, t stands for the year, $\omega_{tgt,acq}$ is a country fixed-effect, μ_t is a year fixed-effect. The countries should be split into four subsamples dependent on the developed or emerging economies of target and acquirer countries (this classification can be obtained from the World Bank database). In this model, control variables are different from those in the model for separate countries, and they are as follows: GDP per capita difference for target and acquirer, GDP growth difference, market return difference, financial market development difference and credit market development difference, exchange rate relationship. Additional control variables include geographical distance between target and acquirer countries, cultural distance, and dummy variables for colony relationships in the past, common law, common religion and common language.

To summarize, OLS panel regression models with fixed effects for the countries, country-pairs (where appropriate) and years should be used for the empirical check of the proposed hypotheses about the relationship between IPR protection and cross-border M&A.

Data and Summary Statistics

The sample consists of M&A from 64 developed and developing countries that are the most active in terms on M&A between 1985 and 2017 based on the dataset collected by the author of this research (the list of these countries with the number of deals is provided in *Appendix 2*). The Patent Index is measured starting in 1960, but the 1985–2017 time period was selected because a sufficient number of yearly cross-border M&A deals was reached since 1985 for a sufficient number of countries. The M&A sample was collected from Thomson Reuters Eikon database, macroeconomic and cultural data was collected from the World Banks, CEPII, CIA World Factbook, World Values Survey, and the article by Stulz and Williamson [30]. The list of M&A deals with corresponding information was collected, and subsequently transformed into a pivot table, where the information about separate M&A deals was transformed into the sum of the numbers or volume of M&A deals for each target country or country-pair in each year. For example, the list of 366 inbound M&A deals in Germany in 2000 was only turned into the number "366" in the pivot table. Then other data like Patent Index and control variables was

added to the final pivot tables (there were different pivot tables for target countries and country-pairs), which were used in regressions.

According to the approach of Alimov and Officer, Erel et al. and other authors, only international M&A deals were examined (without spinoffs, LBOs, recapitalizations, repurchases, partial equity stakes, self-tender and exchange offers, acquisitions of remaining interest, privatizations and deals with government acquirers or targets). Both private and public targets and deals with both disclosed and undisclosed value can be included because the main focus is on the aggregate M&A activity rather than individual deals [10; 11].

At the country-pair level, each country pair means a specific target country in the first place and a specific acquirer in the second place. For example, if German companies buy Chinese companies and vice versa, these are two pairs of countries: Germany-China and China-Germany. Only country pairs with 3 and more deals within the sample period remained in the dataset, as many country pairs didn't have cross-border deals with each other [10].

The final sample includes 509 216 cross-border and domestic M&A deals with total disclosed value of $41.4 trillion. Domestic deals are included in the sample because they were initially used as a control variable in the regressions and are used in robustness checks. 115 905 or 23% of the M&A deals are cross-border deals with total disclosed value of $11.9 trillion. In almost 57% of cross-border deals transaction value is not disclosed. Importantly, it happens more often when the countries participating in a deal are emerging ones. Therefore, the number of deals, rather than their value, is used as a measure of M&A activity. In cross-border M&A deals, very few targets (5%) are public firms, while there are many more public acquirers (56%). Most of the deals are diversifying (63%), where the acquirer and target companies are from different industries, and there are almost no hostile deals (less than 1%). Deal characteristics are similar for cross-border and domestic M&A, as shown in Table 1.

It is important to mention that due to the data collection method (mentioned above) and turning the list of M&A deals into the number of country-year or country-pair-year cross-border M&A deals, 115 905 cross-border M&A deals turn into 2112 country-year observations or 42 504 country-pair-year observations.

Table 1. Deal-level summary statistics (%)

Variable	Inbound c-b M&A	Domestic M&A	Total
Total number of cross-border deals	115 905	393 311	509 216
Transaction value ($ trillion)	11.9	29.5	41.4
Deal with disclosed transaction value	43	42	42

Variable	Inbound c-b M&A	Domestic M&A	Total
Acquirer is a public firm	56	45	47
Target is a public firm	5	6	6
Diversifying deal	63	60	61
Hostile deal	0.1	0.1	0.1

Figure 1. The evolution of Patent Index from 1985 to 2015
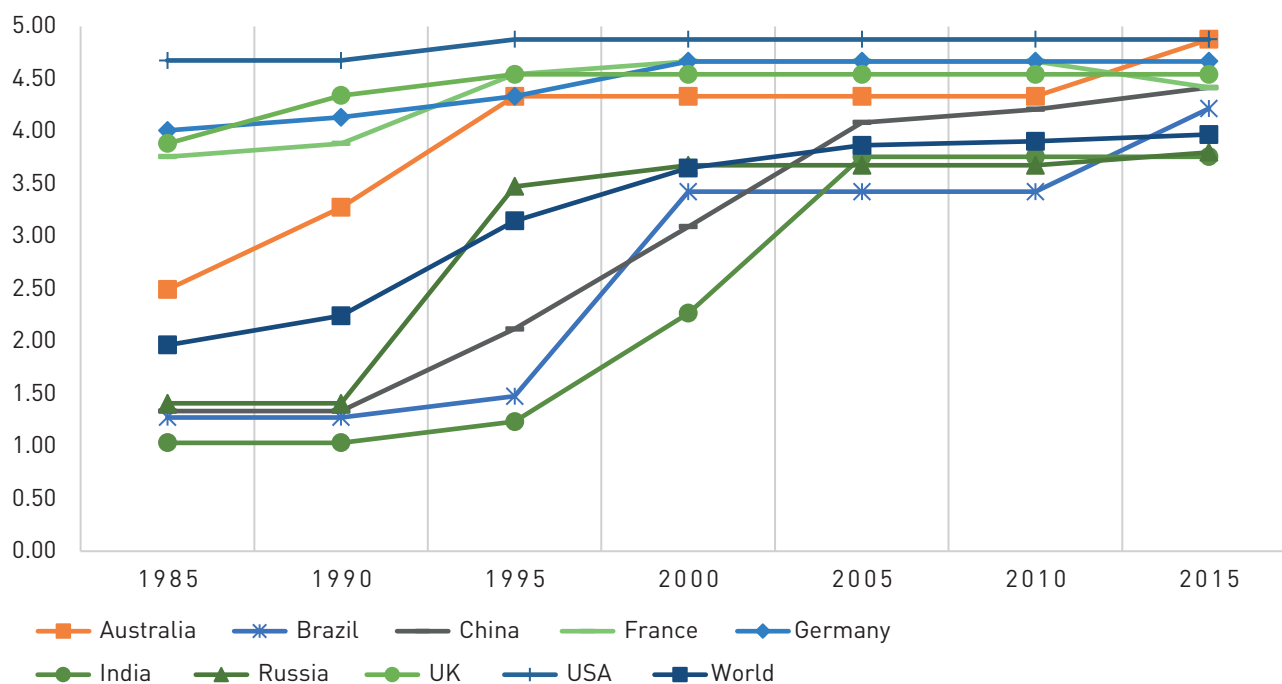
Appendix 2 represents the detailed information about the countries in the sample with information about domestic, inbound and outbound cross-border M&A deals along with the average economy size and the level of Patent Index. The information about all kinds of M&A deals is needed to see how active different countries are in terms of different types of M&A. The United States, the United Kingdom, Canada, Germany and France are the most active cross-border acquirers, and they are the most attractive destinations for cross-border M&A deals. The same countries are the most active in terms of domestic M&A along with Japan. Notably, the number of M&A deals in the United States vastly exceeds the number of deals in any of the other 63 countries. It is interesting to notice that emerging countries have the highest imbalance between inbound and outbound M&A deals compared to the total number of cross-border deals (Romania, Ukraine, Ecuador, Vietnam, Uruguay, Indonesia, Hungary, Argentina and so on).

The country with the weakest IPR protection in 2017 is Venezuela (2.44). Historically, the country with the highest Patent Index was the United States, but in 2017 it has the highest IPR protection along with Australia and Finland (4.88). In general, the Patent Index is an indicator of economic wealth, although exceptions exist. For example,

India is the 2nd poorest country in the sample with the average GDP per capita lower than $756, but India's patent strength on 2017 is in the first quartile (3.67).

Average Patent Index from 1985 to 2017 is 3.33. Over time, most of the countries have significantly improved their IPR protection, and most of the countries keep improving it. The average Patent Index increase from 1985 to 2017 is 2.01. The most significant increase happened in Colombia (from 0.96 to 4.42) and Costa Rica (from 1.16 to 4.42). However, in the recent years some developed countries, including Belgium, France, Luxembourg and New Zealand, with traditionally high IPR protection have loosened their IPR protection. In the United States and the United Kingdom, the Index has remained static and relatively high for many years.

Figure 1 documents the evolution of the Patent Index between 1985 and 2015 for several representative countries from the sample and for the world on average. The Index is determined once in 5 years for each country. It is apparent that the IPR protection is generally improving in all countries with some exceptions, which are mentioned above. It is important to note that signing the agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) in 1994 led to global diffusion

and improvement of IPR systems. After that, even developed countries increased the level of IPR protection and emerging ones adopted new systems or adapted existing systems to the minimum standards demanded by TRIPS [1].

Appendix 3a presents the detailed summary statistics for the dependent, key independent and control variables used in the regression models for the country-level. On average, there are 55 inbound cross-border deals in a country per year with total disclosed deal volume of $5.6 billion. Average Patent Index for a target country is 3.33, average GDP per capita is $17 000 and total GDP growth is 3% per year. The average trade openness (sum of imports and exports to GDP) is 76%, local stock market return is 10%, financial market development (market capitalization to GDP) is 49%, and credit market development (private loans to GDP) is 74%. Average national exchange rate scaled by 100-dollar CPI is 4.13 and the average number of domestic M&A deals is 186 deals in a country per year. The dynamics of these variables is shown in *Appendix 4*.

It is possible to see that some variables are distributed unevenly between different quartiles as they are driven by some highly developed countries. This is considered in the empirical calculations, and the results are robust to changing the country dataset, which is demonstrated further.

As to the dataset for the country-pairs, summary statistics about some variables is shown in *Appendix 3b*. The average number of deals between each country pair per year is 3 with the total disclosed deal volume of $273 million. Average Patent Index for the target country (3.58) is lower than for the acquirer country (3.90), as expected. Target countries have lower GDP, higher GDP growth, higher market return and lower financial and credit market development, according to theory. The average distance between M&A country pair is 5550 kilometers and their cultural difference (what percent of respondents state that other people can be trusted) is 24%. 6% of country pairs have a colonial relationship in their past, 27% of country pairs have common laws, 31% – the same religion, and 18% – common language.

Correlation between variables at the country-level is shown in *Appendix 5a*. There is no correlation between different variables, which is higher than 58%. Thus, no multicollinearity is expected in the models. Correlation table indicates that the number of inbound cross-border M&A deals has a positive and significant relationship with the Patent Index, which supports the proposed hypothesis about the positive influence of the Patent Index on inbound cross-border M&A in the target country. In addition, the number of deals have a positive relationship with GDP per capita, number of domestic deals, financial market and credit market development and negative relationship with GDP growth and exchange rate, which is consistent with theory. It also has a negative relationship with trade openness and market return, which is inconsistent with theory.

Correlation matrix for the country-pair level is presented in *Appendix 5b*. The maximum correlation between variables is 45%, so no multicollinearity is expected in the models. The number of inbound cross-border M&A deals is positively and significantly related to target and acquirer countries' Patent Index, which supports the proposed hypotheses. In addition, there is a positive and significant relationship between the number of inbound cross-border deals with GDP per capita difference, GDP growth difference, common religion and language. On contrary, there is a negative and significant relationship with the financial market development difference, geographical distance and cultural difference.

To conclude, summary statistics indicates that better IPR protection positively affects the number of inbound cross-border M&A deals and shows that generally, control variables affect M&A intensity according to theoretical assumptions.

Empirical Results

Empirical analysis is conducted using two kinds of models: for country level and for country-pairs. Each model is presented in several specifications, and the difference between them is described further.

Country Level Model

The model for the country level should be used to test Hypotheses 1, 2 and 3. The main estimation results are presented in Table 2.

Model (1) is the benchmark specification with control variables, which analyzes the number of inbound cross-border M&A in 64 countries of the dataset, where Patent Index is the only independent variable. The estimates indicate that intellectual property reforms, which result in an increase of the Patent Index, are positively and significantly related to the number of inbound cross-border M&A deals for the targets both in emerging and developed markets. The Patent Index coefficient for all country samples is 0.23, and it is significant at a 1% level. This means that if the patent index increases by 1 point, the number of inbound cross-border deals will increase by 23% on average, which supports the Hypothesis 1 for the emerging targets at the 1% significance level. So, *Hypothesis 1 about a positive impact of IPR protection on inbound M&A deals is not rejected at the 1% significance level*.

The results can also be expressed in a different way, by calculating predicted changes in the number of inbound cross-border M&A deals that would result if a typical sample country in the 25th percentile of the Patent Index distribution (2.65) improved its Patent Index by 59% to the level of an emerging country in the 75th percentile of the Patent Index distribution (4.22). The Patent Index coefficient from the *Model (1)* is 0.23, so the inter-quartile growth in IPR protection expressed through the Patent Index would raise the annual number of inbound M&A deals by 14%. The average number of inbound M&A deals per year is 55, which translates to a increase of 8 deals per year, an economically significant effect. The average volume of one inbound M&A deal is $103 mln, so this increase of

IPR protection brings in $824 mln every year, which is equivalent to 1% of the yearly GDP of such countries from the sample as Bulgaria, Lithuania, Kenya, Uruguay and so on. Therefore, the impact of changes in IPR protection on cross-border M&A is not only statistically significant, but also economically important.

However, by looking at the regression results and standard errors of the Patent Index coefficients, it is impossible to say that the impact of IPR protection is higher for the targets from emerging markets than for the targets from developed ones. It means that *Hypothesis 2 about a stronger positive influence of IPR protection on inbound M&A deals in emerging markets is rejected.*

Regarding control variables:

- GDP growth has a significant positive impact on inbound cross-border M&A deals: an increase in GDP growth increases the number of inbound M&A deals in a target country. This finding is consistent with theory, as faster growing markets are more attractive for cross-border M&A investors.

- The number of domestic M&A deals has a similar effect: a 1% increase in the number of domestic M&A deals increases the number of inbound cross-border deals by 28%. If the target country is active in terms of domestic M&A, it is likely that it is also an attractive target for foreign investors.

- The exchange rate has a positive impact: if the national currency of the target country depreciates, the companies become cheaper for foreign investors.

Model (2a) represents the specification that includes the squared Patent Index. In the 1985 dataset, the Patent Index is positive and significant in relation to the number of inbound M&A, however the squared Patent Index is negative and not significant. It means that there is no non-linear relationship during that period: the higher the Patent Index, the better the situation is in terms of M&A. However, academic literature cites both positive and negative consequences of very strong IPR protection.

As mentioned above, the signing of the TRIPS agreement in 1994 led to global diffusion and improvement of IPR systems. If a dataset of the post-TRIPS period between 1995 and 2017 is selected *(Model (2b),* the squared Patent Index for the emerging countries becomes negative and signifi-

cant. During this period IPR protection started reaching very high levels and some disadvantages of overly strong IPR protection began to emerge. Summary statistics supports it, since there are several countries whose Property Index has increased in the recent years. Therefore, *Hypothesis 3 about the inversed U-shape relationship between IPR protection and inbound M&A activity has not been rejected since 1995 at the 1–10% significance level.* By examining the coefficients in *Model (2b),* we can state that the optimal level of IPR protection for emerging countries is 3.4, and for developed countries is 3.6 in current specification (this difference is subsequently tested in the robustness checks), which is consistent with the theory that developed countries have a higher IPR protection level. We can also see that the IPR index rose quite high for many countries, and some developed countries with traditionally high IPR protection have loosened their IPR protection in the recent years (Belgium, France, Luxembourg and New Zealand). It supports the finding about the existence of an optimal IPR protection level .

There is an alternative proxy for IPR protection measurement – the International Property Rights Index developed by the Property Rights Alliance in 2007. This index is used instead of the Patent Index by Ginarte and Park in the empirical analysis *(Model (4),* and the results do not show a significant impact of this Index on inbound M&A. It means that the International Property Rights Index developed by the Property Rights Alliance is not a suitable measure of IPR protection in connection with M&A activity.

The Patent Index contains five components, so each component can be used instead of the Patent Index in order to understand what aspects of IPR protection have the biggest impact on cross-border M&A activity. The results are presented in Table 3 *(Model (4),* control variables are the same as in *Model (1)* and coefficients for them are omitted. Membership in international patent agreements and duration of protection have a positive impact at 1–5% significance level for inbound M&A deals for targets both from the developed and emerging markets, while other components of IPR protection are not significant. It is explained by the fact that the acquirers are concerned by the possibility that violations of acquired intellectual property in the other country may be enforceable in their home country.

Table 2. Country-level analysis of IPR protection and cross-border M&A connection. Model (1): base case regression with control variables; Model (2a): base case regression with squared Patent index from 1985; Model (2b): base case regression with squared PI from 1995; Model (3): base case with PI by Allience instead of Patent Index by Ginart and Park

Variables	Model (1): All	Model (1): Em.	Model (1): Dev.	Model (2a): All	Model (2b): All	Model (2b): Em.	Model (2b): Dev.	Model (3): All
				Log C-b Deal Num.				
Patent Index	0.225***	0.198***	0.255***	0.528***	0.707**	0.711**	0.826*	-0.002
	(0.045)	(0.058)	(0.081)	(0.111)	(0.267)	(0.333)	(0.478)	(0.017)
Patent Index Squared				−0.065	−0.104***	−0.105**	-0.115*	
				(0.023)	(0.037)	(0.047)	(0.067)	
Log GDP Per Capita	−0.557	−1.141	0.380	−0.183	−0.600	0.602	0.076	-0.773
	(0.497)	(1.755)	(0.401)	(0.493)	(0.576)	(1.927)	(0.536)	(0.881)
GDP Growth	1.008**	1.200**	−1.300	0.931*	1.687***	1.814***	-0.437	1.991***
	(0.501)	(0.544)	(1.041)	(0.493)	(0.487)	(0.557)	(1.059)	(0.633)
Trade Openess	0.105	0.029	0.092	0.077	0.063	−0.037	0.087	0.146
	(0.073)	(0.166)	(0.073)	(0.075)	(0.079)	(0.221)	(0.082)	(0.203)
Market Return	0.014	0.003	0.052	0.013	−0.073	−0.101*	0.084	-0.011
	(0.070)	(0.077)	(0.097)	(0.075)	(0.049)	(0.051)	(0.098)	(0.046)
Financial Mar. Dev.	−0.026	−0.026	−0.021	−0.009	−0.010	−0.021	-0.003	-0.039
	(0.030)	(0.160)	(0.028)	(0.033)	(0.032)	(0.118)	(0.031)	(0.037)
Credit Mar. Dev.	−0.037	−0.008	0.006	−0.019	0.054	0.087	0.109	-0.145
	(0.115)	(0.184)	(0.136)	(0.114)	(0.116)	(0.200)	(0.126)	(0.088)
Exchange Rate	0.002**	0.001	0.038*	0.001	0.004	0.004*	0.026*	-0.001
	(0.001)	(0.001)	(0.021)	(0.001)	(0.003)	(0.002)	(0.013)	(0.004)
Log Dom. Deal Number	0.282***	0.346***	0.185***	0.294***	0.205***	0.260***	0.066*	0.079
	(0.029)	(0.034)	(0.041)	(0.028)	(0.037)	(0.041)	(0.035)	(0.048)
Constant	0.127	−0.135	0.389	−0.137	0.994*	0.403	1.600*	3.504***
	(0.126)	(0.132)	(0.275)	(0.156)	(0.552)	(0.649)	(0.899)	(0.383)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2048	1056	992	2048	1472	759	713	704
R-squared	0.779	0.790	0.798	0.782	0.449	0.483	0.479	0.141

Robust standard errors in parentheses; Significance *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3. Country-level analysis of IPR protection and cross-border M&A connection. Model (4): regression with 5 PI components instead of total PI

Variables	Model (4): All	Model (4): Em. Log C-b Deal Num.	Model (4): Dev.
PI Durat. of Protection	0.669***	0.612**	1.017***
	(0.193)	(0.243)	(0.320)
PI Enforcement Mech.	0.025	−0.132	0.054
	(0.093)	(0.141)	(0.094)
PI Loss of Protection	−0.321	0.026	−0.650
	(0.218)	(0.313)	(0.205)
PI Memb. in Agreements	0.606***	0.616**	0.621**
	(0.190)	(0.259)	(0.283)
PI Extend of Cover.	0.165	−0.016	0.297
	(0.231)	(0.281)	(0.259)
Year FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Observations	2048	1056	992
R-squared	0.787	0.796	0.817

Robust standard errors in parentheses; Significance *** p<0.01, ** p<0.05, * p<0.1.

To sum up, IPR protection has a positive impact on the number of inbound cross-border M&A deals for the targets from the emerging and developed markets. There is an inverse U-shaped relationship between IPR protection and the amount of cross-border M&A deals in the post-TRIPS period, when IPR protection improved significantly worldwide, and countries started dealing with the benefits from IPR protection, as well as its drawbacks. The optimal level of IPR protection for the emerging countries is lower than for the developed ones. Among the Patent Index components, membership in international patent agreements and duration of protection are the only IPR index components that have a positive impact on cross-border M&A activity. There was an attempt to find another proxy for IPR protection, such as the Index of the International Property Rights Index developed by the Property Rights Alliance, but so far, the Patent Index by Ginarte and Park is the best proxy to measure IPR protection level.

Country-Pair Level Model

The model for country pairs should be used to test Hypothesis 4. The main estimation results are presented in Table 4. The model is used for four combinations of the countries: emerging targets and developed acquirers; emerging targets and emerging acquirers; developed targets and developed acquirers; developed targets and emerging acquirers.

The results indicate that developed acquirers are 5.4% more likely to buy emerging targets with 1-point improved IPR protection, which proves the findings by Alimov and Of-

ficer: acquirers care about IPR protection more when they enter less developed markets because they are concerned about technology and idea imitations in the less protected emerging markets [10]. It means that *Hypothesis 4 about a stronger positive impact of IPR protection on inbound M&A activity if the target country has weaker IPR protection than the acquirer country, is not rejected at the 1% significance level.*

The same happens when IPR protection improves in the emerging acquirers' markets. Emerging acquirers with 1-point higher IPR index are 8.5% more interested in acquisition of targets from the developed markets. It probably happens because the investors from the emerging acquirer countries get used to new standards after IPR protection improvement and they feel ready to enter new developed markets, where IPR protection is likely to be stronger.

On the contrary, when developed acquirers consider buying targets, acquirers' IPR protection improvement by 1 point decreases the number of purchased emerging targets by 5.4% and that of developed targets – by 6.1%. It can be explained by the fact that acquirers are more interested in staying at their own markets with improved IPR protection rather than going to other markets without IPR improvements.

Besides, a 1-point IPR improvement in the developed targets discourages developed acquirers from cross-border M&A by 5.8% because IPR protection is already quite high in the developed markets and it does not bring any benefits if it increases more.

Regarding the control variables:

- If GDP growth in an emerging target country becomes higher than in a developed acquirer country, the number of cross-border M&A deals increases: the investors are attracted to the faster growing markets.

- If the market return in a target country becomes lower than in the acquirer country, it will lead to less cross-border M&A deals.

- If the financial market development in a target country is weaker than in the acquirer country, it discourages investors from cross-border M&A deals.

- If the local currency in a target country becomes cheaper in relation to the currency of an acquirer country, it stimulates foreign investors because they can afford to buy more for the same amount of their local currency.

- According to the gravity model, countries trade with and invest in each other less if they are far from each other; this is supported by the strongly significant and positive coefficients of distance.

- Cultural difference has an effect similar to geographical distance.

- If a country pair had a colonial relationship in the past, it increases the number of annual M&A deals between them because the countries have strong historical bonds and some common characteristics.

- Common law increases M&A activity in a target couple since it is clear to investors what laws are implemented in a target country.

- Common religion increases M&A activity since countries are mentally close to each other.

- Finally, common language increases M&A activity since it is easier for companies to negotiate if they speak the same language.

To sum up, better IPR protection in the target countries has a positive impact on cross-border M&A activity and the optimal level of IPR protection in the post-TRIPS period is higher for developed targets than for emerging ones. Developed acquirers buy more emerging targets with higher IPR protection and emerging acquirers with higher IPR protection buy more developed targets. On the opposite, IPR protection for developed acquirers discourages them from cross-border M&A activity, the same happens when IPR protection improves in developed targets.

All the specifications in the above-mentioned models pass the tests for multicollinearity (checked by the Variance Inflation Factor). Some control variables, which were initially included in the models, are excluded as a result of these tests, for example, rule of law or control of corruption. However, even with multicollinearity, the results do not suffer much because all the significant variables retain their significance and about the same coefficients.

Heteroscedasticity is not expected in this kind of panel data models, but all the specifications are controlled for the heteroscedasticity and robust residuals are used.

The use of patent reforms in Ginarte and Park IPR index helps us to address endogeneity and omitted variable problems to the extent the reforms are adopted at the country level and are not endogenously influenced by any individual acquiring or target firm in the sample [10].

Table 4. Country-pair level analysis of IPR protection and cross-border M&A connection. Model (6): base case model for country pairs

Variables	Model (5): Em.tgt-Em.acq	Model (5): Dev. tgt-Dev.acq	Model (5): Dev. tgt-Em.acq	Model (5): Em.tgt-Dev.acq
	Log Bil. Deal Num.			
Patent Index Target	0.024	−0.058***	−0.037	0.054***
	(0.018)	(0.018)	(0.028)	(0.016)
Patent Index Acquirer	−0.010	−0.061***	0.085***	−0.054**
	(0.018)	(0.018)	(0.024)	(0.023)
GDP Per Capita Dif.	−0.001	−0.001	−0.002	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
GDP Growth Dif.	−0.037	−0.310	−0.404	0.356***
	(0.111)	(0.177)	(0.179)	(0.119)
Market Return Dif.	−0.011	−0.056***	−0.018	−0.056***
	(0.016)	(0.021)	(0.016)	(0.014)

Variables	Model (5): Em.tgt-Em.acq	Model (5): Dev. tgt-Dev.acq	Model (5): Dev. tgt-Em.acq	Model (5): Em.tgt-Dev.acq
		Log Bil. Deal Num.		
Financial Mar. Dev. Dif.	−0.060**	−0.017***	0.001	−0.019
	(0.028)	(0.005)	(0.024)	(0.019)
Credit Mar. Dev. Dif.	0.042	0.001	0.007	−0.028
	(0.027)	(0.016)	(0.037)	(0.033)
Exchange Rate Dif.	0.018	0.198***	0.198***	0.375
	(0.048)	(0.007)	(0.015)	(0.721)
Distance	−0.020**	−0.078***	−0.081***	−0.074***
	(0.008)	(0.006)	(0.014)	(0.006)
Cultural Difference	−0.102	−0.273***	−0.816***	−0.274*
	(0.146)	(0.092)	(0.180)	(0.153)
Colonial Relationships	0.408***	0.125	0.270***	0.205***
	(0.158)	(0.098)	(0.105)	(0.075)
Common Law	0.076*	0.405***	0.012	0.032
	(0.045)	(0.051)	(0.063)	(0.038)
Common Religion	0.109**	0.078*	−0.020	0.055
	(0.053)	(0.041)	(0.077)	(0.042)
Common Language	0.089**	0.269***	0.571***	0.419***
	(0.044)	(0.065)	(0.121)	(0.094)
Constant	−0.0238	−1.098***	−0.286*	0.196
	(0.156)	(0.202)	(0.161)	(0.185)
Year FE	Yes	Yes	Yes	Yes
Target country FE	Yes	Yes	Yes	Yes
Acq. country FE	Yes	Yes	Yes	Yes
Country-pair FE	No	No	No	No
Observations	4864	17 600	5536	13 216
R-squared	0.6166	0.8211	0.7918	0.7487

Robust standard errors in parentheses; Significance *** p<0.01, ** p<0.05, * p<0.1.

Robustness checks

- For country-level models there are several ways to check the robustness of the influence of IPR protection on inbound cross-border M&A activity (Table 5, control variables coefficients are omitted):

- Summary statistics shows that the USA, Germany and the UK are the most active countries in terms of M&A, and the results can be driven by them, so the observations from these countries can be omitted *(Model (1R) and (1R-U)* [10; 16].

- M&A activity can be measured in terms of volume, rather than the number of deals *(Model (2R) and (2R-U)* [10; 11; 16; 18].

- The cross-border merger ratio can be used as a dependent variable instead of simple cross-border M&A, which is measured as the total number of cross-border M&A in a target country scaled by the sum of the domestic and cross-border deals at the country, country-pair and industry level [10; 11; 18]. In this case, the Tobit model should be used because the dependent variable is limited to the range between zero and one *(Model (3R) and (3R-U)*.

Table 5. Country-level analysis of IPR protection and cross-border M&A connection. Model (1R), (1R-U): base case regression without the three biggest countries; Model (2R), (2R-U): base case regression without deal volume; Model (3R), (3R-U): base case regression with cross-border merger ratio

Variables	Model (1R): Em.	Model (1R): Dev.	Model (2R): Em.	Model (2R): Dev.	Model (3R): Em.	Model (3R): Dev.
Patent Index	0.198***	0.245**	0.406*	0.622**	0.838*	5.311***
	(0.058)	(0.093)	(0.212)	(0.227)	(2.175)	(1.358)
Patent Index Squared						
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1056	896	1056	992	1056	992
R-squared	0.790	0.795	0.563	0.619		
	Model (1R-U): Em.	Model (1R-U): Dev.	Model (2R-U): Em.	Model (2R-U): Dev.	Model (3R-U): Em.	Model (3R-U): Dev.
Patent Index	0.711**	0.694*	2.331**	1.925**	16.58*	47.87***
	(0.333)	(0.431)	(1.099)	(0.863)	(10.36)	(12.18)
Patent Index Squared	−0.105**	−0.099*	−0.370**	−0.176*	−2.700*	−6.058***
	(0.047)	(0.062)	(0.166)	(0.134)	(1.741)	(1.665)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	759	644	759	713	759	713
R-squared	0.483	0.486	0.238	0.316		

Robust standard errors in parentheses; Significance *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 6. Country-pair level analysis of IPR protection and cross-border M&A connection. Model (4R): base case model for country pairs without the three biggest countries; Model (5R): base case regression without deal volume; Model (6R): base case regression with FE for country couples

Variables	Model (4R): Em.tgt-Em.acq	Model (4R): Dev.tgt-Dev.acq	Model (4R): Dev.tgt-Em.acq	Model (4R): Em.tgt-Dev.acq
		Log Bil. Deal Num.		
Patent Index Target	0.024	−0.021*	0.003	0.037**
	(0.018)	(0.016)	(0.025)	(0.016)
Patent Index Acquirer	−0.010	−0,000*	0.064**	−0.011*
	(0.018)	(0.019)	(0.025)	(0.020)
Year FE	Yes	Yes	Yes	Yes
Target country FE	Yes	Yes	Yes	Yes
Acq. country FE	Yes	Yes	Yes	Yes
Country-pair FE	No	No	No	No
Observations	4864	12 544	4480	10 496
R-squared	0.617	0.747	0.714	0.681
	Model (5R): Em.tgt-Em.acq	Model (5R): Dev.tgt-Dev.acq	Model (5R): Dev.tgt-Em.acq	Model (5R): Em.tgt-Dev.acq
Patent Index Target	0.020	−0.208***	−0.042	0.046*
	(0.051)	(0.042)	(0.077)	(0.041)
Patent Index Acquirer	−0.002	−0.197***	0.231***	−0.054*
	(0.048)	(0.053)	(0.058)	(0.054)
Year FE	Yes	Yes	Yes	Yes
Target country FE	Yes	Yes	Yes	Yes
Acq. country FE	Yes	Yes	Yes	Yes
Country-pair FE	No	No	No	No
Observations	4864	17 600	5536	13 216
R-squared	0.505	0.820	0.778	0.719
	Model (6R): Em.tgt-Em.acq	Model (6R): Dev.tgt-Dev.acq	Model (6R): Dev.tgt-Em.acq	Model (6R): Em.tgt-Dev.acq
Patent Index Target	0.024	−0.058***	−0.037	0.054***
	(0.018)	(0.018)	(0.028)	(0.016)
Patent Index Acquirer	−0.010	−0.061***	0.085***	−0.054**
	0.024	−0.058***	−0.037	0.054***
Year FE	Yes	Yes	Yes	Yes
Target country FE	No	No	No	No
Acq. country FE	No	No	No	No
Country-pair FE	Yes	Yes	Yes	Yes
Observations	4864	17 600	5536	13 216
R-squared	0.189	0.277	0.233	0.241

Robust standard errors in parentheses; Significance *** p<0.01, ** p<0.05, * p<0.1.

For the country-pair models (Table 6):

- As above, the three most active countries in terms of M&A as targets and acquirers can be excluded (*Model (4R)*).

- Again, M&A activity can be measured in terms of deal volume instead of number of deals *(Model 5R)* [10; 11; 14; 16; 18].

- Instead of using separate FE for target and acquirer countries, FE for country-pairs can be used (*Model 6R*).

Many robustness check methods are implemented for both country level and country-pair level models. Generally, the conclusions from the empirical analysis are confirmed.

Conclusion

Intellectual property Rights protection has a serious impact on international investment decisions. The right choice of IPR protection level is an effective tool, which can significantly influence the countries' economies and stimulate the technology and knowledge transfer to developing countries through cross-border inbound M&A. It can result in the economic development of poor countries and help to partly solve one of the most serious issues in global economy of all times – the global inequality between countries.

The previous studies found the positive influence of IPR protection on cross-border inbound M&A activity in target countries. IPR protection has a higher influence on M&A activity in the industries, which are more intellectual capital-intensive and where IPR are more vital in production. This influence is stronger when the target country has weaker IPR protection than the acquirer country. Besides, the increase in the Patent Index of a target country is positively associated with synergy gains of cross-border M&A [1; 10].

This is one of the first research studies about the impact of IPR protection on international M&A activity, which is analyzed in detail for developed and emerging countries in the updated period until 2017 for the existence of positive and inversed U-shaped relationship.

Using the set of cross-border M&A in 64 developed and emerging countries from 1985 to 2017 it was discovered that better IPR protection in a target country attracts international M&A activity for the targets from emerging and developed markets. Besides, there is an optimal level of IPR protection in the target countries, which balances the costs and the benefits of IPR protection during the post-TRIPS period, and it is lower for emerging markets. Developed acquirers are more likely to buy emerging targets with higher IPR protection, and emerging acquirers with higher IPR protection are more likely to buy developed targets. Besides, cross-border M&A activity decreases for developed acquirers with improved IPR protection, and when developed acquirers buy developed targets with improved IPR protection. Besides, the Patent Index developed by Ginarte and Park is the best proxy for the IPR protection level so far.

There is a high potential for future research. First of all, the impact of IPR protection on M&A can be determined depending on the industry: IPR protection is expected to be more important in the technology-intensive and high-tech industries where the value of R&D is higher, and in the sectors with long life-cycles, where it is easier to steal a technology before it becomes obsolete. Secondly, the relationship between IPR and M&A should be determined in relation to different characteristics of target and acquirer companies, such as their age, size, assets, life cycle stage and others. Thirdly, the relationship between IPR and merger gains should be determined: it is expected that synergy gains in cross-border M&As are positively related to reforms of intellectual property rights. Fourth, the probability of cross-border M&A can be researched depending on IPR protection and other new factors, which were not commonly used before, for instance, the number of international trade agreements. Finally, since the membership in international patent agreements is the most significant component of the Patent Index, deeper research of impact on cross-border M&A seems promising.

Appendix 1

Control variables for country and country-pair level.

Variable	Sign	Description	Source
Log C-b Deal Number/ Volume	/	The logarithm of one plus the total number/volume of inbound cross-border M&A deals in a target country	Thomson Reuters
Log C-b Deals Number/Volume in pair	/	The logarithm of one plus the total number/volume of inbound cross-border M&A deals in a target country by an acquirer country	Thomson Reuters
C-b Deal Number/ Volume	/	The total number/volume of inbound cross-border M&A deals in a target country	Thomson Reuters
C-b Deals Number/Volume in pair	/	The total number/volume of inbound cross-border M&A deals in a target country by an acquirer country	Thomson Reuters
C-b Deal Number Share	/	The share of inbound cross-border M&A deals in a target country of the sum of these deals and domestic M&A deals	Thomson Reuters
Patent Index	+	PR index, which is obtained by the summation of extent of coverage, membership in international treaties, duration of protection, absence of restrictions on rights, and statutory enforcement provisions. Range: 0 to 5	Ginarte and Park, 1997; Park, 2008; e-mail from Park
IPR Index by Alliance	+	International Property Rights Index developed by the Property Rights Alliance	Property Rights Alliance
GDP per Capita	+	Logarithm of the real GDP per capita ($ mln)	World Bank
GDP growth	+	Average annual real growth rate of GDP (decimals)	World Bank
Trade Openness	+	Ratio of imports and exports to the real GDP (decimals)	World Bank
Market Return	–	Local stock market return (decimals)	World Bank
Financial Mar. Dev.	+	Total stock market capitalization divided by GDP (decimals)	World Bank
Credit Mar. Dev.	+	Total amount of private loans divided by GDP (decimals)	World Bank
Exchange Rate	+	National exchange rate scaled by dollar CPI (per $100)	World Bank
Log Dom. Deal Number/ Volume	+	The logarithm of one plus the total number/volume of domestic deals in a target country	Thomson Reuters
Dom. Deal Number/Volume	+	The total number/volume of domestic deals in a target country	Thomson Reuters
Dom. Deal Number Share	+	The share of domestic M&A deals in a target country of the sum of these deals and inbound cross-border M&A deals	Thomson Reuters
GDP per Capita Dif.	+	Average difference (AD) in the annual GDP per capita between target and acquirer countries ($ mln)	World Bank
GDP Growth Dif.	+	AD in the annual real GDP growth rate between target and acquirer countries (decimals)	World Bank

Variable	Sign	Description	Source
Market Rreturn Dif.	+	AD in the local stock market return between target and acquirer countries (decimals)	World Bank
Financial Mar. Dev. Dif.	+	AD in the total stock market capitalization divided by GDP between target and acquirer countries (decimals)	World Bank
Credit Mar. Dev. Dif.	+	AD in the total amount of private loans divided by GDP between target and acquirer countries (decimals)	World Bank
Exchange Rate Dif.	+	Average exchange rate of currency of target country per currency of acquirer country (per $100)	World Bank
Geographic Distance	–	The great circle distance between the capital cities of the countries, calculated with the usage of their latitudes and longitudes (k. km.)	CEPII
Cultural Difference	–	Difference in the citizens' answer to the question if most people can be trusted (decimals)	World Values Survey
Colonial relationships	+	Dummy variable, which is 1 if countries had a colonial relationship	CEPII
Variable	Sign	Description	Source
Common Law	+	Dummy variable, which is 1 if countries share the same legal origin	La Porta et al., 1998
Common Religion	+	Dummy variable, which is 1 if countries share the same religion, and 0 otherwise	CIA World Factbook; Stulz&Williamson, 2003
Common Language	+	Dummy variable, which is 1 if countries share the same primary language, and 0 otherwise	CEPII

Appendix 2

Country-level Patent Index and M&A activity from 1985 to 2017

Country	PI: 1985	PI: 2017	PI: average	# inbound c-b M&A	# outbound M&A	# domestic M&A	Av. GDP per capita (USD)	Dev./ Emer.
Argentina	1.54	4.02	2.95	993	165	841	7547	Emer.
Australia	2.49	4.88	4.09	4190	3126	13 785	32 007	Dev.
Austria	3.43	4.54	4.17	1116	1521	1108	33 010	Dev.
Belgium	4.09	4.22	4.48	2076	1905	1606	30 930	Dev.
Brazil	1.28	4.22	2.73	1964	359	3521	5767	Emer.
Bulgaria	0.00	4.42	3.11	368	65	346	3853	Emer.
Canada	3.16	4.42	4.18	6770	8829	18 197	30 942	Dev.
Chile	2.01	4.42	3.85	655	205	598	7355	Emer.
China	1.33	4.42	3.04	3264	1580	11 356	2522	Emer.
Colombia	0.96	4.42	2.83	489	184	345	3505	Emer.
Costa Rica	1.16	4.42	2.56	135	26	47	5273	Emer.
Cyprus	2.58	3.48	3.15	241	836	134	18 832	Dev.
Czech Republic	0.00	4.42	2.92	1002	240	1017	10 263	Dev.
Denmark	3.63	4.54	4.40	1947	1709	2497	40 466	Dev.
Ecuador	1.16	4.22	2.88	125	16	39	3105	Emer.
Egypt	1.41	4.02	2.37	203	57	176	1579	Emer.
Finland	3.31	4.88	4.31	1492	1655	3636	32 875	Dev.
France	3.76	4.42	4.41	6410	6546	15 823	29 400	Dev.
Germany	4.01	4.67	4.48	9137	6756	15 112	31 383	Dev.
Greece	2.33	3.88	3.79	231	272	626	16 427	Dev.
Hong Kong	2.70	4.02	3.43	1830	2783	2965	25 754	Dev.
Hungary	0.00	4.42	3.48	650	107	608	7468	Emer.
Iceland	1.67	3.42	2.98	38	199	84	37 478	Dev.
India	1.03	3.76	2.49	1351	1343	3569	756	Emer.
Indonesia	0.20	2.77	1.92	702	114	752	1591	Emer.
Ireland	2.03	4.33	3.92	1298	1826	1055	34 583	Dev.
Israel	2.78	3.96	3.52	622	641	467	21 824	Dev.
Italy	3.68	4.33	4.33	3391	1832	5995	25 856	Dev.
Japan	3.43	4.67	4.40	882	2773	17 596	34 607	Dev.
Kenya	1.58	3.22	2.72	84	37	51	649	Emer.
Lithuania	0.00	3.88	2.81	255	96	236	6418	Emer.
Luxembourg	2.57	3.76	3.68	414	1144	101	67 001	Dev.
Malaysia	1.92	3.23	2.93	805	1098	6167	5568	Emer.
Malta	1.40	3.23	2.64	61	70	25	13 937	Dev.

Country	PI: 1985	PI: 2017	PI: average	# inbound c-b M&A	# outbound M&A	# domestic M&A	Av. GDP per capita (USD)	Dev./ Emer.
Mauritius	1.73	2.57	2.17	70	110	19	5186	Emer.
Mexico	1.02	3.75	2.80	1305	414	907	6472	Emer.
Morocco	1.58	3.75	2.70	99	33	86	1883	Emer.
Netherlands	3.77	4.67	4.50	3753	4720	4642	34 110	Dev.
New Zealand	2.37	3.55	3.34	1228	500	1842	23 215	Dev.
Nigeria	2.37	2.89	2.70	83	27	136	985	Emer.
Norway	2.98	4.29	3.90	1746	1596	2834	53 701	Dev.
Panama	1.34	3.75	2.64	150	93	58	5945	Emer.
Peru	0.59	3.63	2.52	432	82	385	3050	Emer.
Philippines	2.36	3.88	3.28	272	124	629	1424	Emer.
Poland	0.00	4.00	3.05	1310	286	1819	6669	Emer.
Portugal	1.67	4.08	3.44	676	290	823	14 543	Dev.
Romania	0.00	4.00	3.07	619	37	294	4388	Emer.
Russia	1.41	3.80	3.11	1561	675	8189	5594	Emer.
Saudi Arabia	1.33	2.77	2.09	106	130	112	12 655	Emer.
Singapore	1.71	4.21	3.57	1368	2218	2094	29 676	Dev.
Slovakia	1.21	3.88	3.00	262	66	118	8887	Dev.
South Africa	2.90	3.88	3.52	907	646	2239	4408	Emer.
South Korea	2.49	3.93	3.91	601	587	3278	14 920	Dev.
Spain	2.64	4.33	3.94	3518	1854	7216	20 237	Dev.
Sweden	3.48	4.54	4.33	3111	4068	6077	37 976	Dev.
Switzerland	3.66	4.54	4.16	2298	3574	3186	52 858	Dev.
Thailand	1.21	3.23	2.35	389	189	846	3146	Emer.
Turkey	1.20	3.88	3.08	700	153	871	5986	Emer.
Ukraine	0.00	3.88	3.05	598	65	437	1762	Emer.
United Kingdom	3.88	4.54	4.45	13 404	14 239	38 878	30 575	Dev.
United States	4.68	4.88	4.83	19 207	28 079	173 634	37 768	Dev.
Uruguay	1.67	3.23	2.63	149	23	34	7582	Emer.
Venezuela	0.92	2.44	2.32	157	45	179	5288	Emer.

Appendix 3a

Summary statistics for the variables used in the country-level models

Variable	N	Mean	SD	P25	P50	P75
Deal Number	2112	55	109	3	17	55
Deal Volume ($ mln)	2112	5628	22 354	15	462	2979
Patent Index	2112	3.33	1.13	2.65	3.68	4.22
GDP Per Capita	2112	0.17	0.19	0.03	0.10	0.25
GDP Growth	2112	0.03	0.04	0.01	0.03	0.05
Trade Openess	2112	0.76	0.67	0.41	0.60	0.90
Market Return	2112	0.10	0.33	0.00	0.00	0.19
Financial Mar. Dev.	2112	0.49	0.96	0.00	0.25	0.66
Credit Mar. Dev.	2112	0.74	0.69	0.19	0.57	1.16
Exchange Rate	2112	4.13	21.16	0.01	0.04	0.31
Domestic Deals	2112	186	720	2	17	85

Appendix 3b

Summary statistics for the variables used in the country-pair models

Variable	N	Mean	SD	P25	P50	P75
Deal Number	42 504	3	12	0	0	2
Deal Volume ($ mln)	42 504	273	2551	0	0	4
Patent Index Target	42 504	3.58	1.20	3.00	4.00	4.00
Patent Index Acquirer	42 504	3.90	1.08	4.00	4.00	5.00
GDP Per Capita Dif.	42 504	−0.01	0.02	−0.02	0.00	0.01
GDP Growth Dif.	42 504	0.00	0.05	−0.02	0.00	0.03
Market Return Dif.	42 504	0.02	0.30	−0.05	0.00	0.07
Financial Mar. Dev. Dif.	42 504	−0.16	1.51	−0.64	−0.14	0.28
Credit Mar. Dev. Dif.	42 504	−0.15	0.68	−0.45	0.00	0.00
Exchange Rate Dif.	42 504	1.79	39.63	0.00	0.00	0.03
Distance	42 504	5.55	4.69	1.00	4.00	9.00
Culturl Difference	42 504	0.24	0.17	0.09	0.21	0.35
Colonial Relationships	42 504	0.06	0.25	0.00	0.00	0.00
Common Law	42 504	0.27	0.44	0.00	0.00	1.00
Common Religion	42 504	0.31	0.46	0.00	0.00	1.00
Common Language	42 504	0.18	0.39	0.00	0.00	0.00

Appendix 4

Dynamics of the model variables.
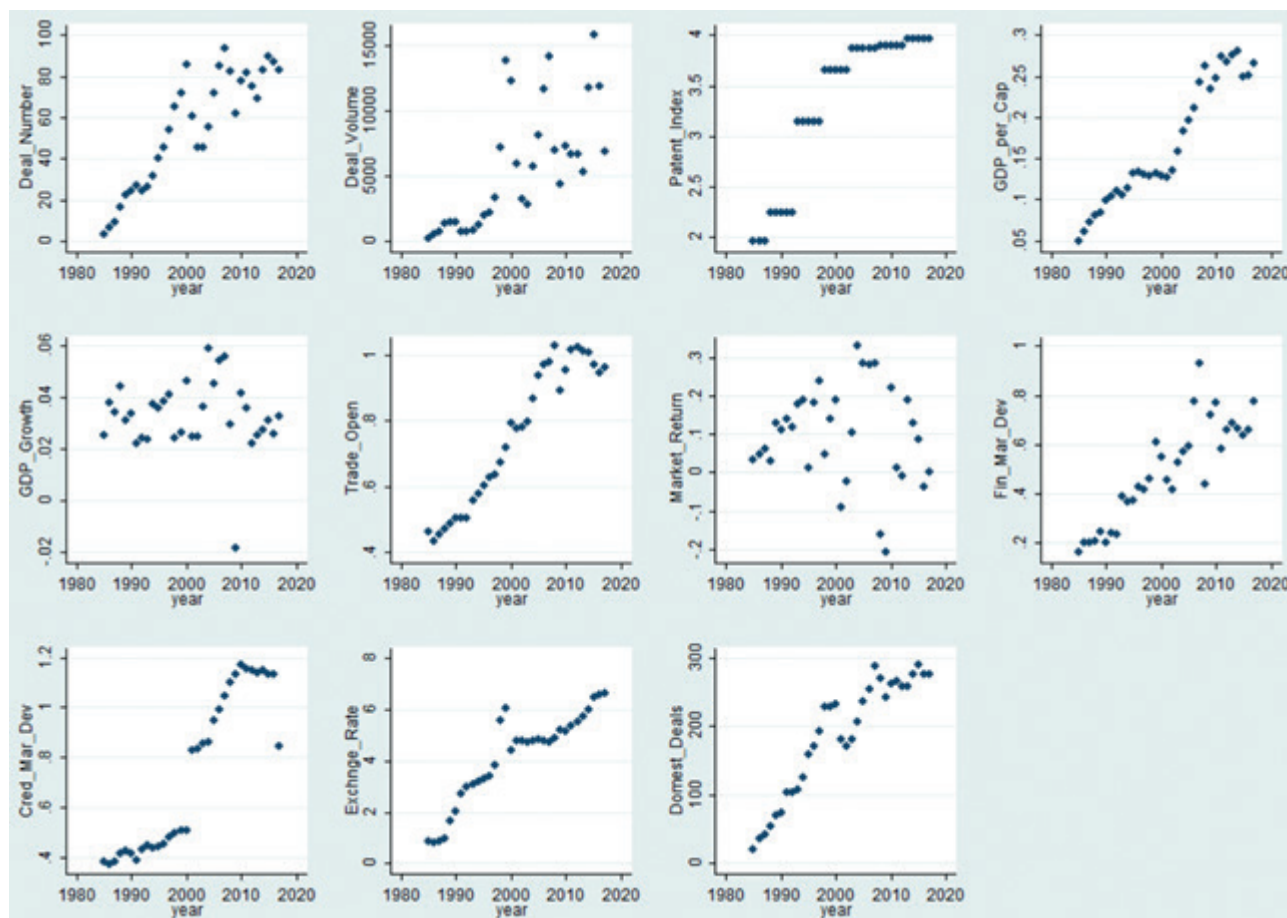
Appendix 5a

Correlation matrix for country-level models

Variable	Deal Number	Patent Index	GDP Per Cap.	GDP Gr.	Trade Open.	Mark. Ret.	Fin. Dev.	Cred. Dev.	Exch. Rate
Deal Number	1								
Patent Index	0.4424*	1							
GDP Per Cap.	0.4063*	0.5755*	1						
GDP Growth	−0.0653*	−0.0733*	−0.1442*	1					
Trade Openess	−0.0594*	0.1697*	0.2852*	0.1134*	1				
Market Return	−0,029	−0.0580*	−0.0862*	0.2555*	−0.0554*	1			
Fin. Mar. Dev.	0.1942*	0.2574*	0.2962*	0.0517*	0.4714*	−0.003	1		
Cred. Mar. Dev.	0.3384*	0.4035*	0.5145*	−0.0976*	0.2195*	−0.1096*	0.3146*	1	
Exchange Rate	−0.0665*	−0.0671*	−0.1421*	0.0994*	0,036	0,0043	−0.0584*	−0.0327	1
Dom. Deals	0.5185*	0.2779*	0.2528*	−0,0424	−0.1028*	−0,017	0.1378*	0.3109*	−0.0434*

Appendix 5b

Correlation matrix for country-pair models

Variable	Deal Numb.	PI Tgt.	PI Acq.	DGP Cap. Dif.	GDP Gr. Dif.	Mar. Ret. Dif.	Fin. Mar. Dif.	Cred. Mar. Dif.	Exch. Dif.	Distance	Cult. Dif.	Colony	Com. Law	Com. Rel.
Deal Numb.	1													
PI Tgt.	0.1644*	1												
PI Acq.	0.1526*	0.3122*	1											
GP Cap. Dif.	0.0100*	0.2048*	−0.3195*	1										
GDP Gr. Dif.	0.0146*	−0.0224*	0.1675*	−0.2255*	1									
Mar. Ret. Dif.	−0.0080	−0.0754*	0.0657*	−0.1235*	0.1772*	1								
Fin. Mar. Dif.	−0.0146*	0.0648*	−0.0580*	0.1795*	0.0341*	−0.0335*	1							
Cred. Mar. Dif.	−0.0075	0.1208*	−0.2324*	0.4506*	−0.2279*	−0.1367*	0.1874*	1						
Exch. Dif.	−0.0063	−0.0283*	−0.0198*	−0.0196*	0.0097*	0.0038	−0.0144*	−0.0261*	1					
Distance	−0.0535*	−0.0345*	0.0430*	−0.0366*	0.0203*	0.0271*	−0.0162*	−0.0726*	0.0181*	1				
Cult. Dif.	−0.0591*	0.0922*	0.1036*	−0.0244*	0.0170*	−0.0100*	0.0035	0.0131*	−0.0230*	-0.0328*	1			
Colony	0.1201	0.0263*	0.0093	0.0398*	0.0159*	0.0012	0.0142*	0.0184*	−0.0085	0.0274*	-0.1150*	1		
Com. Law	0.1028	−0.0170*	−0.0591*	0.0390*	0.0159*	−0.006	0.0243*	0.0342*	0.0008	0.0110*	-0.1298*	0.2106*	1	
Com. Rel.	0.0499*	0.0021	−0.0212*	0.0134*	0.0229*	−0.002	0.0127*	0.0316*	0.0058	−0.1321*	-0.0819*	0.0475	0.2255*	1
Com. Lang.	0.1419*	−0,0029	−0.0892*	0.0868*	0.0095*	−0.0201*	0.0322*	0.0632*	−0.0133*	0.0674*	-0.1005*	0.2946*	0.4524	0.1892*

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