Symmetric and asymmetric effects of proximities. The case of M&A deals in Italy

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Abstract (max. 100)
This paper investigates the effect of geographical, industrial, organizational and institutional proximity on the probability that any two firms located in Italy engage in a M&A deal. Within a logistic rare event framework, we investigate 4,261 actual deals completed over the period 2000-2011 and around 3.8 million potential deals. We find robust evidence that all forms of proximity have a positive effect, especially industrial relatedness. Moreover, we find evidence that proximities generate asymmetric effects on M&A deals, depending on the location of bidders and targets and on whether some specific individual characteristics are featured by the acquirer or by the target firm.

Keywords: M&A, geographical proximity, industrial relatedness, rare events models, asymmetry

JEL: G34, R12, C21

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1. Introduction

Economic interactions are likely to be influenced by geographical proximity. The proximity literature (Rallet and Torre, 1999; Boschma, 2005; Knoben and Oerlemans, 2006; Boschma and Frenken, 2010; Balland et al., 2013a) remarked that other dimensions of similarity among economic agents (like cognitive, industrial, institutional and organizational dimensions), in addition to geographical proximity, can also play a role in shaping their relationships. A vast number of studies have investigated how the different proximities among agents affect different types of economic relationships, like research collaborations (e.g. Singh, 2005; Autant-Bernard et al., 2007; Ponds et al., 2007; Broekel and Boschma, 2012; Usai et al., 2013), regional knowledge spillovers (Basile et al., 2012; Paci et al., 2014), co-inventor networks (Cassi and Plunket, 2013; Ter Wal, 2014), trade and FDI flows (Lankhuizen et al., 2011) and temporary innovative projects (Balland et al., 2013b).

This paper investigates the effects of proximities on a particular form of inter-firm relationships, that is, mergers and acquisitions (M&A). There are a number of studies on the determinants of M&A partnering that either implicitly or explicitly follow a proximity framework (e.g. Rodríguez-Pose and Zademach, 2003; Böckerman and Letho, 2006; Eun and Mukherjee, 2006; Grote and Umber, 2006; Schildt and Laamanen, 2006; Chakrabarti and Mitchell, 2013; Ragozzino, 2009; Di Guardo et al., 2013; Ellwanger and Boschma, 2013). However, these studies have restricted themselves to one or two proximities utmost. This paper applies a more comprehensive proximity framework on M&A partnering in one country, in which four forms of proximity (geographical, industrial, organizational and institutional) at the firm level and two kinds of proximity (social capital and rule of law) at the local level are considered. By means of a logistic rare event model, we assess the role of these six proximities on the probability that any two firms located in Italy engage in an M&A deal over the period 2000-2011. We investigate 4,261 actual deals completed over the period 2000-2011 and around 3.8 million potential ones. The econometric analysis shows that the probability of carrying out an acquisition is positively influenced by all dimensions of proximity between bidder and target companies, especially industrial relatedness.

Proximities may also generate asymmetric effects on agents' behaviour. Shenkar (2001) called attention for the 'illusion of symmetry' when discussing the effects of cultural distance on international business. In pure geographical space, the distance between point A and point B is identical to the distance from B to A. However, this might not be the case when other dimensions of distance – like cultural or institutional distance – are considered. As pointed out by Shenkar (2001), the cultural distance perceived by a Dutch firm investing in China is not the same distance faced by a Chinese firm investing in the Netherlands. In a multidimensional framework, spatial distance may turn out asymmetric if the agents' perception of risk and uncertainty depends on their relative

location in space or when relevant factors, like social or institutional capital, which are specific to the local level, are overlooked. The proximity literature has largely ignored the role of asymmetric proximity (Balland et al. 2012). This paper investigates whether proximities can generate asymmetric effects on M&A deals. We assess whether the effect on the probability of carrying out an M&A deal is the same when the acquirer is located, say, in Milan and the target in Naples, with respect to the case where the acquirer is located in Naples and the target in Milan. We provide evidence on sizeable asymmetric effects for the geographical, industrial and institutional dimensions of proximity. These proximities indeed generated asymmetric effects on domestic M&A deals in Italy during the period 2001-2011, depending on the location of bidder and target and on whether some particular individual characteristics are featured by the acquirer or by the target firm.

The structure of the paper is as follows. In Section 2, we discuss the literature on proximities and M&A deals. In Section 3, we present the database on M&A deals in Italy. Section 4 describes how the different measures of proximity are operationalized. In Section 5 we present the empirical model and discuss some relevant econometric issues. The estimation results of the baseline model together with some robustness tests are presented in Section 6. In Section 7, we extend the model to deal with the issue of asymmetric effects of proximities. Section 8 concludes.

2. Symmetric and asymmetric proximities in M&A

M&A represent one of the most important tools available to implement firms' strategic goals, such as increasing market size, entering in new markets, lowering production costs and acquiring new competencies (Caves, 1982; Teece, 1982; Dunning, 1988; Helfat et al., 2007). There is a huge literature on the determinants of M&As, as well as an increasing number of studies on M&A partnering that adopt, either implicitly or explicitly, a proximity framework (e.g. Böckermann and Letho, 2006; Eun and Mukherjee, 2006; Grote and Umber, 2006; Schildt and Laamanen, 2006; Chakrabarti and Mitchell, 2013; Di Guardo et al., 2013; Ellwanger and Boschma, 2013).

Geographical proximity is considered as one of the most important driving forces behind M&A (e.g. Ragozzino, 2009; Ellwanger and Boschma, 2013). In M&A partnering, information is crucial not only for the identification of potential partners but also for the success of the due diligence process (Chakrabarti and Mitchell, 2013). The risk of adverse selection, i.e. the selection of a "bad" target, is more likely to be mitigated when potential partners are geographically close (Schildt and Laamanen, 2006). Firms also possess a cognitive bias towards their own local environment, or what Huberman (2001) called familiarity. While familiarity can be regarded as an irrational or unconscious factor, bidders may also choose a proximate target rationally. In these cases, target search and identification explicitly involve a spatial element (Laulajainen, 1988).

Strategic reasons to select a proximate target may be easing price competition (Levy and Reitzes, 1992), the possibility to share common assets after the acquisition, and the capacity to monitor and lower implementation costs (Böckerman and Lehto, 2006). Moreover, geographical proximity may drive M&A when potential targets with a favored profile are spatially clustered. Therefore, we expect that bidders select targets that are geographically closer than the average target.

But geographical proximity is unlikely to be the main and sole driver of M&A. Apart from individual features of firms, other forms of proximity may influence M&A partnering. The acquisition of a potential target involves a prolonged and costly search process, while bidders' managerial resources are clearly bounded by physical, cognitive and monetary constraints. Thus the acquirer obviously limits the extent of its potential targets according to several dimensions of proximity, including geographical proximity. The central idea is that in the search process, the acquirer will evaluate only a very small proportion of the total population of potential targets, preferring, on average, those who are more proximate in terms of geographical location, technological relatedness, organizational resemblance and institutional factors.

The M&A literature has provided evidence that industrial or technological relatedness has a significant impact on partnering (see e.g. Ahuja and Katila, 2001; Schildt and Laamanen, 2006; Hussinger, 2010; Chakrabarti and Mitchell 2013; Ellwanger and Boschma, 2013). The main reason to acquire a company from the same or a similar industry is the possibility to realize synergy effects. M&A research has extensively addressed the role of synergies that stems from related resources, such as similar products and technologies (Chatterjee, 1986; Sirower, 1997; Seth et al., 2000; Homberg et al., 2009). If these resources are shared or combined, related acquisitions can benefit from economies of scope and scale. If companies can benefit from acquiring complementary industries, partnering likelihood is expected to increase. If both firms are active within the same industry, their managers are more likely to know each other, which affects the target identification phase (Chatterjee et al., 1992). But also during the due diligence phase, bidders have an advantage when assessing industrially related targets, because their value can be more easily determined.

There are a number of studies on domestic M&A deals in Germany (Grote and Umber, 2006), Finland (Böckermann and Letho, 2006), the Netherlands (Ellwanger and Boschma, 2013) and the US chemical industry (Chakrabarti and Mitchell, 2013). However, these studies on domestic M&A have accounted for only one or two proximities (most notably geographical proximity), and therefore lack a comprehensive proximity framework, as proposed by Boschma (2005). This is crucial, as all forms of proximity may act as substitutes or complements when explaining M&A partnering. Social proximity, as embodied in directorship interlocks for instance, has been reported as another determinant of acquisition decisions, especially in regions where social networks are

dense, but this factor has remained relatively unexplored in studies on domestic M&A's (Okazaki and Sawada 2011). The effects of cultural and institutional proximity have been taken up in M&A studies, but these primarily concern international M&A deals across countries (Chapman, 2003) in which differences in the institutional and cultural national frameworks, along with financial and exchange rates conditions and prospects of entry in new foreign markets (Rossi and Volpin, 2004; Ragozzino, 2009; Di Guardo et al., 2013) have been found to influence cross-country acquisitions. However, cultural and institutional proximity may also affect inter-firm M&A deals within a more homogeneous national context. This is likely to occur when there are relevant differences in the quality of institutions at the local level that may result in varying degrees of perceived risk and uncertainty on the part of economic actors. There are many countries where differences in institutional quality reflect different levels of social capital that historically have determined a sharp divide between regions, like between the Northern and Southern regions in Italy (Putnam 1993). The latter are systematically associated with low levels of trust, opportunistic behaviour and lack of cooperation among agents which has led to a more fragile civil environment, lower quality of local institutions and lower economic development with respect to the Northern part of the country (Daniele and Marani, 2011; De Blasio and Nuzzo, 2010; Di Liberto and Sideri, 2011). These institutional distances within a country affect inter-firm economic exchange (Habib and Zurawicki, 2002; Bénassy-Quéré et al., 2007; Hyun and Kim, 2010), and possibly domestic M&A deals.

In the proximity literature, there is a strong assumption that economic relationships are symmetric, as if the effect of proximity works equally in both directions. This seems to be at odds with economic reality, which is full of asymmetric forces that shape the mobility of goods, people and knowledge across space, and which are directly observable in unequal international trade, brain drain and unbalanced capital flows (Balland et al., 2012). M&A deals are no exception to that rule. If one looks at the inter-regional patterns of M&A deals, one can clearly observe a strong bias: some (core) regions are more active as acquirers, while other (more peripheral) regions contain more targets of M&A deals. Overall, M&A activity tend to reinforce core-periphery patterns, as high-level corporate functions and corporate control concentrate more and more in a limited number of core regions (Markusen, 1985; Chapman, 2003; Rodríguez-Pose and Zademach, 2003). M&A activity in banking has also led to a huge increase in the spatial concentration of banking in a few financial centres (Burgstaller, 2013; Boschma and Hartog, 2014; Colombo and Turati, 2014).

The proximity literature so far has rendered the direction of these economic flows as almost irrelevant (Balland et al., 2012). Interestingly, this issue of asymmetry has been taken up in the International Business literature in a seminal paper by Shenkar (2001). Shenkar heavily criticized the use of the concept of cultural distance for creating an "illusion of symmetry", or what Zaheer et

al. (2012) referred to as “a concept without direction”. While in geographical space, the distance between A and B may be identical to the distance from B to A, this might not be the case when other dimensions of distance - like cultural or institutional distance - are considered. Shenkar (2001) pointed out that the cultural distance perceived by a Dutch firm investing in China is not the same distance faced by a Chinese firm investing in the Netherlands. In a study on expatriates, Selmer et al. (2007) concluded that German expatriates assigned to the US were better adjusted than US expatriates assigned to Germany. Håkanson and Ambos (2010) argued that managers from a country with a well-defined regulatory environment and transparent governance structures experience huge difficulties in countries with weak formal institutions. By contrast, managers from countries with weak institutional structures may not experience the same difficulties in countries with more developed and transparent institutions that are easier to understand. Another example of asymmetry in the study by Håkanson and Ambos (2010) concerns the size of countries and their political and cultural influence. For instance, despite sharing the same language, Belgian newspapers and other media are more likely to report on developments in France than the other way around, which creates asymmetry in the perceived distance between the two countries.

In sum, the effects of proximity on economic relationships between regions cannot be studied regardless of direction. According to Shenkar (2012), there are still very few empirical studies on asymmetry in the International Business literature. This is certainly true for the proximity literature in economic geography. To our knowledge, this issue of asymmetric proximity has not yet been taken up, at least not explicitly, in studies on the geography of M&A. This paper aims to make a first attempt to explore in a proximity framework whether there is evidence of asymmetry, even within a national context, when explaining domestic M&A deals in Italy. In particular, we test whether the argument advanced by Håkanson and Ambos (2010) outlined above finds empirical evidence in the case of a single country by looking at differences between Italian regions in their endowment of social capital and level of institutional quality.

3. The database on M&A deals in Italy

Data on M&A deals in Italy over the period 2000-2011 are retrieved from the databank SDC Platinum (Thomson Reuters) and the criteria for the data base selection are reported in Table 1. We started with 11,303 announced M&A deals in Italy, of which 44% involved a foreign firm which were excluded from the analyses. Among the remaining 6,367 domestic transactions, 19% have been eliminated because they were not completed over the period considered. Next, we have done an extensive search on the web to find the exact location of the bidder and target companies when this information was missing. In this way, we could identify the location of 1,427 out of 1,621

missing cases for the targets, and 859 out of 1,086 for the acquirers. Finally, we eliminated 468 deals in which the acquirer could not be individually identified, as was the case for creditors, investment groups, shareholders and undisclosed acquirers. After carrying out this procedure, we ended up with a total of 4,261 domestic M&A deals. These show an increasing trend until 2008 and a sharp decline afterwards, due to the worldwide crisis, which brought about a general lack of confidence and liquidity shortages.

Looking at the geographical composition of the transactions, we found that the large majority of both acquirer and target firms are located in the North of Italy (Table 2), while less than 10% of the deals involve Southern companies. Interestingly, the share of Southern companies is much higher when they act as target (8.8%), rather than bidder (4.9%), suggesting the existence of a spatial asymmetric pattern in the set of completed deals.

Table 3 shows the distribution of the bidder and target firms by status. Considering the acquirers, the most relevant group consists of private firms; the latter accounts for 41% of the total, followed by subsidiaries (31%) and listed companies (24%).[1] The picture slightly changes when we look at the targets: subsidiaries firms are more frequently acquired (43%), while listed firms are rarely involved in M&A deals as targets (8.6%). Considering the firms status it is also interesting to notice that around 55% are independent firms and that around 10% of them are foreign owned.[2]

The sectoral composition of the M&A transactions, based on the Standard Industrial Classification (SIC) divisions, is reported in Table 4. The largest number of acquisitions is performed by companies in the financial and insurance sector (37.5%), which can be largely explained by the important consolidation process carried out by the domestic banking system. A high share of acquisition is also reported by the manufacturing sector (24.8%). It is interesting to remark that the sectoral ranking is reversed when we look at the target side, with 22.7% and 30.9% of the firms operating in the finance and manufacturing sectors, respectively. A relevant share of deals is also reported in the transport and communication industry (16.7%) and in the personal and business services (18%).

These descriptive elements indicate substantial differences in the distribution of spatial, organizational and industrial features when comparing the set of acquiring firms with that of target firms. This points to possible asymmetric effects on the probability of accomplishing a deal

[1] According to the SDC definition, a company is *Private* when its shares are not traded on a public exchange market and when it is owned by individuals (or family) or has a parent company owing less than 50% of the assets. On the other hand, a *Subsidiary* is an entity with a parent company owing at least 50% of the assets, and it is not publicly traded on a stock exchange market. For each bidder or target firm, regardless of their status, the SDC database reports the ultimate parent company so that it is possible to control for the firm's ownership.

[2] Since we are considering only companies located in Italy, we define a firm as *foreign owned* when its ultimate parent company (which should own at least 50% of the firm) is based in a country different from Italy.

depending on firm's location and on whether some individual characteristics are featured by the acquirer or by the target firm. This issue of asymmetry will be discussed in depth in Section 7.

4. Data description

Our aim is to assess the effect that geographical closeness, industrial relatedness, organisational and institutional similarity exert on the probability that any two Italian companies engage in an M&A deal, while controlling for social capital and institutional quality at the local level. In this section, we discuss the rationale for including the four dimensions of proximity at the firm level and the two types of proximity at the province level, as well as describing in detail how they are operationalized. The complete lists of the variables along with their definitions are reported in the Appendix.

4.1 The dependent variable

The observational unit in our model is represented by dyads of firms. The dependent variable is constructed as a binary variable, which takes value 1 when an M&A deal was set up between any two companies and 0 when a pair of firms could have engaged in a deal but did not. We refer to the latter as "potential" pairs.

The set of potential pairs is constructed by considering as bidders only actual acquiring firms and as targets any target that was involved in deals completed one year before and up to one year after each actual deal. This three-year time window seems realistic given the span of the M&A decision process and adequate enough to ensure a sufficient number of observations. This criterion implies that the actual deals considered are those observed over the period 2001-2010, the information related to 2000 and to 2011 is used to identify the potential targets related to M&A occurred in 2001 and 2010, respectively. We thus analyse 3,574 real deals and around 3.8 million potential ones. Given the proportion of firm pairs actually involved in the transactions (0.094%), it is evident that M&A deals are rare events. Therefore, the econometric analysis is based on the logistic framework for rare events suggested by King and Zeng (2001, 2002), which is outlined in Section 5 along with the discussion on some relevant estimation issues.

4.2 Proximity dimensions at firm level

Geographical proximity. As discussed before, M&A deals may be affected by geographical closeness since it diminishes information asymmetries and thus reduces the transaction costs usually incurred to complete the deal. For each M&A deal, geographical proximity is measured by the inverse of the distance in kilometres (*Inv_dist*) between the locations of the bidder and target firms.

As an alternative, spatial closeness between firms has been also accounted for by constructing a set of five mutually exclusive dummy variables computed on the basis of the co-location of the bidder and target firms.[3] More precisely, the dummy *ID_intra_city* takes value 1 if both firms are located in the same city; in such a case, the two companies are characterized by the highest degree of co-location, which is expected to increase the probability of engaging in an M&A. The dummy *ID_intra_lls* takes value 1 when the two firms are located in the same local labour system (LLS), while it is equal to 0 if they are located in different LLS or if they are co-locate at a lower spatial level (i.e. the municipality). Similarly, the dummies *ID_intra_prov* and *ID_intra_reg* take value 1 if the firms are located in the same province or region, respectively. Finally, the dummy *ID_inter_reg* takes value 1 when the bidder and target are located in different Italian regions, this set of cases represents the reference group in the estimation analysis; therefore the other dummies are expected to capture to what extent the probability of observing a M&A deal increases as the degree of co-location becomes closer.

In Table 5, we report the number of M&A deals for each hierarchical spatial scale identified by the set of dummies described above. We notice that almost 60% of total domestic deals in Italy takes place among firms located in different regions. Interestingly, the share of M&A completed among firms located in the same city (22%) appears also to be relevant.

Industrial proximity. As explained in Section 2, we expect that firms operating in the same sector or related sectors exhibit a higher probability of partnering in an M&A deal. Following Ellwanger and Boschma (2013), we construct five mutually exclusive binary variables to account for the degree of industrial proximity. They are computed on the basis of the primary economic activity reported in the SDC database at the 4-digit SIC code for both the bidder and the target.[4] More precisely, the dummy *ID_intra_SIC4* takes value 1 if both the acquirer and the target firms operate in the same 4-digit SIC industry. The dummy *ID_intra_SIC3* takes value 1 when the highest degree of industrial relatedness is at the 3-digit SIC industry group and it is equal to 0 when the two firms operate in different Industry groups or are related at a finer industrial disaggregation (i.e. the SIC4 industry level). With the same procedure, we also computed the dummies *ID_intra_SIC2* and *ID_intra_SIC1* for the 2-digit SIC Major group and the 1-digit SIC Division, respectively. Finally, the dummy *ID_inter_SIC1* takes value 1 for the cases in which the companies involved in the M&A

[3] Italy is divided into 21 regions (NUTS2 level), 103 provinces (NUTS3), 686 Local Labour Systems (LLS) and 8101 municipalities. LLS are geographical areas identified on the basis of workers' daily commuting flows. A LLS comprises different municipalities which are not necessarily located in the same administrative province but may be also be located in contiguous provinces.

[4] The Standard Industrial Classification is organized in 10 Divisions (1-digit classification), 83 Major groups (2-digit), 410 Industry groups (3-digit) and 965 Industries (4-digit).

transaction operate in different divisions (i.e. conglomerate agreements); such cases identify the reference group for industrial relatedness.

Table 5 shows that firms pairs exhibiting the lowest degree of industrial relatedness are very frequent in the sample of actual deals (that is, 36.4% of the cases). As we have remarked in the previous section, such cases are very often represented by bidders operating in the financial services division that acquire manufacturing division targets. At the same time, it is interesting to notice that the group with the strongest sectoral affinity is rather common (35.9%), which is consistent with the on-going process of concentration of domestic market shares to exploit economies of scale.

Organisational proximity. The economic exchange among companies can be facilitated by the common membership to the same group or organization because it generates a shared set of rules, procedures, routines, which tend to reduce uncertainty and opportunistic behaviour among members (Kirat and Lung, 1999). As in Balland et al. (2013b), we measured organizational proximity by means of the dummy variable *ID_intra_group*, which is equal to 1 if the bidder and target firms have the same ultimate parent company, implying that they belong to the same corporate group. In our sample, this concerns only 11% of total actual M&A deals.

Institutional proximity. The probability that two firms perform an M&A deal can be also influenced by a common institutional background that reduces information asymmetries and transaction costs. Following Ponds et al. (2007), we proxy the institutional closeness by means of a dummy variable based on the status of the two companies. More specifically, the dummy *ID_status* takes value 1 if the two firms have the same institutional status (both listed on a stock exchange, or private, or subsidiaries, or government bodies). In our sample, this happens in 38% of the actual cases (see Table 5). As an alternative, we also computed two more specific measures of institutional closeness, *ID_listed* (3.8% of observed deals) and *ID_private* (21%), which takes value 1 when the bidder and target are both listed or both private companies, respectively.

4.4 Proximity dimensions at local level

In order to rigorously assess the determinants of M&A deals in Italy, we have to account for the different levels of social capital and quality of institutions featured by the Italian territories. It is worth noting that such differences are very persistent, notwithstanding the fact that the territories have common policies, institutions, laws, judiciary and education systems and, overall, the country is ethnically and religiously homogeneous. Accounting for social capital and institutional quality is crucial because high level of both characteristics reduce opportunistic behaviour and increase trust and law enforcement (Knack and Keefer, 1997), thus lowering transaction costs and the perceived level of economic risk. This is expected to enhance the probability of inter-firm exchanges.

Social capital. We consider the composite indicator recently constructed by Cartocci (2007) for the Italian provinces. Cartocci (2007) basically updates the social capital indicator originally proposed by Putnam (1993) using data for more recent years, 1999-2002. The composite indicator is obtained as the average of four standardized indicators on newspapers reading, blood donations, election turnout and membership to sport associations[5]. These four items are supposed to adequately capture the two essential elements of social capital: trust and participation. The geography of the indicator confirms the remarkable divide between the two main macro-areas of the country: the provinces exhibiting the highest values of social capital are all located in the Centre-Northern part of Italy, whereas the lowest values are associated with the Southern provinces. It is worth noting that the coefficient of correlation between the social capital indicator and per capita gross domestic product observed in 2001 is 0.80. The social capital proximity (*SocCap_proximity*) is computed as the opposite of the absolute difference between the values that the indicator takes for the two provinces where the acquirer and the target firms are located.

Quality of institutions. As a proxy for quality of institutions, we consider the "Rule of law" indicator recently proposed by Nifo and Vecchione (2013)[6]. This indicator comprises information on crimes against property, crimes reported, trial times, magistrates productivity, shadow economy and tax evasion and, thus, should adequately capture the law enforcement dimension of the Italian economic context. Higher values correspond to better outcomes. As was the case for social capital, Southern provinces exhibit the lowest values, thus confirming the lower quality of their local institutions with respect to the Centre-Northern provinces. Rule of law proximity (*RuleLaw_proximity*) is computed as the opposite of the absolute difference between the values that the indicator takes for the two provinces where the bidder and the target firms are located.

In general, for both social capital and rule of law proximity, we expect a positive effect on the likelihood of observing a domestic acquisition. However, it is worth noticing that we can obtain the same proximity value for pairs of provinces sharing either high or low values of the indicator. In the latter case, the positive effect of proximity may be attributed to the fact that managers from a province with weak social and institutional traits would face lower transaction costs as they know how to "navigate" an opaque, informal environment, similar to their home one.

[5] The indicators proposed by Putnam (1993) were preferential vote (this allowed citizens to elect specific people in their constituency; under the current national electoral law this is no longer possible), referenda turnout, newspaper readers, and the number of cultural and sports associations.

[6] Nifo and Vecchione (2013) propose a composite indicator for the quality of institutions at the province level in Italy. The construction of the indicator mimics the World Governance Indicator proposed by Kaufmann et al. (2010). Its individual components are voice and accountability, government effectiveness, regulatory quality, rule of law and corruption. In this study we did not use the composite indicator because it partly overlaps with the social capital indicators (election turnout and membership to associations are included in the voice and accountability indicator). As a proxy for quality of institutions, we selected the rule of law indicator, because it is more related to law enforcement.

In order to check whether there is an additional positive effect when both the acquirer and the target firm are located in provinces with high levels of social capital or rule of law, we also include two interaction terms. The two proximity variables are multiplied by a dummy variable which takes value of 1 when both the acquirer and the target firms are located in provinces with a high level of social capital (*D_high_SC*) or rule of law (*D_high_RL*), respectively. High values are defined as those values higher than the second tercile of the indicator distribution.

4.5 Individual firms' characteristics

In our regression models, we also include a wide array of controls to account for various individual characteristics of the firms, which are likely to be correlated with the proximity measures. More specifically, for each firm we include information on its status, organization, ownership nationality, geographical location and main sector of activity. Regarding the status, we have computed four dummies to account for the firm being publicly traded on a stock exchange market or a private company (that is a company owned by a relatively small number of shareholders, often a family in Italy), or a subsidiary or a governmental organisation. We have also included a dummy taking value 1 when the bidder or the target is an independent firm (i.e. when the ultimate parent company corresponds with the company itself), and a dummy to account for foreign-owned companies. Regarding the location of each firm, we control for it by including dummies according to the firm being located in one of the two macro-areas of the country, the Centre-North or South of Italy. Nine mutually exclusive dummies are included for the firm's main economic activity, as indicated by its 1-digit Division SIC code. Finally, we also include the level of social capital and the level of rule of law for the province where the two firms involved in the M&A deal are located.

Following Mitchell and Shaver (2004) and Chakrabarti and Mitchell (2013), for acquiring firms, we also account for their previous experience in carrying out M&A transaction by including a dummy variable taking value 1 for bidders that were involved in deals completed in the three years preceding the focal acquisition (*D_exp3*). In our sample, nearly 28% of the acquirer firms exhibit such feature. Experiential learning may positively affect the success of the acquisition because it improves the target selection capabilities of the acquirers as they become more skilful in gathering and processing information and in distinguishing among different types of acquisitions (Haleblian and Finkelsten, 1999).

5. Empirical model and estimation issues

The analysis of the effects of proximities on the probability that two firms perform an M&A deal is carried out within the logistic framework for rare events. As stated above, this entails creating the

dependent variable (*Y*) taking value 1 for pairs of firms (3,574) that actually completed the deals during the period 2001-2010 and 0 for dyads of firms (around 3.8 millions) that could have engaged in the transaction process but did not.

Comparing the high number of potential pairs with the one related to actual deals (0.094%), it is evident that firm acquisitions are rare events. When the number of zero observations is overwhelmingly larger than the positives, the logit model severely underestimates the probability of occurrences. Following King and Zeng (2001, 2002), we apply the choice-based or endogenous stratified sampling approach, which requires selecting all the observations for which $Y=1$ (the "cases") and randomly (independently from the explanatory variables) selecting the observations for which $Y=0$ ("controls"). It is important to emphasize that selecting on the zeros permits to reduce data collection efforts because only a small part of such observations contribute to the information content of the explanatory variables. However, data selection based on *Y* induces bias and therefore it is necessary to apply the appropriate statistical corrections to obtain consistent and efficient estimators. The most applied ones are based on prior correction and on the weighting method, both of which require prior knowledge of the population proportion of positive observations.

In addition to bias induced by the endogenous stratified sampling, we have also to deal with another potential source of endogeneity bias. This might be related to the selection of the actual M&A observations included in the sample and to unobservable firm heterogeneity. The selection problem may arise because the decision to undertake an M&A deal as a mode of firm growth might be driven by the fact that the acquirer knows its proximate potential targets. In order to attenuate the potential bias, we apply the independence in conditional-mean approach by including in our models a wide range of firm's characteristics (firm's status, type of organization, ownership, operating division, geographic location and institutional characteristics of the area where firms are located). Once we control for these individual firm features, we expect that the decision to select a specific target is much less influenced by higher-level firm growth decisions.[7] Although we cannot exclude that unobservable firm heterogeneity may still be present and that we are aware that our approach does not entirely ensures the estimation of genuine causal effects, we think that it may provide insightful evidence on the role played by different dimensions of proximity on the probability of observing firms acquisitions.

The empirical specification for the probability of observing an M&A transaction is formalized on the basis of the cumulative logistic distribution as follows:

[7] The same approach is adopted by Chakrabarti and Mitchell (2013).

$$Prob\left(Y_{ij}=1\middle|X_{ij},W_i,W_j\right)=\frac{1}{1+e^{-\left(X_{ij}\beta+W_i\delta+W_j\gamma\right)}} \quad (1)$$

where Y_{ij} is the response variable taking value 1 if a deal was completed between acquirer *i* and target *j* and zero otherwise; the matrix X_{ij} includes the variables which measure inter-firm proximity along the geographical, industrial, organizational, institutional and local dimensions, discussed in the previous section. The individual control variables pertaining to the acquirer or the target firm are gathered in the W_i and W_j matrices, respectively. More specifically, the $X_{ij}\boldsymbol{\beta}$ and $W_i\boldsymbol{\delta}$ ($W_j\boldsymbol{\gamma}$) terms[8] of the model are specified as follows:

$$\begin{aligned}X_{ij}\boldsymbol{\beta} = {} & \beta_1 ln(inv\_dist_{ij}) + \beta_2 ID\_intra\_SIC4_{ij} + \beta_3 ID\_intra\_SIC3_{ij} + \beta_4 ID\_intra\_SIC2_{ij} + \\ & + \beta_5 ID\_intra\_SIC1_{ij} + \beta_6 ID\_intra\_group_{ij} + \beta_7 ID\_listed_{ij} + \beta_8 ID\_private_{ij} + \\ & + \beta_9 SocCap\_proximity_{ij} + \beta_{10}(SocCap\_proximity_{ij} * D\_high\_SC_{ij}) \\ & + \beta_{11} RuleLaw\_proximity_{ij} + \beta_{12}(RuleLaw\_proximity_{ij} * D\_high\_RL_{ij})\end{aligned}$$

$$\begin{aligned}W_i\boldsymbol{\delta} = {} & \delta_1 D\_listed_i + \delta_2 D\_private_i + \delta_3 D\_govern_i + \delta_4 D\_indep_i + \delta_5 D\_fo_i + \delta_6 D\_north_i + \\ & + \delta_7 D\_south_i + \sum_{k=8}^{K=16} \delta_k D\_SIC1\ division_{ki} + \delta_{17} SocCap_i + \delta_{18} RuleLaw_i + \delta_{19} D\_exp3_i\end{aligned}$$

The term $W_j\boldsymbol{\gamma}$ for the target firm controls is defined analogously to the term $W_i\boldsymbol{\delta}$, but it excludes firm's previous experience variable.

Model (1) is estimated by performing the sequential procedure suggested in King and Zeng (2001) for selecting the zero observations.[9] More specifically, we considered several random samples by starting with the sample for which each actual pair is matched with just one random control and stopping when we obtained no further efficiency gains, signaled by a reduction in the magnitude of standard errors. For both the prior correction and the weighting method this occurred for the sample in which each actual pair is matched with 5 randomly drawn potential pairs.[10] For the same sample size, we found that overall the estimated coefficients did not differ substantially across the two alternative correction approaches, thus signalling the absence of any clear misspecification problem. We interpret this result in favour of our highly parameterized specification, which simultaneously accounts for six different proximity dimensions and for a wide set of firm characteristics that control for possible sources of heterogeneity.[11] For these reasons, in the next

[8] See section 4 and the Appendix for the variables' definitions.
[9] All estimations are carried out by the ReLogit software by Tomz et al. (1999).
[10] For a thorough discussion on the correction methods refer to King and Zeng (2001).
[11] Results on model comparisons across correction methods and different sample sizes are available from the authors upon request.

section, we focus the discussion on the evidence provided by models based on the prior correction method, estimated on the sample of 1:5 actual:potential pairs (21,444 observations).

6. Empirical results

6.1 The baseline model

In column 1 of Table 6, we report our benchmark model, where only the geographical dimension of proximity is considered, while in column 2, we present our baseline model with the whole set of the four different proximities.[12] The comparison of these two specifications shows that, although geographical closeness is a fundamental determinant of M&A deals, it is by no means a substitute for the other proximities. As a matter of fact, while the coefficient of spatial nearness decreases (from 0.26 in model 1 to 0.18 in model 2), all the other proximities exhibit the expected sign and are highly significant. Moreover, they contribute to an increase of the probability of observing a deal from 0.09% (model 1) to 0.13% (model 2). This indicates that proximities act as complements rather than substitutes, thus underlining the importance of simultaneously accounting for the multi-dimension notion of proximity, as recommended by French School of Proximity (Kirat and Lung, 1999; Torre and Gilly, 2000; Boschma 2005). Our results on the complementary role played by proximities confirm previous evidence found for domestic M&A (Ellwanger and Boschma, 2013). These findings are also in line with contributions in other related fields, like in the case of regional knowledge spillovers (Basile et al., 2012; Paci et al., 2014), inter-firm knowledge flows (Autant-Bernard et al., 2007; Usai et al., 2013) and trade and FDI flows (Lankhuizen et al., 2011).

Focusing on the baseline specification (model 2), the increasing magnitude of the coefficients of the four indicators of industrial relatedness shows that the probability of completing an M&A deal is strongly dependent on the degree of industrial similarity between the bidder and the target firms. With respect to the reference group that includes the least related firms (those operating in different SIC divisions), the smallest coefficient (0.95) is found when the highest level of industrial relatedness is the division level (same 1-digit SIC code), whereas the largest coefficient (4.08) is found when both firms operate in the same industry (same 4-digit SIC code). This result highlights the crucial relevance for the pair of firms involved in the transaction of having a common productive and knowledge base in order to mitigate the costs associated with information asymmetries on one hand, and to exploit synergies and economies of scale on the other hand. Italian

[12] Although the discussion of the regression results is mainly focused on the set of proximities, note that all specifications include acquirer and target firms' individual controls for status (listed, private, government), independent organization, foreign ownership, SIC1 division, geographic location (North, Centre, South Italy), social capital and quality of institutions.

domestic M&A, like Dutch M&A (Ellwanger and Boschma, 2013), are more likely to be driven by motives related to consolidation and enlargement of their existing productive base, rather than by true diversification purposes.

Organizational proximity, measured in terms of membership to the same group, is also found to be relevant in determining M&A deals, as in Balland et al. (2013b). Its significant coefficient is similar in magnitude (4.35) to the one associated with the highest degree of industrial relatedness. Belonging to the same corporate group – having common rules, procedures, routines and sharing the same firm's culture – facilitates the accomplishment of the deals because search and transaction costs are largely reduced.

Institutional proximity also impacts positively on M&A deals in the case of listed firms. It is worth highlighting that, differently from other contexts (Cassi and Plunket, 2013; Usai et al., 2013), in the case of Italian domestic M&A, it is not sufficient to share the same ownership status,[13] as a positive effect is associated only to the case of the most-publicly available information case of firm pairs. This is plausible, as when both firms are listed, information asymmetries between bidder and target – and thus search and transaction costs – tend to be lower. Conversely, in the other extreme case, when they are both private, information asymmetries are at their highest level and thus have a detrimental effect on the probability of observing an M&A deal. It is worth noting that the estimated coefficient for listed firms is in absolute terms almost twice (0.41 vs. -0.24) the one related to private firms.

Results for the provincial level proximities indicate that firms located in provinces with similar levels of both social capital and rule of law are more likely to engage in M&A deals. Both proximities exhibit a positive and highly significant coefficient. Moreover, their effects are reinforced when similarity in social capital and quality of institutions is attained for high levels of both local characteristics, as indicated by the positive and significant interaction terms. It is worth noting that if the baseline model is estimated without the provincial level proximities, the coefficients of all the firm level proximities are basically unaffected. The only exception is the spatial proximity coefficient, which in this case would be larger (0.231), signalling that geographical proximity accounts, at least partially, for the spatial pattern exhibited by social capital and rule of law provincial characteristics when these are not included in the model.

[13] We also estimated a model including the most comprehensive institutional proxy, i.e. the dummy variable *ID_status* taking value 1 when the two firms involved in the deal have the same institutional status (both listed, or private, or subsidiaries, or government bodies). However, it turned out to be not significant. We then considered the model including the dummies for each of the four possible status, but the two dummies related to both firms being subsidiaries or government bodies were not significant. For parsimony, we report and discuss the model which includes only the most informative and significant status indicators, i.e. those associated with both firms being listed or private.

6.2 Robustness checks

Before discussing in detail the effects exerted by the different kinds of proximities, we assess whether our baseline model provides robust evidence with respect to alternative indicators for geographical proximity, additional controls and sub-period analysis.

We first consider accounting for geographical closeness in an alternative way. In model 3 of Table 6, in place of the inverse of the distance, we included the four mutually exclusive dummy variables measuring co-location of acquiring and target firms at the regional, provincial, LLS and municipality level.[14] All indicators are positively and highly significant, confirming that being proximate in space is crucial for engaging in M&A transactions. An aspect worth noting is that, differently from what we found for industrial relatedness, in the case of geographical proximity, the magnitude of the coefficients is not an increasing function of geographical closeness. More specifically, the highest coefficient is found at the provincial level (1.2), followed by the municipality (1.0), LLS (0.65) and regional (0.55) level. This kind of nonlinearity in space may be due to the province being the spatial level where firms are most likely to accrue the benefits of becoming larger thanks to agglomeration effects. These, in turn, might be associated with localization economies given that, as discussed above, the Italian companies tend to prefer acquiring similar firms. The high coefficient associated with the municipality level confirms evidence provided in Ellwanger and Boschma (2013) on M&A being affected by the existence of home-bias effects, due to the fact that acquiring firms tend to prefer their most proximate potential targets, with which they are more familiar and better informed on.

It is worth noting that the estimates of all the other coefficients are extremely robust with respect to the inclusion of the four spatial indicators instead of the continuous inverse distance variable. In model 3, the estimate probability is slightly smaller (0.12%) with respect to the baseline model (0.13%).

Column 4 of Table 6 reports the baseline model (2) augmented by the acquirer's experience in doing M&A deals in the past. We considered the period of the three years preceding the focal acquisition. Although the other coefficients remain mainly unchanged, the new variable is not significant at conventional levels. This was also the case when, for further robustness, we also considered a longer period of five years. Although acquiring experience is expected to facilitate the occurrence of the deals, its irrelevance in empirical studies has already been documented (Chakrabarti and Mitchell, 2013). Though it remains to some extent an unexpected result, it may be consistent – at least for the time span considered – with M&A being indeed rare events, so that

[14] We have also tried to include together the inverse of the geographic distance and the four spatial dummies. However, the municipality and the LLS indicators turn out to be not significant; as they are the variables accounting for the highest proximity degree, their effect is likely to have been absorbed by the continuous distance variable.

firms that have already been engaged in such transactions in the past are not more likely to be involved again in the future. This issue is certainly important and requires further investigation.

Finally, we subject our baseline model to a further check of robustness by carrying out a sub-sample analysis. As discussed in Section 2, the number of completed deals exhibits an increasing trend until 2008 and a sharp decline afterwards, probably as a result of the worldwide economic crisis. To check whether the financial downturn occurred in the last two years of our sample might have affected the probability of observing domestic M&A in Italy, we split the sample in two sub-periods, 2001-2008 and 2009-10, and re-estimated the model in each sub-sample. The results are reported in the last two columns of Table 6. In general, the magnitude of coefficients does not change considerably across the two sub-periods and with respect to the baseline model, with the exception of firm institutional proximity, for which both status indicators are not significant in the second sub-period. Comparing the estimated probability, it turns out to be higher than the baseline one in the first sub-period, but smaller in the 2009-10 years. To test for the statistical significance of such differences, we carried out a Likelihood-Ratio test entailing model 2 under the null hypothesis and models 5 and 6 under the alternative hypothesis. It returned a value of 40.8 (p-value 0.73) which, favouring model 2, allows us to rule out a significant structural change occurring in 2008.

On the basis of evidence discussed above, we can cautiously conclude that the results reported for the baseline model are quite robust. Therefore, in the next section, we present the proximities effects computed on the basis of model 2.

6.3 Effects of proximities

This section discusses what the estimation of our baseline model implies in terms of how changes in the different proximity dimensions affect the probability of observing a domestic M&A deal in Italy. Therefore, we measure the increase in the estimated conditional probability for a given change in each explanatory variable in turn, keeping the other independent variables and the controls at their median values. Unless otherwise stated, such a change is considered with respect to the median value and it is equal to one standard deviation. This amounts to hypothesize what would happen if a given proximity indicator was one standard deviation higher for the whole sample.

Table 7 reports the results obtained with respect to the baseline model (model 2 in Table 6) and, just for the spatial binary variables, with respect to model 3. We recall that, when median values are attributed to all variables, model 2 yielded an estimated probability of observing a deal equal to 0.13%. The most remarkable result is that the largest effect on this probability is associated with the highest degree of industrial relatedness (the acquirer and the target firm belong to the same

industry), which shows an expected percentage increase equal to 188% with respect to the baseline probability. All other industrial proximities indicators yield sizeable probability increases, 43% for relatedness at the division level, 50% at the major group level, and 37% at the industry group level.

Effects induced by geographical proximity produce less remarkable enhancements in probability when compared to those associated with industrial affinity. Decreasing the geographical distance between the acquirer and the target firm by one standard deviation (approximately 230 km) increases the probability by 12% with respect to the baseline case. Similar effects are found for the spatial co-location indicators related to the provincial and the LLS territorial level. Among the geographical variables, the greatest contribution to probability is given by the municipality indicator (41%), confirming that geographical proximity is very effective at very short distances.

A more effective role is played by organizational proximity, which may yield a percentage change in probability as high as 81%. This is the second most sizeable effect after industrial relatedness at the same industry level. This result confirms the crucial influence of membership and of sharing the same organizational rules on corporate decisions. On the contrary, institutional proximity plays a limited role. The both-listed case contributes to the increase of the baseline probability by a mere 6%, while a decrease of 9% is associated with the both-private case. This result is due to the fact that when the deals involve two private companies, the search and the due diligence stages are very costly (Shen and Reuer, 2005), because information on the target is scarce and often opaque, difficult to obtain and to process. We recall that in our sample, 21% of actual deals occurred between private firms, while just 4% between the more transparent listed companies.

At the local level, both the social capital and the institutional proximity yield sizeable increases (around 20%) in the likelihood of observing a domestic acquisition. This result confirms expectations that high level of quality of the socio-institutional context facilitates economic transactions and inter-firm relationships (Buonanno et al., 2009; Guiso et al., 2004).

7. Testing for asymmetric effects

Inspired by the management literature (Shenkar, 2001; 2012; Zaheer et al., 2012), we now assess whether proximity may have asymmetric effects on the response variable due to the relative position of the acquiring or target firm in the different proximities. To clarify the matter, we start considering geographical proximity. The hypothesis we aim to test is that the relative firms' location may determine a different effect of geographical proximity, notwithstanding the fact that geographical distance between the bidder and target firms is the same in both directions.

Geographical proximity may have a different effect for two deals occurring between two firms at the same distance, but in one case the acquirer is located in the North of Italy (say, Milan)

and the target in the South (say, Naples), while in the second deal the two locations are switched. This issue is analysed by augmenting model 2 of Table 6 with two additional dummy variables. The first one (*ID_An_Ts*) assumes value 1 when the acquirer is in the Northern part of the country and the target is in the Southern part, while the second dummy (*ID_As_Tn*) takes value 1 in the opposite case. Our *a priori* expectation is that the first case should be associated with a higher probability of observing a deal. This stems from considering that in Italy, Northern firms are on average larger, more innovative, more involved in dynamic and foreign contexts, and better endowed with financial assets. However, the results reported in the first column of Table 8 confute such an expectation. A negative and significant coefficient is associated with the *ID_An_Ts* dummy, while the second dummy is not significant, indicating that the related case is not remarkably different from average behaviour. Having controlled for social capital and quality of institutions at the province level, this result may be explained by considering the "perceived" North-South distance, which results in a higher perceived level of risk and uncertainty and expected higher transaction costs associated with acquisitions in the South. Managers may fear having to experience great difficulties in operating in an informal, less transparent environment, characterized by inefficient and highly bureaucratic procedures and routines. Moreover, Southern cities offer a narrower range of amenities and have lower availability (and in certain case also lower quality) of public services (such as nurseries, health care, transport, cultural and sports facilities, waste management, infrastructures) with respect to the Centre-Northern ones, so that they are less appealing to those entrepreneurs and managers who have to move to the South to direct the new acquired firms. According to our results, the benefits of being a better-endowed Northern company are not sufficient to counterbalance the negative aspects of operating in the South and, therefore, there is a lower probability to observe a completed M&A deal between a Northern acquirer and a Southern target.

In the second and third column of Table 8, we test whether different levels of social capital and quality of institutions featured by the provinces of the firms involved in an M&A deal produce asymmetric effects on the acquisition probability. In this case, we augment the baseline model with two additional dummies for social capital (column 2) and rule of law (column 3). The first dummy (*ID_Ahsc_Tlsc*) assumes value 1 when the acquirer is located in a province with a high level of social capital (i.e. a level higher than the second tercile of the indicator distribution) and the target is located in a province with a low level of social capital (i.e. a level lower than the first tercile of the indicator distribution), while the second dummy (*ID_Alsc_Thsc*) takes value 1 in the opposite case. The set of dummies for the rule of law variable are constructed analogously. For both indicators, we do not find any evidence for the existence of possible asymmetries, so that in the case of social capital and institutional quality what matters most in affecting the probability of engaging in a deal

is being located in provinces with similar high levels of both characteristics, as indicated by results found for the baseline model.

In the fourth column of Table 8, we report the model estimated to analyse possible asymmetries related to the status of the firms involved in the deal. Our results indicate that the probability is significantly higher (coefficient estimated in 0.79) when we consider the cases in which the acquirer is private and the target is a listed firm. The opposite cases (listed targets and private acquirers) do not depart significantly from the average behaviour. Our results confirm the crucial importance of publicly available information for selecting the target firm. As already discussed when reporting on the role of institutional proximity for the baseline model, the evidence on asymmetric status effects allows us to reaffirm that when firms are large and listed, more information on the organization and its performance are publicly available. This tends to increase the odds of carrying out a completed acquisition (Capron and Shen, 2007).

In the second part of Table 8, we investigate a different source of asymmetries, in this case concerning the industrial dimension. More specifically, we consider pairwise combinations of the most recurrent divisions observed in our sample of actual deals, namely Finance, Manufacturing, Services and Trade (Wholesale Trade + Retail Trade). We then augment the baseline model with the corresponding dummy variables. For instance, in the first case, we construct a dummy variable taking value of 1 when the acquirer operates in the Finance division and the target in the Manufacturing division, and a dummy for the deals in which operating divisions are switched between bidder and target. Considering all the possible combinations, we end up with six different possible industrial asymmetries. Our results indicate that, with respect to the baseline case, it is more likely that a Finance firm acquires a Manufacturing firm (coefficient estimated is 0.80), than the other way round (-0.83). This result is line with *a priori* expectations on the diversification aims that motivate acquisitions carried out by financial firms in Italy. Other highly significant asymmetries yielding to increases in the acquisition likelihood are found for the case in which the acquirer operates in the Services division and the target in the Finance division (0.72), or when the acquirer operates in the Manufacturing division and the target in the Trade division (1.09). On the contrary, the likelihood of partnering tend to decrease when the acquirer firm is in the Finance division and the target in the Trade division (-0.88), or when they are in the Services and Trade divisions (-0.73), respectively. A marginally significant positive (negative) effect is associated to the deals in which the acquirer is the Manufacturing (Services) sector and the target in the Services (Manufacturing) sector. All the other cases do not differ significantly from the baseline scenario. Positive asymmetric effects may be due to cross-sector acquisitions carried out to expand the firm's

production base in different sectors and in this way enhance the acquiring company's opportunities to exploit cross-sector synergies and benefit from the combination of diversified sets of resources.

8. Conclusions

This paper investigated the effect of a comprehensive set of proximities – geographical, industrial, organizational and institutional – on the probability that any two firms located in Italy engage in a M&A deal. Within a logistic rare event framework, we investigated 4,261 actual M&A deals completed over the period 2000-2011 and around 3.8 million potential M&A deals.

The first main finding was that all proximity dimensions (geographical, industrial, organizational and institutional) had a positive effect on the probability of making domestic M&A deals. The probability of an acquisition is positively influenced by all dimensions of proximity between bidder and target firms. This finding underlines the importance of geographical proximity as a key driver of M&A partnering (also at very short distances), even after controlling for the other forms of proximity. Especially industrial relatedness turned out to be a crucial driving force, but also institutional proximity at the province level, indicating that firms located in provinces with similar (and especially high) levels of social capital and institutional quality are more likely to engage in M&A deals. To our knowledge, this is the first study on the geography of domestic M&As adopting such a comprehensive proximity framework.

The second main finding was that we found some evidence of the asymmetric nature of proximity for the industrial, institutional and geographical dimensions. It was significantly more likely that a finance firm acquired a manufacturing firm than the other way around, the probability of making a M&A deal was significantly higher when the acquirer was private and the target was a listed firm than *vice versa*, and we found a lower probability of domestic M&A deals between Northern acquirers and Southern targets. This latter finding of asymmetry may be attributed to the institutional distance between the North and South of Italy where institutions are weak, and which results in a higher perceived level of risk and uncertainty associated with acquisitions in the South by firms from the Northern part of Italy. However, we could not find the existence of asymmetric effects of social capital and quality of institutions at the province level on domestic M&A deals: the probability of acquisition was not significantly higher when the acquirer was located in a province with a high level of social capital (or high quality of institutions) and the target was located in a province with a low social capital (or low quality of institutions), than *vice versa*[15].

[15] We only investigated the involvement of domestic firms in M&As, not foreign firms in our analyses, due to data availability. Future research could develop an interesting comparison between domestic and foreign firms because

Overall, these findings on asymmetry in M&A deals show that the effects of proximity cannot be investigated regardless of direction, an issue to which the proximity literature has drawn little attention so far. Our paper made only a first explorative step, as our findings raise a number of issues which call for further investigation. First, we need systematic theoretical explanations for why we expect particular asymmetric relations to occur. We proposed a tentative institutional framework, but more systematic theoretical work needs to be undertaken. This would clearly enrich our understanding of how proximities impact on economic relationships and regional development (see Balland et al., 2012). Second, we are in need of more empirical studies on M&A and other types of economic interactions that test systematically these asymmetric effects. This is absolutely a crucial next step in the further development and refinement of the proximity approach in economic geography. Third, our analyses on asymmetry in the various proximity dimensions have been rather explorative in nature, which applies especially to the study of industrial asymmetry. We had no *a priori* theoretical expectations in which directions asymmetry would show up between particular industries, but our findings clearly show that some industrial asymmetries do matter. But we are not only in need of more theory on asymmetric proximities, but also in need for better indicators. In this latter respect, one could link to the literature on industrial relatedness which assesses the extent to which industries are skill related (Neffke and Henning, 2013) or product related (Boschma et al., 2012). Here, we expect asymmetries between industries to occur, like skills used in one industry (like computer hardware) might be very relevant for another industry (like software), but not necessarily the other way around. This skill asymmetry across industries might affect the probability of firms in one industry to acquire firms in the other industry, but not *vice versa*. Such analyses could provide insightful and additional evidence on the importance of asymmetries along the industrial dimension that would be more theoretically informed.

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symmetric and asymmetric effects on M&As deals could work out differently for them. For instance, would foreign firms from countries with weak institutions be more inclined to take over firms in the South of Italy because of institutional proximity? And would foreign firms from countries with high social capital be more inclined to acquire domestic firms in Italian regions with low social capital than the other way around (i.e. foreign firms from countries with low social capital acquiring domestic firms in Italian regions with high social capital)?

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Appendix. Variable definitions

Dependent variable	
Y	dummy = 1 if the two firms have completed a domestic M&A; = 0 otherwise
Interaction dummies between acquirer and target firm in each M&A deal	
Spatial proximity	
Inv_dist	inverse of the distance in km between partners cities (log)
ID_intra_city	dummy = 1 if the highest degree of co-location is the city
ID_intra_lls	dummy = 1 if the highest degree of co-location is the local labour system
ID_intra_prov	dummy = 1 if the highest degree of co-location is the province
ID_intra_reg	dummy = 1 if the highest degree of co-location is the region
ID_inter_reg	dummy = 1 if are located in different regions
Technological proximity	
ID_intra_SIC4	dummy = 1 if the highest degree of industrial relatedness is at SIC4
ID_intra_SIC3	dummy = 1 if the highest degree of industrial relatedness is at SIC3
ID_intra_SIC2	dummy = 1 if the highest degree of industrial relatedness is at SIC2
ID_intra_SIC1	dummy = 1 if the highest degree of industrial relatedness is at SIC1
ID_inter_SIC1	dummy = 1 if they operate in different divisions
Organisational proximity	
ID_intra_group	dummy = 1 if acquirer and target have the same ultimate parent company
Institutional proximity	
ID_status	dummy = 1 if acquirer and target have the same institutional status
ID_listed	dummy = 1 if acquirer and target are listed companies
ID_private	dummy = 1 if acquirer and target are private firms
Acquirer experience	
D_A_exp3	dummy = 1 if the aquiror has done other deals in the previous three years
Individual characteristics of acquirer or target firm	
D_listed	dummy = 1 if firm status is listed in the stock exchange
D_private	dummy = 1 if firm status is private
D_government	dummy = 1 if firm status is governmental organisation
D_subsidiary	dummy = 1 if firm status is subsidiary
D_indep	dummy = 1 if firm is independent
D_fo	dummy = 1 if firm is foreign owned
D_north	dummy = 1 if firm is located in northern Italy
D_centre	dummy = 1 if firm is located in central Italy
D_south	dummy = 1 if firm is located in southern Italy
D_SIC1 division	10 dummies, each dummy = 1 when firm economic activity is in the relevant division (see Table 4 for the list)
SocCap	Social capital level of the province where the firm is located. For each province the social capital indicator is obtained as the average of 4 standardized indicators on newspapers reading, blood donations, election participation, members of sport associations (source: Roberto Cartocci, 2007)
RuleLaw	Rule of law level of the province where the firm is located. For each province the rule of law indicator is based on information on crimes against property, crimes reported, trial times, magistrate productivity, submerged economy, tax evasion. Higher values correspond to better outcomes (source: Nifo and Vecchione, 2013)
Provincial level proximity	
SocCap_proximity	opposite of the absolute difference between the social capital level of the provinces where the acquirer and target firm is located.
RuleLaw_proximity	opposite of the absolute difference between the rule of law level of the provinces where the acquirer and target firm is located.
D_high_SC	dummy = 1 if both the acquirer and the target firm are located in provinces with a level of social capital higher the second tercile of the indicator distribution
D_high_RL	dummy = 1 if both the acquirer and the target firm are located in provinces with a level of the rule of law indicator higher than the second tercile of its distribution

Source: Own calculations on SDC Platinum M&A firm data (Thomson Reuters)

Appendix. Variable definitions *(continued)*

Asymmetric interaction dummies between acquirer and target firm in each M&A deal

ID_An_Ts	dummy = 1 if acquirer is located in the north and target in the south
ID_As_Tn	dummy = 1 if acquirer is located in the south and target in the north
ID_Ahsc_Tlsc	dummy = 1 if acquirer is located in a province with a high social capital level and the target in a province with a low social capital level*
ID_Alsc_Thsc	dummy = 1 if acquirer is located in a province with a low social capital level and the target in a province with a high social capital level*
ID_Ahrl_Tlrl	dummy = 1 if acquirer is located in a province with a high rule of law level and the target in a province with a low rule of law level*
ID_Alrl_Thrl	dummy = 1 if acquirer is located in a province with a low social capital level and the target in a province with a highsocial capital level*
ID_Alis_Tpriv	dummy = 1 if acquirer is listed and target is private
ID_Apriv_Tlis	dummy = 1 if acquirer is private and target is listed
ID_Afin_Tman	dummy = 1 if acquirer is in finance and target is in manufacturing
ID_Aman_Tfin	dummy = 1 if acquirer is in manufacturing and target is in finance
ID_Afin_Tser	dummy = 1 if acquirer is in finance and target is in services
ID_Aser_Tfin	dummy = 1 if acquirer is in services and target is in finance
ID_Aman_Tser	dummy = 1 if acquirer is in manufacturing and target is in services
ID_Aser_Tman	dummy = 1 if acquirer is in services and target is in manufacturing
ID_Afin_Ttrade	dummy = 1 if acquirer is in finance and target is in trade (wholesale+retail trade)
ID_Atrade_Tfin	dummy = 1 if acquirer is in trade and target is in finance
ID_Aman_Ttrade	dummy = 1 if acquirer is in manufacturing and target is in trade
ID_Atrade_Tman	dummy = 1 if acquirer is in trade and target is in manufacturing
ID_Aservices_Ttrade	dummy = 1 if acquirer is in services and target is in trade
ID_Atrade_Tservices	dummy = 1 if acquirer is in trade and target is in services

* A high level of social capital (or rule of law) is a level higher than the second tercile of the indicator distribution
A low level of social capital (or rule of law) is a level lower than the first tercile of the indicator distribution

Source : Own calculations on SDC Platinum M&A firm data (Thomson Reuters)

Table 1. M&A sampling criteria, 2000-2011

Total M&A announced in Italy	11303
international	4936
domestic	6367
domestic uncompleted	1217
domestic completed	5150
minus missing target city	194
minus missing acquirer city	227
minus undefined acquirer	468
M&A considered	4261
year 2000	363
year 2001	349
year 2002	213
year 2003	319
year 2004	285
year 2005	396
year 2006	396
year 2007	407
year 2008	464
year 2009	386
year 2010	359
year 2011	324

Table 2. M&A deals per firms spatial location

	Acquirer		Target	
	num.	%	num.	%
North	3237	76.0	3035	71.2
Centre	814	19.1	852	20.0
South	210	4.9	374	8.8
Total	4261	100.0	4261	100.0

Table 3. M&A deals per firms status

	Acquirer		Target	
	num.	%	num.	%
Private	1753	41.1	1944	45.6
Subsdiary	1346	31.6	1847	43.3
Listed	1050	24.6	367	8.6
Government	60	1.4	27	0.6
Joint Venture	52	1.2	76	1.8
Total	4261	100.0	4261	100.0

Note: private include also investors

Table 4. M&A deals per SIC division

	Acquirer		Target	
	num.	%	num.	%
A Agriculture	16	0.4	16	0.4
B Mining	26	0.6	29	0.7
C Construction	85	2.0	77	1.8
D Manufacturing	1055	24.8	1317	30.9
E Transp., Comm., Energy, Sanitary Serv.	621	14.6	711	16.7
F Wholesale Trade	95	2.2	124	2.9
G Retail Trade	194	4.6	236	5.5
H Finance, Insurance, Real Estate	1597	37.5	969	22.7
I Services (personal and business)	542	12.7	768	18.0
J Public Administration	30	0.7	14	0.3
Total	4261	100.0	4261	100.0

Table 5. M&A deals for Acquirer-Target interaction dummies

Variable	num.	%
Spatial proximity		
ID_intra_city	934	21.9
ID_intra_lls	208	4.9
ID_intra_prov	119	2.8
ID_intra_reg	489	11.5
ID_inter_reg	2511	58.9
Technological proximity		
ID_intra_SIC4	1528	35.9
ID_intra_SIC3	183	4.3
ID_intra_SIC2	329	7.7
ID_intra_SIC1	671	15.7
ID_inter_SIC1	1550	36.4
Organisational proximity		
ID_intra_group	468	11.0
Institutional proximity		
ID_same_status	1631	38.3
ID_listed	164	3.8
ID_private	899	21.1
Acquirer experience		
D_A_exp_3y	1182	27.7
D_A_exp_5y	1288	30.2

See Appendix for the defintions of the variables

Table 6. Determinants of the probability of M&A deals, baseline model and robustness

Logit models - prior correction for rare events

	1 2001-10	2 2001-10	3 2001-10	4 2003-10	5 2001-08	6 2009-10
Spatial proximity						
geographic distance (inverse)	0.260 ***	0.178 ***		0.193 ***	0.170 ***	0.215 ***
	(0.009)	*(0.014)*		*(0.016)*	*(0.016)*	*(0.033)*
same region			0.551 ***			
			(0.080)			
same province			1.202 ***			
			(0.168)			
same local labour system			0.654 ***			
			(0.124)			
same city			1.007 ***			
			(0.084)			
Technological proximity						
same division (SIC1)		0.948 ***	0.947 ***	0.878 ***	0.932 ***	1.052 ***
		(0.064)	*(0.064)*	*(0.072)*	*(0.071)*	*(0.151)*
same major group (SIC2)		2.338 ***	2.333 ***	2.267 ***	2.377 ***	2.169 ***
		(0.096)	*(0.096)*	*(0.105)*	*(0.104)*	*(0.243)*
same industry group (SIC3)		2.826 ***	2.842 ***	2.925 ***	2.817 ***	2.825 ***
		(0.140)	*(0.140)*	*(0.159)*	*(0.153)*	*(0.349)*
same industry (SIC4)		4.082 ***	4.076 ***	4.212 ***	3.992 ***	4.454 ***
		(0.078)	*(0.078)*	*(0.088)*	*(0.087)*	*(0.187)*
Organisational proximity						
same group		4.347 ***	4.322 ***	4.501 ***	4.246 ***	4.985 ***
		(0.253)	*(0.254)*	*(0.283)*	*(0.262)*	*(1.104)*
Institutional proximity						
both listed		0.415 **	0.407 **	0.487 **	0.542 ***	0.046
		(0.198)	*(0.197)*	*(0.229)*	*(0.216)*	*(0.527)*
both private		-0.232 ***	-0.232 ***	-0.183 *	-0.305 ***	0.043
		(0.093)	*(0.093)*	*(0.102)*	*(0.104)*	*(0.211)*
Acquirer's previous experience - 3 years				-0.025		
				(0.059)		
Provincial level proximities						
social capital proximity		0.054 ***	0.044 ***	0.060 ***	0.053 ***	0.056 *
		(0.015)	*(0.015)*	*(0.017)*	*(0.017)*	*(0.035)*
social capital proximity*D_high_SC		0.110 ***	0.105 **	0.116 **	0.117 **	0.081
		(0.044)	*(0.044)*	*(0.049)*	*(0.048)*	*(0.103)*
rule of law proximity		1.358 ***	1.095 ***	1.113 ***	1.373 ***	1.231 *
		(0.291)	*(0.293)*	*(0.318)*	*(0.320)*	*(0.714)*
rule of law proximity*D_high_RL		1.793 **	1.821 **	2.035 **	2.049 **	0.699
		(0.864)	*(0.868)*	*(1.014)*	*(0.963)*	*(1.987)*
Estimated probability Y=1|X at median values (%)	0.09	0.13	0.12	0.14	0.15	0.12
Observations	21444	21444	21444	18072	16974	4470

See Appendix for the definitions variables. Observations: 21444. Proportion of ones:zeros observations equal to 1:5

All models include a constant and acquirer and target individual controls for status (listed, private, government), independent organization, foreign ownership, SIC1 division, geographic location, social capital and rule of law levels for the province where the firm is located

The variable *D_high_SC* (*D_high_RL*) is a dummy variable which takes value of 1 when both the acquirer and the target firm are located in provinces with a level of social capital (rule of law) higher than the second tercile of the distribution. Geographic distance is log-transformed

Robust standard errors in parenthesis. Significance level *** 1%, ** 5%, *10%

Table 7. Effects of proximities on the probability of M&A deals

All changes are equal to one standard deviation and are measured with respect to the median values

From Model 2 Table 6: Prob (Y=1|X)=0.13%	**standard deviation**	**absolute effect**	**percentage change in probability**
Spatial proximity			
geographic distance	230.2	0.00015	11.5
same region*	0.277	0.00020	16.5
same province*	0.108	0.00017	14.0
same local labour system*	0.170	0.00014	11.6
same city*	0.306	0.00044	36.4
Technological proximity			
same division (SIC1)	0.378	0.00056	43.1
same major group (SIC2)	0.173	0.00065	50.0
same industry group (SIC3)	0.112	0.00048	36.9
same industry (SIC4)	0.260	0.00244	187.7
Organisational proximity			
same group	0.137	0.00105	80.8
Institutional proximity			
both listed	0.145	0.00008	6.2
both private	0.412	-0.00012	-9.2
Provincial level proximities			
social capital[+]	--	0.00024	18.5
rule of law[+]	--	0.00028	21.5

All effects are calculated by the Bayesian method and are significant at the 5% significance level

Proportion of ones:zeros observations equal to 1:5

* The effect is calculated on the basis of Model 3 in Table 6

[+] The value reported includes the effect of both social capital (or rule of law) terms included in the regression models

Table 8. The asymmetric effect of proximities on the probability of M&A deals

Logit models - prior correction for rare events

	1	2	3	4
Spatial proximity				
geographic distance (inverse)	0.176 ***	0.177 ***	0.178 ***	0.178 ***
	(0.014)	*(0.014)*	*(0.014)*	*(0.014)*
Technological proximity				
same division (SIC1)	0.946 ***	0.948 ***	0.948 ***	0.947 ***
	(0.064)	*(0.064)*	*(0.064)*	*(0.064)*
same major group (SIC2)	2.332 ***	2.341 ***	2.337 ***	2.339 ***
	(0.095)	*(0.096)*	*(0.096)*	*(0.096)*
same industry group (SIC3)	2.824 ***	2.829 ***	2.824 ***	2.832 ***
	(0.141)	*(0.140)*	*(0.141)*	*(0.141)*
same industry (SIC4)	4.082 ***	4.083 ***	4.082 ***	4.080 ***
	(0.078)	*(0.078)*	*(0.078)*	*(0.078)*
Organisational proximity				
same group	4.342 ***	4.337 ***	4.343 ***	4.357 ***
	(0.253)	*(0.253)*	*(0.253)*	*(0.253)*
Institutional proximity				
both listed	0.417 **	0.416 **	0.416 **	0.905 ***
	(0.198)	*(0.198)*	*(0.198)*	*(0.266)*
both private	-0.233 ***	-0.233 ***	-0.233 ***	-0.135
	(0.093)	*(0.093)*	*(0.093)*	*(0.107)*
Provincial level proximities				
social capital proximity	0.047 ***	0.062 ***	0.052 ***	0.054 ***
	(0.016)	*(0.017)*	*(0.015)*	*(0.015)*
social capital proximity*D_high_SC	0.115 ***	0.104 ***	0.103 **	0.110 ***
	(0.044)	*(0.044)*	*(0.045)*	*(0.044)*
rule of law proximity	1.439 ***	1.359 ***	1.227 ***	1.358 ***
	(0.294)	*(0.290)*	*(0.328)*	*(0.290)*
rule of law proximity*D_high_RL	1.772 **	1.928 **	1.994 **	1.750 **
	(0.868)	*(0.867)*	*(0.895)*	*(0.865)*
Asymmetric effects				
A_north - T_south	-0.667 ***			
	(0.172)			
A_south - T_north	0.188			
	(0.246)			
A_high Soc Cap - T_low Soc Cap		0.179		
		(0.113)		
A_low Soc Cap - T_high Soc Cap		-0.016		
		(0.117)		
A_high Rule Law - T_low Rule Law			-0.081	
			(0.097)	
A_low Rule Law - T_high Rule Law			-0.047	
			(0.110)	
A_private - T_listed				0.773 ***
				(0.243)
A_listed - T_private				0.051
				(0.133)
Estimated probability Y=1|X	0.13	0.13	0.13	0.14

See Appendix for the definitions variables. Period: 2001-2010. Observations: 21444. Proportion of ones:zeros observations equal to 1:5

All models include a constant and acquirer and target individual controls for status (listed, private, government), independent organization, foreign ownership, SIC1 division, geographic location, social capital and rule of law levels related to the province where the firm is located

The variable *D_high_SC* (*D_high_RL*) is a dummy variable which takes value of 1 when both the acquirer and the target firm are located in provinces with a level of social capital (rule of law) higher than the second tercile of the distribution. Geographic distance is log-transformed

Robust standard errors in parenthesis. Significance level *** 1%, ** 5%, *10%

Table 8. The asymmetric effect of proximities on the probability of M&A deals *(continued)*

Logit models - prior correction for rare events

	5	6	7	8	9	10
Spatial proximity						
geographic distance (inverse)	0.177 ***	0.178 ***	0.178 ***	0.177 ***	0.178 ***	0.178 ***
	(0.014)	*(0.014)*	*(0.014)*	*(0.014)*	*(0.014)*	*(0.014)*
Technological proximity						
same division (SIC1)	1.002 ***	0.984 ***	0.952 ***	0.952 ***	0.997 ***	0.938 ***
	(0.069)	*(0.066)*	*(0.068)*	*(0.065)*	*(0.066)*	*(0.064)*
same major group (SIC2)	2.365 ***	2.370 ***	2.339 ***	2.347 ***	2.378 ***	2.326 ***
	(0.098)	*(0.097)*	*(0.098)*	*(0.096)*	*(0.097)*	*(0.096)*
same industry group (SIC3)	2.839 ***	2.863 ***	2.818 ***	2.837 ***	2.857 ***	2.803 ***
	(0.142)	*(0.141)*	*(0.143)*	*(0.141)*	*(0.142)*	*(0.141)*
same industry (SIC4)	4.111 ***	4.119 ***	4.082 ***	4.080 ***	4.121 ***	4.070 ***
	(0.081)	*(0.080)*	*(0.080)*	*(0.079)*	*(0.079)*	*(0.078)*
Organisational proximity						
same group	4.340 ***	4.360 ***	4.344 ***	4.337 ***	4.353 ***	4.360 ***
	(0.251)	*(0.254)*	*(0.253)*	*(0.253)*	*(0.256)*	*(0.255)*
Institutional proximity						
both listed	0.410 **	0.411 **	0.411 **	0.410 **	0.422 **	0.416 **
	(0.198)	*(0.198)*	*(0.198)*	*(0.198)*	*(0.199)*	*(0.198)*
both private	-0.232 **	-0.232 ***	-0.230 **	-0.230 **	-0.232 ***	-0.230 **
	(0.093)	*(0.093)*	*(0.093)*	*(0.093)*	*(0.093)*	*(0.093)*
Provincial level proximities						
social capital proximity	0.055 ***	0.054 ***	0.054 ***	0.054 ***	0.054 ***	0.054 ***
	(0.015)	*(0.015)*	*(0.015)*	*(0.015)*	*(0.015)*	*(0.015)*
social capital proximity*D_high_SC	0.108 **	0.109 **	0.110 ***	0.112 ***	0.110 ***	0.110 ***
	(0.044)	*(0.044)*	*(0.044)*	*(0.044)*	*(0.044)*	*(0.044)*
rule of law proximity	1.367 ***	1.353 ***	1.355 ***	1.363 ***	1.374 ***	1.362 ***
	(0.291)	*(0.291)*	*(0.291)*	*(0.291)*	*(0.291)*	*(0.291)*
rule of law proximity*D_high_RL	1.799 **	1.787 **	1.777 **	1.839 **	1.805 **	1.772 **
	(0.867)	*(0.864)*	*(0.865)*	*(0.865)*	*(0.865)*	*(0.865)*
Asymmetric effects						
A_finance - T_manufacturing	0.798 ***					
	(0.112)					
A_manufacturing - T_finance	-0.848 ***					
	(0.245)					
A_finance - T_services		-0.131				
		(0.132)				
A_services - T_finance		0.720 ***				
		(0.231)				
A_manufacturing - T_services			0.295 *			
			(0.159)			
A_services - T_manufacturing			-0.332 *			
			(0.188)			
A_finance - T_trade				-0.883 ***		
				(0.194)		
A_trade - T_finance				0.221		
				(0.231)		
A_manufacturing - T_trade					1.089 ***	
					(0.183)	
A_trade - T_manufacturing					-0.166	
					(0.213)	
A_services - T_trade						-0.728 **
						(0.333)
A_trade - T_services						-0.403
						(0.305)
Estimated probability Y=1|X	0.15	0.13	0.13	0.13	0.13	0.13

See Appendix for the definitions variables. Period: 2001-2010. Observations: 21444. Proportion of ones:zeros observations equal to 1:5

All models include a constant and acquirer and target individual controls for status (listed, private, government), independent organization, foreign ownership, SIC1 division, geographic location, social capital and rule of law levels related to the province where the firm is located

The variable *D_high_SC* (*D_high_RL*) is a dummy variable which takes value of 1 when both the acquirer and the target firm are located in provinces with a level of social capital (rule of law) higher than the second tercile of the distribution. Geographic distance is log-transformed

Robust standard errors in parenthesis. Significance level *** 1%, ** 5%, *10%