

Spatial distance and economic performance in European multi-unit firms

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Managers of multi-unit firms face a trade-off between the advantages of spatial proximity for the control and monitoring of business units and the need to acquire specific skills, resources and technologies in distant locations (Chakrabarti and Mitchell, 2013). Spatial proximity facilitates communication between the headquarters and its subsidiaries, enhancing the effectiveness of control and reducing monitoring costs. As a result, a geographic spread is expected to be negatively related to economic performance (Gao, Ng and Wang, 2008; García and Norli, 2012).

Most of the literature on the performance of multi-unit firms focuses on the impact of technological diversification (Ferris, Kim, & Kitsabunnarat, 2003; Hamelin, 2011; Purkayastha, Manolova, & Edelman, 2012; Singh, Nejadmalayeri, & Mathur, 2007). Less attention has been paid to how the geographic spread of business units, i.e. the distance between headquarters and subsidiaries, affects the performance of the latter. A few studies examine the hypothesis that spatial proximity reduces communication costs and facilitates monitoring, thus enhancing the organization and performance of controlled businesses in multi-unit firms (Giroud, 2013; Rail, Charnoz, Lelarge, & Trevien, 2018).

Moreover, there is a lack of quantitative studies measuring the impact of the distance between headquarters and subsidiaries on their performance and how geographical and technological distance interact. As a result, the aim of this paper is to analyse how the spatial distance between headquarters and the units it controls influences their profitability. We expect the performance of a subsidiary to be negatively influenced by physical distance as a result of the reduced efficacy in coordinating the two units and the higher costs for monitoring and control activities. We also expect this effect to be increased by technological distance which is assumed to impair the coordination and communication activities between the subsidiary and its headquarters.

The underlying idea is that the greater the geographical distance, the higher the cost of monitoring and control, the fewer the synergies and the less frequent the knowledge/information exchange between different units. Moreover, spatial proximity facilitates the coordination and exchange of resources between the headquarters and its units. These effects are mitigated by technological proximity (two units in the same or

related industries) and increased by the technological distance between the two units. Indeed, technological distance is expected to make communication and coordination more difficult, raising costs and impairing the efficacy of monitoring and control activities.

Most of the literature on the geographic spread of firms relies on the number of different regions/states in which the firm operates (Gao, Ng and Wang, 2008; García and Norli, 2012; Platikanova and Mattei, 2016; Santangelo and Stucchi, 2018). This paper uses a measure of geographic dispersion based on the physical distance (in Km) between headquarters and subsidiaries. We also consider the travel time between each headquarters and its subsidiary, since a subsidiary may be located far in terms of Km but close in terms of travel time. The technological distance between the headquarters and its subsidiaries is measured in or outside the same sector.

Finally, the decision to spread its units may be influenced by country-institutional factors.

To analyse how the physical distance between headquarters and their subsidiaries affects the economic performance of the latter, the business group is taken as the unit of analysis. Specifically, we built a database of European business groups in 2016, based on ownership information for joint stock companies and their subsidiaries, taken from the Bureau Van Dijk Amadeus database. Only groups with headquarters and their subsidiaries located in the European continent are included.

Our dataset contains information on 40,946 EU business groups controlling about 107,000 firms located in Europe. We take into account the dyads between the subsidiaries and their headquarters, since the main aim of this paper is to investigate the empirical relationship between the geographical spread of the units in a business group and the economic performance of their subsidiaries, also considering institutional and technological differences between the headquarter and its subsidiary. The 64.5% of subsidiaries are located in the same country of their headquarter. However, about 105,000 dyads headquarter-subsidiary belong to the European Union, the remaining dyads may have one of the two units located on the European continent but not member of the European Union in the year 2016.

This study including EU multi-unit firms located in different country considers the potential effects of different institutional and country factors.

As measure of economic performance, we use the average return on assets (ROA) for each subsidiary in the years 2017 and 2018. As is well-known, ROA is based on operating profits, setting aside the consequences of specific financing or tax policy adopted by the headquarters for its business units.

Our main explanatory variable is distance_i. This variable is measured using two different measures. The first is the physical distance, the second one is the travel time.

Moreover, we include a set of controls at industry, firm, regional and country level.

At industry level, we use, as main control variable, the technological proximity between the headquarters and their subsidiaries. To measure it we employ a dummy variable (Tech proximity) with value 1 if the headquarter and the subsidiary belong to a same two-digit industry and 0 otherwise. We expect that the technology proximity between headquarter and its subsidiary positively effects the economic performance of the latter.

At firm level, we consider subsidiary size (measured as the natural logarithm of turnover) and its age (computed as the difference between the year 2016 and the year in which the firm was founded). We also include in our main econometric specification the *Minority_shareholders* variable which measures the share of equity in the subsidiary by minority shareholders. The stake of minority shareholders is obtained as the total less the headquarters' controlling interest. This variable captures the presence and the relevance of minority shareholders.

To account for geographic heterogeneity, we include a set of regional dummies at NUTS-1 where the geographic area is identified according to the (administrative) EU region where each subsidiary is located. These 97 regional dummies capture the differences in European regions in terms of industrialization, institutional quality, social capital, political and social values, and so on. Furthermore, at regional level we include the GDP per-capita at current market prices in the year 2016 by NUTS 2 regions (measured as the ratio between GDP and population of each region to which the subsidiary belongs to) to capture the aggregate labour productivity of each region and therefore indirectly to measure its labour cost (assuming that markets are competitive). Our expectation is that if the per capita GDP is lower, the economic performance of subsidiaries will be higher, since these units may exploit lower labour costs. We also include in our equation a variable measuring the economic density at NUTS2 regions in the year 2016, calculated as the ratio between the population of each region to which the subsidiary belongs to and its area (Km²). Regions with a lower economic density will exhibit less congestion costs thus generating positive effects on the economic performance of subsidiaries.

At country level, we consider the Corporate tax rate variable, which is a tax on the profits of a corporation (in this case of subsidiaries). The taxes are paid on a company's operating earnings, which is the revenue minus cost of goods sold, general and administration expenses, selling and marketing, research and development, depreciation, and other operating costs. Corporate tax rates vary widely by country. There are some countries considered to be tax havens due to their low rates. Corporate taxes can be lowered by various deductions, government subsidies, and consequently the effective corporate tax rate payed is usually lower than the statutory rate, the stated rate before any deductions. In this case, the discussion may be more tangled. Consequences due to the corporate tax rate may influence more the initial decision of the headquarter where opening or locating a new unit

rather than the performance of a previously established firm.

Finally, we include a dummy called Schengen country which is equal to 1 if the subsidiary's country belongs to Schengen Area, otherwise is equal to 0. The Schengen Agreement is a treaty which led to the creation of Europe's Schengen Area, in which internal border checks have largely been abolished and people are free of movement between country members of this Area. We expect a positive effect of this variable on subsidiaries' performance given the abolition of barriers to the movement of people for those country members of Schengen Area.

The econometric analysis is estimated using an OLS estimator. However, since any potential endogeneity problem for our main explanatory variables- i.e., our two measures of distance - cannot be excluded, we re-estimate all specifications using an Instrumental Variable (IV) approach. We adopt two different instrumentation strategies. The first uses "external" instruments, while the second is based on Lewbel's (2012) approach.

The empirical analysis confirms our expectations. The geographic spread in terms of physical distance or travel time has a negative impact on the economic performance of subsidiaries. Subsidiaries perform better when they are closer to headquarters. We also find the same negative relation between distance and performance when considering the technological distance between the headquarters and its subsidiaries. The country and institutional factors play different roles in the proximity or dispersion of units from its headquarter. Finally, the belonging to European Union and in particular the membership to the Schengen agreement may facilitate the geographic dispersion of business groups.

Our empirical results may have several management and policy implications. When firms decide to acquire or set-up business units in distant locations managers are expected to balance the costs and benefits of such decisions. They must consider the trade-off between the advantages of growth and diversification, which may lead to the increased geographical spread of controlled units, with higher coordination and monitoring costs. In practice it seems that managers undervalue these costs and the loss of efficacy in controlling distant units, hence the negative relation between geographical distance and performance. These problems are mitigated when the distant unit is in the same sector as headquarters or in a vertically related sector. Indeed, the technological proximity of headquarters to its business units facilitates coordination and control; hence the positive effect on the performance of the distant units.

This paper also has some interesting policy implications. First, spatial proximity is not only relevant, as suggested by the literature on industrial clusters/districts, for firms operating in the same industry or supply chain but also for business units in the same group. This means that public interventions specifically designed to promote spatial agglomeration within a region/local system should be accompanied by actions aimed at fostering the reduction of

travel time: for example, through the development of new infrastructure, which should not only be physical, such as high-speed trains, but also digital, like broadband. These investments in infrastructural endowments can reduce communication costs, facilitating monitoring and enhancing the organization and profitability of controlled businesses in multi-unit firms. Moreover, the belonging to the EU and the abolition of barriers for people may positively effect on the performance of units, overcoming typical obstacles of spatial distance.