Spatial patterns of territorial competitiveness: The role of peripherality, urbanization and physical geography

Federico Fantechi [a,*], Ugo Fratesi [b]

[a] *University of Palermo, DSEAS - Department of Economics, Business and Statistics, Via delle Scienze Ed.13, 90128, Palermo, Italy*
[b] *Politecnico di Milano, Department of Architecture, Built Environment and Construction Engineering, Piazza Leonardo da Vinci, 32, 20133, Milano, Italy*

1. Introduction

Competitiveness is a key feature of today's EU regional policies oriented to reduce the disparities between its territories. Despite being initially conceived as firm-related, since the 1990s the concept has frequently been applied to territorial units.

In the contemporary European policy framework, the concept of territorial or regional competitiveness is a central element for both the allocation and design of policies, with the double intent of nurturing and supporting those regions that are best competing in the international market and drive the least competitive ones towards more productive and competitive paths. This is especially relevant when looking at regional economic development and industrial policies, such as those included in the smart specialization strategy. Indeed, these are designed to foster *"the national or regional innovation strategies which set priorities in order to build competitive advantage by developing and matching research and innovation own strengths to business needs in order to address emerging opportunities and market developments in a coherent manner, while avoiding duplication and fragmentation of efforts"* (Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013, article 2).

Due to the conceptual and policy relevance of the concept, many instruments have been designed to measure and compare the territorial competitiveness of different regions, most notably the regional competitiveness index (RCI) computed by the EU Commission [1]. The RCI, as well as other indicators and composite indices in use, is a very powerful instrument, allowing us to account for multiple characteristics of a region and its industrial structure into a single measure comparable between EU regions. However, while these instruments are quite useful to compare different regions, they do not allow to discern differences in territorial competitiveness inside the same region because of lack of fine-grained enough data.

This becomes a relevant issue when we consider that the distributions of capital, infrastructure, and both geographical and social assets are highly differentiated inside a NUTS-2 region; the effect of different elements impacting the competitiveness of both firms and territories is highly localized [2].

In the attempt to provide evidence highlighting the presence of a heterogeneous distribution of territorial capital and policy needs within NUTS-2 regions, the approach proposed in this paper ascends from the consideration that the competitiveness of firms and territories are two facets of the same concept. Indeed, firms' competitiveness is strongly affected, if not determined, by the local context embedding them. A large set of elements influencing firms' competitiveness are, indeed, highly territorialized and unevenly distributed in space (e.g., infrastructure, human capital, skilled workers, and quality institutions). The combination of all these factors is now commonly known as territorial capital [2,3].

At the same time, it is the competitiveness of firms which provides regional economies the resources upon which to build sustainable development inside the regions, as it is possible to improve the standard of living for citizens enjoying higher salaries, to further public

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* Corresponding author.
E-mail addresses: federico.fantechi@unipa.it (F. Fantechi), ugo.fratesi@polimi.it (U. Fratesi).

investments thanks to levies, to attract more qualified workers and their human capital, to invest in greener and more environmentally sustainable technologies, push innovation forward, and to reinforce these positive trends with a cumulative path [4–11].

Building on the extensive literature on regional competitiveness and the insights provided by instruments such as the RCI, this work studies the spatial patterns of the intra-regional heterogeneity in territorial competitiveness in a large and competitive European NUTS-2 region: Lombardy, in Italy.

Lombardy is an excellent target for this research since it is one of the most productive and competitive regions in the EU and is considered the core engine of the Italian productive system, with consistently high scores in the Regional Competitiveness Index (RCI) at EU level and the highest ranking in the country; moreover, Lombardy is a densely populated (both by people and firms) large region, yet composed of a very differentiated territory.

To measure the competitiveness of sub-regional territories, the paper employs a novel counterfactual strategy to isolate the overall effect of different territories – characterised by different levels of territorial capital endowment – on firms' competitiveness from the effects produced by specific firms' characteristics or industry dynamics [12]. This is possible employing balance-sheet information from firm-level databases.

Such counterfactual design is applied alongside a Territorial Classification – especially developed for the case study – classifying each municipality in terms of urbanisation, accessibility and mountainous geography. By employing such classification, the paper is able to indirectly capture the non-homogeneous distribution of territorial competitiveness - within a NUTS-2 region - produced by different levels of urbanization and accessibility [13] measured through peripherality and mountainous geography. The study explores such intra-regional perspective of the spatial distribution of territorial competitiveness by addressing two main Research Questions:

1) Is territorial competitiveness homogeneously distributed within a NUTS-2 region?

Following both conceptual [2] and empirical [12,13] contributions, the study aims to show that territorial competitiveness is unevenly distributed in space within administrative NUTS-2 regions. This is quite relevant, especially in the perspective of European Cohesion policies, with EU structural funds usually deployed at NUTS-2 level, even if inside that scale the situation is not homogeneous but highly differentiated.

This first Research Question is addressed by measuring territorial competitiveness in a novel way, by analysing it through the impact it has on firms' competitiveness [12,14]. Different levels of competitiveness at the territorial level are detected, rather than from composite indicators, by isolating the overall effect of territorial assets from the effect of specific firms' characteristics; this means that the differences in firms' performance, after controlling for the latter, can only be due to where they are located and, therefore, when a significant difference of competitiveness is detected, this can be interpreted as being due to territorial characteristics of places, i.e. their territorial capital.

2) What is the role played by accessibility? I.e. how urbanisation, peripherality and geographical disadvantage impact the competitiveness of territories – their ability to provide a supportive environment to firms – within a large and overall competitive European region?

The second research question is important because, while there is an established consensus on the overall urban/rural dichotomy, in terms of regional competitiveness and economic performance, this study focuses on individuating much finer differences at a smaller territorial level. Recent literature suggests peripherality, declined via accessibility, urbanisation and difficult geography [15–17] as the main element driving

the uneven distribution of such territorial competitiveness. In the effort to move forward from a simple dichotomous conceptualisation of the urban/rural divide, this work aims to show intra-regional spatial patterns of territorial competitiveness and how peripherality shapes such uneven distribution within a large and competitive European NUTS-2 region.

The produced results confirm the complex role played by peripherality for the competitiveness of territories and - implying their implementation in conjunction with regional comparative metrics to inform a complete picture - can inform on the uneven distribution of territorial capital and competitiveness within specific NUTS-2 regions, providing novel and valuable information for decision making and policy implementation.

The rest of the paper is organized as follows: the next section (2) provides a concise presentation of the literature on the concept of competitiveness, its measurement, and the spatial differentials of competitiveness. The following section (3) presents the developed Territorial Classification and the applied methodology. Section 4 presents the results of the empirical analysis; Section 5 concludes with some reflections to be considered for policy and research.

2. Positioning and literature review

The concept of competitiveness is a central topic of discussion for both academics and policymakers. First applied to the analysis of firms and their comparative performance, since the early 1990s, the concept has also been employed to analyse territories - nations first, then regions and cities. It is with the seminal work of Porter [18] - which had studied competitiveness at the firm level before - that the concept was extended to analysis at the national level. The application of the concept of competitiveness to nations and, more generally, spatial units has been lengthily debated in the public policy debate, with critics led by Krugman [19,20] who considered that the view of countries as competing in the global arena as firms was misleading and leading to wrong economic policies. However, despite Krugman's criticisms, the concept has been largely applied to territorial contexts (often NUTS-2 administrative regions) both in research and policy. This because of the inherent differences between nations and regions and the consideration that competitiveness for regions is different than for nations, due to the absence of several macroeconomic adjustment mechanisms, thus making being competitive, for a region, a necessity to avoid exclusion and decline [21].

After the early 2000s, the regional science literature has mostly maintained this approach, seeing competitiveness as a process with a clear regional distinctiveness.

Regional competitiveness, in the prevailing contemporary approach, is "understood to refer to the presence of conditions that both enable firms to compete in their chosen markets and enable the value these firms generate to be captured within a particular region" [22] (p.2).

This concept, however, is not free from complications and caveats. For instance, policymakers tended to equate competitiveness with regional prosperity and productivity, while it should be considered part of a wider discourse on regional development [6]. Global and local forces are both at play, and therefore regional competitiveness cannot be simply considered as endogenous, as exogenous changes might radically change the advantage/disadvantage of a region. This also means that the internal and external dimensions of regional development need to be considered together and a good balance among them needs to be found to nurture viable local economic systems[23]. Moreover, there is still a too limited focus by the literature on the components of quality of life and well-being [5]. Another aspect which is still developing in the competitiveness literature, and which is gaining ground also as a field of study to see its impact on local prosperity, is that of environmental sustainability, which might lead to trade-offs with competitiveness for certain regions [24] and, a great spur to development for others [25]. The focus on firms by the policymakers, therefore, might be excessive

[6]. Also for these reasons, it is important to note a conceptual difference arising in recent literature, where competitiveness can be considered both at the level of firms or spatial units. The competitiveness of firms is normally assessed through various indicators of firm performance [26–28], in many cases coming from the firm balance sheets, in others from other aggregate indicators such as employment or revenues. Many studies rely on the simple productivity of labour (measured as GVA per employee) [29–31], while other studies adopt the more complex (to calculate), but also more encompassing, measure of total factor productivity [32–34]. Other indicators are also less often used, such as employment growth, GVA growth, profitability, etc [35–37].

On the other hand, the competitiveness of regions and cities is normally measured through composite indicators and indices. One of the most interesting earlier attempts is the one by Huggins [38]. His measurement for UK regions was empirically an advancement, but even more, it was conceptually interesting because it used indicators that belong to three phases of the competitiveness process, i.e., the inputs, the outputs, and the outcomes. More recently, several studies focused on the role of competitiveness on regional growth and development (R. [39–42]), and in connection with the application of European Cohesion policies [43–45].

The European Union itself started to benchmark the competitiveness of its regions against each other, creating the European Regional Competitiveness Index (RCI), which has been produced every three years starting in 2010, arriving now at the 5th edition [46].

Following this interest of the EU in regional competitiveness, the concept has been an important objective for policies and policy design. Despite the failure to achieve the Lisbon strategy objective of making the EU the most dynamic and competitive economy in the world by 2010, the reference to competitiveness is still a central topic in today's policy agenda within objectives related to smart growth.

As highlighted by both policy objectives and academic studies, competitiveness is a key element to surpass conventional approaches to rural development policies focusing too strongly on agriculture and traditional rural industries, with the result that rural and regional policies for economic growth are poorly integrated [47,48].

While today the need for more integrated regional policies, building on the economic strengths of regions and markets to help develop the competitiveness of rural regions, is agreed upon, the implementation of these policies is still partially limited by the available instruments. On the one hand, regional composite indices (such as the RCI) are very useful to compare regions and measure the overall strengths and weaknesses of a region in terms of competitiveness. At the same time, however, these composite indices tend to put a veil of fog around the internal differences of the regional territory. Studies have highlighted how, in terms of competitiveness, the influencing territorial factors are highly territorialized and unevenly distributed in space (e.g., infrastructure, human capital, skilled workers, and quality institutions) [21, 49] and how the effect of policy within administrative regions is not homogeneous [13].

While the overall link between larger endowments of territorial capital and the ability of territories to be competitive and support the local industrial substrate has been long conceptualised (Camagni, 2017; [2]), empirical works – looking at the impact of territorial capital on firms' performance – often focus on single aspects. Most notably, *human capital* and the access to a skilled pool of labour have attracted a general consensus regarding their role among scholars. The local availability of skilled and educated workers positively impacts firms in those regions [50]. Several other dimensions are shown to be correlated to positive impacts, although scholars still debate on its relevance and intensity, including *technological capital* [51], but also *natural, infrastructural, social* and *institutional capital* [52–57].

A large territorial endowment of these external factors – when met with endogenous factors such as the entrepreneurial capability of local actors [58] – is able to explain local (regional) competitiveness. Despite such a strong conceptualisation of the impact of capital endowment on territorial competitiveness, most literature and developed tools adopt a regional perspective analysing the phenomenon through administrative boundaries (e.g., NUTS-2 or NUTS-3) [59,3].

This paper argues that the regional level, as employed in the RCI, is often too large to represent the heterogeneous distribution of territorial capital within a specific European region [2,49,3,60]. As a consequence, providing metrics and a picture at the regional level is not enough to correctly advise policymakers in the implementation of policies. Alongside other studies highlighting the importance of determining the key local factors that influence the competitiveness of places (e.g. Ref. [61,62]), this paper positions itself to fill the still-existing gap between the necessities of policymakers and the capabilities of researchers to provide sufficiently detailed information.

The presented study is also largely influenced from the wide literature on the measurement of the benefits of agglomeration through its impact on firm performance. Within this literature, the interest relies on the effects of agglomeration on firm creation, employment growth, firm productivity, etc. ([15,16,63,64]; P. [65]). While the interest of this literature is normally on urban agglomeration, there are several studies exploring the shortage of attractiveness and competitiveness of peripheral areas due to their lack of geographical centrality and accessibility (e.g., Ref. [17,66,67]). Following this stream of research, this paper wants to analyse the full spectrum of the territorially-differentiated competitiveness inside the region. Moreover, only in some cases (e.g. Ref. [64]) does the literature on the effects of agglomeration look at industry-specific coefficients, while here the approach is systemic in this sense. While – recently – is emerging a common trend of research analysing territorial performances by aggregating firm-level data [32,36, 68], the methodology adopted here is a novel one – adopting a counterfactual methodology – which compares similar firms in different territories and should be able to overcome some of the selection and aggregation biases which needed to be addressed in the literature on agglomeration [69,70].

3. Identification strategy

The two Research Questions stated are addressed by measuring the differences in territorial competitiveness inside a specific NUTS-2 region using firm-level data and individuating the role played by the peripherality and accessibility of places.

Considering the empirical and data-driven nature of the developed territorialized competitiveness differentials, the authors opted to only include a single NUTS-2 region in the analysis. This is done to avoid dealing with other possible influencing factors and producing an over-complicated model, allowing to focus on the role played by peripherality and accessibility inside the region. The choice can be summarized by three main considerations [12]: i) administrative boundaries, which are especially important in the Italian context by holding administrative and selected legislative powers over several fields impacting the performance of firms and the development of the administrated territory; ii) regional cultures and social practice, which are also very differentiated between Italian regions due to a rich history of small independent states and city-states before the unification of Italy in the second part of the 19th century; iii) the very large industrial and economic gap existing in Italy between different regions, especially northern and southern ones.

The heterogeneous distribution of territorial capital is identified, empirically, by first classifying the territory in terms of accessibility and peripherality (Section 3.1) and then running a two-step matching algorithm (Section 3.2) to isolate territorial component of firms' competitiveness for firms located in different types of territories. The identification strategy is summarized in Fig. 1 below, the rest of the section will go in further detail of the methodological application of each step.
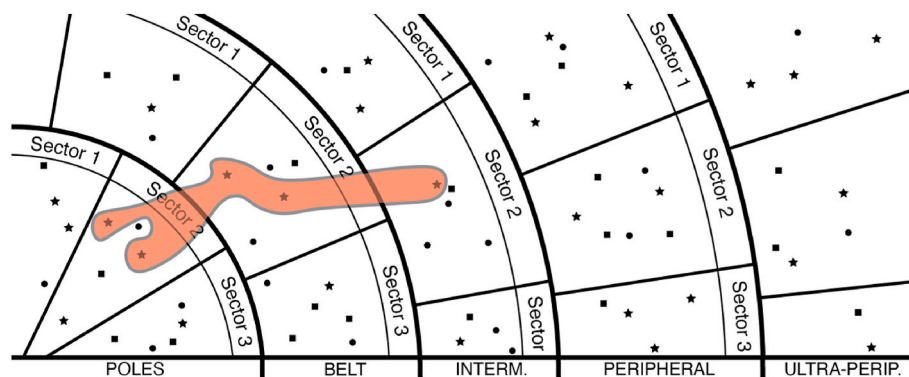
Fig. 1. Graphical representation of the Identification Strategy.

3.1. Study area description and Territorial Classification

Lombardy, in the northern part of Italy, is the selected NUTS-2 region for this study. Focusing on a single NUTS-2 region has the advantage of enclosing the study area inside its administrative borders, thus eliminating the need to manage and control for a variety of influencing effects (e.g., regional policies and industrial regulations, culture and social practices, macroeconomic dynamics) that – inside the same NUTS-2 region – can be considered invariant.

Lombardy is one of the largest regions in Italy and, by far, the most populated in terms of both population and economic activities [71]. Multiple reasons indicate the region is a perfect candidate for this study. First, Lombardy is considered a very competitive region (scoring higher than other Italian regions in the RCI) [1] often compared to northern European regions in terms of competitiveness and overall high levels of production for both industry and services, with a GDP PPS per capita of €39,200 in 2018 (against an average of €29,700 in Italy and €31,000 in the EU) [72]. Moreover, from a geographical point of view, the region is highly differentiated, ranging from vast flatlands (the Po Valley) to hills and mountainous areas, while none of these territories is directly connected to the sea (thus eliminating another possible influencing variable).

Inside this highly varied territory, one large metropolitan area, the city of Milan, can be found, which is not only the largest city of the region but also the leading economic centre of the country. Alongside the metropolitan area of Milan, there are also other large cities with different economic and social vocations and many medium and small cities.

A novel classification for the territories of the Lombardy region is created to pursue the aim of highlighting the effects of peripherality, urbanization, and mountainous geography – and generalize the role played by them in the competitiveness of different territories inside the region.

The starting point is accessibility, considering that the physical proximity to large infrastructures and services is considered to be a great advantage in terms of competitiveness. To measure accessibility, the Italian Inner Areas Classification (SNAI, Classificazione delle Aree Interne) [73] is the main source and main conceptual framework [74].

Inner areas are officially defined by the Italian Statistical Institute based on road accessibility to three main important services: railways stations, schools, and hospitals.[1] Within this classification, Municipalities are classified between: (i) poles, if they provide these services, (ii) belt if they are close to the locations where these services are provided,

(iii), intermediate areas, if they are further away, (iv) periphery if they are very far from the provision of services (more than 40 min by car).[2]

Following the SNAI, Lombardy is composed of 49 municipalities classified as "Poles of services" (for a total of 3.350.000 inhabitants), 974 municipalities classified as "Belt" (for a total of 5.590.000 inhabitants), 275 municipalities classified as "Intermediate" (for a total of 687.000 inhabitants) and 180 municipalities classified as "Peripheral" (for a total of 311475 inhabitants).

The second aspect is urbanization. Larger urban areas not only are advantaged in terms of agglomeration economies, but they also differ in terms of the opportunity to access specific services and networks. To measure different levels of urbanisation data on Italian Local Labor Systems are used. Municipalities that are capitals of provinces (administrative units at NUTS-3 level) are considered to be different from other poles, while belts belonging to the Milan Local Labour System are also considered to be different from other belts areas.

The third aspect is geographical, the presence of mountains, which could disadvantage specific areas not only in terms of physical accessibility but also in terms of operating costs [75]. For that, official data on the municipality's mountain degree are used to distinguish between intermediate and peripheral areas. While being peripheral or mountainous often produces the same differences, the distinction is relevant here due to the additional costs of being located in the mountains. Indeed, one thing is being located in a peripheral area, a completely different thing is being located in a peripheral mountainous area.

The developed Territorial Classification groups the 1.478 municipalities composing the region into 9 ordinated classes (and 4 macro-classes), and then each firm is assigned to a specific class based on the municipality in which they operate. The two-step counterfactual strategy (presented in the next section) will compare the competitiveness of firms located inside one of these classes with similar firms located in the other classes.

The classification is shown in Table 1, and Fig. 2. The four Inner Areas macro-classes – Poles, Belt, Intermediate, and Peripheral – are the starting points of the classification, to which information on LLS and mountainous territory is added. The resulting classification is composed of 9 mutually exclusive territorial classes. Urban Poles municipalities are subdivided into Milan city, other Administrative Capitals, and Other Poles. Belt municipalities are divided between those municipalities inside Milan's LLS (Milan's Belt) and Other Belts. Finally, both Intermediate and Peripheral municipalities are subdivided between mountainous and non-mountainous municipalities.

As shown in Fig. 2, the largest part of the regional territory is composed of belt areas, located in the large Po river's plain connecting a constellation of small and medium cities. The north-east part of the

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[1] Please refer to https://www.agenziacoesione.gov.it/strategia-nazionale-aree-interne/?lang=en for further details.

[2] The classification employed and described here is an adaptation of the original classification which includes 6 categories: Poles, Intermunicipal Poles, Belt, Intermediate, Peripheral, and Ultra-Peripheral.

Table 1
Territorial Classification and relative descriptive statistics.

|	N. Municipalities	Tot. Employees (2016–2017)	Tot. Local Units (2016–2017)	Tot. Inhabitants (2016–2017)
ALL POLES	49	1441957	332749	3352281
Milan	1	774277	167645	1348706
Adm Capitals (no Milan)	11	327631	88327	912723
Other Poles	37	340049	76777	1090852
BELT	974	1542009	353423	5593192
Milan's Belt	155	545260	120545	1855823
Other Belts	819	996749	232878	3737369
INTERMEDIATE	275	162860	43774	687999
Interm. not Mountain	234	153158	40106	633476
Interm. Mountain	41	9702	3668	54523
PERIPHERAL	180	81178	22724	311475
Periph. not Mountain	79	54704	13826	116133
Periph. Mountain	101	26474	8898	195342
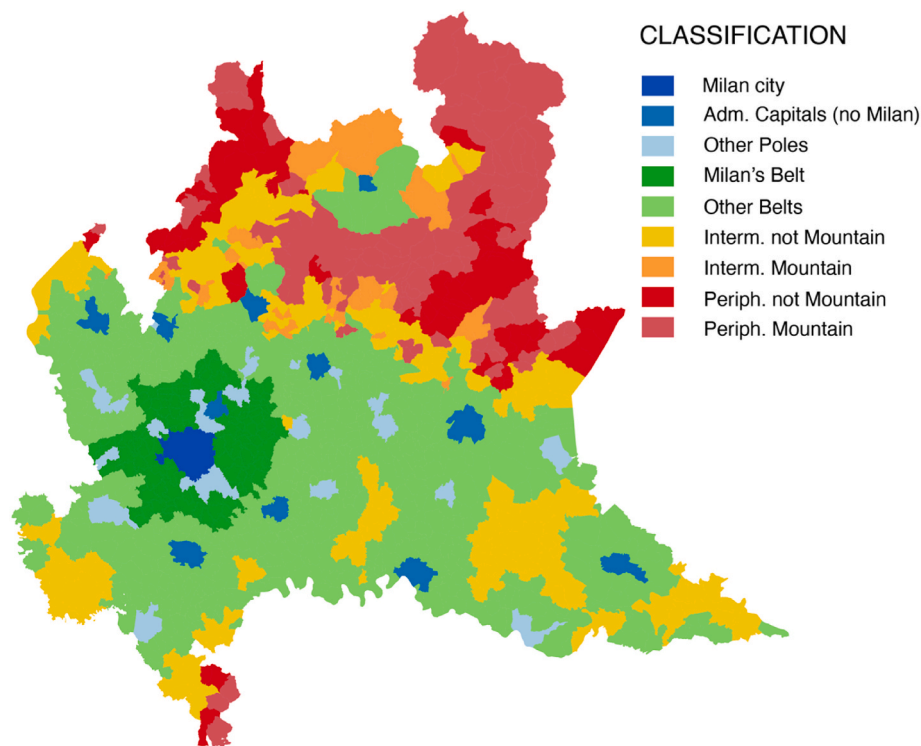
Fig. 2. Spatial distribution of the Territorial Classification.

region, mostly mountainous and further from the main transport routes, hosts the most peripheral areas.

3.2. A Two-step matching design

To capture the heterogeneity of territorial competitiveness over different classes of territory the study relies on a two-step matching design to compare the average performance of firms located in each specific class of peripherality to similar firms located in different contexts; following Fantechi and Fratesi [12] differences in territorial competitiveness, at the sub-regional level, are individuated via a two-step matching design [76] allowing to isolate the differential effects on the competitiveness of firms produced overall by territorial capital from other sources. Considering that three major elements contribute to the competitiveness of firms – i.e. sectoral dynamics, individual characteristics, and the surrounding context of the firm – the two-step design makes use of firm-level data and their localization to produce aggregate

competitiveness differentials for the selected territorial units or groups [12]. Controlling for the industrial sector and specific firm characteristics, the outputted coefficients represent the residual difference in firms' competitiveness which is due to the specific contextual characteristics in which firms operates.

By applying this matching design alongside the developed Territorial Classification, we are able to identify the role played by peripherality and how different endowments of territorial capital interact with firms' competitiveness.

If, in fact, two firms share similar characteristics and only differ in terms of their location – in one territory or the other – the difference in competitive performance between these two firms can be interpreted as due to the external conditions (external to the firm) in which they operate, i.e., the territorial characteristics of places and the possible presence of external economies there. Moreover, by aggregating municipalities with the Territorial Classification, the analysis focuses on highlighting the specific role played by different levels of peripherality/

accessibility, urbanisation and mountainous geography.

Such identification strategy is described as two-step due to the presence of two separate matches, one involving industrial sector dynamics and the other involving firm characteristics [12].[3]

The first step controls for different sectoral dynamics. The industrial sector in which a firm operates substantially impacts both the dynamic growth chances of a firm and the different margins and requirements of the market to which the firm belongs. To control for these effects, we implemented an exact matching on the industrial sector in which the firms operate to only compare firms inside their specific industrial sector. The exact matching is done by aggregate industries using the NACE sector at 2 digits, following the SNA/ISIC aggregation with 11 categories (known as the ISIC "High-level aggregation" [77]. Eurostat (2007) NACE Rev. 2. Introductory Guidelines, division Statistical governance, quality, and evaluation). Based on this established aggregation, firms are matched and compared only with other firms in the same sector. It is important to note that only firms from 7 of the 11 categories are included in the analysis; indeed, due to location requirement specificities (e.g., agriculture, mining) or due to the massive presence of the public sector for which competitiveness is normally little relevant (e.g., healthcare, defence), firms operating in these sectors are excluded from the analysis.

The second step of the matching strategy is composed of a propensity score matching, computed via probit function, over various selected firms' characteristics. This is done to ensure that, inside the same industrial sector, firms located in a specific territorial class are only compared with similar firms located elsewhere.

The selection of firms' characteristics is crucial in ensuring that firms are compared with similar firms; for this selection, we relied on the established literature on firms' competitiveness [32,78–80]. The selected characteristics, computed from firms' level balance sheet information, include i) the age of the firm; ii) whether it is beneficiary of public policies for the programming period 2007–2013 (previous to the time frame of the analysis); iii) whether the firm is incorporated as a cooperative; iv) whether it focuses mainly on exports; v) the number of employees; vi) the share of immaterial assets on total assets; and vii) the debts-to-profit ratio. Moreover, only firms incorporated before the initial period of the analysis and still operating after the final period considered are included in the analysis. While the delineated identification strategy is designed to control for several dynamics and characteristics, it is important to notice that the availability of data and information does not allow to every possible dynamic and nuance. Most notably, the model only partially addresses the relationship between technological innovation and firms' performance which is shown to be particularly impactful in different contexts [81,82]. Indeed, the availability of data does not allow for a specific classification of firms on their level of innovation; the presented model does partially address the issue, both by matching firms separately within industrial sectors and by including the "share of immaterial assets on total assets" in the matching. Such strategy should allow to match firms (within the same industrial sector) relying on more or less immaterial assets in their operations, however, this is an area in which the identification strategy can be improved in the future.

3.3. Data, time-spawn, and competitiveness indicators

To build the Territorial Classification and the two-step matching model, a wide range of data has been gathered. The main data sources employed are i) AIDA, a proprietary dataset from Bureau Van Dijk providing balance sheet information for firms located inside Italian territory [83]; ii) ISTAT, the Italian Statistical Office providing census data, defining municipal and LLS administrative boundaries and geographical characteristics [71]; iii) Italian Agency for Territorial Cohesion, providing the original Inner Areas Classification from which our Territorial Classification is built; iv) the ASIA database (The Italian register for active firms and companies) providing municipal aggregate data on the full universe of firms and employees [84].

The paper incorporates both a static and a dynamic setting to best evaluate the differences in territorial competitiveness inside the NUTS-2 region. The two settings share the methodological approach and model the static setting measures different levels of competitiveness, while the dynamic setting measures differences in terms of growth of competitiveness.

As a measure to account for eventual missing data or inconsistency in the AIDA database, we defined two time periods composed of multiple years to frame our analysis: the initial period, between 2009 and 2011, and the final period, 2016–2018. Both firms' characteristics and competitiveness indicators are calculated as the mean values over these periods.

For the static setting, the competitiveness indicator and the matching covariates are calculated for the initial period only; for the dynamic setting, firms are matched with their characteristics in the initial period, but the ATTs are computed over the relative growth of the indicator between the initial and final period of the analysis.[4] The dynamic analysis maintains a time gap equal to five years between initial and final observations.

Finally, before moving to present the results of the analyses, a few words about the selected indicator of firms' competitiveness. Considering that the ability of firms to successfully compete in markets cannot be measured directly but only through a "comparable dimension that allows one firm to compete better than its rivals" ([85], p. 53). Among the many possible variables related to the competitiveness of firms, we selected two that can be computed employing balance sheet data.

We selected two productivity variables: Labour Productivity (Value added per employee) and Total Factor Productivity (TFP), also because of their effects on territorial income and earnings [86]. The two indicators are conceptually similar but hold relevant differences in how they are computed. The first is computed as the ratio between the value added generated by the firm and the number of employees. Labour productivity, thus defined, is probably one of the most common and established variables used to compare the competitiveness of firms [29, 31,80].

Total factor productivity, on the other hand, is more complex to compute, but it is arguably more informative by also incorporating assets and capital into the computation. For this paper, TFP is computed as the residual of a Solow production function [87] based on value added calculating the capital stocks at the firm level using the perpetual inventory method (PIM) [88]. It is used, among others, in the papers by Albanese et al. [32] Ciani et al. [79], Gal [88], Lasagni et al. [57].

The next section reports and presents the results measuring competitiveness in terms of labour Productivity; results produced measuring differentials in territorial competitiveness via TFP, confirming the observations presented in the next section, are reported in Appendix (Tables A1 and A2).

4. Results and discussion

The developed counterfactual strategy is applied to firms located

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inside the Lombardy region alongside the Territorial Classification.

Results are reported in the tables below. To better understand the role of peripherality, accessibility and mountainous geography – on territorial competitiveness, the tables report ATTs for each class and macro-class, on the horizontal axis, and each industry on the vertical one. A positive and significant coefficient in the manufacturing industry for *Milan* means that firms in *Milan* are significantly more competitive with respect to other similar firms located elsewhere in the region.

Moreover, each table is vertically divided into two parts: the top part of the table reports ATTs for the macro-class *Poles* and its classes; in the bottom part, instead, the table reports results for all classes excluding firms localized in the metropolitan area of *Milan* from being matched as controls. This is done to reduce the sorting effect [89], providing additional externalities to firms localized inside the metropolitan area.

Table 2 shows the coefficients of the matching analysis for labour productivity, together with the relative significance. Overall, results show the relevant role played by peripherality; more peripheral territories (*Intermediate* and *Peripheral*) are less able to support the productivity of firms located in their territories (compared to similar firms located in other territories). Their lack of accessibility and the distance from large agglomerative forces makes them less competitive compared to the rest of the region. Moreover, with a closed view of the results inside the macro-categories and sectors, interesting patterns emerge.

Starting from the macro-category of the *Poles*, it is reported that the firms located there are – looking at the total economic system – more productive than the rest of the region. It is interesting to emphasize that this result is, however, driven by the city of *Milan*: in fact, the differential for the two categories *of capital* and *Other Poles* is significant and negative. Sectoral productivity is also quite differentiated as shown by differences in signs and intensity of the differential coefficients.

On the rest of the regional territory, keeping firms located in the city of *Milan* out of the matching, higher total productivity is observed only in *Milan's Belt* category, while there is a lower – and statistically significant – productivity for the *Other Poles*, *Intermediate* categories (both mountainous and non-mountainous) and *Peripheral* (mountainous and non-mountainous).

Alongside the overall difference in territorial competitiveness and their ability to support their industrial structure, which correlates neatly with the ordinal Territorial Classification, Table 2 also shows the heterogeneous distribution of territorial competitiveness across different industrial sectors. While some sectors, e.g. construction activities, show no signs of intra-regional heterogeneity, activities in other sectors – especially, in the case of Lombardy, retail activities and the information and communication sector – can greatly benefit by being located in certain classes of territory compared to similar firms located elsewhere.

Moving from the static setting, ATTs for the indicators in a dynamic setting are reported below.

Table 3 reports the results of the dynamic variation in the labour productivity of similar firms located in different territorial areas of the region. This allows us to observe in which areas and in which sectors the indicator has grown or decreased significantly compared to the rest of the region. Controlling for both individual firms' trends and industrial sector dynamics, within our counterfactual design an increase in productivity could be explained by either a cumulative advantage effect (also known as the Matthew effect, see Ref. [90]) or an increase in territorial capital impacting the competitiveness of territories. Overall, results show a generalised decrease in productivity during the study period due to macroeconomic dynamics (the period analysed includes the 2011 public debt crisis) which impacted more severely urban and core areas rather than peripheral ones. Apart from specific sectoral patterns, described below, the peripherality (in global terms) of some territories helped them being less impacted from the financial crisis and potentially gain some competitive advantage compared to urban and Pole territories in the region.

Speaking of the *Poles* and the categories related to them, it is already noted that at the level of total economy, there is a decrease in the productivity differential of the firms located there. This decrease seems to be driven by the decrease in productivity recorded by the *capital* category; indeed, the coefficients of the other two categories, *Milan* city and *Other Poles*, are not significant. Breaking down the analysis in the various sectors, we first notice how this decrease is less evident and how the situation is different for firms located in the city of *Milan* than for other categories. Although most of the coefficients are not significant, when they are significant they are also positive (suggesting growth in labour productivity compared to similar firms located elsewhere) for the city of *Milan* and negative (suggesting a decrease) for the other two categories. Specifically, the dynamic variation in productivity appears to be homogeneously distributed for the Manufacturing, Scientific and Technical Professions sectors, while a negative differential is recorded for the *Other Poles* in Construction and for both the *Capitals* and *Other Poles* in the Information and Communications sector. In contrast, the differential of this labour productivity indicator of firms located in *Milan* in the commerce sector grew in the reference period, as did those in the real estate sector.

In the rest of the region, and excluding the firms located in the city of Milan, the overall picture suggests a growth in the productivity differential only for those firms located in the *Other Belt*, while the same decreases in the *Capitals*, *Other Poles*, *Milan's Belt* and mountainous *Intermediates*. This pattern apparently suggests that many of the relatively more competitive territories were not able to exploit their cumulative advantage in supporting the productivity of firms located nearby. Similarly to the static picture presented in the previous table, also in dynamic terms, the differentials across industrial sectors are quite heterogeneously distributed highlighting the presence of elements and capitals differently impacting different industrial sectors. Results are shown in Table 3 below.

The results presented in this section show a largely heterogeneous distribution of territorial capital at the sub-regional level (RQ1). Moreover, such an heterogeneous pattern shows a clear correlation with a fine measurement of peripherality thanks to the adopted Territorial Classification (RQ2) and, alongside measurements of the industrial structure at the territorial level,[5] provides a more complete picture of the distribution of territorial capital within a specific NUTS-2 region.

Below, Figs. 3 and 4 show the aggregate territorial competitive advantage in industrial activities (manufacturing and construction activities, Fig. 3) and services (retail and information and communication activities, Fig. 4) on a map of the region.[6]

The patterns presented in the two figures are almost complementary to one another. For services activities, in particular, it is quite noticeable the agglomeration effect produced by core urban areas and medium to large cities. Indeed, results presented in this section suggest the presence of centripetal cumulative agglomeration effect due to the presence of a large metropolitan area (Milan). It is noticeable how this centripetal effect works over two different dimensions. Not only in the metropolitan area, as the largest agglomerate of economic activities, firms are largely more productive than similar firms located elsewhere (Table 2); also, the dynamic patterns (Table 3) emerging here are clearly centripetal and extending towards neighbouring territories. Such framework of information can be interpreted as the effect of economic processes that are leading the metropolitan area toward an ever-greater tertiarization and servitization [91]. In fact, it's mostly the firms in the tertiary sectors (particularly those in the information and communication sector, finance, and the scientific and technical professions) that, net of higher productivity in the initial period, are growing in all competitiveness indicators in conjunction with a relative increase in employees and the

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[5] Location Quotients per industrial sector at the municipal level are calculated; data, on the whole industrial structure, are provided by ASIA, the Italian registry of firms [84].

[6] We cannot disentangle the single sectors at this small spatial scale due to the numerosity of the sample.

Table 2
Static ATTs for labor productivity.

	Total	Manuf.	Construct	Retail	Info and comm	Finance	Real estate	Prof sci and tech
POLES (att, tstat)	**.040***	**.038***	.005	−.006	**.097***	−.050	**.095***	**.059***
	6.479	3.729	.271	−.577	4.056	−.678	2.692	2.904
MILAN	**.071***	**.070***	.031	**.043***	**.132***	−.055	**.093**	**.107***
	9.324	4.907	1.271	3.063	5.081	−.754	2.233	5.260
CAPITALS	**−.024**	.011	.020	**−.051***	**−.052*	.021	−.003	**−.045*
	−2.321	.562	.666	−2.951	−1.546	.288	−.063	−1.582
OTHER POLES	**−.025***	**−.030**	−.026	−.014	**−.085**	.062	−.027	**−.078**
	−2.492	−1.914	−.880	−.725	−1.936	.589	−.456	−2.274
Without Milan								
CAPITALS	.001	.021	−.031	−.026*	−.033	−.006	**.132***	−.003
	.091	1.076	−.113	−1.482	−1.003	−.066	2.409	−.115
OTHER POLES	**−.025***	**−.035**	.000	−.024	**.064*	.025	−.009	−.009
	−2.426	−2.221	.010	−1.247	1.470	.144	−.153	−.284
BELT	.007	**.015*	.012	**.045***	.022	**.164*	**−.082**	.013
	1.011	1.475	.627	3.306	.767	1.497	−1.807	.530
MILAN'S BELT	**.027***	**.019*	.025	**.059***	**.070**	.014	−.047	.013
	3.166	1.608	1.017	3.665	1.877	.113	−.779	.418
OTHER BELTS	.003	−.002	−.009	.002	**−.089***	.097	−.021	−.009
	.444	−.305	−.513	.127	−2.564	.705	−.457	−.354
INTERMEDIATE	**−.026**	**−.048***	.037	**−.048*	−.077	.027	.062	**−.091*
	1.775	−2.398	.956	−1.470	−1.073	.072	.709	−1.292
INTERM. not Montain	**−.035**	−.012	−.017	−.026	**−.142**	.336	.082	**−.134**
	−2.257	−.591	−.408	−.752	−1.830	1.227	1.061	−2.049
INTERM. Montain	**−.133***	−.093	−.162	.026	**.042***		**.290	−.064
	2.438	−.898	−2.095	.207	6.959		.785	−.457
PERIPHERAL	**−.026*	−.037	−.011	**−.052*	**−.270***	−.326	**−.204*	.034
	1.400	−1.176	−.275	−1.391	−2.402	−.797	−1.411	.424
PERIPEH. not Mountain	**−.066***	−.028	−.011	**−.069*	**−.190**	−.363	.0001	**.120*
	2.771	−.767	−.244	−1.367	−2.039	−.916	.003	1.334
PERIPH. Mountain	**−.046*	−.029	**−.102*	**−.118**	.114		**−.380**	.031
	1.409	−.521	−1.444	−1.948	.534		−1.721	.231

T-stat *t.90 = 1.29, **t.95 = 1.66, ***t.99 = 2.36.

creation of new jobs in the metropolitan area.

Fig. 3 shows how this process is affecting also the hinterland of the metropolitan area and the municipalities of *Milan's Belt*. Overall, *Belt* areas are those where manufacturing activities are most concentrated; these areas offer a good balance between access to capital, services and distribution centres (being close to the poles) and smaller production (cost of the land above all). Looking at the differences between the *Milan's Belt* and the *Other Belts* areas (Table 3), it can be observed that for the manufacturing sector, net of the higher productivity levels of the companies located in the *Milan's Belt*, it is only the *Other Belts* companies that have significantly improved their productivity levels over time, while *Milan's Belt* companies see their productivity levels drop. This difference can be interpreted as the effect of the outsourcing process, hegemonic within the metropolis, which is expanding its impact on neighbouring areas as well.

Intermediate and *Peripheral* areas are confirmed to be generally disadvantaged in comparison with the rest of the region. This confirms the idea that peripherality produces a large (and measurable) disadvantage in the ability of territories to be competitive, even within the same NUTS-2 region. A major role here is arguably played by the physical accessibility to infrastructure, services, and resources and by large local markets or agglomeration economies [2,3]. Most interestingly, however, the disadvantage of *Intermediate* and *Peripheral* areas (Tables 2 and 3) is not reflected in a clear disadvantage of mountainous vs non-mountainous areas (except for the manufacturing sector). This may be very important for future policies, suggesting that, in an economy always more focused on services, while sharing the disadvantage of peripherality mountainous territories are not necessarily penalized further.

5. Concluding remarks

This work analysed the competitiveness of different territories inside the same region using the case study of Lombardy, a large and competitive European region. This was done using a novel methodology alongside an especially developed Territorial Classification to show the impact of different levels of peripherality, urbanization and physical geography on territorial competitiveness. The analysis covers a period of 10 years, after the 2008 crisis and before the Covid crisis, to reduce possible biases produced by particularly hard times.

While the methodological design allows to measure differences in territorial competitiveness within administrative regions by controlling for both firms' and industrial sector characteristics, the study presented here only considers one Italian NUTS-2 region. Such choice, coming partly from data availability and mostly because of a search for homogeneity, poses some limitations to the extent which results can be generalised but, read in conjunction with the overall picture portrayed by regional comparative metrics, there is no reason to believe the results presented here for one European region cannot be generalised to several other similar advanced regions, also considering that Lombardy is a very large and competitive region, whose total GDP in PPS is similar to that of Belgium.[7] On the contrary, it is possible that lagging regions could not experience the same centripetal effects detected in Lombardy, as – e.g. – their metropolitan areas are weaker. Additional research, targeting these regions, is required to either confirm the dynamics identified in this research or highlight the emergence of differences in different territorial contexts.

[7] Replicating the analysis for other regions is certainly highly data-demanding but, if feasible, may allow confirmation of the extent to which these trends can be generalised.

Table 3
Dynamic ATTs for labor productivity.

	Total	Manuf.	Construct	Retail	Info and comm	Finance	Real estate	Prof sci and tech
POLES (att, tstat)	−.012***	−.004	.005	−.001	.007	.037	.015	.003
	−3.648	−.743	.516	−.281	.597	.882	.574	.303
MILAN	−.003	.006	−.010	.011*	.016	.018	.044*	.006
	−.780	.846	−.662	1.554	1.183	.447	1.580	.618
CAPITALS	−.008*	−.009	.002	−.007	−.035**	−.043	−.025	−.001
	−1.572	−1.044	.148	−.833	−2.144	−.960	−.766	−.129
OTHER POLES	−.006	−.003	−.029**	.011	−.044**	.063	−.044	−.003
	−1.256	−.389	−1.831	1.236	−2.301	.893	−1.014	−.213
Without Milan								
CAPITALS	−.008**	−.004	−.002	−.001	.008	−.009	.011	−.003
	−1.722	−.446	−.150	−.111	.594	−.211	.305	−.259
OTHER POLES	−.012**	−.013**	.015	−.002	−.025*	.037	−.083**	−.004
	−2.257	−1.735	.985	−.289	−1.288	.665	−1.897	−.254
BELT	.002	.003	−.001	−.007	−.011	−.065*	.043*	.011
	.699	.762	−.102	−1.217	−.786	−1.323	1.558	.961
MILAN'S BELT	−.007**	−.008*	−.008	−.011*	.001	.035	.002	−.004
	−1.721	−1.348	−.570	−1.291	.025	.588	.053	−.302
OTHER BELTS	.015***	.010**	.006	.006	.007	−.059	.048*	.003
	4.444	2.225	.633	1.038	.508	−1.020	1.419	.240
INTERMEDIATE	.004	−.008	.001	.005	.013	.017	.049	.074**
	.729	−.955	.052	.404	.527	.119	.717	2.184
INTERM. not Montain	.008	−.008	.018	.027**	.007***	−.037	.040	.054*
	1.237	−.872	.968	1.910	.247	−.246	.552	1.492
INTERM. Montain	−.048**	−.016	−.001	−.036	−.046		−.285*	−.184*
	−1.721	−.409	−.011	−.621	−.753		−1.478	−1.562
PERIPHERAL	.011	−.018*	−.029*	.027**	.027	−.002	−.030	−.005
	1.245	−1.322	−1.375	1.759	.618	−.003	−.442	−.128
PERIPEH. not Mountain	−.014	−.008	.003	−.009	−.028	.075*	.077	.029
	−1.282	−.513	.140	−.541	−.539	1.450	.881	.573
PERIPH. Mountain	.019	.009	.056*	.024	.099		−.383*	.112
	1.203	.407	1.384	.911	1.262		−1.477	1.233

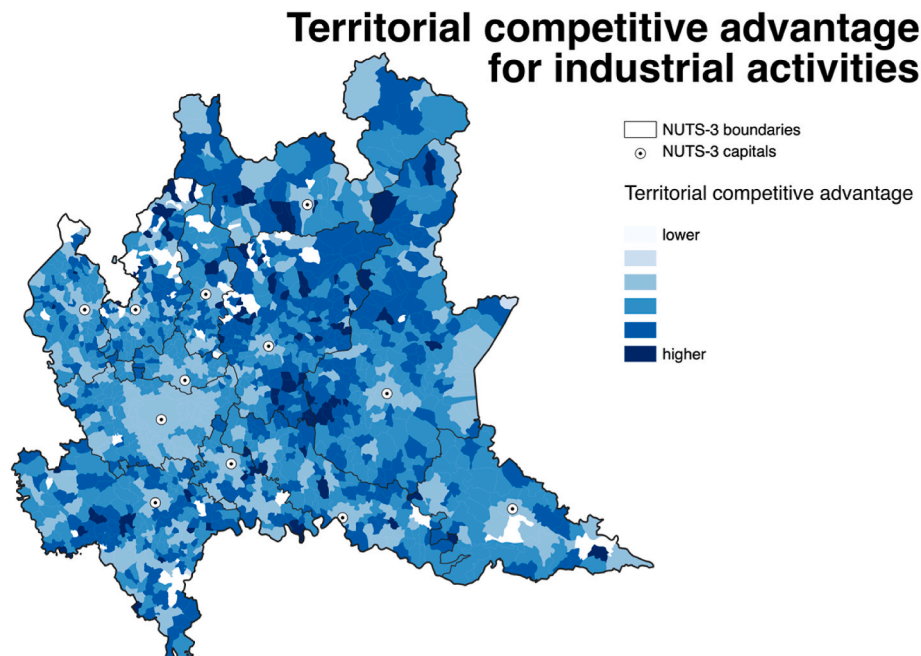T-stat *t.90 = 1.29, **t.95 = 1.66, ***t.99 = 2.36.

Fig. 3. Territorial competitive advantage for industrial activities.

Moreover, the methodology still does not allow to distinguish between different sources of such competitiveness (e.g., presence of key infrastructures, urbanization or agglomeration effects, presence of specific stocks of human capital, etc.) and, by definition, measuring territorial competitiveness using firm-level data is obviously giving a larger role to economic performance with respect to other indicators such as sustainable development or well-being.

In answering to the two Research Questions proposed in the introduction, the study first and foremost aimed to highlight the importance of intra-regional measures of territorial competitiveness, such as the one
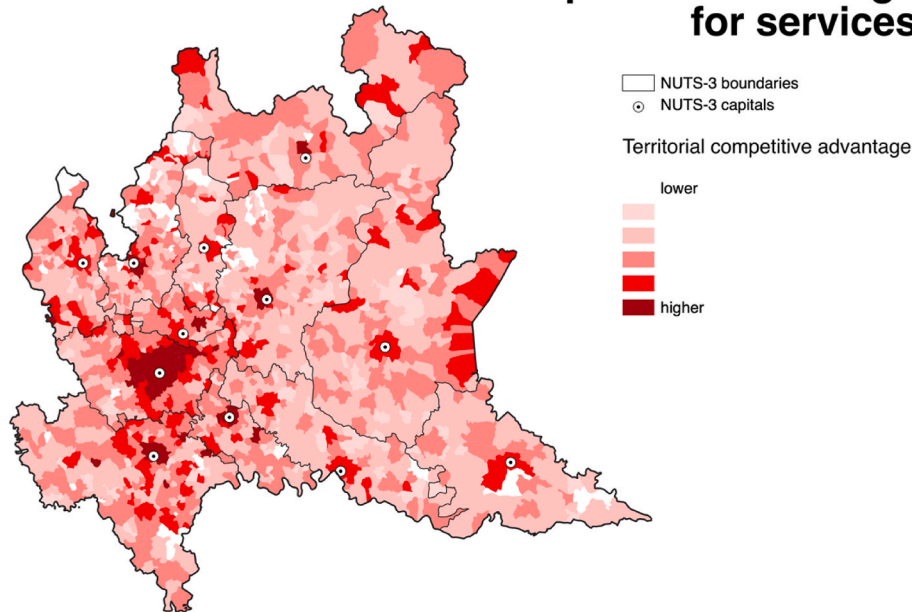
Fig. 4. Territorial competitive advantage for services.

employed here, to captures the large heterogeneity across different territories and industries.

The results presented and the territorial implication they show, are very relevant especially in the policy implementation perspective. Indeed, in combination with other instrument providing more general information on the economic structure of the region (e.g., the RCI), the measurements presented and the processes highlighted in this study can inform the implementation of policy actions presenting a clearer and more precise view of the internal territorial heterogeneity of regional competitiveness.

As for the second research question, that on the role played by accessibility, peripherality and geographical disadvantage, it appears that this role depends on the sector of economic activity. However, some general trends also emerge. First, there is a large centripetal attraction effect coming from the presence of metropolitan areas. This spreads to the hinterland which, while being exhausted by the attraction of the core city, is however more competitive than the other similar areas inside the region. Furthermore, there seems to be a gradient with accessibility, as areas further from the economic core turn out to be, on average, less competitive. This second-nature geography effect dominates that of purely first-nature geographical disadvantage, as being mountainous is not providing a bump to firm competitiveness for any given level of peripherality.

This evidence is relevant to regional development policies based on the enhancement of firm competitiveness, which are usually not differentiated inside the region and, consequently, might inadvertently turn out to exacerbate internal differentials.

With the increasing focus on place-based policies, Innovation and Smart Specialization Strategies promoted by European Cohesion Policies, there will be the need for more finely sectoral and territorially targeted policies. In this sense, the development of instruments - as the one presented here - able to measure territorial differences at a territorial level smaller than the NUTS-2 will play a key role in the design of programs and interventions and also in the assessment of their effects.

Authors' contribution statement

Dr. Federico Fantechi (FF) and Prof. Ugo Fratesi (UF) conceived of the presented idea. Both discussed and developed together the theory and the empirical design. FF performed the analysis. Both FF and UF verified the analytical methods. UF supervised the findings of this work.

All authors discussed the results and contributed to the final manuscript.

Declaration of competing interest

No potential competing interest was reported by the authors.

Data availability

The data that has been used is confidential.

ANNEX.

Table A 1
Static ATTs for Total Factor Productivity.

	Total	Manuf.	Construct	Retail	Info and comm	Finance	Real estate	Prof sci and tech
POLES (att, tstat)	**.101*****	**.048*****	**.080*****	**.059*****	**.037**	**.147***	**.043**	**.134*****
	14.511	4.415	3.638	4.611	1.026	1.396	1.050	5.859
MILAN	**.127*****	**.084*****	**.062****	**.091*****	**.124*****	**.151***	**.067***	**.169*****
	14.622	5.592	2.054	6.071	3.399	1.431	1.551	7.496
CAPITALS	**−.005**	**−.011**	**−.003**	**−.002**	**−.071***	**−.128**	**.012**	**−.059****
	−.439	−.567	−.095	−.115	−1.481	−1.107	.202	−1.891
OTHER POLES	**.006**	**.032****	**.059***	**−.007**	**−.001**	**.097**	**−.068**	**−.057***
	.494	1.939	1.595	−.326	−.004	.512	−.918	−1.496
Without Milan								
CAPITALS	**.030*****	**.020**	**.026**	**.007**	**−.013**	**−.074**	**.011**	**−.033**
	2.608	.975	.672	.355	−.234	−.609	.184	−1.032
OTHER POLES	**.038*****	**.046*****	**.115*****	**.012**	**.012**	**.051**	**−.099**	**.051***
	3.162	2.666	3.107	.561	.199	.320	−1.219	1.379
BELT	**−.004**	**.014***	**.009**	**−.023***	**.013**	**−.032**	**−.000**	**.010**
	−.598	1.378	.398	−1.543	.283	−.224	−.003	.362
MILAN`S BELT	**.061*****	**.053*****	**−.006**	**.074*****	**.021**	**.241****	**.094***	**.018**
	6.212	4.095	−.195	3.991	.361	1.708	1.346	.496
OTHER BELTS	**−.044*****	**−.038*****	**−.041****	**−.041*****	**.015**	**−.050**	**−.021**	**−.014**
	−5.555	−3.775	−1.698	−2.626	.321	−.224	−.413	−.436
INTERMEDIATE	**−.066*****	**−.069*****	**−.100****	**−.075***	**.077**	**−.386*****	**−.074**	**.022**
	−4.223	−3.305	−2.101	−2.272	.502	−2.439	−.644	.342
INTERM. not Montain	**−.078*****	**−.039****	**−.116****	**−.086*****	**−.099**	**−.386*****	**−.039**	**−.023**
	−4.689	−2.081	−2.270	−2.524	−.639	−2.439	−.309	−.338
INTERM. Montain	**−.036**	**−.091***	**−.044**	**.106**			**−.332**	**−.241**
	−.587	−1.429	−.322	.873			−.571	−1.274
PERIPHERAL	**−.078*****	**−.113*****	**−.106****	**−.116****	**−.170**	**.337**	**.003**	**−.053**
	−3.445	−3.379	−2.276	−2.337	−1.201	.957	.019	−.682
PERIPEH. not Mountain	**−.085*****	**−.094*****	**−.063**	**−.098***	**−.437*****	**.637***	**−.137**	**.024**
	−3.066	−2.490	−.962	−1.656	−2.866	1.314	−.856	.264
PERIPH. Mountain	**−.088****	**−.106****	**−.084**	**−.098**	**−.286**		**.095**	**.091**
	−2.224	−1.872	−1.026	−1.186	−.727		.377	.864

T-stat *t.90 = 1.29, **t.95 = 1.66, ***t.99 = 2.36.

Table A 2
Dynamic ATTs for Total Factor Productivity.

	Total	Manuf.	Construct	Retail	Info and comm	Finance	Real estate	Prof sci and tech
POLES (att, tstat)	**.016*****	**.003**	**.014***	**.011****	**.036****	**.030**	**.016**	**.003**
	4.800	.860	1.317	1.943	1.703	.642	.763	.310
MILAN	**.028*****	**.007**	**.021***	**.010***	**.026***	**.075***	**.021**	**.042*****
	6.801	1.112	1.292	1.469	1.330	1.444	1.022	3.726
CAPITALS	**−.004**	**−.007**	**−.029***	**−.022*****	**−.018**	**.023**	**.004**	**−.007**
	−.888	−.889	−1.601	−2.516	−.772	.342	.181	−.456
OTHER POLES	**.002**	**.016****	**−.012**	**.003**	**.004**	**.115**	**.004**	**−.031***
	.491	2.194	−.628	.336	.135	1.025	.144	−1.631
Without Milan								
CAPITALS	**.001**	**−.004**	**−.005**	**−.005**	**.024**	**.061**	**−.017**	**−.011**
	0.329	−.462	−.292	−.622	.942	.801	−.638	−.777
OTHER POLES	**.010****	**.020*****	**−.016**	**.012**	**−.037**	**.026**	**.038**	**−.029***
	1.910	2.842	−.878	1.221	−1.249	.228	.954	−1.581
BELT	**−.000**	**−.001**	**−.008**	**.004**	**−.034***	**−.037**	**−.020**	**.001**
	−.011	−.056	−.778	.598	−1.557	−.496	−.886	.073
MILAN`S BELT	**.004**	**−.003**	**.002**	**.001**	**.019**	**.056**	**−.001**	**.008**
	.894	−.606	.183	.190	.678	.582	−.021	.465
OTHER BELTS	**−.006****	**−.007****	**−.003**	**.003**	**.006**	**.001**	**−.032***	**−.007**
	−1.892	−1.836	−.286	.445	.278	.012	−1.291	−.452
INTERMEDIATE	**−.022*****	**.001**	**.012**	**−.034*****	**.003**	**−.141***	**.018**	**.031**
	−3.137	.137	.595	−2.416	.060	−1.545	.368	.776
INTERM. not Montain	**−.006**	**.002**	**−.008**	**−.035*****	**.011**	**.013**	**.028**	**.030**
	−.919	.250	−.381	−2.386	.206	.122	.391	.749
INTERM. Montain	**−.019**	**.021**	**.064**	**−.115*****	**−.252*****		**.216**	**−.048**
	−.741	.753	.790	−2.487	−3.375		1.115	−.338
PERIPHERAL	**−.006**	**−.005**	**.010**	**.018**	**.074**	**.323***	**−.093***	**.001**
	−.677	−.490	.481	1.130	1.096	1.530	−1.288	.018
PERIPEH. not Mountain	**−.001**	**−.013**	**−.046***	**.011**	**−.020**	**.085**	**−.122****	**−.007**

(continued on next page)

Table A 2 (*continued*)

	Total	Manuf.	Construct	Retail	Info and comm	Finance	Real estate	Prof sci and tech
PERIPH. Mountain	−.124	−.876	−1.554	.551	−.259	.276	−1.792	−.140
	.011	**−.002**	**.056****	**.002**	**−.154**		**−.048**	**−.022**
	.680	−.100	1.695	.093	−.983		−1.048	−.214

T-stat *t.90 = 1.29, **t.95 = 1.66, ***t.99 = 2.36.

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Federico Fantechi is assistant professor in Political Economy at the University of Palermo, Department of Economics, Business and Statistics. He discussed his thesis, entitled "Learning From The Past. Forecasting Community Disaster Resilience after the 2016 Central Italy Earthquake via Supervised Machine Learning", in 2020 winning the AISRe "Giorgio Leonardi" Best PhD thesis award the next year. He has since co-authored papers in peer-reviewed international journals in the field of regional economics. His research interest concerns labour economics, regional policy, regional and territorial growth, measurements and modelling of spatial inequality, and the design of quasi-experimental settings.

Ugo Fratesi is Professor of Regional Economics and Policy at Politecnico di Milano, Italy, and the Editor-in-Chief of Spatial Economic Analysis. He is author of books and articles, primarily on the themes of regional growth and development, regional policy assessment, cohesion policy, territorial capital, the models for forecasting regional growth, the theory and measurement of regional disparities, the territorial aspects of human capital and innovation.