Summary

The relevance of geographic proximity in modeling economic interactions has deep economic microfoundations. In the Regional Science, Economics, and Geography literature, the fact that space plays a major role in shaping most economic outcomes has been supported by strong empirical evidence.

A major channel through which geographic space impacts economic outcomes is via the formation of agglomeration economies. These can be defined as externalities accruing to firms and individuals because of their decision (which may also be inherited from the past) to co-locate (agglomerate). Such economies can be thought of as stemming from three major sources, viz. proximity, indivisibilities and synergies. While initially research on agglomeration economies focused on the first of these dimensions, i.e. on the effect of pure geographic proximity, the literature gradually adopted a more comprehensive view of agglomeration economies, adding the notions of synergies (cost savings accruing to agglomerating firms and individuals because of easier mutual relations) and indivisibilities (productivity increases due to sheer size effects of agglomerated economic activities).

Over time proximity, indivisibilities and synergies, that were initially used for explaining static productivity advantages, have gradually been conceived as directly affecting innovation and knowledge creation and diffusion processes. Firms and individuals deciding to co-locate in fact enjoy learning economies, both because of sheer scale effects (connected to indivisibilities in production), as well as by being exposed to ideas outside their own expertise.

Recently, the literature dealing with synergies as sources of agglomeration economies evolved towards the formalization of economic interactions in space on the basis of non-geographic proximity. In fact, stylized facts clearly suggest that, on the one hand, not necessarily agglomerated actors enjoy positive externalities in the form of cost reductions, easier interactions, or faster and more effective learning, while, on the other hand, in some cases non-geographic proximity can partially substitute for, or at least complement, geographic proximity. Quantitative evidence is now available on the friction (or enhancing) role played by non-geographic space in shaping economic interactions.

This dissertation enters the debate on the role that non-geographic proximity plays in shaping the spatial economics of knowledge and innovation. This perspective does not deny the relevance of geographic space in determining the ease with which knowledge is produced, diffuses, and impacts economic performance; however, a major point made in this dissertation is that geographic proximity is often at best a proxy for the underlying regional characteristics based on other forms of proximity, that are at least as important as geographic proximity in explaining economic relations. The synergy element plays a particularly relevant role in the processes of knowledge exchange and diffusion, and the interpretation of proximity in terms of pure physical space clearly shows major shortcomings.
Although this line of research is not entirely new, previous contributions have been focusing on proximity from a mainly local (regional) perspective. This initial stream of literature deals in fact with the concept of proximity between agents being physically co-located (i.e., geographically proximate) and that share, in addition to physical co-location, some additional degree of commonality.

In this dissertation, knowledge production and diffusion processes are observed from an inter-regional perspective. Regions, instead of firms, become the units of analysis, and proximity is conceptually interpreted and empirically tested in terms of similarity between regions. In this perspective, this dissertation provides new evidence in particular for what concerns the empirical measurement of inter-regional proximity.

In this new perspective, the dissertation provides answer to the two following main research questions:

RQ1 What is the joint role of non-geographic proximities in inter-regional knowledge diffusion?

RQ2 Through which types of proximity does knowledge impact regional growth?

From the empirical analyses discussed in Part B and Part C the following three main messages emerge:

- While the role of geographic proximity in enhancing knowledge diffusion is found to be less relevant once other, non-geographic types of closeness are taken into account, geographic proximity still represents a crucial precondition for knowledge diffusion.

- The impact of both geographic as well as non-geographic proximity on knowledge diffusion is characterized by remarkable non-linearities. This result provides evidence of possible optimal levels of proximity between regions; this implies that excessive proximity could engender knowledge lock-ins that regional actors may want to avoid, lest they reach sub-optimal outcomes in terms of both productivity and knowledge generation.

- Different forms of proximity can complement each other: their effects thus display relevant synergies, that have so far been relatively neglected in both the theoretical and the empirical debate.

While providing evidence about several theory-based forecasts, and shedding more light on the relative strength of the knowledge diffusions preconditions, these results pave the way for further future research, rather than saying the last word on proximity economics. In fact, while the relevance of geography appears indeed diminished with the inclusion of some of the underlying non-geographic proximity mechanisms, geographic proximity still represents a major factor for the production and diffusion of knowledge in space. Besides, in the future the relevance of inter-regional characteristics here summarized under the non-geographic
proximity umbrella will likely shape even more than presently the way knowledge will be produced, and will diffuse.

The empirical findings discussed in this dissertation lead to complex and challenging policy implications.

The first strong policy implication is related to the fact that the effects of geography on knowledge diffusion processes are far from dead. As a consequence, managing the chain of production and diffusion of knowledge should take this first point into account.

A second topic to be discussed could be defined, as done in Chapter 9, as the “proximity impossibility theorem”. It may in fact not be feasible to alter any positioning of an area not only in terms of geographic location (which is by definition, at least to a certain extent, given, and can only partially be altered), but also in terms of relational, social, cognitive, and technological space. Policymakers could hardly be able to manage the behavior of individuals from whose aggregation the relative positioning of regions emerges. This could ultimately determine hysteresis in the location of regions in terms of relational, social, cognitive, and technological space.

A third major point, assuming that the “proximity impossibility theorem” does not hold strictly, pertains the nonlinearities of proximity effects. This dissertation provided consistent evidence about the complexity of inter-regional proximity effects, which often act nonlinearly in enhancing knowledge diffusion; too much proximity between different areas may be detrimental for the ease and speed with which knowledge can be absorbed, decoded, and exploited in an area.

However, it must be noted that a limited degree of control is still left for local and (supra-) national authorities. For instance, in light of the evidence supporting the importance of inter-regional relational proximity presented in this dissertation, with the aim to enhance such knowledge flows, EU authorities may further strengthen the scientific cooperation relations that are structurally formed by means of financing FP and Horizon 2020 projects.

However, such relations should not reach the threshold beyond which they become excessively strong, engendering the proximity lock-ins described in Chapter 2. National and regional authorities, especially those in areas that are not strong in endogenous knowledge production, may instead focus on the challenging task of fostering social proximity with areas that are stronger in this respect, once again without running into social proximity lock-in. Finally, industrial policy may also be aimed at providing incentives for the development of those industries that would enhance industrial and cognitive proximity with areas that can generate positive inward knowledge spillovers.

Managing intangible development assets clearly presents relevant problems, and yet investing in geographic and non-geographic proximity cannot be ignored. Returns from this type of investment tend to mature in the long run, and this poses a further challenge: long-run investments tend to be less attractive for policymakers, because of the short length of the
average political cycle. However, the payoff of investing in the quality of norms and institutions, in social and relational proximity to knowledge-intensive areas, in cognitive and technological proximity to regions specialized in advanced industries could make a major difference.

Empirically, this dissertation has also provided evidence about the interrelations between the effects of various types of proximity. Because of these synergies, any investment in a unique type of proximity may mean obtaining a sub-optimal outcome, thus stressing the need for a balanced path of proximity in order to maximize knowledge diffusion processes.

The dissertation has been concluded with a few suggestions of future research avenues in the field of proximity economics.

One major advancement in this line of research could be related to a theoretical reflection on how non-geographic proximity comes about, and, in particular, how it accumulates or decumulates. Much like social and human capital, and other forms of non-material growth determinants, non-geographic proximity evolves over time and follows the continuous flow of change that affects the characteristics that underlie each concept of proximity.

A further potentially fertile field of analysis relates to proximity dynamics, which translates into the need for a sound reflection on the ways non-geographic proximity can evolve, and to what extent this process can be actually governed.

Equally beneficial would be a theoretical discussion, with a corresponding empirical assessment, of the shape of the functional form describing possible non-linearities in proximity effects. This line of research could allow to identify possible threshold effects in the role played by non-geographic proximity in shaping knowledge diffusion processes.

Proximity effects could also be partially endogenous to the incentives and choices of individuals and firms; if, at least partially, proximity endogeneity would be demonstrated, then the floor would be open for policymakers to provide incentives for individual actors (households and firms) towards actions and decisions that enhance, from an aggregate perspective, inter-regional proximities.

A further difficulty in dealing with proximity from a policymaking perspective may stem from an imperfect overlapping of the timing of proximity dynamics and proximity formation policies. Whether proximity dynamics can usefully match the political cycle, and whether policymakers can reasonably invest in an adaptive and evolutionary way in the accumulation of something whose return will accrue to later generations, remains an unanswered question, and promises to be an exciting new field for future research.