

Place-based policies and the foundations of productivity in the private sector

What are we building on?

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This paper examines a broad range of place-based policies and their impact on productivity in the private sector and on other complementary outcomes. The analysis looks at how policies relate to different levels of heterogeneity of places, activities, firms and human capital. We discuss how the effectiveness of policies must factor in such heterogeneity. Given the increasing polarisation of regions both in the OECD and in the EU space, policies must deal with the inclusion of laggards, without stifling the dynamic potential of leaders. It is a complex balancing act. Policies favouring or governing agglomeration patterns in core regions are different from policies targeting technology transfer or FDI towards non-core regions. At the same time policies boosting the productivity of highly productive and fast growing firms are different from those favouring the inclusion of laggards, and also the type of activities, tradable or non-tradable services, manufacturing or R&D matter. Our bottom line is that the broad range of measures discussed can be effective, but only if they build on the inherent forces, the inherent competitiveness, the inherent comparative advantage of places. The impact is especially sizeable and sustainable if there are other factors interplaying with the policy, triggering a positive reaction of local actors. If there are no such factors, supporting policies are not cost effective. Even though policies may smooth patterns of exclusion, they cannot be universal, hence, they may also enact new patterns of exclusion that need to be analysed and addressed.

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The workshop is a part of the five-part workshop series in the context of the OECD-EC project on "Productivity Policy for Places". The five workshops cover the following topics: (1) Innovation-Productivity Paradox; (2) Productivity in the Private Sector; (3) Public Sector Productivity; (4) Inclusive Productivity? and (5) Productivity and Resilience.

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1 Introduction: Something to build on

Even in the most integrated of all markets, the single market of the European Union, and the internal market of the US, not all places converge to an equivalent level of development and income per capita. For many years, both the European Union and the US have been areas of convergence. Yet since the early 2000 in the EU and earlier in the US, there is evidence of an inversion of this trend of mean reversal and of a growing wedge in income per capita between core and lagging regions, even within countries (Ehrlich and Overman, 2000). The focus of this report is productivity which is of course one of several ingredients of income growth. However, the dispersion we observe in GDP per capita is to a large extent related to and intertwined with productivity trends.

This is clearly observable in firm level productivities. Firms in the top percentiles of productivity distributions (however measured) are growing faster than laggards, and again gaps are increasing fast (Andrews et al. 2015 and 2016). Moreover, superstars, firms in the top productivity percentiles, are concentrated in core regions and cities, with self-reinforcing patterns of productivity growth in the private sector and consequently in GDP per capita in core places.

This pattern of growing dispersion could be efficient in principle. Essentially, it reflects a reallocation of resources towards places and activities with the highest growth potential. Hence, place-based policies aiming at smoothing this trend and redistributing resources towards less core areas could be conflicting with federal, national, or even EU wide strategies of productivity growth. Therefore, there may be a tension between aggregate productivity growth and inclusive geographies.

Yet, there are three major caveats concerning this trade-off between the concentration and the redistribution of resources. The first one is that growth at the core is not sufficient to boost average productivity adequately. The slow-down of average productivity growth in the advanced economies (both the EU and the US) calls for a larger base of activities and agents shifting towards fast productivity patterns.

Second, core places are becoming increasingly congested. Congestion implies a growing market power of the incumbents, with lower opportunities for entry and virtuous patterns of creative destruction. Third, the rising disparities in income and opportunities between core and peripheral regions, and hence for activities and people with limited mobility, is socially and economically unsustainable.

These three caveats highlight the need for policy action to address growing potential market failures, especially in non-core places. The aim is trying to reduce the gap between leaders and laggards, without, at the same time, stifling the pace of progress of leaders.

To understand this pattern of lack of convergence and to design policies dealing with it is also necessary to assess the various elements of heterogeneity characterising contemporary economies. Heterogeneity in places: there are not just cores and peripheries but a continuum range of places with different characteristics and different economic specialisations. Heterogeneity in activities: manufacturing, tradable and non-tradable services. And heterogeneity in firms: in terms of productivity levels and growth. Because of these heterogeneities, the scope for policies is very broad. The measures that should be enacted and their effectiveness depend on the type of places, activities and firms targeted.

There are various reasons for the growing gaps between leaders and laggards, both places and firms. And for these very reasons, the design of place-based policies is very complex. The fact that many core places

are no longer Marshallian districts with a strong specialisation in some manufacturing industry, but rather diversified poles with many different activities, integrating industry, services research and education, is the result of a complex pattern of technological and pecuniary externalities, very difficult, probably impossible to recreate in other places (Crescenzi et al. 2020). For example, one-pronged policies, dealing with industry-specific pecuniary and technological externalities are probably less effective in enabling the catching up of laggards.

The speed of technological development, with the combination of many technologies and a mix of highly specialised skills, make transfers of knowledge more difficult to achieve and support. Digitalisation of course is setting new challenges and certainly its acceleration during the COVID lockdown has put into question many of the established facts concerning the drivers of agglomeration or dispersion of economic activities. During the pandemic, we have experienced new formats and channels of digital proximity, which have been frequently good surrogates of physical proximity. The easy conclusion is that the geography of work, especially in services, is less important than it used to be and that the externalities traditionally triggered by physical proximity can also emerge digitally. Does this mean that we no longer need big agglomerations of diversified talents and activities to boost productivity? Up to a point, as we also learned that the surrogate is nonetheless partial and that the geography of economic activities will keep being important. Also, digitalisation on the one hand may have reduced barriers to entry, which means higher turnovers of firms and more dynamic business environments. But on the other hand, it has strengthened competition and network externalities, making the incumbents harder to challenge.

The competition from cheap labour countries, especially in the manufacturing of traditional products, forces the transition of old industrial districts towards technology and skilled based models of competitiveness, to integrate with advanced services (logistics, digitalisation etc.) and also to diversify into other activities. This requires large investments and many places are unable to follow this route. Designing policies supporting this transition is a daunting task indeed.

The increasing geographic dispersion of production and Global Value Chains (GVCs) raises the issue of the centrality of places in complex geographical networks and puts the development opportunities of each node in relation to those of other nodes, more or less distant in space and time. Infrastructures reducing the transaction costs between nodes are crucial in this framework, but they require huge investments and they are not easy to accomplish. Even here, digitalisation brings along new challenges and patterns of connection. Will optical fibres make physical transport infrastructure rapidly redundant and become the dominant way of connecting nodes: less trains, less travelling by car, less airplanes and much more internet? This would trigger a complete rehauling of work places and the organisation of transport networks and of the urban development of cities. But at this stage it is not clear what will be the extent of these technological patterns.

Within this quite complex framework, this paper examines how place-based policies can affect productivity in the private sector. It is essentially a review of a growing literature . Even though we have to sail through pretty complex waters, there are many regularities that help us in organising our review of policies. In terms of tools, we will have to distinguish between general ones, only affecting the overall business environment (e.g. national corporate taxation; funding of public research, labour regulations, funding of research departments in Universities etc.), from those that target specific groups of firms or actors (e.g. subsidies for R&D and small firms). We will mostly work on place-based policies, although many national or European general policies may have different effects and implications for different places. In this respect, we will consider policies implemented by local authorities, but also national, EU-wide or federal policies targeting specific places and regions (e.g. EU cohesion policies; national infrastructural networks etc.)

Our discussion will also classify policies under a few broad umbrellas. The first one is those related to the objective of strengthening agglomeration forces in given places. This is of course very different whether we are considering core places, where the key concern is avoiding excessive congestion and where agglomerative forces in place are already fully at play, from non-core places, where policies must enact

weak or non-existing agglomeration forces. Also, we will distinguish between policies aimed at the extensive margin, i.e. attracting productivity boosting new activities or human capital in a given place (e.g. FDI), from policies aimed the intensive margin, i.e. strengthening existing activities (e.g. cluster policies; investment and R&D subsidies). Finally, we will look at policies aimed at reducing transaction costs between locations like transport infrastructure.

The review will be mostly focused on how such policies affect productivity at the firm level, although we will also consider other complementary policy outcomes, indirectly related to productivity: expansion of economic activities, attraction of human capital etc. (see Tsvetkova et al., 2020). The evaluation of the policies rests on three subsequent steps. The first one identifying how any observed outcome (e.g. increase in observed labour productivity) is the result of the policy itself. This implies solving complex identification problems in the empirical assessment. Many recent papers have been quite successful in dealing with this issue. The second one is assessing whether policies achieve the objective of additionality, i.e. they increase productivity of some firms without crowding others out; or they attract new investment in a given place without diverting them from another place; or, finally they do not induce firms to carry out actions they would have carried out even without the policy (dead weight losses). Finally, we should examine if they are cost effective, i.e. that their impact in terms of resources and social capital created is larger than their cost. Whereas there is quite sizeable evidence on the first two steps, evidence on the third one is more scarce and difficult to identify. All in all, the hurdle for a socially and economically efficient policy is extremely high and not always easy to assess.

We titled this paper “something to build on”, because this is the main take away of our analysis. Can policies aimed at boosting productivity really manage to reduce disparities among places? The balance of the evidence is indeed more positive than it is usually presumed. Also papers setting the highest analytical standards in assessing the impact of some specific programs (e.g. Criscuolo et al. 2019; Kline and Moretti 2014; Busso et al. 2013) find positive outcomes. Nonetheless, such programs work well if they can build on the inherent forces, the inherent competitiveness, the inherent comparative advantage of places. The impact is especially sizeable and sustainable if there are other factors interplaying with the policy, triggering a positive reaction of local actors. If there are no such factors, supporting policies are not cost effective.

This is the case for example for general policies to attract FDI (e.g. Corporate taxation) and also specific policies to subsidise investment in backward regions. Countries that have managed to use their corporate taxation to attract high tech FDI they could always match favourable rates with other advantages, good human capital (e.g. Ireland), cheap labour (new EU accession countries). Similarly, EU cohesion policies and structural funds transferred massive funds to peripheral EU areas. The effects on growth have been positive, yet mostly driven by regions with relatively high levels of human capital and quality of institutions. These results show that there is a trade-off between the cost effectiveness of policies and how backward are the targeted regions.

At the microlevel, we find that policies specifically targeted to firms, do especially benefit the most productive among the targeted ones. In general terms, it is inevitable that growth-oriented policies are captured by the best performing anyway, being them places or economic actors. These policies work well as far as they can induce patterns of new inclusion. They work for regions and activities that are close to the margin. In that sense they expand the population of agents that are included, they smooth the patterns of exclusion driven by market forces, they enlarge the base of the included. But they also inevitably foster new exclusions. As such, policies cannot be universal and because inevitably there are left outs, they also create disparities.

This of course raises the big issue of how to deal with backward places, especially when policies cannot be cost effective. Of course, the policy space cannot just be restricted to areas where there are low hanging fruits. Yet, figuring out how to get the high-hanging ones is not easy. Not all places can converge to the same level of income and productivity. Although in such places it is important to enhance productivity growth anyway, nevertheless a policy mix lenient to social support and income redistribution rather than

directly targeted to growth could be necessary and also effective. The minimum objective of avoiding a depopulation of such places could in itself be essential in preserving viable economic activities.

Also, policies must reflect the economic specialisation of places. It is quite clear that productivity trends in tourist areas cannot be compared to those in high tech districts. As we will discuss extensively in the next section, a clear distinction should be made with respect to productivity gaps within or between activities. In comparing places, we should have in mind if we are considering their efficiency in carrying out similar activities, or rather the mix of their activities, which have inherently different levels of productivity.

In what follows we first set the scene, by discussing the heterogeneity of places, activities and people and firms and how they may affect the interplay of policies. We then review policy measures. First, those aimed at fostering and preserving agglomeration in core areas. Secondly those aimed at attracting and reinforcing activities in more peripheral ones. Finally we will discuss infrastructural policies linking different areas.

2 Sources of diversity. Heterogeneity of places, activities and firms

Place-based policies are necessary because places are different, even in terms of the most basic metric, income per capita and even within countries in the European single market, probably the most integrated economic area involving several sovereign nations. This is clearly shown by Figure 1 below, where regions are classified in terms of GDP per capita at the NUTS 3 level.

Figure 1. GDP per inhabitant



Source: Authors' elaboration based on Eurostat data.

Of course, productivity is just one of several ingredients of measures of GDP per capita. But differences in GDP per capita are intertwined and related to gaps in labour productivity and total factor productivity, which have been growing since the early 2000. Also, heterogeneity between regions reflect also a large heterogeneity within regions, at the microeconomic level, in terms of the type of activities carried out, and in terms of the level and growth of productivity of firms. Identifying such heterogeneities and their sources is at the core of any place-based policy design, especially focussed on private sector productivity. In this section, we will discuss each type of heterogeneity in turns (places; activities; firms) and how they interact in determining different equilibria at the level of places.

Heterogeneity of places

As Figure 1 above clearly shows, there are massive gaps in income per capita between NUTS 3 EU regions, even within single nations. Similar patterns can be observed in the US and of course across all OECD member countries. As for Europe, regions with a lower income per capita are concentrated in the new accession countries in Central and Eastern Europe, and, in Southern Europe, even though less so. Also, within all countries there are large gaps between the richest and the poorest regions. This is clearly visible in Italy, France and also the UK. Interestingly, in the last twenty years cross regional dispersions in income per capita have been growing, after many years of mean reversal, where both within the EU and the US the pattern was one of regional convergence. Since the early 2000s, the interregional convergence patterns observed in the earlier decades in mature economies started fading out, with a growing polarisation of income, innovation and productivity in large metropolitan areas.

Divergence started increasing especially within fairly homogeneous areas, like the EU 15 countries or the US. According to Ehrlich and Overman (2020), the coefficient of variation of GDP per capita among Euro 15 metro areas increased by 18% and in the US by 12% between 2004 and 2015, but in the US the reversal in the pattern of convergence had started earlier than for the EU. If we consider the EU 28 aggregate, of course disparities rise even further, but probably trends show that the recent pattern of divergence is less intensive than in the EU 15.

Another trend is that of a growing concentration of activities in large metropolitan areas. According to Crescenzi et al. (2020), the so called Third Industrial Revolution involves the end of Marshallian sector specific patterns of agglomeration, and the emergence of multifunctional poles, combining universities, R&D centres, advanced financial services and also manufacturing. Consequently, such diversified metropolitan centres have favoured a global pattern of well-connected metropolitan poles, hub-to-hub connections, and has slowed down the diffusion of innovation and frontier practices towards less advanced regions.

There is widespread evidence that urban areas are characterised by much more productive workers and enterprises than non-urban locations (Puga, 2010; Combes, Duranton, Gobillon, Puga and Roux, 2012; Rosenthal and Strange, 2004). In the OECD, more than half of the population live in metropolitan areas and these urban locations are responsible for more than half of total GDP. Thus, a large part of a country's productivity is related to the productivity of its large cities. Ahrend et al. (2017) in an econometric analysis conducted on five OECD countries (Germany, Mexico, Spain, UK, and the US) find that doubling the size of a city would increase productivity by 2-5%. Other works find a significant positive effect of clustering and the size of places on firms' productivity: a gain between 3% and 8% is found when a cluster's size doubles, as reported in Rosenthal and Strange's survey (2004) and discussed in Fontagné et al. (2013). Also manufacturing activities, albeit frequently outside strict city boundaries, nonetheless cluster along major transport routes and around densely populated areas.

Hence, although large cities face congestion costs, pecuniary and technological externalities likely dominate in generating patterns of fairly concentrated economic activities with higher productivity (GDP per capita) than more remote places. In this respect, the emergence of core periphery patterns could help raising productivity at the national level.

From the point of view of policy, however, there could be a trade-off between pursuing a fast productivity growth of nations, through a market driven allocation of resource, leading to a growing pattern of concentration of activities, versus instead favouring more dispersed patterns and a catching up of laggard places.

Yet, as far as congestion costs exist and people are unwilling or unlikely to leave declining or peripheral locations, distributional problems emerge. Sustainable growth requires patterns of geographical dissemination of technologies, activities and best practices also to peripheral areas. A growing concentration of activities in the core may in the longer term also be detrimental to innovation and

productivity. Recent studies have shown that R&D productivity in the core has been slowing down, as also less productive R&D workers concentrate in large metropolitan areas (Bloom et al., 2019) or also because many high-tech companies enjoy more market power than earlier front runners (Crescenzi et al., 2020, Feldman et al., 2019; Philippon, 2019). Therefore, both for efficiency and for redistributive reasons, policy frameworks should even out the objectives of strengthening productivity growth of core areas, without stifling productivity growth there, and the dissemination towards other places within countries or broader spaces like the EU.

Clearly, the scope for place-based policies aimed at rising productivity in the private sector is very different if we are dealing with large high income metropolitan areas (core regions) or if we are dealing with peripheral areas, with lower levels of productivity and economic activity. Even though there are overlaps, nonetheless it is conceptually useful, when dealing with policies, to distinguish between those aimed at fostering performance at the frontier, and those more targeted to the catching up of backward places.

OECD (2016) extensively deals with this issue. The distinction is important for several reasons. First, the business environment. Generally, patterns of productivity growth in leading regions are more market-driven and self-reinforcing. Backward regions are frequently affected by market failures, calling for active policy measures. Second, because of this, laggard regions are less likely to operate at full employment. Hence, policies frequently face a trade-off between favouring fast productivity growth (e.g. churning and creative destruction) or supporting jobs (in low productivity non-tradable activities). Consequently, it is not always clear what is the first best policy equilibrium in backward regions. Third, not all the activities located in core regions are likely transferrable to the periphery. For example, it is very hard to attract FDI outside of core regions, but only at a very high cost (subsidies etc. See Barba Navaretti and Venables 2013 on this).

Even though we observe a clear polarisation, nonetheless the core periphery pattern is a bit of a coarse representation of the geography of economic activities, as much variety exists in between. Within the OECD there is a continuum of regions, measured in terms of GDP per capita or size of their economic activities, from the core large metropolitan areas in each country, to smaller but thriving mid-sized places, down to the very peripheral areas.

Todtling and Trippl (2005), in their study on innovative policies in Europe, identify several characteristics distinguishing peripheral regions from core ones. Different combinations of such characteristics generate a large heterogeneity of patterns, and at the same time specific market failures and possible policy responses: low level of R&D; weakly developed firm clusters; few knowledge providers; weak endowments with innovation support institutions. Similarly, they also identify key characteristics of declining old industrial regions: many firms, dominant clusters and relevant organisations, but they are often too strongly oriented on old industries and technological trajectories; various forms of “lock-in”, such as too strong business and policy networks, cognitive blockades due to common world views; inefficient public administrations and institution; too narrow orientation of knowledge providers on existing trajectories, which hamper regional development.

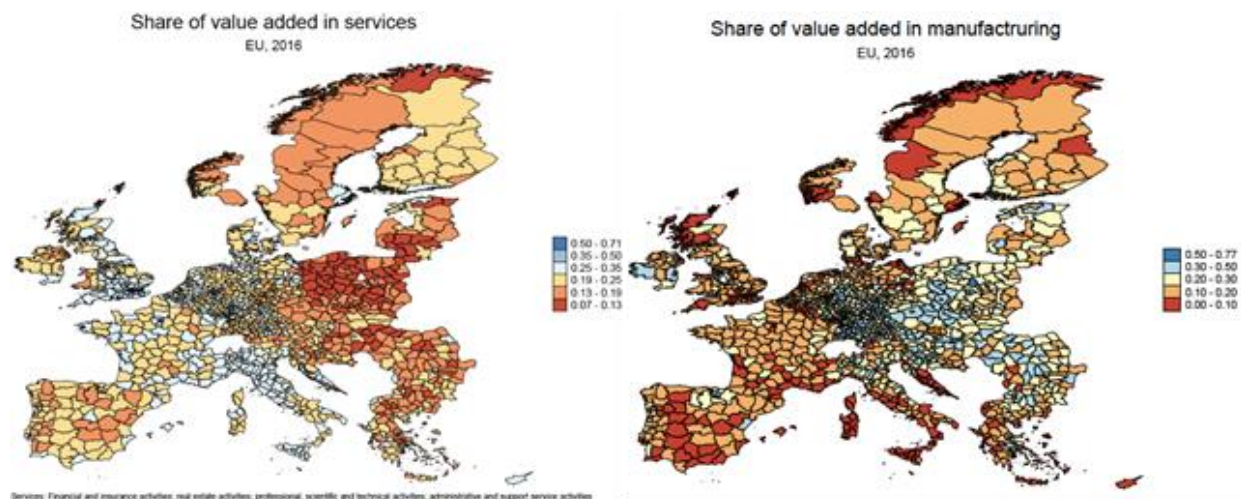
Other contributions have shown that among laggard regions it is important to distinguish between low growth areas, (e.g. some regions in Southern Europe), and low income areas, e.g. some regions in Eastern Europe, (Rodriguez-Pose and Ketterer, 2020; European Commission, 2017). The taxonomy is not too far away from the one of Todtling and Trippl (2005), in that the former group of low growth places are partly similar to the old industrial regions, as they are areas with resources but unable to use them towards new growth patterns and refresh their comparative advantage. The low-income ones are instead regions that lack basic endowments. The optimal policy mix in such regions differs accordingly, with low growth regions, which have a fairly developed infrastructure, but need a complete rehaul of their institutional environment, and low income regions, that do show a better growth potential (and some catching up), but they lack some basic endowments for business development, like infrastructure or regulatory architecture.

Heterogeneity of activities

Productivity of places differs because of the efficiency of their economic actors, and because of the bundle of activities located there. Figure 2 shows the share in regional GDP (NUTS 3 regions) of advanced services (the left panel) and of manufacturing (the right panel) in the European Union in 2016. It is immediately visible that some activities dominate in certain regions (e.g. manufacturing in Eastern Europe, Northern Italy and West Germany; advanced services in South East of the UK, Ile de France, Northern Italy and Germany).

Consequently, a rough comparison of any metric of productivity between places (GDP per capita, per active population, TFP), combines between-activities and within-activities measurements. To be able to decompose these two effects, it is very important to use sectoral data. Does it make sense to compare GDP per capita of London with the GDP per capita of Normandy? The former is higher of course, but mostly because there is a concentration and a composition of economic activities that would never take place in Normandy. It does however make sense to compare similar activities carried out in both places, e.g. non-tradable services like hotels and restaurants or also manufacturing plants in similar industries. Hence, an accurate analysis of productivity patterns should be kept within activities.

Figure 2. Share of regional value added in advanced services and in manufacturing (NUTS 3 EU regions)



Source: Authors' elaboration based on Eurostat data.

Nonetheless, from a policy perspective the combination of activities is also important. As sectorally specialised clusters in manufacturing become less important, innovation hotspots and core productivity regions are increasingly characterised by horizontal agglomerations, i.e. diversified activities, frequently sharing common technologies (digital; AI.). Hence, many clusters move towards functional rather than sectoral specialisation. According to Crescenzi et al. (2020), Europe is characterised by a combination of vertical sectorally-specialised agglomerations and multisectoral horizontal agglomeration. Policies, as we will discuss below, may be quite different, depending on the type of cluster they are addressing and depending on whether they aim at helping regions diversifying and changing their bundle of economic activities, or rather at boosting the efficiency of existing ones. Still, there will always be a very broad heterogeneity in the specialisation of different regions. And clearly very highly productive and high value added activities, will not be spread out everywhere, and there are equilibria where regions are highly productive in low value added activities (e.g. tourism) and it does make no sense aiming at changing their

specialisation. Hence, the real issue is how to be at the frontier in what a given region does, not aiming at every one doing the same thing.

A further element of complication and added heterogeneity is given by the expansion of Global Value Chains (GVCs). Clearly, without them, the specialisation of places would have to be analysed in terms of integrated production systems. With GVCs, each place needs to be connected to a web of other places where other parts of the production chain are carried out. Therefore, there are elements of complementarity between different places that must be taken into account, stretching much the standard definition of comparative advantage. The productivity of places will depend very much on the productivity of other nodes in the production chains. Hence places and policies in there should no longer be seen in isolation or purely in terms of exporting and importing relationships with the rest of the world, but they must be looked at as nodes of tangled networks. Criscuolo and Timmis (2018) make it very clear that the productivity of firms is very much related to their centrality in GVCs. The concept of centrality here also refers to the geographical characteristics of nodes where firms are based. In that a single firm could not be central, unless it is adequately connected and is able to enjoy locational advantages with respect to the rest of the value chain. Criscuolo and Timmis (2018) find that there have been large changes in the organisation of some GVCs. Motor vehicles manufacturing remain clustered around central hubs in Europe and the US. In contrast, IT manufacturing shifted to Eastern Europe and Asia, far away from high-income centres of production. According to them, IT services instead have become more central for GVCs almost universally.

Heterogeneity of firms and people

The productivity of places is very much linked to the efficiency of the firms and the quality of the human capital based in such places. Even more so if we consider the productivity of the private sector. Ample evidence shows that there is much within industry heterogeneity in the level and growth of firms productivity (Andrews et al., 2015, 2019; Barba Navaretti and Rosso, 2020; EIB, 2019). In particular, leaders and laggards patterns have been observed, whereby there are resilient and growing gaps in performance between firms in the top percentiles of productivity distributions and those in the lower ones.

Several arguments have been brought forward to explain this pattern. First, it is possible that new technologies contributed mainly to the productivity of leaders, unleashing winner takes all dynamics. Coherently, Andrews, Criscuolo and Gal (2016) find that within ICT-intensive services, compared to other industries, global frontier companies have higher market shares and had more diverging TFP trends from non-frontier firms. A second explanation is a breakdown in the pattern of diffusion of knowledge. Andrews et al. (2016) argue that slower technological diffusion could also be explained by the reliance on tacit knowledge and increasing complexity of technologies. New knowledge and technologies at the frontier might not diffuse immediately to all enterprises. There could be growing time lags for new inventions being transferred to and adopted by laggards. (Andrews et al., 2015; Comin and Mestieri, 2018; Akcigit and Ates, 2019). Finally, the slowdown in the productivity growth of laggards might be a consequence of the diminished competitiveness of markets because of rising entry and/or exit barriers and even looser competition authorities (Philippon, 2019). Andrews et al. 2016 find that TFP divergence is more pronounced in industries characterised by least extensive deregulation and slower pro-competitive product market reforms.

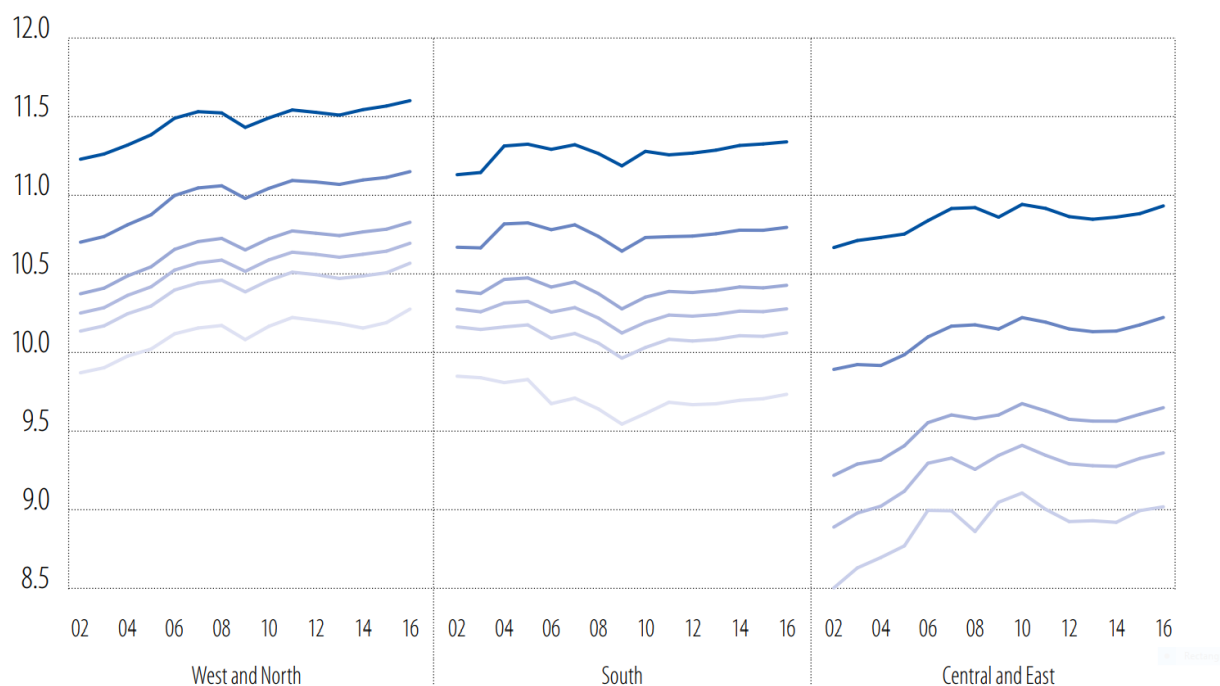
Productivity in the private sector has a very relevant spatial dimension. Tsvetkova et al. (2020) examine carefully how several of the factors affecting productivity at the firm level are highly related to the characteristics of places where firms are based. Indeed, leaders tend to be concentrated in high income regions and cities, in both manufacturing and service activities. For example, Barba Navaretti and Rosso (2020) show that the mode of the Italian national productivity distribution for firms located in the Southern regions is at the lowest 20th percentile, whereas in the North it is between the 50th and the 80th percentile. Exactly the same pattern can be observed for the overall productivity distribution of the European Union,

whereby firms in the top percentiles are clustered in North Western countries, those at the bottom in Central Eastern countries and those in between the other two in Southern Europe (EIB, 2019).

As shown in Figure 3 below, drawn from EIB (2019), region-specific productivity distributions are very different in the three areas. Firms in the low-income Central Eastern countries are overall much less productive. Although their productivity is growing fast, this trend is not sufficient to catch up, especially for firms in the lowest percentiles. Firms in the South have productivity levels in between the other two regions, but stagnant, again especially the less productive ones, likely concentrated in the slowest growing regions in this area (e.g. Southern Italy). This firm-level pattern is consistent with the one observed in the aggregate in Europe as documented in the European Commission's report on lagging regions (2017). There, a clear distinction is made between the low-growth Southern regions and the low-income Central Eastern regions. The former are richer but stagnant. The latter are poorer but more dynamic, nonetheless, not enough to catch up.

Figure 3. TFP level and trends for within EU region

TFP level and trends for within EU region (West and North; South; Central and East) percentiles of TFP distributions.



Note: The different figures present the regional TFP distributions. Percentile 95 thus refers to the 95th percentile of that specific region. The same applies to all percentiles.

Source: EIB Investment Report, 2019 p. 336.

Why do top performers cluster in core regions? The literature has identified three sets of motives. The first one is self-selection, in that the most productive firms decide to locate in most productive areas (Berry and Glaeser, 2005). The second one is selection, as in core areas there is more competition and only the best survive (Combes et al. 2012; Alfaro et al., 2019; Syverson, 2004; Baldwin and Okubo, 2006; Melitz and Ottaviano, 2008). The third one is related to agglomeration economies of different sorts: sharing and economies of scope, like shared resources and diversified inputs etc. (Puga, 2010; Ahrend et al., 2017; Syverson, 2004; Alfaro et al., 2019; Alfaro and Chen, 2016); learning induced by externalities like

knowledge and best practice spillovers (Alfaro et al., 2019; Di Giacinto et al., 2014; Griffith et al., 2009; Zheng, 2016); more efficient matching between firms, between workers and between firms and workers (Fontagné and Santoni, 2018; Bacolod et al., 2009; Andersson et al., 2007).

These patterns and the strong agglomeration dynamics they generate are self-reinforcing and they strengthen even further core periphery gaps and geographical inequality. Firms in core regions have higher productivity and grow faster. Leaders in core regions conglomerate other firms and generate local spillovers. Hence, leaders self-select in fast growing regions, and productivity grows faster there. Alfaro et al. (2019) show, for a large sample of EU and US companies, that industry leaders tend to concentrate in central areas and that they agglomerate many other firms. Also, firms in core regions have a higher probability to move towards the frontier of productivity distributions than firms in the periphery. So, it is not easy to envisage policies favouring a flow of high productivity firms and human capital towards low productivity areas, and counterbalance the advantage of agglomeration with the disadvantage of congestion.

The higher productivity of cities is also related to their ability to attract human capital. A highly skilled workforce might prefer denser areas either because of the availability of amenities or because of the larger productivity premium in denser areas for skilled workers (Combes et al., 2010). Higher productivity implies of course better-paid jobs and higher wages. According to Behrens et al. (2014), the elasticity of average US city earnings relative to city population is 8.2%. Since wages and firms' productivity are closely related, we can infer that larger cities are characterised by more productive workforce and firms (Baum-Snow and Pavan, 2012). That large cities are better endowed with skilled workers is also confirmed by Bacolod et al. (2009), though only to a modest degree. Combes, Duranton and Gobillon (2008) note that wages in Paris are on average 15%, 35% and 60% higher than in other large cities (e.g. Lyon and Marseille), mid-sized cities and rural-employment areas, respectively.

3 Policy and heterogeneity

These three dimensions of heterogeneity interact, creating a very complex pattern of places, combining activities and firms in very different ways.

We have seen that highly productive firms do cluster in fairly high income regions. Although these findings generally hold for all activities, the degree of clustering will change depending on the economies of scale and scope of the activity, the specificities of the technologies used, the concentration or dispersion of demand etc. and certainly the level of concentration will be different for services and manufacturing.

How can policy deal with such specificities? Not simple. Policy design cannot always be too specific. Most contributions in the literature group policies around a limited number of families, classified on the basis of their objective: those favouring agglomeration; those favouring dissemination of best practice and technology transfers, and those reducing transportation and communication costs between regions. We will follow this same classification in our discussion below.

Nonetheless, policies should be designed so as to take into account the intricate layers of heterogeneity discussed above. We will adapt the concept of agglomeration and the analysis of policies depending on the characteristics of the places examined. Dealing with agglomerative forces is very different when policies are targeting multifunctional core places, where the real issue is avoiding congestion costs and the fading out of creative destruction, from old industrial regions, where the issue is avoiding a pattern of obsolescence and deglomeration.

Also, when dealing with the periphery, agglomerative forces are strictly intertwined with the possibility of transferring investment, human capital and technologies to those areas. It is therefore difficult to distinguish between the targets of favouring agglomeration or fostering technology transfers. And also policies need to be more specific depending on the characteristics of laggards. For example, Rodriguez-Pose and Ketterer (2020) carry out an econometric analysis where they show that the policies for boosting regional growth for lagging European NUTS 2 regions are different depending on whether these are low growth regions (mostly in Southern Europe) or low income regions (mostly in Central/Eastern Europe). For the former group, the quality of institutions matters most, whereas for the latter basic endowments, like infrastructure and schooling are the fundamental impediments for development (on this see also European Commission, 2017). In what follows we will therefore discuss how different groups of policies could best fit heterogeneous patterns of regional characteristics and development.

Table 1 below provides a broad outline of the policies examined in this paper and where do they fit in this pattern of complex heterogeneous places. The first two blocks (lines) refer to policies aimed at regions where agglomeration forces are already in place and need to be preserved rather than fostered. The third relates to policies fostering agglomeration and transfers and the fourth line to policies linking different areas. The columns report the type of places where policies should be directed, the actual type of policies that apply to such frameworks and finally examples of specific policies applied.

Nonetheless, within this framework, it is also essential to discuss policies affecting the potential channels generating firms' productivity growth, as discussed in Tsvetkova et al. (2020). These are: knowledge inputs and specifically investments in R&D and Innovation, technology transfers and learning; the competitive context, and specifically churning and competition, international trade and global value chains and local demand; the local availability of factors of production, and more specifically, human capital and the

availability of skills of various types, or other specialised endowments and resources; the quality of institutions and local governance. All the policies listed in Table 1 are aimed at triggering such channels and boost productivity at the firm level, although with various intensity and balance. Hence, we will look at the policies, thinking which of the channels above they may be more effective at triggering, and also which group of firms and type of activities will likely be affected.

Table 1. Policies examined

Aim	Where: which places	Target	Policies	Examples
Preserving Agglomeration	Core	Preserving creative destruction and strengthening R&D at the frontier	Tech city clusters and accelerators	Silicon Roundabout, London Silicon Valley accelerator
		Avoiding congestion	Social Housing Provision of public services	
Avoiding Deglomeration	Old industrial clusters	Diversification	Develop technology intensive cluster	Barcelona
		Upgrading and diversification	Business climate; infrastructure; funding R&D	High tech offensive Bavaria
		Upgrading	Industry 4.0	
Fostering Agglomeration and Transfers	Periphery	Fostering agglomeration economies and pecuniary externalities	Transfers	EU cohesion policy and structural funds UK Southern Yorkshire Italy: Abruzzi Tennessee Valley Authority in the US
		Attracting Investments	Improving business environment Corporate taxation Targeted subsidies R&D subsidies	National corporate taxation policies EU Structural and Cohesion Funds Technopolis and Intelligent Location, Japan Regional Subsidies, UK and France
		Fostering incumbents	Investment subsidies	UK Regional Selective Assistance Program Italy Law 488: US Empowerment Zones
		Fostering agglomeration	Cluster formation and R&D subsidies	France Local Productive

		economy, pecuniary and technological externalities		Systems" (LPS), Competitive Clusters
Connecting Core and Periphery	All	Reducing trade and transaction costs	Infrastructural investments Rail Highways Digital connections	High speed train: Germany, Italy, UK Highway: Spain; Switzerland

Source: Authors' elaboration.

4 Preserving agglomeration

One central issue is of course how to foster patterns of agglomeration. We will try, as far as possible, to discuss potential lines of action distinguishing between core areas, where agglomerative forces are already functioning and effective and where the issue is rather that of avoiding congestion, and, in the next section, other relatively backward areas, where market failures may prevent agglomeration patterns and should be directly targeted by policies. Naturally, favouring pecuniary and technological externalities has a twofold dimension. The first one is attracting in a given place new activities, firms, investment and human capital. The second one is how to strengthen existing agglomerative forces and activities in a given location. We will try to keep these two dimensions separate as far as possible, but as we will see, especially in non-core locations, they are strictly intertwined. We will first start with a discussion on how to deal with agglomeration in areas where agglomerative forces are at play or how to avoid deglomeration, for example in old manufacturing regions. In the next section we will then look at how to foster new agglomerative patterns in more peripheral location.

Core poles: Preserving creative destruction and avoiding congestion

In large metropolitan areas, existing forces of agglomeration are in themselves effective drivers of attraction and generate investments aimed at boosting productivity. In a way, in large cities everything is easier: easier to attract new investments; easier to find funds for social activities; easier to attract talents and good corporations; easier to diversify in complementary activities and easier to generate knowledge externalities.

Still, large agglomerations must be managed. Productivity wise, the concern is how to preserve a healthy pattern of creative destruction. In principle, large cities are ideal environments for light touch policies, whereby public entities provide some support services to favour technological upgrading and network building. Yet the risk of these interventions in very dynamic environments is their redundancy.

An example of a light touch policy is the 'Tech City' cluster policy launched in London in late 2010. The aim of the program was to foster the cluster of 2800 technology companies, based in Shoreditch and the Old St. roundabout. The cluster, mostly specialised in digital technology, had been growing rapidly before government intervention and had attracted media attention as the "Silicon Roundabout". According to Nathan (2019), who carried out a detailed impact assessment of the policy, the outcome is not fully encouraging, although the size and the density of the cluster had certainly increased after the policy had been implemented. Tech firms productivity did not necessary rise and crowding out, congestion effects apparently dominated positive agglomerative effects especially for small digtech (mainly hardware and software) firms. Interestingly, agglomerative effects were instead positive for larger, more established digital content firms. Finally, it is not clear that the dynamics of the cluster had been strengthened by policies, as year-by-year outcomes were larger during the pre-policy years.

Another potentially fertile approach in core dynamic areas, is supporting incubators or firms' accelerators (Madaleno et al., 2018, Fehder and Hochberg 2014). While entrepreneurial incubators attempt to boost creation of new start-ups, entrepreneurial accelerators are dealing with already established enterprises

and they provide assistance in the later stages. More precisely, they are established with an aim to boost an enterprise, not to launch it. Many accelerators are located in core metropolitan areas, where complementary investment and resources are available.

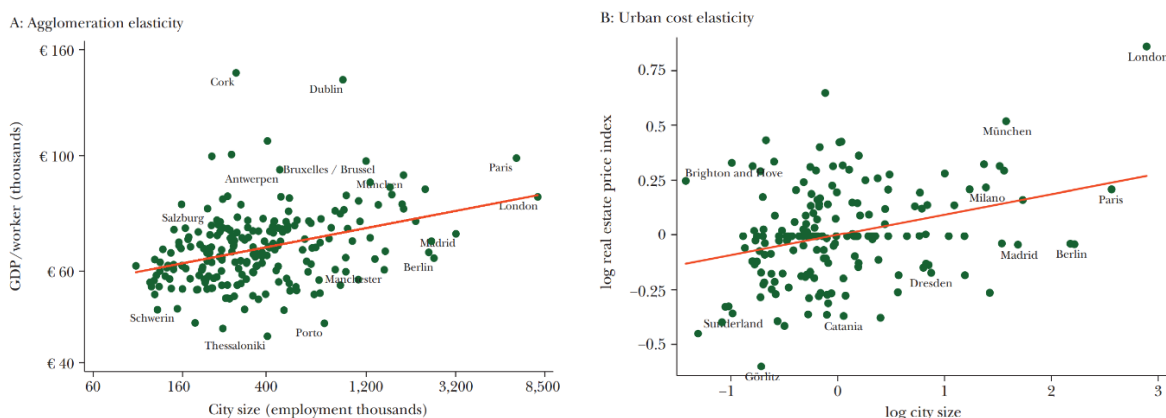
As a benchmark, it is interesting to look at a private sector accelerator in probably the core of the contemporary innovative world, the Silicon Valley Accelerator. Brown et al. (2019) investigated whether the accelerator programmes in the Silicon Valley are successful in attracting foreign entrepreneurs. Their continuous entry is at the core of Silicon Valley's innovative environment. The programme offers accommodation, seed funding and mentoring in return for a small equity stake in the firm. Of course, participation to the programme is on a competitive base. Brown et al. (2019) find that foreign entrepreneurs join the programme not because they need financing, but rather to connect themselves with like-minded entrepreneurs. In other words, the main asset of the accelerator is the provision of monitoring, mentoring and contacts within the Silicon Valley community. In this respect, and thinking at public funded initiatives, it is quite unlikely that the success of this accelerator can be replicated in less advantageous or innovative environments, with a less dynamic ecosystems. Nevertheless, precisely because entrepreneurs look for such ecosystems, accelerators can provide a strong element of attraction in other core environments, where frequently entry barriers are very high for new companies.

What these examples show is that it is not always easy to identify market failures for policy interventions in areas with complex patterns and webs of activities. And also that the costs of congestion and crowding frequently dominate over the benefits of agglomeration, especially for weaker, yet potentially dynamic actors, like small firms or start-ups.

The risk, to the limit, is that agglomeration forces may get reverted if large cities are no longer able to keep renewing themselves and they are unable to cope with the social costs of dynamic adjustment (see Duranton and Puga, 2020 on this). Figure 4 below, from Ehrlich and Overman (2020), reports elasticities of GDP per worker and real estate price per size of the metropolitan agglomeration in the EU 15. Both elasticities are positive and sizeable: both income per capita and cost of housing are positively associated with city size.

In this respect social policies are crucial complementary ingredients of policies directly aimed at fostering productivity growth. The issue is minimising the costs of congestion. These can kill vital forces of renewal, as youngsters, start-uppers, artists, and middle classes are pushed out of large cities. Also, policy and local governments should avoid social distress and rising inequality within such cities. As each high-tech job generates other low-tech jobs in non-tradable sectors, this implies that large metropolitan areas do combine several layers of economic activity, social status and income levels (Moretti, 2004 and 2013; Ehrlich and Overman, 2020).

Figure 4. Blessing and curse of agglomeration: City size, GDP per worksher and real estate prices



Source: Ehrlich and Overman (2020), p. 134.

A first real challenge for policymakers in metropolitan areas is how to achieve the balance between costs and benefits of gentrification. Benefits include an increase in property prices for homeowners, more grocery stores and increased access to jobs, while agglomeration forces might displace small local businesses, non-wealthy citizens, as rents and house prices rise due to the lack of affordable housing (NCRC, 2016).

There are several instruments through which policymakers may provide affordable housing. For instance, governments may support home-seekers through grants, various public guarantees and financial assistance typically provided for low-income households and first-time buyers. Policymakers may also provide homebuyers with measures such as tax reliefs, though these instruments are more common for middle-class citizens, rather than low-income households. In Appendix 1 we will report some examples of such policies, highlighting however, how these not always help more needy citizens, and rather they may benefit wealthier middle-income citizens (Del Pero et al., 2016).

Another crucial issue is to manage a continuous and inclusive efficient provision of public services as congestions make things difficult: infrastructure, public transports etc. Finally, of course, there is a need to reduce the stress of congestion on the environment, with carefully planned policies. In this respect, congestion charges, as increasingly applied in large cities, can be effective tools for reducing traffic and favour the smooth functioning of public transports (Davies and Hallet, 2002; Price and Tsouros, 1996). All such policies will not directly impact productivity, but are essential ingredients to a pattern of healthy agglomeration, especially given the recent path of clustering and fast urbanization.

Avoiding deglomeration and converting specialised poles

Poles which are highly specialised, as is typical of manufacturing districts, have with time frequently faced reversals in their growth patterns, as new highly productive poles, possibly with new types of activities emerge. This process is well described in Moretti (2013)'s account of American cities in the transition from manufacturing to IT and services (the rust belt). The issue of reconverting and diversifying highly specialised agglomerations is of great concern for most OECD countries, especially mature economies. Actually, a lack of a sufficient reallocation of economic activities both between and within sectors is at the heart of the slow-down of European productivity. Clusters with an economic specialisation which is no longer viable and which have not been able to renew themselves are destined to decline. Yet, the cost of the fading out of poles of agglomeration, the economic decline of cities, has always been socially and economically extremely high, with the gradual fading out of pecuniary and technological externalities at place.

The healthy restructuring and revival of existing poles in mature economies, if viable, is a very important driver of aggregate productivity growth in the private sector. Old industrial regions have generally many firms, dominant clusters and relevant organisations, but they are often too strongly oriented on old industries and technological trajectories. And they suffer from various forms of "lock-in", such as too strong business and policy networks and cognitive blockades. An excessively narrow orientation of knowledge providers on existing trajectories hampers regional development (Todtling and Trippl, 2005).

The problem here is whether to support the resilience of the cluster or to foster an accelerated pattern of reconversion. And of course, there is a need for a mix of growth-oriented policies and policies supporting the social costs of reconversion.

Also, firms' heterogeneity matters a lot. The demise of old industrial clusters has completely changed the hierarchical structure among firms, with the survival and also rapid expansion of leaders and the decline of smaller firms. Hence agglomeration patterns are less and less related to the sharing of common factors of production and externalities among groups of similar firms, but such factors are increasingly internalised

by dominant companies within the cluster. In this respect, traditional policies targeted at enhancing networking between the members of the cluster may be less relevant with time, given also a geographical broadening of value chains. Rather, policies supporting leading firms in interacting with their suppliers and hence building local externalities can be effective. A counterfactual evidence of this process is the decline of the high-tech cluster in Rochester, due to the inability of its leading firm, Kodak, to shift from analog to digital technology in photography (Moretti, 2019).

A very successful example of manufacturing upgrading and technological diversification, supported by local policies, is the high tech cluster of Bavaria in Germany, as analysed by Falck et al. (2010). Policymakers in Bavaria started privatising state-owned companies in 1990s and reinvesting the proceedings to improve the general business climate of the State with investments in telecommunication and transport infrastructure, support for start-ups and small and medium firms, investments in education, qualification programmes, research and development infrastructure, environmental policies, culture and new energy sources. Initially a non-targeted very broad program. The program was subsequently focussed on targeting five key technology industries: ICT, environmental technologies, new materials, life science and mechatronics, which helped upgrading the industrial base of the state and to diversify its economy at the same time. Altogether, between 1999 and 2004, for the so-called High-Tech Offensive, the State of Bavaria invested €1.35 billion. The program was precisely aimed at clustering industry and services and also creating connections with institutions and public research infrastructure. According to Falck et al. (2010), these cluster-oriented policies were successful in boosting R&D intensive activities and in enhancing firms' collaboration, while decreasing R&D expenditures at the same time.

The Bavarian example shows how the successful integration with high tech services like digitalisation is key to the survival and strengthening of manufacturing. Indeed, this favours a more effective interaction among intricate and frequently distant parts of value chains; the introduction of new systems of production, like 3D printing; a better management of complex logistics; an enhanced targeting of clients and the implementation of online distribution channels.

In other words, the survival of manufacturing poles, confronted by the rapidly growing competition of emerging economies, does require a deeper integration between manufacturing and advanced services. Policies can here be instrumental in supporting this transition towards the digitalization of manufacturing, even though digitalisation has frequently become the buzz word of in fact empty policy dreams.

There is an issue of the supply of skilled personnel with competence matching the digital with the manufacturing side of technology. This probably requires University education and on-the-job training. Frequently companies complain that they are unable to fulfil vacancies for technical positions.

At the same time, many companies, especially SMEs, are reluctant to face a digital transition. In other words, there is frequently a problem of insufficient demand for digital services. This is a problem, as such firms will soon be no longer able to dialogue with other companies and the rest of the economic environment. Hence, incentives to induce firms to invest in digitalisation are important, as far as SMEs are willing to accept the effective introduction of such technologies.

Under some circumstances, industrial poles can be unable to survive, unless they completely convert themselves out of manufacturing. A good example of this pattern is the conversion of the textile district in Barcelona into a pole of high tech services. Textile factories were established in the 1830s, in the Poble Nou industrial district. After decades of growth, in the 1970s the district started declining and the area to de-industrialise. A deep transformation was triggered by the Olympic games in 1992 and at the beginning of 2000s the city council implemented a program to redevelop the neighbourhood into a cluster of knowledge-intensive enterprises. The programme included several complementary measures: a substantial change in urban planning; infrastructural networks; fostering an adequate business climate to attract knowledge-based activities; housing policies targeted to high tech workers. According to Viladecans-Marsal and Arauzo-Carod (2012), cluster policies and the amenities developed by local governments succeeded in

attracting new knowledge-intensive activities and reconverting the district. Also, MNEs entered the neighbourhood and favoured skills upgrading.

These examples, however, show that a successful reconversion of industrial poles require the parallel development of other factors on which to ground the new or the revived comparative advantage in the area. As for Bavaria, this was clearly an area that was able to build on its very deep competences in advanced manufacturing to integrate it with advanced services and new technological development. Barcelona, instead, was able to lever on the strong attractiveness and amenities of the city and on the public resources that became available with the Olympic games. Clearly this is not a sufficient ingredient for a successful restructuring. There are many other less successful examples of places, which had comparable conditions to Barcelona. Nevertheless, the starting point and the necessary condition for a successful reconversion is the clear identification of the key advantages on which to ground the process.

5 Agglomeration and transfers in non-core areas

Fostering agglomeration in peripheral areas and creating sufficient externalities and critical mass to enhance productivity in the private sector is not very simple. Whereas for core areas the policy action is supported by market driven triggers, in the periphery the lack of obvious comparative advantages, of leading firms and of a critical mass of human capital makes it very difficult to generate persistent economic and technological externalities. Yet there is a broader policy space, as market failures prevent an adequate economic expansion of these areas. Here the aim of policy is to trigger a transfer of resources towards these areas, being them investment, firms, human capital, finance and technology. However, at the same time it is clear and it will become even clearer in the discussion below, that transfers work only if there are adequate local resources interacting with any type of new inception. For these reasons, policies also aim at fostering and strengthening incumbent activities. We will discuss in turn several tools and policies to strengthen non-core places.

Agglomeration and transfers in peripheral areas (1): Public transfers

Because of increasing geographical polarization there is quite a widespread support for place-based policies involving transfers towards non-core places. According to Ehrlich and Overman (2020), there are a few efficiency-based arguments in favour of such transfers of public funds. The first one is that if there are decreasing returns to public investments, it is efficient to channel resources towards areas with a low stock of such investment. Also, there is a need for central coordination (being at the federal level in the US or at the level of the European Commission in the EU) if such investments generate externalities to other areas. Finally, there is a question of race to the bottom, if places were allowed to decide the allocation of resources by themselves. On top of this there are of course equity arguments and finally, especially in the case of Europe the need for stronger policy integration.

For all of these reasons such transfers are quite large. The United States spends around \$40 to \$50 billion per annum. The transfers enacted by the EU Cohesion Policy to backward regions are larger, €645 billion between 2014 and 2020, especially with respect to the economy of the beneficiary regions, given that only NUTS 2 regions with a GDP per capita lower than 75% of the EU average are eligible.

The EU Cohesion policy enacts several different programs with targets like transport infrastructure, firm subsidies, and human capital investments. A recent paper by Ehrlich and Overman (2020), surveys different studies of the effects of EU cohesion policies. Such studies look at the program in general, focussing on the amount of resources transferred and not on the characteristics of the specific programme. They are able to identify the impact of the transfer on eligible NUTS 2 regions by comparing them to those immediately above the threshold and hence not eligible for the transfer. The conclusion is that the overall effects of the transfers on growth have been positive, yet mostly driven by regions with relatively high levels of human capital and quality of institutions. Also, other studies find that the positive effect declines with the intensity of the transfers, as measured by the ratio of the transfers on the regions' GDP. In other words, the treatment is less effective the more dependent is the region on such transfers.

Also, several studies have looked at the time persistence of such transfers, by focussing on regions like the Italian Abruzzi or the UK's Southern Yorkshire which lost eligibility (Barone et al., 2016; Di Cataldo, 2017; Becker et al., 2018). The evidence is that such regions revert to the pre-transfer trajectories after several years. These results are a bit discomfoting, as earlier studies reviewed below were instead more optimistic on the initial effect of EU structural policies, at least in the attraction of new investments.

A more positive view emerges from the study of the immense investments in public transport infrastructure, electricity and flood control systems, the Tennessee Valley Authority (TVA) in the US by Kline and Moretti (2014). Started in 1930, the TVA represents an example of one of the largest programmes for modernisation of deprived regions in the US. The study finds that between 1930 and 1960, when the magnitude of transfers was substantial, TCA yielded positive employment effects in both agriculture and manufacturing. Once the programme became self-sufficient, positive employment effect in agriculture disappeared, while manufacturing industries continued to generate new employment within the treated counties. Additionally, as manufacturing sectors offered relatively higher wages than agriculture, there was also an increase in aggregate income within the recipient regions.

Kline and Moretti (2014) also developed an equilibrium model to quantify the effect of the TVA on national income. The aim of this exercise was to understand if the positive pattern observed in the treated areas had also positive externalities at the national level, or rather it had displaced and crowded out non treated activities. They found that the TVA affected positively national welfare directly, increasing the productivity of local companies through the provision of improved public infrastructure, but only weak evidence of a positive effect through the indirect channel of positive externalities on the non-treated firms. They conclude that the TVA had indeed been cost-effective, but this result was completely driven by the direct impact of the infrastructural investment on productivity.

Summing up, the economic externalities enacted by large EU transfers have been sufficiently persistent only in the presence of other development triggers like human capital and quality of institutions. The real issue is how far such transfers, in creating economic externalities and hence improving the competitive framework for firms, are able to trigger a virtuous pattern of productivity growth in the private sector. It is clear here that the quality of the projects on the one hand, and the ability to target resources to promising firms and activities are crucial. In this respect, poor institutions and human capital are more likely to allocate resources towards rent seeking activities. A longer term program, like the TVA in the US had instead lasting effects, although there is no evidence of externalities in non-treated areas. Of course, details in the design and the implementation of the programmes may partly explain the more positive results for the US compared to the EU. Also, the impact of the transfers very much depends on the type of measures financed. We will discuss the effects of specific measures below.

Transfers and agglomeration in peripheral areas (2): Attracting new investments

Attracting new investments of productive companies can be essential for local productivity and to foster agglomeration. Quite widespread evidence supports the view that multinational companies or national leaders, being generally more productive than local incumbents, may set standards and enact technological transfers, even in peripheral areas. We have argued above that the progressive concentration of high productivity firms in core regions is a crucial reason for the widening gap from peripheral regions.

Several studies have shown how the presence of high productive firms is very important for attracting others and generate technology spillovers (Alfaro et al., 2019). Baldwin and Venables (2013) show how the movement of a plant that is strongly linked to other stages of the production process (such as an assembly plant) can trigger relocation of a wide range of other activities (component suppliers). For declining areas there is also an important issue of avoiding that existing firms move elsewhere.

Greenstone et al. (2010) investigated the impact of the new opening of large plants in US counties on incumbents' performance. They compared winning counties (i.e. the ones where the plant was eventually opened) with losing counties (i.e. the ones that narrowly lost the race). They find that five years later, TFP of the incumbent manufacturing plants in the winning counties increased by 12%. Productivity gains are generally related to worker flows and technological linkages (see also Fons-Rosen et al., 2017). Also Javorcik (2004), Javorcik and Spatarneanu (2008), Girma et al. (2008), Alfaro-Urena et al. (2020) and Abebe et al. (2018) find evidence of considerable spillovers from FDI to local firms especially through upstream vertical linkages towards suppliers.

It is important to note that productivity gains are frequently unequally distributed among the incumbent firms. Those with sufficient absorptive capacity to interact with new high productivity entrants are able to benefit more, whereas others are either displaced (especially when the new entrants are competitors) or do not achieve gains through this channel.

For this reason, and for the lack of other locational advantages, attracting FDI and new economic activities in peripheral areas can be extremely costly and not necessarily beneficial. Therefore, the opportunity costs and the potential benefits of policies aimed at attracting FDI should be carefully analysed.

Following Barba Navaretti and Venables (2013), we will discuss two separate channels of action. First general measures affecting the business environment overall and not directly targeted to attracting FDI. Some of these measures are national, but we will discuss their direct bearing on specific regions. Second, we will discuss specific measures instead targeted to attracting FDI, like regional investment subsidies.

General measures. Related to the issue of transfers within the EU cohesion policy, is how far these funds also trigger an inflow of FDI or in general investments in new activities. These funds are not directly targeted at FDIs, but they aim at fostering business conditions and hence they can have an indirect effect on investment flows. Basile et al. (2008) provide supporting evidence that EU structural and cohesion funds had been successful in attracting FDIs towards more backward regions between 1991 and 1999. Their econometric analysis controls for several other market factors affecting firms' decision to invest in a given region. This implies that even controlling for most other agglomerative factors, cohesion transfers are still positively related to FDI flows. We should notice that this is the time of the EU enlargement, when the EU attracted massive FDIs from outside the region, but also large flows within the region. So even though in backward areas, firms have free access to the EU single market, which is in itself a crucial factor of attraction.

Midelfart-Knarvik and Overman (2002) also found evidence that EU structural funds had been effective in attracting activities at the regional level. Interestingly, according to their evidence, they especially favoured the attraction of R&D-intensive activities, yet to regions not well endowed with human capital and highly skilled individuals, probably making such investments less effective. Their result can be generalised in arguing that the large transfers involved in the EU sectoral funds, (being them under the shape of horizontal, e.g. SMEs, sectoral – e.g. shipbuilding – or regional assistance), prevented a market driven transition towards an efficient allocation of resources and a location of activities reflecting evolving comparative advantages. Considering the later evidence reported above about the lack of persistency of the effects of structural funds on long term growth, it could be argued that this negative prediction turned out to be right: the activities attracted by the cohesion transfers have not always been able to generate permanent long terms effects, even though they certainly fostered additional investments and activities.

Mayer (2004) is perhaps the most pessimistic among the studies of this period, as he finds not very encouraging results when looking at the impact of the cumulated structural funds received by French regions in 1989-91 on the location choices by multinationals in 1992-95: such funds, according to the findings of this study, do not have a significant and sizeable impact on location decisions.

The noticeable exception in this quite somber setting in the use of structural funds to foster investments on poor regions is Ireland. According to Midelfart-Knarvik and Overman (2002) these funds and the

consequent large investments in education, in attracting highly skilled return migrants and a very aggressive corporate taxation policy were all instrumental in creating a dynamic comparative advantage in high tech industries. But the policy action was probably nested in an already existing fertile ground (good institutions and education systems) and it was sufficiently comprehensive to ground high tech investment in a pattern of long term productivity growth.

In this respect, a very important factor of attraction is the quality of the institutional environment: FDI inflows are particularly sensitive to the credibility and stability of public institutions. Free market oriented and transparent policies, impartial and effective legal systems that enforce contracts and protect individuals and property rights help in attracting highly productive firms. Although national frameworks normally dominate, nonetheless there is a regional dimension in the quality of the business environment. Rodriguez-Pose and Ketterer (2020) and European Commission (2017) show that institutional change is a fundamental drive for the economic development of lagging European regions, especially of low growth Southern regions. Their econometric analysis of 249 NUTS 2 regions between 1999 and 2013 shows that such regions could gain a lot from improving the quality of their institutional framework, as measured by a regional government quality index decomposed into four constituent components: corruption, rule of law, government effectiveness and bureaucracy and government accountability. Their analysis focuses on GDP per capita, yet other studies have shown how the quality of institutions has a very high bearing on the location decision of firms (Globerman and Shapiro, 2002). Considering the high sunk cost of greenfield investments, poor governance infrastructure is indeed an important source of deterrence (Benassy-Quere et al., 2007).

Another important general policy lever influencing investment choices, especially the decision of where to set up a plant, is taxation. There is a very broad literature showing that the average and the marginal taxation rates do affect the extensive and intensive margins of the decision to invest in a foreign location (Hines, 1999; Devereux and Griffith, 2003; Devereux and Lockwood, 2006; De Mooij and Ederveen, 2008). Normally, most analyses focus on the national tax rates and less on place-based policy. But two fundamental lessons, also useful at the level of places, emerge from this literature. The first one is that the effectiveness of a favourable taxation in attracting investments fully depends on broader agglomeration patterns, with also large variations between regions and within countries. As argued in Barba Navaretti and Venables (2013), several contributions have shown that agglomeration factors interplay with taxation in attracting FDI. This, in particular, is the result of a paper by Hansson and Olofsdotter (2010) on EU-15 countries between 1995 and 2006. And this is the reason why especially mature economies can keep higher taxation rates than emerging countries and attract considerable inflow of FDI. Hansson and Olofsdotter (2010) also provide evidence that low corporate taxation has helped attracting investment in New Member States in Central and Eastern Europe, but there too, other factors of attraction, like relatively cheap labour, highly skilled human capital and good access to other EU countries played a fundamental role. In this respect, the effectiveness of lowering corporate taxation to attract investment faces very similar constraints to those discussed for structural funds, even though at a much broader level (as there are no restrictions on eligibility here).

The second issue is that competing on taxation may be socially sub-optimal and unleash a race to the bottom. Also regions could compete in terms of local fiscal levies. Devereux et al. (2008) provide evidence that OECD countries indeed had been competing between each other over tax rates attempting to attract more foreign investors. Observing the decline in taxes in the last decades among the OECD countries, the authors argue that this Nash equilibrium with lower tax rates has been achieved because of the competition among countries, which has intensified following a substantial lifting of capital controls. This is the reason why the OECD and the EU keep working on harmonizing a regulatory framework on corporate taxation among their member countries.

Specific measures. The reasoning behind these two issues at the level of national taxation can be applied to place-based policies. While core regions do not have to put so much effort in attracting FDI inflows due to the existing agglomeration forces, lack of self-attractiveness in the peripheral regions implies their need

to offer significant targeted incentives to companies. At the local level, where possible according to the EU state aid rules, or in other countries where this is possible, a combination of fiscal incentives or ad hoc subsidies can be used to attract investors (Moretti, 2011 for the US; Criscuolo et al., 2019).

Following Barba Navaretti and Venables (2013) the concerns emerging for national policies, can be applied to the regional dimension by addressing three separate questions. First, is there any evidence that a policy or a set of policies have changed the decision taken by firms? And this of course will depend on how much it is possible to isolate the effect of the policy from other frequently unobservable confounding factors. Second, if location decisions have changed, then can anything be said about where firms would have located in the absence of the policy? This is the issue of the negative externality on other regions and countries, the race to the bottom. Finally, even if policy passes these two tests, is there evidence that it has been cost effective? This question is once more related to the interaction between fiscal incentives and other covariates and to the fact that the subsidy rate might be extremely high for backward regions (see also Ehrlich and Overman, 2020).

Addressing these sets of concerns in the regional context is very important because, whereas general policies like the level of corporate taxation apply to everybody, many regional interventions and subsidies are more selective and frequently target specific types of companies and/or industries (e.g. public subsidies, different tax rates and entrepreneurial nurseries). If we consider firms' heterogeneity, selectivity if not applied adequately may frequently be counterproductive, inducing inefficient allocation of resources. For example, as more productive firms generally respond to agglomeration forces, they are more likely to locate in highly productive areas, as we have seen earlier. Regional subsidies aimed at attracting new companies towards the peripheral regions may instead provide incentives to the least productive firms to locate there, as these companies have the lowest opportunity costs of locating in deprived areas, as they would probably not survive in highly competitive core areas (Baldwin and Okubo, 2006).

As for the first question, how policies have affected the decision of firms, although the evidence is mixed, still, what observed at the national level is generally confirmed at the regional one: such policies are not particularly effective in backward regions.

Many studies on this were carried out in the early 2000s, taking stock of interventions carried out in the 1990s. Devereux et al. (2007) investigated the impact of agglomeration forces and regional subsidies in the UK's deprived regions on location decisions by greenfield FDIs. They found that higher grants are needed for attracting firms if those areas do not contain already established firms in the same industry. The same conclusion has been reached in Jones and Wren (2008), where authors examined the determinants of manufacturing FDI inflows in the less developed UK regions. Also Mayer (2004) finds a similar result for regional policies in France between 1985 and 1995. National subsidies, specifically targeted to new investment and job creation, failed to achieve their objective. Accurate econometric analysis shows that additional investment flows in peripheral regions have essentially been driven by local economic conditions and mostly by the pre-existence of large number of firms, rather than by the subsidies. Midelfart-Knarvik and Overman (2002) also found that direct subsidies granted as State Aid had no effects on attracting new companies.

Finally, Okubo and Tomiura (2012) tested the impact of the two major programs in Japan to relocate manufacturing firms from congested core regions to other more peripheral regions, Technopolis in 1983 and Intelligent Location in 1988. Interestingly the destination regions had been selected on the basis of their holding of some factors of attraction, like pre-existing manufacturing activities and a University with a good engineering department and being fairly close to large markets. The first programme aimed at promoting high tech manufacturing, and the second one the integration between manufacturing and IT services. In essence, "both programmes were designed to relocate manufacturing plants away from congested cores and to develop new high-tech manufacturing clusters during the period of industrial structure transition to high-tech manufacturing". The results were in line with the predictions of the Baldwin and Okubo (2006) paper. The programmes were indeed successful in attracting new manufacturing

companies into backward regions, however firms with below average productivity levels. Highly productive firms stayed behind in core areas.

Most of the papers reviewed focus on manufacturing. Yet, the impact of policies will also depend on the type of activities. As for the attraction of investments, this has been studied mostly at the national level. Both Riedl (2010) and Lawless et al. (2018) argue that non-tradable services will essentially be driven by the customer base where they locate. Among tradables, the most responsive to financial incentives are financial services. In contrast, manufacturing is responsive to incentives, but clearly the availability of the required factors of production and access to market will interact with local incentives, like corporate taxation or subsidies, in affecting the opportunity costs and the relative trade-offs of each location.

A special case is the attraction of R&D-intensive activities, as the interaction with local research networks is a fundamental factor of attraction. A very successful operation in this respect was the development of the Research Triangle Park (RTP) in North Carolina in the mid-1950s. The state was at the time a poor region, at the bottom of the US income per capita rankings. The idea was to connect the three universities in the state, and use them as a starting point for attracting new firms. The park was first created as a private initiative, but was rapidly in bankruptcy. The Governor realised the importance of the project and decided to support it creating a public-private partnership. The goal of the project was to create an environment that would attract large R&D-intensive companies and also encourage start-up creation either through spinoffs or by inducing new firms to locate nearby large MNEs. It took six years for project to develop and to attract IBM, the first large R&D corporation to invest there. Another important ingredient of the project was that it attracted corporate venture capital (i.e. corporates directly investing in external start-ups or young companies), rather than traditional venture capital funds. Traditional venture capital requires high rates of return and payback in a short time horizon generally through an IPO. Corporate venture capital is instead patient and invest in strategic technologies and promising longer term business opportunities for the corporate investor, and generally ends up in acquisitions rather than IPOs, hence strengthening existing corporations and their presence in a given place.

The RTP was certainly a very successful example of deep economic transformation of a poor region into a very effective R&D hub. The attraction of a major investment at the start of the program was certainly key to make it successful. But IBM would have never invested there if there had not been three high level Universities, able to develop interactions between business and academia. Also, it was the outcome of a long term steady and broad policy action shared by all the subsequent governments of the State.

Additionally, the second big question in evaluating policies aimed at attracting resources and activities in a given region, is that they should be designed so as to generate new activities, rather than favouring transfers from other regions. The policy game should in other words not be zero sum, both within countries and also between countries, especially in the EU. Of course, when we are looking at the congestion of large cities or given poles of agglomeration a relocation of some activities from there to other less congested places could be beneficial both for the location of origin and the one of destination. But in many cases competition takes place among backward areas. At the level of places, EU State Aid, by defining common rules of the game may limit races to the bottom, but at the same time it may cause a diversion of investment from non-eligible regions as neighbouring places may have different eligibility regimes to targeted policies.

Available evidence on races to the bottom in corporate taxation and relocation of FDI is mostly at the national level, as discussed above (Devereux et al., 2008). Empirical evidence on whether local subsidies follow the principle of additionality or not are scarce as trying to estimate these effects is immensely challenging (e.g. lack of data or inability to construct proper identification strategy) (Ehrlich and Overman, 2020). Nonetheless we also have some evidence for regional programs, in the UK, yet mostly targeted to SMEs and frequently in non-tradable sectors. Einio and Overman (2020) investigate the impact of the Local Enterprise Growth Initiative (LEGI), introduced by the British government in 2006 in deprived areas, which, amongst other objectives, also included the reduction of exit rates among local businesses and the

attraction of additional investments. LEGI targets mostly small non-tradable businesses. Their analysis focuses precisely on how far the LEGI initiative displaces investments in nearby areas. They find a strong displacement of employment from nearby non-treated regions and almost no displacement of businesses. This shows that whereas local labour markets cross regional borders and that treated workers might be resident in non-treated regions, firms face instead higher relocation costs and therefore are less mobile, and the incentives provided by the policy are not sufficient to induce them to relocate. Once more, this proves that subsidies are not a sufficient driver for relocation, unless matched with other structural factors of the competitive environment.

In contrast to earlier evidence, Criscuolo et al. (2019) who looked at the Regional Selective Assistance Program of the UK and who found a marginally positive effect of regional grants on job creation through the extensive margin in the peripheral UK regions, argue that this positive impact has not been achieved through the reallocation of workforce from non-eligible neighbouring regions.

Finally, there is evidence that many such programs have been costly, either because their actual measurable impact (in terms of jobs created or new investments triggered) has been small with respect to their costs or because they have caused deadweight losses: i.e. they have supported activities that would have taken place anyway (Barba Navaretti and Venbles 2013). Identifying the cost effectiveness of projects is not simple, but should be carefully assessed. As we will see, this is a problem occurring for many other forms of support discussed below, not just for attracting new investments.

Transfers to and agglomeration in peripheral areas (3): Strengthening the incumbents with subsidies to investment

Of course, productivity in non-core places cannot only rise through the extensive margin, the entry of new more efficient firms, but also through the upgrading of the incumbents. We have already discussed the effect of transfers and especially EU structural and cohesion funds aimed at the overall business environment and at the creation of pecuniary external economies. In what follows we focus on measures targeted at raising investment and employment and subsequently at strengthening R&D and innovation.

A recent study exploits changes in the EU State Aid rules in 2000, and hence in the eligibility of regions to the use of subsidies to support local firms, to evaluate the impact of the UK Regional Selective Assistance Program, which is the main small business support program in deprived areas of the country. Grants were discretionary, mostly targeted to the manufacturing sector and could fund capital expenditure on property, plant, or machinery in the deprived regions. The study focuses on the period between 1997 and 2004, and finds a sizeable positive effect on investment and employment, but not on TFP. Effects were confined to SMEs, whereas large firms absorbed the subsidy, with no effects on employment and investment outcomes (Criscuolo et al., 2019). Although there is some evidence that regional subsidies increased employment rates through the extensive margin (i.e. higher net entry), the main driver of this effect has been the intensive margin (i.e. incumbent firms increasing their size). The fact that this program was unable to raise productivity of the treated firms also implies the inability to foster an allocation of resources towards more productive firms. And also that in background areas programs supporting economic activities and employment creation, an obviously important objective anyway, do not necessarily lead to productivity growth.

In the case the Italian Law 488, under which companies receive a public subsidy if they invest in deprived regions, findings are even more pessimistic. Bronzini and de Blasio (2006), (surveyed in Ehrlich and Overman, 2020) find evidence of dead weight losses (hence lack of cost effectiveness) and absence of additionality. Public subsidies increased investment levels of treated companies, but firms had already planned such investment for the future. The policy accelerated the investment pattern, but did not trigger new investments. Moreover, there was a lack of additionality: the study finds that subsidies crowded-out non-treated firms.

A positive effect on local employment and wages in backward regions is found by Busso et al. (2013), who examine the impact of the US Empowerment Zones (EZs) program in 1993. The program granted substantial tax reliefs to companies employing people resident and working in EZ and also granted to local councils funding for several support activities, like business assistance, infrastructural investments etc. The programme was initially targeted to only six EZs and in a sequence of six rounds to an overall population of approximately 700 000 individuals. According to Busso et al. (2013), “by 2000, the first round EZs had spent roughly \$400 million dollars in Social Service Funds. However, large quantities of outside capital accompanied the grant spending. The six EZs reported allocating roughly \$3 billion to local projects by 2000, with more than \$7 of outside money accompanying every \$1 of Social Service funds”. Interestingly, therefore, the program, even though mostly targeted to social spending and income support, managed to create better-paid jobs and outside investments. In this case, we do not have evidence on the impact of the program on productivity, neither on whether there was indeed additionality in the activities carried out with no dead weight losses. Yet, it is possible that rather than targeting economic activities, programs providing income support and social services in background areas could indeed be especially effective in triggering new activities. Naturally, such programs must have an ultimate objective of creating jobs and must not be perceived as purely meant at granting subsistence, with no focus on future employment prospects.

Transfer to and agglomeration in peripheral areas (4): Strengthening the incumbents with subsidies to cluster formation and R&D incentives

Another approach to promoting local industries is supporting industrial clusters. Martin et al. (2011) investigated the impact of industrial policy on firms’ productivity and cluster formation in France. The program, called the “Local Productive Systems” (LPS), was administered by the French agency in charge of regional policy (Datar) and started in 1998. Subsidies were granted to collaborative projects of groups of firms, based in the same area and part of the same industry. Subsidies would fund different activities, for example a feasibility study to develop a common brand, all aimed at strengthening the cluster and favouring the creation of agglomeration externalities. Subsidies were small, in line with other European programmes of cluster creation and mostly targeted declining industries and regions¹. Although the programme implied a radical shift of French regional policies, from support measures to growth-oriented measures, the study finds that it was not able to revert the decline in TFP in these regions. This shows first that it is difficult to change declining patterns of specialization, especially in backward regions and especially with small subsidies. Also, that rarely such policies are able to pick those firms which have a high growth potential, possibly because declining firms have a higher incentive to tap subsidies.

The LPS was a first attempt to launch competitiveness clusters. A more ambitious program and targeted to R&D investment was started in 2005 and called indeed “competitiveness clusters”, with an endowment of €500 million per year. Three clusters funded by this program were in the Aquitaine, Languedoc-Roussillon and Provence-Alpes-Cote d’Azur regions and in the optic/photonic industry², which was

¹ “CIR-CE (Co-operation in Innovation and Research with Central and Eastern Europe)” policy, financed by national budgets and European structural funds between 2005 and 2008, provided funding that could not exceed 150,000 euros per network. The “Micro-clusters reinforcement programme”, implemented in Catalonia, provides each micro-cluster initiative with a starting subsidy of 20,000 euros that can then increase to 100,000–120,000 euros. In the same vein, the Spanish Basque country, often presented as a pioneer in terms of cluster policy, promotes an approach based on a light funding by public authorities” (Martin et al 2011).

² Route des Lasers in the Aquitaine region, OPTITEC in the Languedoc-Roussillon region and ELOPSYS in the Provence-Alpes-Côte d’Azur region were selected in July 2005, following the first call issued in 2004.

identified as one of most promising sectors for the 21st century by the European Commission³. Ben Abdesslem and Chiappini (2019) investigated the impact of this “competitiveness cluster” policy. Compared to Datar, this policy was more targeted on successful clusters, rather than declining activities. At the same time, public funds were supporting R&D projects, either through financial subsidies or by compensating for overhead costs. Also, the programme tended to pick the winners, targeting larger and more productive companies, and those companies with greater labour productivity growth rates within the cluster. Those firms that participated in the programme experienced higher TFP and labour productivity growth rates relative to non-participating companies, even after controlling for agglomeration economies. Moreover, targeted companies managed to increase employment levels and investments into fixed assets, although the clusters’ size has not changed. The potential limits of the study are that chosen firms were usually receiving other grants and/or tax exemptions at the same time, so it is hard to in fact isolate the effect of the programme. And also that efficient firms self-selected into these clusters. A comparison to another Optic/photonic cluster in Rhône Alpes that did not receive any support shows that TFP patterns are equivalent for treated and non-treated companies, although the former has faster labour productivity growth. This shows that the subsidies probably supported investments, without necessarily inducing productivity gains.

Fontagné et al. (2013), examine instead the whole competitive cluster programme between 2005 and 2012, looking at the pattern of selections of the clusters and the firms part of the clusters. Interestingly, the program operates bottoms up, in that clusters apply to the program, then the Government selects a subset of clusters and finally firms may decide to adhere to the selected clusters. There are therefore two moments of self-selection, that is the clusters that decide to apply and the firms that adhere to the selected clusters. And one moment of selection by the Government, that is the subset of financed clusters among the applicants. Interestingly, Fontagné and co-authors find both a pattern of picking the winners by the government, the clusters selected are those with the highest ex ante average productivity, and also of self-selection of the best firms adhering to the selected clusters.

In the same spirit, Gallié et al. (2013), find that “competitiveness clusters in territories possessing significant R&D resources, and involving large companies capable of organizing projects and which are the most efficient in obtaining state funding. In contrast, competitiveness clusters without prior cooperation experience perform poorly”.

One can draw four lessons from the France cluster policy. The first one is that especially policies targeting R&D investment require an adequate turf of receptive firms. And when the targets are clusters of firms, with the aim of creating R&D externalities in a given location, you need groups of firms able to network and organize credible projects. The second one is that it is not simple to revert trends in declining activities or areas, unless there are green shoots of credible new initiatives. The third one is about the cost effectiveness of such policies, as there is no assessment of the magnitude of the private investment, employment and productivity gains induced per Euro spent. Certainly, the competitiveness cluster policy required large investment, equivalent to 5.5 % of the yearly budget allocated by the French Government to universities and research. Finally, there is an issue of dead weight losses, in that it is not clear whether the reported good outcomes in such clusters were indeed the outcome of the policies or, rather, whether they would have emerged anyway out of market based forces.

Another way how government can target firms and projects is through enterprise zones. These programmes, besides for providing investment funds, also assist companies with other measures (e.g. relaxation of planning regulations). However, there is a concern that deadweight losses and displacements are more likely to emerge in the case of enterprise zones than for place-based subsidies. This may be the

³ The aim of the programme was to support cluster formation of those clusters that applied for tender. The programme was launched in 2005, and since then it was implemented in three rounds. However, the authors investigated its impact only on optic/photonic cluster development.

case as financial subsidies are frequently more selective, while enterprise zones provide non-discretionary assistance to all companies based in the zone, and also provide sizeable incentives for relocation (Ehrlich and Overman, 2020).

6 Approaching core and periphery: Reducing distance and investing in transport infrastructure in digital times

A way to reduce productivity gaps between core and periphery regions is to strengthen transport infrastructure and hence reduce transport and transaction costs. A large share of EU cohesion funds was spent in developing transport infrastructure, 18% in 2014-2020, according to Ehrlich and Overman (2020). Also, the aim of massive investment in Trans-European Networks is precisely to reduce transport costs within the single market. Lowering transport costs and time does indeed favour flows of ideas, technologies, people, and best practices.

The rapid diffusion of digitalization, accelerated further in COVID times, could make the location of workplaces almost irrelevant, favour the scattering out of many economic activities, mostly tradable services, on a much broader geography and reduce the forces for agglomeration. The advantage of digitalization is that it creates proximity even at a large distance. Hence it tampers a crucial force for agglomeration: the need for physical proximity. In this respect, we have lawyers giving or writing opinions, portfolio managers trading online, call centres operators taking calls, professors teaching students and writing papers from anywhere, repeatedly interacting with their counterparts. Accordingly, no doubt, digital platforms favour the diffusion of ideas and may make locations irrelevant. And also the infrastructure for physical transport (roads, railways etc.).

Yet things are not so simple. During the COVID lockdown, we have been living under the illusion that this can be enough, that we could devise a digitally based new form of society, built on the irrelevance of physical places and physical interactions. In fact, this is not the case. Many activities still require physical proximity. This is obviously the case for factories; restaurants; libraries; public transports; hospitals; research labs for anti-COVID vaccines and many others. Even those very digitalised in the end require proximity. Professors have fewer ideas without conferences, seminars and evening discussion with a colleague in front of a beer; lawyers must see their clients, portfolio managers need to interact with their analysts to understand where markets are going. Proximity is an ingredient of society on which societies are built. Think at the very concept of pecuniary externality. All the activities mentioned above, in manufacturing, tradable or non-tradable services, would not exist without a sufficiently large critical mass of people localized in proximity, demanding such activities. So digitalisation has perhaps reinvented proximity at a distance but it has not yet killed distance and probably never will.

Nevertheless, a lower cost of mobility triggers, as argued, larger flows of people, ideas, technologies, products. But also that all what is tradable can be supplied from somewhere else. Hence, it triggers both centrifugal and centripetal forces, as first made very clear by the New Economic Geography scholars (Krugman, 1991; Fujita et al., 1999; Baldwin et al., 2003). Improvements in transportation infrastructure

may even increase regional disparities. Investments in infrastructure reducing transportation costs are bidirectional, in that they reduce mobility and transport costs for both lagging and core regions. Hence, even strengthen agglomeration towards the most developed locations. This could be even more so, given that often large infrastructural projects aim at connecting core areas (e.g. Eurostar trains).

The earlier models of New Economic Geography deliver multiple equilibria outcome: either centripetal or centrifugal forces prevail. The emergence of one equilibrium rather than the other depends on several factors, besides for transport costs: wages, congestion, amenities etc.

As for other forms of public interventions, it is not simple to identify the actual impact of transport infrastructure on treated firms. As mentioned above, policy makers usually select such projects to be located either in more or less prosperous areas. Hence, the outcome of the treatment could be pre-determined, in that observed productivity improvements of the treated may or may not have happened anyway, independently of the project. Also, transport projects may determine a relocation of activities from areas excluded by the new transport networks and hence fail on the requirement of additionality. Hence when looking at the impact of such policies these caveats should be kept clearly in mind (see Duranton and Venables, 2018).

Ehrlich and Overman (2020) correctly argue that multiple equilibria framework fails to take into account more complex regional patterns, with many regions with intermediate levels of development, which are neither core nor periphery. These multiregional geographies are more easily accounted for by a new breed of models of spatial economics, like Allen and Arkolakis (2014) and Redding and Rossi Hansberg (2017). What is the evidence on this?

Transport infrastructure should then be looked at from the perspective of creating networks of activities and connections in a multipolar framework, rather than just providing an input to firms, the cost of which is borne by public actors. Networks determine workers' access to jobs or firms' access to inputs and good markets. Henceforth, transport networks can have a substantial impact on an area's attractiveness, affecting in turn the location decisions of firms and workers. This network perspective is the one that seems to emerge from most studies on transport infrastructure. Such infrastructure enhances interactions and favours rise in productivity for those who are part of it, even though it also strengthens the patterns of exclusion for those not part of it. In other words, a well-connected transport infrastructure is certainly a necessary condition for economic development and productivity growth. As always, it cannot be the sole trigger of economic development, but it works as part of a set of other comparative advantages.

This idea of a transport network is even more relevant if we consider the broader perspective of global value chains. Criscuolo and Timmis (2018) examine how the degree of centrality in GVCs may affect productivity at the firm level. They find that especially for small firms in peripheral areas, the possibility of moving up towards more central positions in GVCs may enhance productivity. One must qualify here what we mean by centrality. In GVCs, especially as captured within an input-output framework, the centrality of an activity refers to the number and intensity of connections with other nodes. However, such definition indirectly is also related to the geographical positioning of activities, to different degrees of intensities, depending on the characteristics of the activities themselves. Hence, the centrality of activities in GVCs may be more or less related to the geography of places.

For example, Criscuolo and Timmis (2018) argue that heavy manufacturing activities, as in the motor vehicle industry, remain concentrated in few hubs in Europe. It is quite hard for any activity in this industry to be of relevance, if not connected to such central hubs with adequate transport infrastructure. Such concept of geographical centrality is less important for IT manufacturing, which, because of the low incidence of transport costs in such activities, has been massively relocated to Eastern Europe or Asia, away from high-income production centres. For such activities, the transport infrastructure necessary to connect them to central hubs is completely different from what is required for heavy industry like motor vehicles. Here, and even more so for digital services, digital connections are the crucial infrastructure. In other words, infrastructures connecting different nodes are essential for the functioning of GVCs, but with

different characteristics and degrees of centrality, depending on the type of activities involved. Paradoxically, it is easier to manufacture IT or provide IT services from the periphery than heavy manufacturing, as far as, though, the right connections are available. Criscuolo and Timmis (2018) find that firms that manage to become more central in GVCs networks also become more productive, especially if they are small and from accession EU countries. Hence in this respect, transport infrastructure targeted to IT activities may have positive productivity feedbacks for firms in the periphery.

Several studies look at the impact of road and rail infrastructure on connected areas. In general, they all find positive economic outcomes along the networks. These positive effects are found by Gibbons et al. (2019) investigating the improvements in road infrastructure in the UK and their impact on employment and firms' labour productivity in targeted areas. They find that among the incumbent firms, there is an evidence that road construction increased labour productivity and wage levels, and intensified usage of intermediate inputs (goods and services). These results may imply that road construction was highly successful in attracting new transport-intensive establishments and in increasing local wages relative to transportation costs and input prices.

Holl (2016) also finds that new highways in Spain positively affected manufacturing firms' productivity, especially in places closer to the new infrastructure, even after controlling for agglomeration forces. Most productive firms in suburban areas and those located closer to highways benefited the most.

Gibbons et al. (2018) carried out an interesting counterfactual exercise. Instead of investigating the impact of investments in transportation infrastructure, they examined the effect of decommissioning of railways (i.e. change in accessibility) on the distribution of population and local socio-economic elements. Indeed, in the UK, policymakers cut substantial railway costs between 1950 and 1980 by removing 42% of lines and 60% of stations. Their results suggest that the reduction of railway infrastructure reduced the population and displaced skilled and educated workforce located in more affected areas compared to less affected ones. Hence, the reduced infrastructure negatively affected long term productivity in displaced locations, by favouring a brain drain towards better connected locations. More precisely, they find that a 10% cut in the access to rails is associated with 3% decrease in population (i.e. the most affected areas, where all railway lines were removed, lost 24% of population), and the effect is permanent.

Same results on the positive impact of railways connections were found by Ahlfeldt and Feddersen (2018) who looked at the high-speed rails (HSR) built to connect two core areas in Germany, Cologne and Frankfurt. Interestingly, the line had three intermediate stops in the small cities of Limburg, Montabaur and Siegburg, with a population between 15,000 to 25,000 people. The study could then investigate the effect of the railway on these less central cities. It finds that HSR increased the average GDP of intermediate stops: after 6 years of the programme, treated regions were 8.5% wealthier than the reference group. Furthermore, they estimated that the elasticity of output with respect to market potential (i.e. market access granted by the railway) is 12.5%, while the elasticity of productivity with respect to employment density (agglomeration of activities as a consequence of the railway) is 3.8%. Interestingly, the railway strengthened the small peripheral towns along the track and did not foster a transfer of activities and people located there towards the two core cities at the two ends of the track. Yet, the positive effects close to the rail track, did not trickle down to regions further apart. Every 30 minutes farther from the HSR halves the spillovers' strength and after 200 minutes farther away there are no more effects.

Baltrunaite and Karmaziene (2020) take a different perspective and they assess the impact of the Italian HSR in Italy on labour market matching. They find that better access to transportation infrastructure improved matching between highly skilled directors and more productive firms. As a consequence of this improved match, firms with more skilled directors are less likely to default and increase their productivity and revenue. Hence, the new railway granted firms along the line access to a pool of highly skilled directors, they could not have hired otherwise and favoured a match between skilled directors and productive firms. This reallocative sorting induced by the railway, certainly helped increasing the productivity of the best performing firms, but also made the environment more competitive and increased

the productivity gap between leaders and laggards. Also, given that the Italian HSR only stops in large city, it also had a positive bias for core areas and less of course on the periphery.

Similarly, sizeable distributive effects are also found for Swiss highway construction projects and their impact on the non-urban areas that directly benefited from these investments. Reduction in transportation costs and locations with better connections are expected to attract disproportionately high-income individuals, while at the same time displacing low-income people. Indeed, by looking at the impact of the Swiss highway system between 1960 and 2010, Fretz et al. (2017) find that new highway access within 10km led to a long-term 19%-increase of the share of high-income taxpayers and a 6% decrease of the share of low-income taxpayers.

All these studies, showing positive effects of improved transportation networks, raise however three sorts of issues. The first is that such networks inevitably create a pattern of inclusion and exclusion. Even though also non-core areas along the networks do benefit, and hence centrifugal forces towards core locations do not appear to be dominant, places left out of the networks evidently fall behind in their development trajectories. And this also because frequently resources for local transport systems are diverted to long haul high speed projects. Moreover, because of the increased competition enacted by such networks, the high enders among firms (high productivity) and individuals (highly skilled and high income) do gain most. Thus, reallocative effects are highly positive, yet with distributive impacts policymakers must deal with.

A further issue is that these investments are extremely expensive. As an example, according to Holl (2016), and Storeygard (2012), the costs of implementing an HSR network in Britain, which mainly consists of a Y-shaped connection of London to Birmingham, Leeds and Manchester of about 500km length are expected to sum up to £42 bn. The literature on the cost effectiveness of such project is broad and we do not want to deal with it in this paper, but this is certainly an issue to consider.

Finally, as argued by Blouri and Ehrlich (2020) infrastructure investments should not be examined in isolation but associated with other types of regional transfers, like subsidies or investment in amenities. Their impact of course will very much depend on their interaction with these other investments.

7 Conclusions

This paper examines a broad range of place-based policies and their impact on productivity in the private sector and on other complementary outcomes. The analysis looks at how policies relate to different levels of heterogeneity of places, activities, firms and human capital. We discuss how the effectiveness of policies must factor in such heterogeneity. Given the increasing polarisation of regions both in the OECD and in the EU space, policies must deal with the inclusion of laggards, without stifling the dynamic potential of leaders.

It is a complex balancing act. Policies favouring or governing agglomeration patterns in core regions are different from policies targeting technology transfer or FDI towards non-core regions. At the same time policies boosting the productivity of highly productive and fast growing firms are different from those favouring the inclusion of laggards, and also the type of activities, tradable or non-tradable services, manufacturing or R&D matter.

There are various reasons for the growing gaps between leaders and laggards, both places and firms. And for these very reasons, the design of place-based policies in a world where performances are increasingly dispersed is very complex. First many core places are diversified poles with many different activities, integrating industry, services research and education. This is the result of a complex pattern of technological and pecuniary externalities, very difficult, probably impossible to recreate in other places.

Second, the speed of technological development, with the combination of many technologies and a mix of highly specialised skills, make technology transfers more difficult to achieve and support. Third, digitalisation in principle eases entry for new firms, but at the same time, it also increases competition and raises network externalities and creates new entry barriers.

Fourth, the competition from cheap labour countries, especially in the manufacturing of traditional products, forces the transition of old industrial districts towards technology and skilled based model of competitiveness and the need to integrate with advanced services (logistics, digitalisation etc.) and also to diversify into other activities. Designing policies supporting this transition is a daunting task indeed.

Fifth, the increasing geographic dispersion of production and Global Value Chains (GVCs) makes infrastructures reducing the transaction costs between nodes crucial, but they require huge investments and they are not easy to accomplish. Finally, the rapid digitalisation and its acceleration in COVID times, blurs partially the need for physical agglomeration, making the location of some economic activities less relevant and will require a complete rehauling of work places and the organisation of transport networks and of the urban development of cities.

Our bottom line is that within this very complex framework, the broad range of measures discussed can be effective, but only if they build on the inherent forces, the inherent competitiveness, the inherent comparative advantage of places. The impact is especially sizeable and sustainable if there are other factors interplaying with the policy, triggering a positive reaction of local actors. If there are no such factors, supporting policies are not cost effective. Even though policies may smooth patterns of exclusion, they cannot be universal, hence, they may also enact new patterns of exclusion that need to be analysed and addressed.

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Annex A. Policies for sustainable housing and reducing congestion

To sustain affordable prices of rents, governments may restrict an increase in growth rates of rents (OECD, 2019). Rent control should provide protection against sudden increase in rent prices, constraint levels of security deposits, establish maintenance standards and so on. However, policymakers should be very cautious when implementing policies regarding the rent control. On the one hand, these interventions should be targeted towards citizens most in need. On the other hand, rent control should not constraint rent prices so much that landlords cannot afford to pay for property maintenance (NHLIC, 2019).

One example of a policy aiming to provide affordable housing was implementing rent control in San Francisco in all buildings that contain five or more apartments. The policy was implemented in 1979 and the rent control referred only to buildings that have been constructed until then in order not to discourage new investments. In 1994, policymakers extended this rent control also on smaller multi-family buildings (Diamond et al., 2019). They exploited this event in 1994 to study the impact of rent control on tenants and landlords. Treated tenants were more likely to remain in their apartments and to stay in San Francisco in general. This effect is more pronounced among the older household and among those who have stayed longer in their apartments prior to treatment. Rent control particularly reduced the likelihood of displacement among the racial minorities. On the other hand, they showed the evidence that landlords responded to this measure transforming existing apartments into owner-occupied housing and by changing initial buildings with new construction. In the long-run, landlords decreased the supply of housing by 15%. Moreover, converting the existing buildings into new construction high income residents have been attracted. Thus, rent control provided completely opposite effect than the policymakers intended, widening income inequality within the city by attracting high income household and preventing minorities to reallocate, and enhanced the gentrification process in San Francisco.

Heskin et al. (2000) investigated the effect of vacancy control and rent control provisions on rental supply and the demography of renters in four cities in California. They exploited the governor's decision to phase out vacancy control for a period of three years in all California cities and found that vacancy control has indeed lowered the rate of increase in rents. Vacancy control has also substantially increased tenants' residential stability reducing and diminished renter turnover. Finally, their results suggest that vacancy control has enhanced ethnic diversity within cities.

In Birmingham, the local government was supporting the affordable housing through different channels. For instance, one scheme included provision of affordable housing with shared ownership. Home seekers would purchase certain share of the property, usually 50%, while the rest of the housing costs buyers would repay through rent payments. Another affordable housing scheme provided home seekers with a discount, typically between 70% and 80%. In the case that buyers decide to move out later in the future, they have an option to sell the apartment to another household at a similar price. There is also a good example of public-private collaboration aiming to provide affordable housing. The Park Central development programme planned to construct 1400 new homes over the course of 10 years. More precisely, as Barber (2007) stated, "it is the one significant scheme in Birmingham city centre that is delivering a mix of housing by price, tenure and type, alongside provision of some new public facilities". The programme was initiated in the city area with predominantly public-sector activity. For project to realise, there has been established a partnership between local governments (as landowner), private sector (as

developer) and social-housing provider. Instead of selling the land to private investors, the government maintained the ownership over the land. Therefore, policymakers managed to ensure non-market housing facilitating at the same time the development of local amenities, such as public parks. In that way, instead of building another housing area within the city, local government created completely new neighbourhood (Barber, 2007).

Davies and Hallet (2002) argue that policymakers should try to reduce congestion within the pole regions, though they note that these attempts may be easier said than done. However, they mentioned the successful example of introducing tolls in the Norwegian city of Trondheim. The tolls were introduced in 1991 restricting the entrance of cars into the city centre and government used these fees to improve environment and public transportation within the city. The same measure has been implemented in Stockholm and Singapore. The fees collected from the vehicles that have entered the city centre are invested in improving public transport. The idea of the policy was to penalise those who pollute and create traffic congestion within the city while rewarding those who do not. California Coastal Act has been developed to regulate coastal access and land use. The programme requires from investors to submit a request to the local government in the case that investment changes the intensity or land use. Moreover, application must contain the approval of all property owners in the radius of 100 feet and from all potentially interested parties. The Commission could also ask investor to make adjustments in their project proposal to compensate for the decrease in resource quality or reduces public access to the coast (Severen and Plantinga, 2018).

Finally, Hilber and Schoni (2020) observe the increasing trend of purchasing the second home among the wealthy individuals and investigate its impact on local labour and housing market. This phenomenon is particularly pronounced in highly desirable cities and seasonal tourist locations. Hilber and Schoni evaluated the impact of the policy in Switzerland that banned the construction of new second homes, focusing on tourist areas, within the locations where second homes exceed 20% of total properties. This policy has been adopted to avoid the appearance of ghost cities, reduce wealth inequalities, and preserve the local landscape. Obtained results are in line with the hypothesis that primary and secondary houses are poor substitutes in tourist locations (as opposed to cities). The implemented policy increased local unemployment and lowered the price growth rates of primary houses while boosting the price growth rates of already built second homes. More precisely, the ban on the construction of new second properties adversely affected local labour market and reduced the wealth of local landlords due to the lower primary house prices. On the other hand, rent seekers benefited from lower primary house growth rates, though the positive effect is partly cancelled with the negative impact on the local economy. Therefore, existing second homeowners are likely to be the only beneficiaries, as the constrain on the construction had a positive effect on price growth rates of second homes. They concluded that implementing constraints on constructing second homes in highly touristic locations is likely to reinforce wealth inequalities. Moreover, they suggest that introducing local taxes on the second homes or on value of land may be more efficient in preserving the natural resources while helping the local economy.