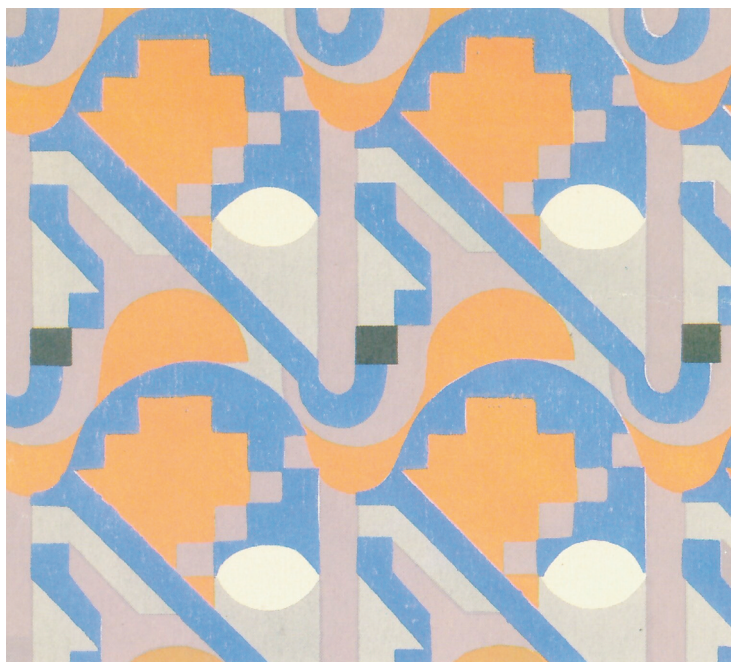# THE REGIONAL CHALLENGES IN THE POST-COVID ERA

edited by
Annalisa Caloffi, Marusca De Castris,
Giovanni Perucca

Collana dell'Associazione Italiana di Scienze Regionali (AISRe)

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FrancoAngeli

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Introduction

Annalisa Caloffi*, Marusca De Castris°, Giovanni Perucca§

1. The Regional Challenges in the post-COVID Era

In September 2021, about one year and a half after the spread of the COVID-19 pandemic, emergency and uncertainty gave way to a somehow normalized scenario, in which the communities of researchers, from any discipline, started intensively interrogating themselves on the long-term consequences, issues and challenges imposed by the coronavirus global emergency. The XLII AISRe Conference, held online between 8 and 10 September 2021, called the Italian community of regional and urban scientists to engage on this topic. The title of the conference – "Territorial challenges in the post-COVID era" – perfectly mirrors its main focus.

These challenges concern, in the first place, the asymmetric consequences of the pandemic across places and within societies. In fact, in a world already characterized by increasing social inequalities, the pandemic is likely to exacerbate the rise of disparities. Limited mobility, the restricted access to public services such as schools and hospitals, and the higher uncertainty generated by the sanitary emergency hit more severely those individuals in a condition of relative economic, occupational, and educational disadvantage.

The territorial implications of these phenomena are extremely relevant, and still understudied. They mainly concern two dimensions.

The first one refers to the differentiated impact of the pandemic on the inequalities *across places*. The effects of the healthcare crisis, and consequently the capacity to recover from such exogenous shock, is presumably associated to the

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level of exposure of places, in terms of population concentration and fragility. Moreover, understanding how and why any long-term effect of the pandemic may (or may not) structurally change the urban-rural relationship is a challenging issue for regional and urban scientists.

The second dimension of the territorial implications concerns the differentiated impact of the pandemic on the inequalities *within places*. Large cities, in particular, are the settings with the most intense disparities, and where a further broadening of the gap between individuals at the top of the social scale and those at the bottom is more likely to translate into discontent and social conflict.

The effect of the COVID-19 pandemic on inequalities cumulates with the one of other deep socioeconomic transformations, as those induced in the production sector and job market by the rise of the Industry 4.0 paradigm.

In such framework, the role of public policies becomes fundamental, in order to mitigate the undesired effects of these phenomena and to amplify the positive ones. The funding program Next Generation EU represents therefore a unique opportunity for addressing all these issues. Again, the community of regional and urban scientists, and its long stream of research on local policy modeling and evaluation, could provide extremely important indications to policy makers and to society as a whole.

The present book collects a selection of the many interesting studies, presented during the XLII AISRe Conference, that were devoted to the abovementioned issues. More in details, the book is structured into three parts. The first section supplies fresh evidence on the levels and trends of socioeconomic disparities across and within regions. The second section investigates the determinants of these trends, pointing in particular to the role of the unprecedented transformations occurring in the economic structure and job markets of regions and cities. Finally, the third section of the book focuses on the policy tools to face the challenges emerged in the previous discussion.

Taken together, the three sections are aimed at providing a detailed and, as far as possible, complete picture of the state and evolution of regional and urban inequalities during the COVID-19 crisis, jointly with implications and insights for future policies. The rest of the present introduction summarizes the main message and novelties of the studies included in each of the three parts.

2. Dimensions of Socioeconomic Disparities: Evidence and Trends across and within Regions

The study of inequalities has to deal with the multifaceted nature of disparities. The latter may concern several different societal aspects and domains, from the strictly economic ones to those more related to the perceived wellbeing of

individuals. The contributions collected in this chapter are aimed at covering different dimensions of socioeconomic disparities, discussing their evolution both across and within places.

The first study, by Ballabio and Tucci, focuses on the impact of the COVID-19 pandemic on poverty risks. Using data from the Extraordinary Survey of Italian Households (ESIH), collected by the Bank of Italy between 2020 and 2021, the findings of this study clearly show a highly asymmetric increase of poverty risks across the population. In particular, the analysis points to two important results. First, the sanitary emergency broadened inequalities, since the most affected households are those that were (or felt) already poor before the pandemic. Second, space and urbanization are not neutral in mediating the effects of the pandemic, since individuals living in small and medium municipalities in Northern and Central areas are the most affected by income reduction.

Hence, this evidence suggests a generalized increase in economic inequalities within the society but, at the same time, a territorial imbalance which is not consistent with the traditional North-South divide but, rather, favors large cities over less urbanized areas.

The relationship between urban and rural settings is the focus of the second contribution, by Agnoletti *et al*. Their study stems from the recognition that some of the changes in individuals' behaviors imposed by the COVID-19 pandemic may translate into a structural rearrangement of the relationship between urban and rural environments. In particular, the lockdown generated a profound crisis for certain businesses, above all tertiary activities that rely on people's mobility, while, at the same time, promoted the spread of other activities that were somewhat underdeveloped before, such as smart working, e-commerce and distance learning. Whether or not cities will structurally change, at least to some extent, their functional configuration, is certainly one of the most challenging research questions. This chapter tackles this topic, providing an in-depth analysis of the locational choices in Tuscany.

Their findings show that the reduced need of mobility is leading to suburbanization processes. As discussed by the authors, these processes are posing several implications in terms of inequality, especially from what concerns the accessibility to primary services like schooling and healthcare, that are still clustered into large cities.

While the first two contributions addressed the issue of spatial inequalities using objective measures of wellbeing, the study by Alsayed *et al.*, analyses this topic through the lenses of individuals' perceptions. More in details, they adopt a novel methodological approach, performing a text analysis on the Twitter messages collected between October 2020 and March 2021. One of the interesting results of their analysis points, again, to an urban-rural divide in individuals'

perceptions. This time, however, the divide is in favor of less urbanized settings, which are characterized, on average, by a higher share of individuals with positive perceptions compared with those living in cities.

Even if this evidence might seem at odds with the results from the previous contributions, it is fully consistent with the broad literature on the so-called urban paradox in subjective wellbeing, associating urban settings with the higher levels of perceived discontent. Rather, these findings suggest, once more, that objective and subjective wellbeing are determined, at least in part, by different mechanisms, still mostly unknown and deserving further research.

The last contribution of this section, by Lelo and Risi, adopts a different, within-city perspective, as it focuses on a single metropolitan area, Rome. This study analysis the physical urban dimension of the city of Rome – heavily influenced by the phenomenon of illegal housing expansion – linking it to the economic and social environment, highlighting the structural inequalities that citizens experience, jointly with their evolution in recent times and during the COVID-19 pandemic. The findings show that, in spite of the economic growth experienced in the recent past, the urban system failed in rebalancing historical inequalities and territorial polarizations which, in the aftermath of the pandemic crisis, even exacerbated. These processes generated dynamic and depressed areas, which do not necessarily respond to the usual center-periphery paradigm. The complex picture showed by the authors highlights relatively dynamic areas located on the margins of the city, in spite of the physical isolation and the structural lack of services, so as central areas that did not experience any real development, despite their social characteristics and urban amenities.

This work confirms that the study of inequalities cannot simply rely on an urban-rural divide. Within large cities, in particular, the gap in the living conditions and opportunities of individuals from different social groups is significant and increasing over time. The measurement and implications of this phenomenon are certainly a stimulating issue for the community of regional and urban scientists.

3. Drivers of Regional Inequalities and Disparities

The second section of the book is aimed at identifying the drivers of the inequalities identified in the previous part.

The first study, by Capello and Lenzi, identifies in the Industry 4.0 technological revolution one of the main factors that amplified the differences in economic growth across regions. By investigating, both conceptually and empirically, the impact of the technological transformations enabled by Industry 4.0 on regional economic growth, they show highly differentiated results. The study suggests

that the adoption of the technologies underpinning these transformations positively affects regional growth but with differences across space, according to the degree of penetration of these technologies. More precisely, the authors show that the adoption of automation technologies in transformative manufacturing sectors deliver unbalanced growth advantages across regions, favoring in some cases those regions most prone to the most advanced manufacturing transformation. This, in turn, may lead to a widening of existing disparities and gaps in technology adoption.

This evidence suggests that, apart from the contingent scenario related to the COVID-19 pandemic, other processes of socioeconomic transformation are at work, and their positive effects on economic growth may come at the expenses of higher inequalities.

The second study of this section, by Monti *et al*., provides an interpretative analysis of the regional resilience in Italy during the COVID-19 pandemic. The aim of the study is to demonstrate how some structural characteristics of regions played an important role in the recovery from the exogenous shock. Among these characteristics, and consistently with the previous chapter, innovation proved to be an important source of resilience, since regions with more advanced productive structures in terms of ICT and R&D underwent less disrupting effects and recovered from the crisis more quickly. Moreover, they show how the pandemic impacted more severely on industry than services but, at the same time, a greater industrial specialization favoured the regional GDP rebound in 2021. Finally, international openness and integration in GVCs involved a sharper fall of regional GDP in 2020 but also a greater capability to recover from the crisis in 2021.

The results from this study imply that the territory is an important mediator of the effects of an exogenous shock. Moreover, the same elements that make a territory more fragile and exposed to shocks in the short term, such as trade and economic specialization, are in several cases also the determinants of a faster recovery. This suggests that a full balance of the effects of the COVID-19 crisis still needs research, and cannot be restricted to the short period.

The study by Faraci *et al*. focuses on the labor market, which is undergoing huge transformations, due to both the Industry 4.0 technological revolution, which introduces labor-saving innovations, and the COVID-19 pandemic, with a transition towards remote working. In this work, the authors examine the regional effects of public spending on active labor market polices. Using an unbalanced sample of 308 regions belonging to 29 OECD Economies, they show that discretionary increases in public spending on active labor market policies at the national level have statistically significant short- and medium-term effect in reducing regional unemployment rate, while raising regional output. Moreover,

these effects tend to be larger during periods of low GDP growth, and when complemented by a larger share of cohesion fund expenditures.

This study sheds light on the role of policies in mitigating the effect of adverse events on socioeconomic inequalities. Moreover, it is worth noting that the beneficial impact of policies on unemployment, are not necessarily counterbalance by a reduction of regional output.

On a similar vein, the contribution by Santandrea *et al.*, is also focused on public policies, but this time aimed at promoting the productive environment and, more specifically, innovative start-ups, large companies and SMEs in Apulia. The authors present a detailed spatial analysis of the location of firms and of the extent to which they benefited of different funding programs. This study shows a higher concentration of public funding in those areas where there are already firms with high and medium-high technological and knowledge intensity. However, this evidence does not hold across all the funding programs considered by the study.

This work complements the previous one. Taken together, they provide interesting insights on the complex ways in which public policies, with different objectives and priorities, generate different effects on inequalities. Policies aimed at promoting inclusion in the job market, as discussed by Faraci *et al.*, may reduce disparities, without being necessarily detrimental for economic growth. Those aimed at fostering the efficiency of the productive environment, as showed by Santandrea *et al.*, under certain conditions could be territorially widespread, preventing the increase of territorial imbalances and inequalities.

4. Policies and Disparities in the Post-COVID Era

The last section of the book looks at the future. The European Commission launched, in May 2020, the Recovery Plan for Europe, now referred to as Next Generation EU (NGEU). This massive program of public funding is likely to affect the development of EU regions for the next decade. Therefore, it is important to understand the opportunities offered by the funding program and, at the same time, learning from the past and from the most virtuous and least satisfactory experiences.

This approach is the one followed by Conte and Molica, who discuss the axes of intervention and priorities of the NGEU program, jointly with a retrospective analysis of the impact of the European Regional Development Fund (ERDF) in Italy between 2014 and 2019. Their results indicate that a decentralized governance and a strong place-based logic are critical – at least in the case of Italy – to achieve in the future more efficiency in spending of European funds.

The territory is therefore identified as an important dimension to be considered, in order to maximize the impact of policies.

Viesti provides a detailed territorial analysis of the NGEU plan for Italy, outlining its general features and its potential impacts on the regions, with particular emphasis on Southern Italy. He points to the absence, in the Plan designed by the national government, of territorial indications for the allocation of public funding, in particular for industrial policy measures and for the Transition 4.0 axis. This implies the risk of concentrating new investments where there is already a stronger fabric of businesses, thus increasing territorial inequalities within the country, and in particular between the South and the rest of Italy. Moreover, he stresses the important role will be played by municipal administration in the planning and execution of interventions. Unfortunately, administrations face a shortage of qualified personnel to plan and execute intervention plans. This shortage is found throughout the country but is particularly pronounced in the southern regions.

Another major critical issue in the plan concerns the infrastructure endowment, which is already characterized by large territorial gaps that are likely to widen in the absence of clear policy direction aimed toward reducing inequalities. 3714. Finally, Torselli shifts the attention to a lower territorial level, discussing the effects of the COVID-19 pandemic in reorienting the ERDF Regional Operative Programs (ROPs). The study shows an increase of the funding devoted to the productive environment, jointly with a decrease in specific fields of intervention, such as R&D and innovation. The author documents how the use of "ordinary" European funds to buffer the "extraordinary" emergency has been particularly important. However, he stresses that the challenge for the next timeframe of European fund programming is to move out of the emergency phase and invest the many available resources wisely, avoiding excessive fragmentation and valuing the principle of additionality of EU resources.

Part 1

Dimensions of Socioeconomic Disparities:
Evidence and Trends across and within Regions

Risk of Poverty and COVID-19:
An Analysis of Fragility Factors at the Territorial Level

Simona Ballabio*, Violetta Tucci°

Abstract

In 2020, the COVID-19 pandemic had a severe impact on poverty risks due to the health emergency crisis and the social consequences of the economic shock. However, these risks are not evenly distributed across the population and the territorial context. Using data from Extraordinary Survey of Italian Households (ESIH) data collected by the Bank of Italy in November 2020 and February 2021, the chapter aims to investigate which sub-populations are exposed to the risk of poverty the most, especially in terms of worsening economic conditions resulting from the crisis caused by the health emergency. From a risk factor level, the focus is on the level of urbanization of the municipality and macro area of residence as well as, the individual's position in the labour market. Empirical findings show the most affected households are those that were (or felt) already poor before the pandemic. Considering the effectiveness and the distribution of the containment strategies, results highlight that both households living in small and medium municipalities in Northern and Central areas and the self-employed, un-employed and temporary workers ones are the most exposed by income reduction during the first year of crisis caused by the COVID-19 virus.

1. Introduction

The year of 2020 is understood to be the beginning of the pandemic crisis due to the COVID-19 that has a significant impact on our social environment, due to both the health emergency crisis and the social consequences of the economic shock caused by the virus containment measures. To date, a complete scenario of the long-term effects of the current crisis on production and consumption is not yet predictable and assessable, as we are still actively living in pandemic period with several restrictions and closures (Martin *et al.*, 2020). However, the effects

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on poverty risks seem to be inevitable: it has been observed the spread of "old and new" poverty and social inequalities (Oxfam, 2022; Palomino *et al.*, 2020). In this sense, Italy is a particularly interesting case for several reasons.

Primarily, it is one of the European countries that was among the first ones to be heavily affected by the pandemic and the first that adopted a total and severe blockade (in March 2020).

Secondly, it is characterized by high geographical and spatial heterogeneity in terms of socio-economic which represents one of the main elements behind the stratification of the risk of poverty (Giarda, Moroni, 2018). Considering the increase in the incidence of this latter as a consequence of the global financial crisis (Mussida, Parisi, 2020b), living in Southern regions has long contributed to accumulate a disadvantage in terms of living conditions with respect to Northern regions (Biolcati-Rinaldi, Sarti, 2015). The difference in disadvantage between macro-regions is found at all levels of urbanization, although it is higher for poverty incidence in metropolitan context (Istat, 2019). Therefore, the characteristics of a weaker welfare state system and the progressive labour market deregulation "at the margins" (Barbieri *et al.*, 2018) may have also contributed to the exacerbation of this pre-existing condition of both poverty and inequality (Almeida *et al.*, 2021; Mussida, Parisi, 2020a).

Finally, Italy is one of the European countries with the highest incidence of *working poor* households (Eurofound, 2017). The probability of experiencing poverty and social exclusion depends on the position of family components in the labour market although having employment does not always protect against the risk of poverty. To date, it is estimated that both containment strategies (e.g. reduction of working hours, freeze on layoffs, teleworkable jobs, etc.) and income support policies (Busilacchi, 2020) have only partially mitigated the effects of the economic and health crisis on employment (Istat, 2021; Galasso, 2020), severely affecting incomes especially of workers with unstable and poorly protected jobs (Carta, De Philippis, 2021). Hence, the COVID-19 pandemic crisis may have produced an accumulation of disadvantages with relevant-long term consequences on individual well-being, as well as on both consumption and investment of households.

In this chapter, we investigate the deterioration of living conditions in terms of income due to the pandemic crisis based on the intersection of socio-economic and structural context characteristics. In particular, we analyze which social subgroups have been disadvantaged the most during the first year of the pandemic crisis in Italy, with specific attention to the territorial context of residence in terms of both level of urbanization and macro area. In order to identify those who have suffered a worsening of their economic and material conditions due to the health crisis, we focus on the relationship between the poverty status in the period prior to the beginning of the pandemic crisis and the subsequent changes

in income. In particular, we consider the subjective poverty conditions in the pre-pandemic period and the effects of these conditions on income variation and we expect that the most vulnerable households in the pre-pandemic period are those who have suffered the heaviest consequences in terms of income reduction, accordingly with what was observed after the great recession (Filandri, Parisi, 2012). Through the analysis of both the size of the municipality and the macro area of residence, as well as the individual employment conditions, we recognize the most economically vulnerable individuals and households who need to be the target of specific income support policies in the long-run perspective.

2. Measuring and Defying Poverty: An Overview

Poverty does not refer to a single concept as it represents a phenomenon with many potential meanings (Morlicchio, 2020). In terms of economic status, poverty, defined as a condition of resources deficit, affects both individual well-being and the achievement of an acceptable living standard. In the literature, there are numerous proposals with different implications for the measurement of poverty (Giarda, Moroni, 2018): absolute versus relative, objective versus subjective or unidimensional versus multidimensional (Atkinson *et al.*, 2017; Hagenaars, de Vos, 1988; Ravallion, 2016). Each of these approaches considers the phenomenon of poverty from a specific perspective with relative advantages, although the simultaneous use of different indicators can lead to targeting and overlapping of several socially frail and vulnerable groups.

The approach generally adopted in national statistics is the objective unidimensional one, measured by monetary and non-monetary indicators. Using the analysis perspective inherent to the economic situation, indeed, we can implement absolute or relative poverty measures (Brady, Burton, 2016; Ravallion, 2016). The first measure concerns the ability to meet basic needs, that is, the ability of individuals/households to access a basket of goods and services in terms of consumptions, which are considered minimum and essential to avoid falling into a state of deprivation. It is also possible to identify a threshold of monetary expenditure below which one is considered poor and unable to maintain a minimum acceptable standard of living in a specific context.

The second measure, instead, identifies poverty or deprivation conditions with respect to other individuals or households belonging to the same social community. Taking into account the distribution of consumer spending or economic resources (income) in the population, indeed, the poor are those who live below a threshold defined through the average (or median) standard of living with respect to the reference context. In this sense, relative poverty provides a measure of inequality of resources that exists within the population examined.

However, poverty or economic disadvantage can also be defined in subjective terms (Mahmood *et al*., 2019). The perception concerning one's condition can be used to operationalise economic individual stress (Goedemè, Rottiders, 2011) that might in turn negatively affect actual consumption and investment levels of households (Guagnano *et al*., 2016; Nandori, 2011). Therefore, the individuals' perception also takes into account other aspects such as social, relational, and circumstantial one (Hagenaars, de Vos, 1988), to the extent that it may be considered as a complementary measure to that of objective poverty. The subjective dimension of economic well-being can be measured by the implementation of several approaches, including one that considers the household ability to "make ends meet" which provides a measure of the monetary aspects (Ravallion, 2016). However, combining objective and subjective measures can offer several (dis)advantages. It can provide a deep insight into the well-being of individuals/households to the extent that subjective poverty may report very high values as it can grasp economic stress from another perspective that is more context-dependent. In Italy, for instance, the share of individuals and households who report a condition of subjective distress is surprisingly high compared to the levels reported in other areas of the EU (Filandri *et al.,* 2019). Nevertheless, the relationship between these indicators may be discordant or not completely overlapping (Filandri, Parisi, 2012) as they can differ at both macro and micro-level (Castilla, 2011; Želinký *et al.*, 2021) producing a clear inconsistency (Atkinson *et al*., 2017; Filandri *et al.,* 2019): households that feel poor with enough income and households that are poor in terms of income but do not assess their economic condition as problematic.

2.1. Fragility factor of being poor

The literature on poverty shows that the probability of being or feeling poor is influenced by several factors. On the one hand, the phenomenon of poverty is shaped by macro- and meso- level structural or institutional elements (Brady, 2019; Duiella, Turrini, 2014) such as macro-economic dynamics (Calderon, Yeyati, 2009), the demographic and economic contexts and the characteristics of welfare systems defined as the level of social protection. From a territorial perspective, the probability of being poor in terms of income is geographically distributed and concentrated along the different levels of spatial economic developments. According to previous studies, the geographical area of residence (i.e. regions, municipalities, degree of urbanization) defined as socio-economic context affects heterogeneously both the opportunities and the ability of individuals/ households to meet their basic needs (Mussida, Parisi, 2020a). It is well known that income poverty is concentrated in central cities of metropolitan areas and rural spaces in the light of the process of urbanization (Ravallion, 2001).

Even though the results may be different based on poverty country characteristics, the urban context offers more opportunities in terms of employment or events that affects living conditions (Cotter, 2002) as well as it corresponds to the higher level of cost of living and consequently a higher risk of poverty (Joliffe, 2006). The differences may also be visible in economic developments and poverty rate between and within the regional level (Longoford *et al*., 2012), that is, living in a less developed region increases the risk of poverty for individuals/households, especially during the period of crisis (Mussida, Parisi, 2020b).

In addition to contextual elements, the phenomenon of poverty is shaped by the individual socio-economic characteristics such as age (Marchand, Smeeding, 2016), educational attainment (Deutsch, Silber, 2005; Brady *et al*., 2009), gender (Aisa *et al*., 2019), household type (Ballabio *et al.*, 2020; Duncan *et al*., 2012), as well as the employment status. In particular, for the latter, we can consider that income from employment represents the main component of household disposable income, and the employment status of family members affects available resources (e.g. their economic status). As expected, the probability of being poor is highest among unemployed individuals. However, one's employment status is known as an advantage in terms of income although it does not systematically represent a protective factor against both an income loss and poverty (*working poor*). Even though the employment growth observed in Europe in the last decades, recent changes in the labour market defined as flexibilization are reflected in the insecurity of temporary contracts and low level of wages that expose households to a high probability of being poor or materially deprived (Dewilde, 2014), especially among the young generations since they are at the beginning of their carriers (Passaretta, Wolbers, 2019).

3. The Italian Model of Poverty

The economic difficulties and the material deprivation experienced by households in Italy are well known. In 2019, our country is one of those at greatest risk of poverty with a rate (24,9%) that is above the European average as well as it being one of the European countries with the highest incidence of *working poor* households (Eurofound, 2017). Moreover, the Italian "poverty model", is shaped along three dimensions (Istat, 2019; Morlicchio, 2020): geographical and spatial heterogeneity, household size and type as well as the correlation of poverty with employment status. The analysis of the phenomenon of poverty in recent decades can be divided into two phases at the beginning of the crisis in 2008 considered as a discontinuity event (Gori, 2020).

The first phase corresponds to the period before the economic and financial crisis of 2008 that provides constant trends and distinct profiles of objective

poverty (Gori, 2020): the most affected households, in fact, came mainly from the Southern regions of the country usually with children and unemployed members. The evidence points out the relevance of both poverty and territorial dualism: Southern households show more severe economic and living conditions than the Northern equivalents, although the territorial gap decreases when family composition is taken into account (Carannante *et al.,* 2017). This trend is also confirmed in subjective terms, although the households' perception shows more oscillation (ISAE, 2007). The second one is related to the last decade which is characterized by several macro-economic and social changes due to the economic crisis of 2008 with two pieced of evidence overall: a constant increase in poos households throughout the Italian context (with a counter-trend between 2018 and 2019) and at the same time a consistent increase of territorial poverty gap (Figure 1).

Moreover, new segments of social precariousness- not just in terms of income and resources – have arisen over time (Gori, 2020) as a result of both changes in the characteristics of both the labour market (Ranci, 2010) and territorial differences that have increased or crystallize social inequality (Lagravinese, 2015).

Focusing on the changes between 2019 and 2020, we provide a complete overview of poverty in Italy, combining three different indicators (absolute, relative

Figure 1 – Household absolute poverty incidence (% of households in absolute poverty)

Source: Authors' calculations using Istat data, http://dati.istat.it/

and subjective poverty), in the light of pandemic although we examine the trend reversal in the short term of one single year.

In 2020, the incidence of household absolute poverty is 7.7%. Compared to 2019 (6.4%), poverty is rising significantly thereby stopping the decreasing trend observed in recent years. In particular, this result shows a strong increase in the number of households in difficulty in the Northern regions, although there is a higher incidence in the Southern regions with a smaller increment. At the same time, the poverty incidence is also structured according to the level of urbanization (Table 1). Specifically, living in small towns provide a poverty effect with significant territorial differences: the highest incidence of poverty is observed in metropolitan areas of the Northern and Southern regions, while in the Central regions it is observed in small towns. The most consistent variations in terms of poverty incidence, however, are observed in suburban and large municipalities.

Instead, the incidence of household relative poverty in 2020 compared to 2019 decreased from 11,4% to 10,1% with an improvement for Southern families (from 21,1% to 18,3%). The descent trend of relative poverty, however, is a proxy for the overall decrease in household income, resources, and expenditure. As opposed to absolute poverty measure, in fact, the relative one shows how inequality has decreased in 2020: the reduction in the national average living standard is associated with a lowering of the poverty line which has allowed some household to move out of relative poverty, although their condition has not substantially changed in terms of available resources and living standards. In other words, the distance between poor and non-poor households in Italy has been reduced.

Nevertheless, the common element between these two measures is the increase in poverty in households with the head of household employed or self-employed

Table 1 – Household absolute poverty incidence by macro area of residence and level of urbanization (% of households in absolute poverty)

	North		Center		South		Italy	
	2019	*2020*	*2019*	*2020*	*2019*	*2020*	*2019*	*2020*
Metropolitan areas	7,1	7,9	2	3,7	9,8	11,1	5,9	7,2
Suburbs and large municipalities (>50.000)	4,8	7	4,5	5,9	8,9	9,4	6	7,6
Small town (<50.000)	6,1	7,8	6,3	6,3	8,2	9	6,9	8
Total	5,8	7,6	4,5	5,4	8,6	9,4	6,4	7,7

Source: Istat (2021a, p. 397)

(Istat, 2021). There are two assumptions to consider with respect the risk of poverty of working households during the first year of the pandemic crisis. First, the Italian labour market is characterized especially after the economic crisis of 2008 by both an increasingly progressive deregulation "at the margins" (Barbieri *et al*., 218) and the fragmentation of employment positions that have reshaped the risk of poverty particularly for those who are self-employed as well as employed on temporary or part-time contracts (Raitano *et al.*, 2019). This means that the Italian labour configuration combined with the containment strategies (e.g. reduction of working hours, freeze on layoffs, teleworkable jobs, etc.) have resulted in the identification of a distinctive framework of both disadvantage and worsening of living condition. Istat (2021) and Carta with De Philippis (2021) show that difficulties were mainly indeed experienced by temporary employees and the self-employed. In other words, these are the categories that appear to face the highest risk of income losses and vulnerable employment (Palomino *et al.*, 2020).

Second, the Italian government have introduced several short-term measures to both protect household labour income and compensate for the hardships created by the pandemic crisis. On the one hand, the State provides a wage-compensation scheme for employees through which the companies have resorted to funds (*Cassa Integrazione Guadagni Straordinaria,* CIGS) allocated to pay wages. On the other hand, it introduced some income bonuses for self-employed who were not protected by any social insurance programme. However, the income support policies and the effectiveness of the social insurance benefits have been defined as limited and highly fragmented (Busilacchi, 2020) because of both their eligibility that was based on both employment status and type of contracts, as well as on the employed sector, and their limited effect in the short time without a long-run perspective on inequality. Hence, work-intensive households may not have been sufficiently protected against the risk of poverty due to the reduction in a work activity or income.

Finally, subjective poverty estimates, resulting from the second survey "Diary of the day and activities at the time of the Coronavirus" conducted by Istat (2021), show a significant share of individuals (22.5%) who that experienced problems paying bills, mortgage payments, etc. and at the same time a greater proportion of adults who reported a worsening of their family's economic condition (20.5%). The high values seem to go beyond those of objective poverty since the perceptions may take into account several factors including the climate of uncertainty derived from the limited temporality of income supports and the protracted pandemic. Therefore, it is possible to make a comparison with the pre-crisis period between a subset of indicators (problems with bills, mortgage or loan payments, food expenses and rent payments) and similar measures derived from the Survey of Income and Living Conditions (EU-SILC). Taking the overall

four indicators into account, in 2020, 20.7% of individuals in the South, 9.5% in the Centre and 12.0% in the North experienced problems. According to the EU-SILC survey (Istat, 2021), in 2019, these incidences were 11.8%, 5.0% and 4.8% respectively. The result highlights a significant worsening of conditions in the North compared to those recorded in the Centre and South. In other words, our country is experiencing a kind of territorial downward convergence according to the data on consumer spending and absolute poverty presented above.

4. Data and Methods

The analyses are based on the Extraordinary Survey of Italian Households (ESIH) data collected by the Bank of Italy. The purpose of the ESIH survey is to gather relevant information regarding the effects of the COVID-19 outbreak on household economic status and expectations. We use individual and house-hold information using both the third and fourth waves conducted in November 2020 and February 2021 respectively. Our analyses were based on a sample of 3.102 cases. The main dependent variable is referred to as "worse economic and material conditions" during the pandemic crisis. We identify the poverty status in terms of a greater than 25% reduction in household income (including any income support received) as a result of the COVID-19 emergency. Instead, the main independent variable is subjective poverty (prior to the pandemic), defined by using the answer to the question assessing the subjective perception of the household ability to make ends meet. The variable is divided into three catego-ries to distinguish household level of difficulty: "difficult" includes households making ends meet with a lot of difficulty or with difficulty; "some difficult" includes household marking ends meet with some difficulty; "no difficult" relates to households making ends meet easily or very easily.

Furthermore, we consider two socio-economic dimensions of accumulation of social (dis)advantage for households during the first year of the pandemic crisis: employment status and zone of residence. Employment status is categorized into employed (permanent), temporary, self-employed, non-employed and retired. In addition, two measures are used to identify the zone of residence: macro-area of residence and level of urbanization. The first is divided into three categories: North, Centre and South, including the Islands. Instead, the second is related to the level of urbanization which is divided into three categories: metropolitan areas (with more than 100.000 inhabitants), large municipalities (between 10.001 and 100.000 inhabitants) and small towns (up to 10.000 inhabitants). Accordingly, we selected the following control variables on the individual and household characteristics: age, gender, educational level, and household size. The association between sub-jective poverty before the COVID-19 crisis and a consequent income reduction is

estimated by a multinomial logistic regression model, which investigates the probability of having experienced a reduction in income for each subjective poverty level. Subsequently, we estimate the household probability of having a relevant reduction in income (greater than 25%) employing of binomial logistic regression. The results are presented as average effects and they show the effect of both the level of urbanization, including the macro area of residence, and the employment conditions.

5. Results

The pre-pandemic poverty framework provided by the descriptive results converges with those observed in the previous sections in terms of the structuring factors of the phenomenon. According to Bank of Italy data, around 17% of the individuals interviewed reported difficulty or serious difficulty in making ends meet in the pre-pandemic period and they can therefore be subjectively defined as poor. The intensity of this indicator is higher than both absolute and relative poverty measures, although it is in line with structural terms of the trends derived from analyses of objective poverty. As discussed in the previous comparison of poverty measures, the subjective indicator goes beyond the objective one and captures more conditions of vulnerability by providing a picture of dependence on the context of residence. The risk of being in a subjective poverty condition is also structured according to both the level of urbanization of the municipality and the area of residence as well as the position of the individuals in the labour market (Table 2).

On the one hand, the incidence of individuals with difficulties or some difficulties in making ends meet is higher in small municipalities (18.8%) and metropolitan centres (18.0%). On the other hand, living in metropolitan cities protects more strongly from feeling poor (19.7%) than living in other types of municipalities (16.0%). At the macro area level, instead, the Southern regions report the highest incidence of poverty (23.4%) against 15.6% and 13.4% in Central and Northern Italy respectively. While those most likely to be at risk of poverty in terms of labour position are the unemployed, they are followed by the precariously employed and the self-employed (Figure 2). In this context, the overall number of households reporting a worsening of their economic conditions as a result of the pandemic situation is just under a third, that is, 13.6% reporting a significant reduction in income defined as a decrease of more than 25%. Proceeding to observe the relationship between feeling poor before the COVID-19 pandemic and experiencing a change in income in the subsequent period, Figure 2 shows that the probability of experiencing a reduction in income decreases as the ease of making ends meet increases.

Table 2 – Level of difficulty to make ends meet in the pre-COVID period by the level of urbanization (% of households in subjective poverty)

	Difficult	Some difficult	No difficult	Total
Level of urbanization				
<=10.000	18,3	66,4	15,3	100,0
10.001-100.000	16,6	66,8	16,6	100,0
>100.000	17,1	62,8	20,1	100,0
Geographical area of residence				
North	13,4	66,0	20,6	100,0
Center	15,6	65,5	18,9	100,0
South and Islands	23,4	65,3	11,3	100,0
Employment status				
Employed	14,1	67,8	18,1	100,0
Temporary	26,6	64,3	9,1	100,0
Self-empl.	18,4	65,3	16,3	100,0
Non-employed	30,5	56,0	13,5	100,0
Retired	13,2	67,6	19,2	100,0
Total	17,2	65,7	17,1	100,0

Source: Own elaborations on Extraordinary Survey of Italian Households data (2020-2021)

At the same time, there is a positive association between the probability that income has remained unchanged or increased and the households' degree to make ends meet. In other words, those who have few or no difficulties in making ends meet are more likely to have their income unchanged. Taking a spatial perspective, instead, the relationship between pre-pandemic subjective poverty and the substantial post-COVID income reduction remains substantially unchanged across all geographic areas and level of urbanization of the municipality (Figure 3).

However, two contextual effects emerged: on the one hand, in all areas of the country the probability of a large income reduction is higher in small and medium municipalities, while living in large urban centres with more employment opportunities most likely had a protective effect; on the other hand, in line with the absolute poverty estimates reported in section 2, each macro area is associated with a different level of the risk factor for the substantial income reduction, also with all control variables included in the model being equal. In

Figure 2 – Probability of suffering an income variation by the ability to make ends meet (multinomial logit, weighted linear probability)

Figure 3 – Probability of income reduction by macro-area of residence, level of difficulty to make ends meet in the pre-COVID period and level of urbanization (logit regression, weighted linear probability)

Figure 4 – Probability of income reduction by macro-area of residence, level of difficulty to make ends meet in the pre-COVID period and employment status (logit regression, weighted linear probability)
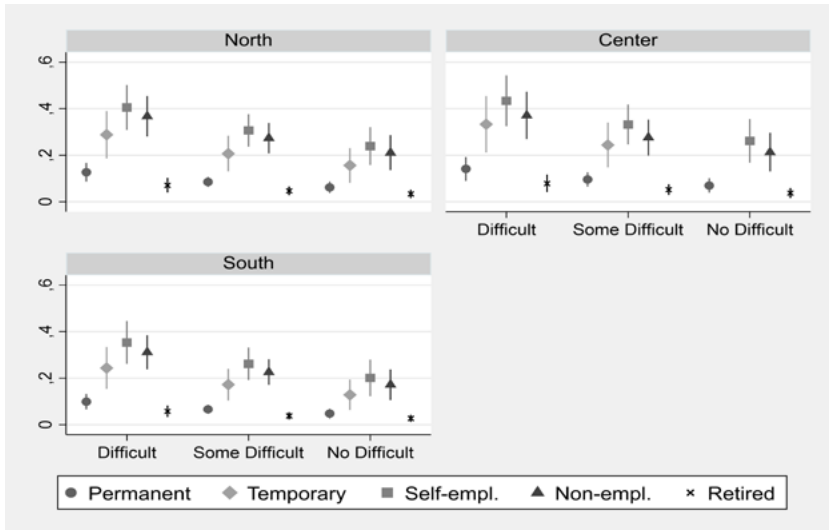
this regard, households in the South are less exposed to the risk of income reduction, probably because pandemic and emergency measures adopted may have affected more the economically most active geographical areas.

Considering the position of individuals in the labour market (Figure 4), there is a similar relationship between subjective poverty and substantial income reduction for all employment statuses although with different intensities and the limits of estimates due to the small sample size.

The effects of pre-pandemic vulnerability unfold more for the self-employed, the unemployed and the precariously employed. Moreover, these categories are the most exposed to the risk of a substantial reduction in income especially in Northern regions. As hypothesised, the crisis seems to have affected the less protected categories that were previously disadvantaged after the 2008 economic crisis by the progressive deregulation and the fragmentation of job positions in the Italian labour market (Raitano *et al.,* 2019). In particular, the category with the highest risk of worsening income situation is "self-employed": the merchants who have suffered the forced closure of their activities, the professionals who have reduced their working hours, the small employers in the non-essential services sector as well as the individuals with VAT (without contracts and with little support) who represent the most vulnerable and least protected category of

workers in the Italian context. The self-employed contractors, indeed, do not have access to the layoff fund and they have received only a small amount of income support during the pandemic emergency. The trends for non-employed (unemployed and inactive) and temporary workers are quite similar: these individuals are very likely to experience a consistent reduction in their income although not as much as the self-employed.

6. Conclusions

In this chapter, we analysed the relationship between the poverty status in the period prior to the beginning of the pandemic crisis and the subsequent changes in income and we explored the effects of two socio-economic dimensions of accumulation of social (dis)advantage for households during the first year of pandemic crisis: employment status and zone of residence, defined as macro-area of residence and level of urbanization. Our results confirm a significant impact of the pandemic on households' living conditions and resources. The health emergency has led to the implementation of extraordinary measures, which have produced several limitations on economic activities as well as an overwhelming effect on Italian households' income. Moreover, both the limited and fragmented reach of social and public policies (Busilacchi, 2020) and the relevant public finance constraints that characterise the Italian context could have further amplified the overall effect of the pandemic crisis on the most vulnerable households and pre-existing condition of both poverty and inequality. According to our analyses, we find that just under a third of households experienced a substantial reduction of their disposable income in the post-COVID period. The most affected households are precisely those that were (or felt) already poor before the pandemic. In line with the previous literature on the economic crisis of 2008, households already economically deprived before the pandemic are more likely to suffer from the deterioration of their economic situation. Taking into account how the extraordinary measures affected both the economic sector and the territories heterogeneously, this finding points out that some social groups have been at risk of becoming even more vulnerable depending on their employment status and area of residence. Accordingly, our results show that households living in small and medium municipalities in Northern and Central areas are the most affected by income reduction in partial line with the poverty dynamics highlighted on the objective measure at the aggregate level (Istat, 2021). In contrast to the trends observed over the last decade, households in Southern regions were less exposed to risk as the pandemic blockade appears to have hit especially the most productive areas of the country. At the same time, the individual positions in the labour market already "at the margins" and fragmentated has become a key factor for

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identifying a distinctive framework of both disadvantage and worsening of living conditions. Combined with the containment strategies, the self-employed, un-employed and temporary workers have not been completely protected due to the limited income support policies and the effectiveness of the social insurance benefits. This result is even more alarming if we consider that Italy is one of the European countries with the highest incidence of in-work poverty. Overall, our findings highlight some suggestions for policy makers. We argue the urgent need for long-term policy planning with a long run structural perspective on inequality. In order for these policies to be effective they should be targeted at the most vulnerable profiles of households in difficulty, taking into account the local costs of living, and which promote more job stability while protecting resources and consumptions of vulnerable individuals/households from periods of economic shock.

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Rischio di povertà e COVID-19: Un'analisi dei fattori di fragilità a livello territoriale

Sommario

Nel 2020, la pandemia COVID-19 ha avuto un forte impatto sui rischi di povertà a causa della crisi dell'emergenza sanitaria e delle conseguenze sociali dello shock economico. Tuttavia, questi rischi non sono distribuiti uniformemente nella popolazione e nel territorio. Utilizzando i dati dell'Indagine Straordinaria sulle Famiglie Italiane (ESIH) raccolti dalla Banca d'Italia nel novembre 2020 e nel febbraio 2021, il capitolo si propone di indagare quali sottopopolazioni sono maggiormente esposte al rischio di povertà, soprattutto in termini di peggioramento delle condizioni economiche derivanti dalla crisi causata dall'emergenza sanitaria. A livello di fattori di rischio, l'attenzione si concentra sul livello di urbanizzazione del comune e della macroarea di residenza, nonché sulla posizione dell'individuo nel mercato del lavoro. I risultati empirici mostrano che le famiglie più colpite sono quelle che erano (o si sentivano) già povere prima della pandemia. Considerando l'efficacia e la distribuzione delle strategie di contenimento, i risultati evidenziano che sia le famiglie che vivono in comuni medio-piccoli nelle aree del Nord e del Centro, sia quelle che lavorano in proprio, che quelle che non lavorano e che quelle che lavorano a tempo determinato sono le più esposte alla riduzione del reddito durante il primo anno di crisi causata dal virus COVID-19.

The City in the post-COVID Era:
Between Centrifugal Trends and Functional Changes

Chiara Agnoletti*, Claudia Ferretti*, Patrizia Lattarulo*, Leonardo Piccini*

Abstract

The COVID-19 pandemic represented a moment of transformation, not only in terms of health, but also economic and social behaviours, some of which are capable of bringing about changes that are sometimes permanent. In particular, the lockdown imposed to tackle the health crisis led on the one hand to a profound crisis for businesses, above all tertiary activities that rely on people's mobility, and on the other to the consistent spread of other activities that were somewhat underdeveloped before, such as smart working, e-commerce and distance learning. It is reasonable to suppose that the remote performance of these activities, although reduced in the post-emergency phase, will not completely disappear. For these reasons, on the one hand we can see that the city might change its functional configuration, at least in part, and on the other that some territories may become more attractive than they have been until now. To this end, the paper offers an in-depth analysis of these issues, referenced through the analysis of a case study in the Tuscan context.

1. Introduction

The health emergency expeditiously precipitated the prospect of living in a radically different way from in the past, made possible by digital tools (Delventhal *et al*., 2021). This evolution, also known as the "zoom shock" (De Fraja *et al*., 2020), was mainly supported by the fact that there was less need to move around due to the shift to being able to work remotely, as well as online consumption and learning, and although this has been scaled down in the post-emergency period it does not seem set to disappear altogether and will also leave clear traces in the near future. The spread of smart working, e-commerce and distance learning has produced a twofold effect: while it has reduced, and is still reducing,

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the time and need to travel on the one hand, on the other it raises the question of new location requirements for businesses and different living standards for families (Mariotti, 2021). In fact, on the business front, the health emergency has led to both a profound crisis in terms of urban activities linked to the mobility of people, and a change in the location preference of some businesses, which until now favoured the city but could lean towards a less concentrated territorial distribution. As for families, on the other hand, having to spend much more time inside their homes, both for work purposes but also to slow the spread of the virus, has raised questions about the quality of life based, in this case too, on different parameters from in the past. For families, in fact, decisions about where to live are made considering the difference in the cost of housing between the centre and the suburbs, or a small or large town, comparing the costs to be incurred with the advantages offered by the various locations, and nowadays taking into account new needs and a different concept of accessibility from that of the past (Mouratidis, 2021). Moreover, if reference is made to residential costs, it should be borne in mind that the latter are not only connected to location but also apartment size and quality of life. It follows that once the amount of income to be spent has been defined, this sum can be divided among the costs deriving from the location (size of the city and reduced cost of transport) and those relating to the size of the apartment. This element should also be cross checked with the growing demand for better quality of life, referring to both housing in itself and the external territorial context (more green areas, less congestion, less difficulty in finding parking spaces), conditions that are easier to find outside of large urban concentrations.

This is why, alongside indicators that detected changes in terms of presences and mobility in the emergency phase, it is also useful to analyse the price trend of both properties for business use and housing (sale and rental costs) in order to promptly identify the change in the uses of the city and in the preferences accorded. Property values, in fact, as they change over time, can represent a first sign of the territorial distribution of the demand for specific locations, for both housing (more or less stable) and other types of use (services, commerce, etc). In this regard, the expected impact on the residential market will not only concern the overall demand trend, but it will mainly be supported by the search for larger homes where people can spend long periods living together as a family, with outdoor areas and in a place with adequate accessibility for remote working (including Hart, 2020). However, people are not expected to renounce *tout court* the opportunities offered by an urban concentration linked to social interaction, the supply of essential services for the population or accessibility, but rather the urban and territorial structure and their functional set up are expected to change,

albeit in a selective and slow manner, hopefully moving towards greater resilience and liveability (Nathan *et al.*, 2020).

2. The Pandemic and the City

2.1. The crisis of urban economies

The pre-pandemic scenario saw cities, and especially metropolitan ones, as places that should almost exclusively be entrusted with the growth and development expectations of vast territories (Glaeser, 2012). Favoured by multiple factors (OECD, 2006, p.56), including the economies of agglomeration, with higher levels of physical and human capital and a distinct production variety of high added value, metropolitan areas have until now stood out for higher than average productivity and per capita income levels than the respective towns. Just to give some emblematic examples, in 2017 the urban area of Paris contributed 32% to the French GDP despite employing only around 19% of the national population; Madrid provided 19% of the GDP, with a population of 15%; London 29%, with population of 19% (Source: OECD Metropolitan Areas Dataset). Despite operating within a national context that is not particularly dynamic, Italian metropolitan areas also represent a significant asset for the country as they are home to important segments of services and higher urban functions that are crucial in this specific development phase. In fact, in the first two decades of the century a new phase emerged in advanced countries with respect to the dominant economic paradigm of globalisation and the spread of information and communication technologies (ICT): a phase in which knowledge, creativity, digitisation or the economy 4.0 prevail (Camagni, 2021), and that find (or would find) larger urban contexts to be a natural place for settlement and development. However, examining some of the main metropolitan areas of Italy more closely, we see how these expectations have only partly been met. Next to the excellent results achieved by Milan, which over the long term has fortified its role as an economic driver, strengthening precisely those services mentioned above based on the creation of knowledge and digitisation, and the encouraging results achieved by Bologna, cities of art seem to be more static, Venice in particular. Florence, which has scaled down its manufacturing industry, recovered a share of the services primarily thanks to the professional and scientific activities component, while Rome stands out for its role in information and communication services (Table 1).

However, the most recent dynamic, referred to the first phase of the health crisis, has put a strain on even the most purely urban economies, albeit with a different level of criticality affected by the sectoral composition (Anderson, 2021). Sectoral composition and demand for mobility in the local labour market have

Table 1 – % Change in the sectors' contribution to Italian added value, 2000-2019 and changes of added value 2000-2019 and 2019-2020

	Industry			Services								
	Manufacturing industry	*Construction*	*Industry total*	*Commerce, transport, hotels and catering*	*Information and communication services*	*Finance and insurance*	*Real estate*	*Professional, scientific and technical activities*	*Artistic, entertainment activities*	*Services total*	*VA 2000-2019 contribution*	*VA 2019-2020 contribution*
Milan	-6.1	13.3	0.8	21.3	27.5	42.6	29.3	23.6	21.2	21.7	19.1	-5.64
Venice	5.1	9.8	7.1	0.5	-26.3	-39.6	3.8	-0.1	-5.5	-3.0	-0.1	-7.02
Bologna	10.5	22.2	10.9	-0.5	25.8	34.1	-8.7	7.5	14.2	5.9	7.7	-6.49
Florence	-13.5	26.3	-11.7	6.4	-24.8	6.9	-5.2	22.5	13.0	4.2	0.9	-9.83
Rome	-35.7	-6.4	-1.3	-6.2	39.1	-12.4	7.7	-2.0	10.1	-0.8	1.5	-6.56

Source: processed by IRPET using TAGLIACARNE Institute data

been identified as the primary causes of virus spread during the pandemic, and resilience during the recovery period (Ascani *et al.*, 2021; Borsati *et al.*, 2022). These differences show a greater capacity for resilience for Milan, and greater suffering for Florence due to lower specialisation in services, except for professional services, and strong reliance on tourism (Figure 1).

Within the Florentine metropolitan area we see how the difference between businesses that closed and businesses that opened during the first phase of the crisis reveals the suffering in the tertiary sector related to services that support tourism, but also the difficulties experienced in the manufacturing industry, which was affected by the unfavourable international dynamics (Figure 2). It is clear how the scenario just described, although extremely critical, is linked to the restriction measures put in place during the health emergency phase and does not necessarily imply that the city will experience a crisis *tout court* in the future nor a drastic loss of its power to attract (Bellandi *et al.*, 2021). What can more realistically be imagined instead is, on the one hand, the territory becoming increasingly attractive, even outside of the city, made possible by a series of functions performed in places that until now had been excluded, and on the other hand changes in a different direction in the urban context moving towards the reduced availability of functions that have instead undergone great development in recent years. We are in fact coming from a phase in which cities have been affected by functional changes that aimed to accentuate their specialisation, in particular in the central areas, favouring

Figure 1 – Balance of enterprises in the metropolitan city of Florence, 2019-2020. Number of enterprises
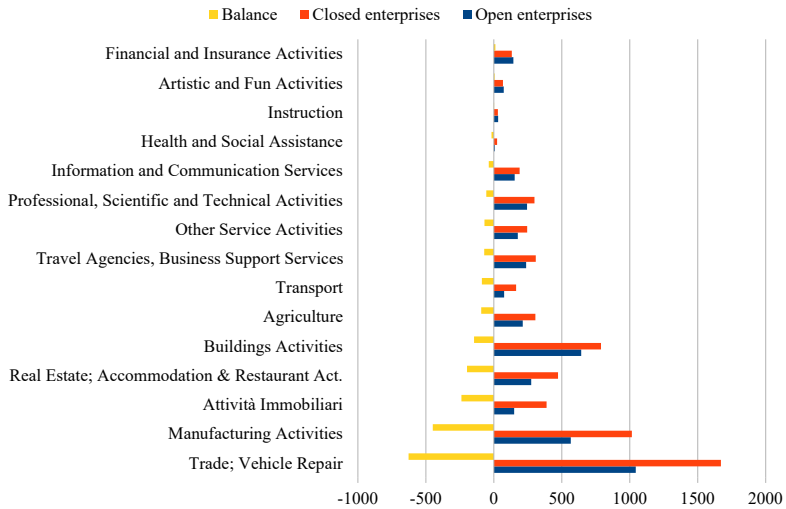
Source: processed by IRPET using UNIONCAMERE data

Figure 2 – Population present in urban areas, from March 2020 to October 2021. Change estimated by Facebook data (mobile average over seven days). Index 100=first week of March 2020
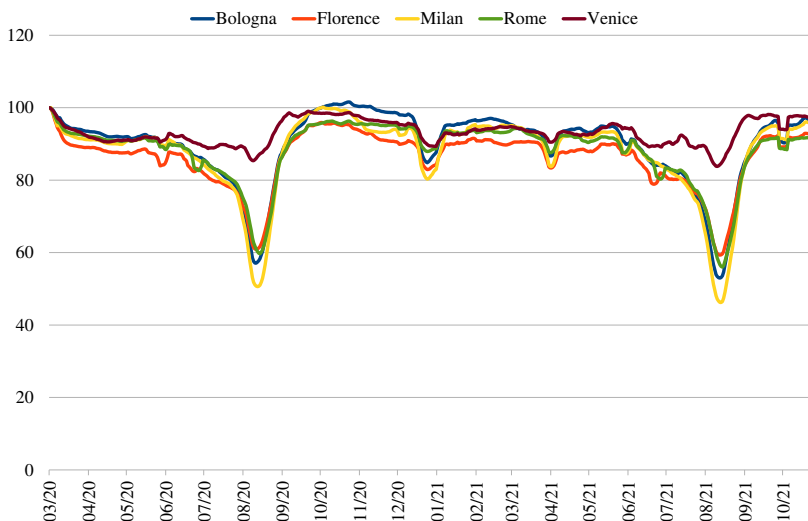
Source: processed by IRPET using Facebook data

tourism and tertiary activities to the detriment of those that support residence. This process occurred by exacerbating competition between businesses favouring those that were willing to support higher costs (urban rents). Competition for the most central locations often resulted in conflicts to the detriment of concerns linked to stable residence, giving impetus to centrifugal tendencies, especially of certain segments of the population. The pandemic, from this perspective too, represented a moment of discontinuity since, as it hit sociality and mobility particularly hard, it halted the spread of services for "city-users", a category that was completely absent during the health emergency.

The effects of what has been described can clearly be seen not only in the outcome already illustrated, which shows the balance between new businesses and ones that have closed, but also by looking at property prices. A glance in particular at those referred to tertiary functions and commerce shows that they have significantly reduced following lower demand for locations to be used for these activities. As regards prices for non-residential functions, the 2020-2021 dynamic indicates, in fact, how greater losses were recorded for these sectors than for residence, particularly accentuated by rental fees which on average went down by 9.8% for offices and 15% for commerce. Distinguishing by city size, we see how the contraction mostly concerns small and medium-sized urban centres and cities, which record the most significant losses in terms of both rental fees and sales prices, while for large towns and cities – and this is an important fact – the loss was smaller, revealing how the recovery expectations are higher (Table 2).

2.2. Presences and mobility

Towns and cities were particularly affected by the restrictions imposed during the emergency phase, as by their very nature they are places where most social

Table 2 – Prices for the non-residential sector. Italy, property prices. % changes, 2020-2021

| | Tertiary sector and offices | | Commerce sector (small and medium surface areas) | |
	Sale prices	Rental fees	Sale prices	Rental fees
Large cities	-2.4	-8.6	-2.8	-13.2
Intermediate cities	-3.0	-10.0	-4.3	-15.0
Small cities	-4.3	-10.8	-5.0	-17.2
Italy Average	-3.2	-9.8	-4.0	-15.1

Source: processed using Scenari Immobiliari data

activities occur and they attract more or less intense mobility flows, which were interrupted or significantly curtailed during the lockdown (Benita, 2021; Borkowski *et al.,*2020; Eisenmann *et al.*, 2021; Scorrano *et al.,* 2021; Suji Kim *et al*., 2021).

To quantify this phenomenon, we can use the data made available by various unstructured sources (Facebook and Google), which can indicate the presence of residents and city users in the various territorial contexts. In particular, the data-set made available by Facebook through the *Facebook for Good* (dataforgood. fb.com) programme and platform can offer information on the location of the population and the movement of its people during a particularly significant event. In the case of Italy, national data is available, with some detailed focuses on individual areas or cities and containing spatial and temporal information based on the behaviour of Facebook users with active GPS and Location History detected passively after the data has been made completely anonymous.

The figures below show the population presence trend with respect to the first week of March (note that the Italian lockdown started on 10 March 2020), which

Figure 3 – Population present in the urban area of Florence, in the first and second urban belt, March 2020-October 2021. Change in the population presence estimated by Facebook data (mobile average over seven days) for urban areas. Index 100=first week March 2020
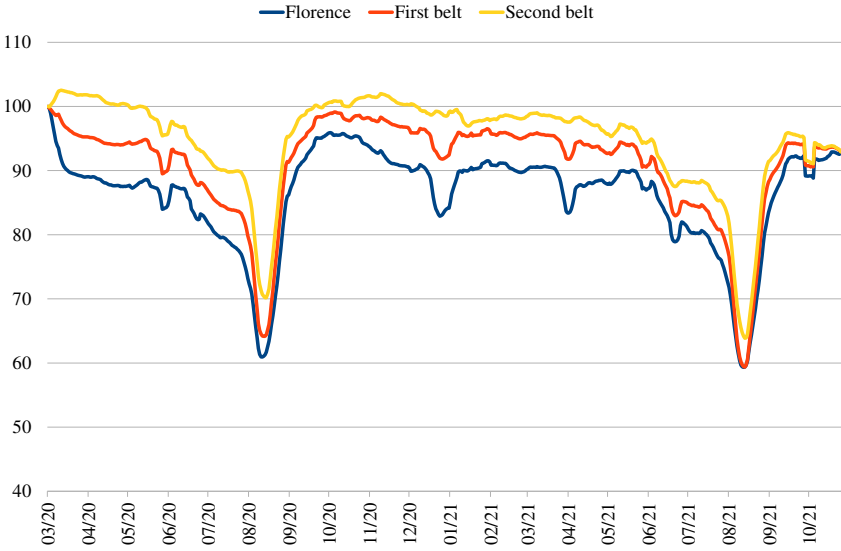
Source: processed by IRPET using Facebook data

clearly shows a significant reduction in the number of people present in the main cities, not only during the great summer exoduses but also during a large part of the rest of the year (Figure 3).

If instead we compare the urban area of Florence with the municipalities in its first and second belt we see how the presences in the last two years had different trends for these types of territories. In particular, presences in the more suburban areas were more constant, with the sole exception of the summer period. This data should be read taking into account the functional vocation of the different areas: the first belt has a significant manufacturing component which drew in fewer workers during the restrictions, while the second belt has a higher prevalence of residential functions, which resulted in a higher presence of individuals (Figure 4).

The significantly lower presence of people in cities was instead due to both the reduction of the working population that travelled daily to the main urban centres to study or work, and the total absence of the tourist population. These smart workers, who in the pre-pandemic period travelled to the closest city centre on a daily basis to carry out their profession, in the emergency phase reduced the share of inflows into the city.

Mobility for work reasons however did not suffer the greatest contraction as a share of workers employed in sectors or professions where remote work is not possible continued to travel, although not to the same extent as in the pre-COVID period, above all reducing the use of public transport (measured by the flows accessing the public transport hubs). Instead, the segment that saw the greatest reduction during the emergency phase was linked to free time, while only movement flows from the homes of employees who could not work remotely remained positive. The movements that represented a real change in the whole emergency phase and that point to the renewed need for contact with nature were those towards "parks, gardens and beaches", the growth of which coincided with the summer period but also saw peaks at times immediately after the first reopening.

Mobility linked to necessity purchases also recorded a significant reduction of up to 50%, above all during the first lockdown, suggesting there was a marked increase in the distance purchasing of goods.

3. The Dynamics of Property Values

While the presences trend in the urban context, corresponding to the most acute phase of the health crisis, takes into account the significant reduction in the number of visitors to the city, the analysis of the property market provides an overview of the demand for urban locations also over the medium term. Before analysing the recent dynamics, it should be remembered that the choice of location, for both

Figure 4 – % change in daily flows of commuters per place of destination with respect to a median day pre-COVID. Tuscany: February-December 2020
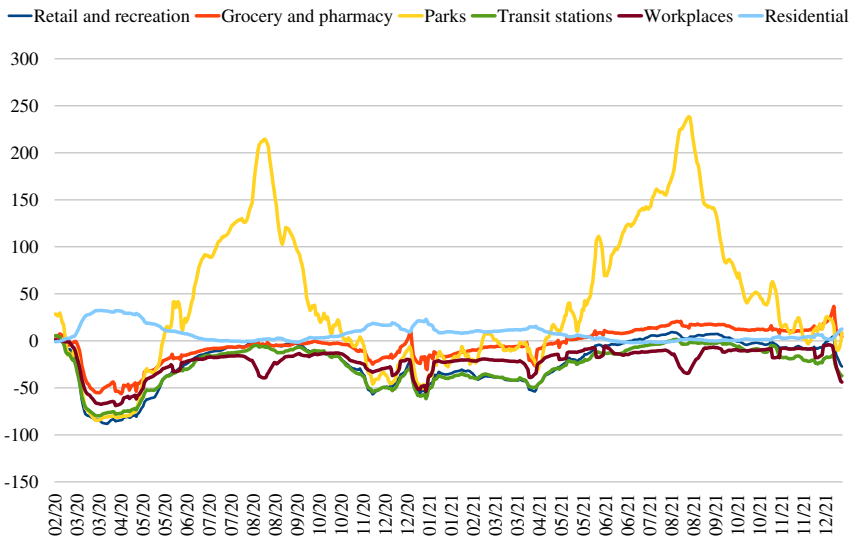
households and businesses, is guided by property values which in turn reflect the clear advantage of the location, that is the relative attractiveness of the various territorial areas (urban rents). For this reason the analysis of the prices of homes and properties to be used for other functions (sale and rental costs) can quickly point to a change in the uses of the city and new trends in housing preferences.

As for the housing demand, the impact on the property market of the changed ways of working did not so much affect the overall demand trend but rather resulted in the search for larger homes with outdoor spaces and in locations with adequate accessibility. The pandemic in fact did not penalise the property market as expected, which was instead supported by greater attention to the quality of life and the emergence of new housing requirements. A glance in particular at the main urban centres in the period just passed shows that the sales market did not come to a complete halt even during the health emergency, although the growth trend seen in the previous period (Milan, Rome, Bologna and Florence) was interrupted, while cities geared more towards tourists and students experienced an actual contraction (Venice). Rents, instead, which more quickly reflect the variations in unstable housing demand, experienced a sharp decline everywhere,

primarily as a result of a lack of students and visitors in these cities; Venice and Florence in fact suffered the greatest losses.

However, precisely due to their marked sensitivity to changes in demand, as of last summer there was a recovery in rental values which coincided with the return in the main cities of some categories of city-user (tourists and students in particular) (Figures 5 and 6).

As regards future prospects, we can imagine a scenario with two demand components. An incentive to change one's living situation in order to cope with the critical issues that emerged during the forced closure (from limited domestic spaces to the lack of outdoor space), which cannot be solved by the housing available in the main urban centres. The other, caused by a reduction in income, may result in a tightening up of the current housing situation or a push towards areas where the cost of living is lower than the departure point. Both cases, in any event, anticipate the consolidation of a phenomenon that is already taking place, namely the growing attractiveness of the belt areas around the main urban centres; with a radius, however, that could theoretically expand to include more distant areas. If this process were to consolidate, the population's incentive to relocate could affect a large number of regions, like Tuscany, characterised by widespread good quality settlements made up of urban centres, including smaller ones, with a satisfactory supply of services and good environmental and landscape quality.

4. Changes in Location Choices

The induced changes in people's behaviours and expectations during the emergency phase are set to become established also going forward, at least to some degree. In particular, these include remote working which, although scaled down with respect to the initial phase of the pandemic, is a method still used in alternation with in-person work. In this regard, it seems useful to remember that access to remote working is not universal but strongly linked to the type of profession carried out (OECD, 2020): for this reason and in order to provide a general overview of this eventuality, IRPET has quantified the population potentially able to work remotely, based on the functions performed and the business sector (Dingel *et al.*, 2020). It is not difficult to imagine that jobs that can be carried out via remote working, mainly clerical and intellectual work pertaining to the tertiary sectors, are primarily located in the main urban areas: in fact, 37% of employees in major cities perform jobs and belong to sectors that can potentially work remotely, while this percentage drops to 24% in other types of areas where commercial, manufacturing and agricultural activities prevail. At the same time, a consistent section of the population, more specifically 37% of those in central areas and 25% of those in suburban areas, are employed in jobs they can do

Figure 5 – Average house prices per square metre January 2019-November 2021. Index January 2019=100
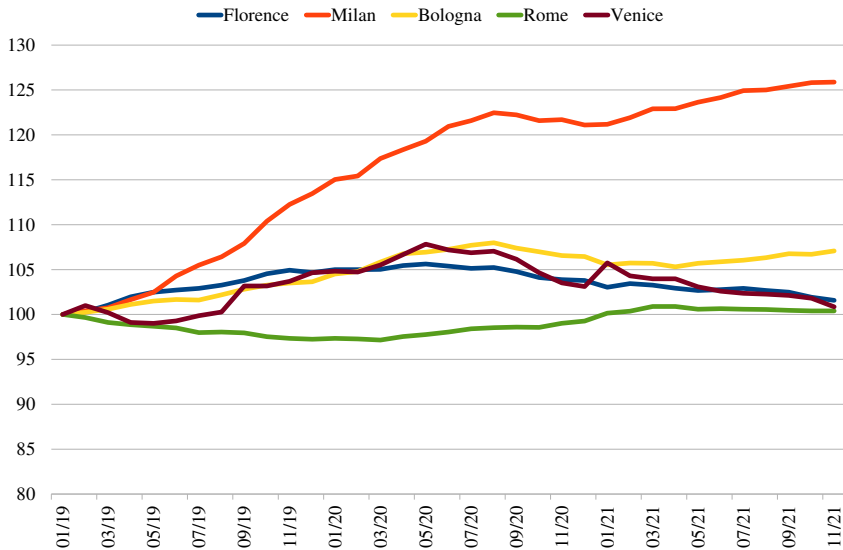
Source: processed by IRPET using immobiliare.it data

Figure 6 – Average residential rents per square metre, January 2019-November 2021. Index January 2019=100
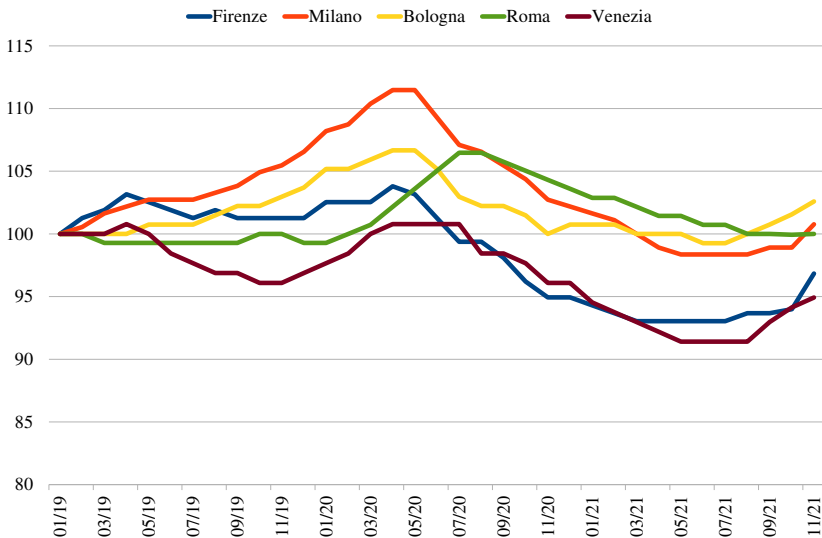
Source: processed by IRPET using immobiliare.it data

Figure 7 – Jobs that can potentially be done remotely (defined by sector and function, clerical and intellectual) by place of residence and place of work. Tuscany, 2019

Figure 8 – Families with broadband access. Tuscany. 2019. % Values
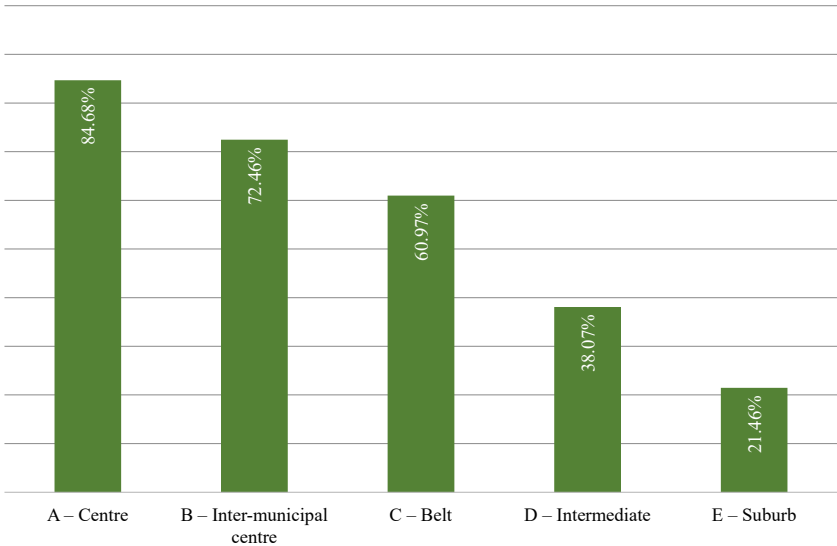
remotely and therefore do not need to travel on a daily basis within or outside of the city to get to work (Figure 7).

More specifically, cross referencing the jobs that can be done remotely with commuter flows shows that remote working, if used to its full potential, would reduce inflows to cities by up to 40%; this would reduce direct flows to the municipalities where the clerical and intellectual sectors are more concentrated. Together with lower congestion and traffic, the reduction in travel to the city for work reasons could also be accompanied by a reduction in revenue for urban contexts as a whole, as consumption opportunities for those sections of the population that are more inclined to spend will also be reduced (Figure 8).

Within the framework just outlined, digital accessibility will play a key role in redefining some location choices, to the detriment of accessibility to the transport network. In terms of territorial competitiveness, territories that are able to provide digital accessibility conditions fit for performing remote work will benefit, while peripheral areas that still do not have a fast connection will be penalised. The best equipped areas are in fact both centres and belt areas, where over 60% of households have broadband coverage, while in the peripheral areas this number is significantly lower (Amankwah-Amoah *et al.*, 2021).

Aspects to be considered when it comes to the territorial reallocation of a part of the Tuscan population include the availability of free housing. The supply of new constructions has grown to a limited degree in recent years, to the point that it can be considered substantially still, also thanks to a new culture of governing the territory primarily aimed at reusing what already exists rather than taking up new ground. It therefore seems important to try and estimate the distribution and potential surplus of housing (in addition to the main home) assuming that the reallocation of Tuscan people occurs with reference to the "free" existing heritage. As can reasonably be expected, the number of homes and their distribution throughout the territory tends to follow that of the population, showing a higher concentration in urban areas (Table 3).

However, the ratio between the number of families and the available homes shows very low values in areas affected by depopulation, where a large part of the housing stock is abandoned, and in tourist areas where there are many second homes. These areas may be of growing interest in the search for new homes, the former for the wide range of spaces, and the latter as they are already available to the owners.

As a whole, according to our estimate, there are around 375,000 homes that are not main homes, 19% of the total. The availability of free homes represents an opportunity to find a living situation that more fully meets the new requirements and, sometimes, at more affordable prices.

Table 3 – The housing surplus, homes for families

	Homes	Families	Home-Family	(Home-Family)/ Home*100
A – Centre	815,435	731,358	84,077	10.3
B – Inter-municipal centre	147,554	113,417	34,137	23.1
C – Belt	686,746	567,223	119,523	17.4
D – Intermediate	228,713	150,047	78,666	34.4
E – Suburb	125,622	67,619	58,003	46.2
F – Outlying region	1,461	639	822	56.3
Total	2,005,532	1,630,303	375,229	18.7

Source: processed by IRPET using Cadastral data

4.1. Some observations on territorial hierarchies

The pandemic will bring with it persistent changes in the competitiveness of the territories and in the disparities between and within regions (Capello, Caragliu, 2021; Bailey *et al.*, 2021). Moreover, as mentioned in the opening remarks, the pandemic may have significant consequences for our lifestyles over the long-term and, therefore, for the structure and configuration of our cities, including their relationship with the urban belts and other areas of the territorial hierarchy (Florida *et al.*, 2021). In response to these changes there may be impacts for population growth and composition, the market, and lastly land use. It is in fact reasonable to imagine that if the risk of infection – or fear of it – should remain over time, the inhabitants of cities might seek more personal space and more private services; this need could drive some people away from urban centres and from areas with the most crowded neighbourhoods (Florida *et al.*, 2021) towards territories where these needs can be better met. This phenomenon has already been identified in Italy by some sector operators (Scenari Immobiliari) which have provided an estimate of the number of families that moved out of the city in 2020, driven precisely by the need to respond quickly and for the most part temporarily to the pandemic. According to these estimates, around half a million households were affected by the phenomenon; these household units decided to move out of the city, renting a home or using their second home.

Moreover, if remote working remains the norm, many of these out-movers might not want to return to the urban areas they came from but, instead, trans-form their life in the suburbs or peri-urban areas from a temporary situation into a definitive one (Hart, 2020).

Table 4 – Registered movements out of Florence, 2000-10 and 2010-20

	Total
Years 2000-2010	
Left Florence	77,370
of whom Left Florence for Municipalities in Tuscany	57,181
of whom Left Florence for Municipalities in the Province of Florence	40,725
Years 2011-2020	
Left Florence	71,457
of whom Left Florence for Municipalities in Tuscany	51,522
of whom Left Florence for Municipalities in the Province of Florence	37,619

Source: processed by IRPET using Municipality of Florence Civil Registry data

The trends just outlined are in any case not entirely inconsistent with what has happened in the recent past, nevertheless the health emergency and the lifestyle changes it has induced will be able to accentuate their distinctive features or multiply their speed.

Looking more specifically at the movements of residents in the Tuscan capital, for example, we see that in the decade 2000-2010 and the subsequent decade 2010-2020 Florence lost around 148,000 inhabitants, 77,000 in the first and 71,000 in the second decade, for an average of around 7,000 inhabitants per year. Around 73% of them relocated within the Tuscan territory, and more than half (53%) to municipalities in the Florentine metropolitan area (Table 4).

Looking at the overall regional trends in relation to the situation from the beginning of the health crisis up to May 2020, we have employed an indicator sensitive to demand trends provided by the property market, namely the trend of the number of distinct transactions for the main urban areas and for belt munici-palities (Figure 9).

This variable allows us to highlight greater dynamism in the areas outside of the main urban centres. The replacement or search for a new home during the health crisis mainly concerned the hinterland with respect to urban centres, thanks to both more affordable housing, size being equal, and lower congestion and therefore the higher quality of life offered by such contexts.

Figure 9 – Property market. Tuscany, January 2020-May 2021. Number of standardised transactions. January 2020=100
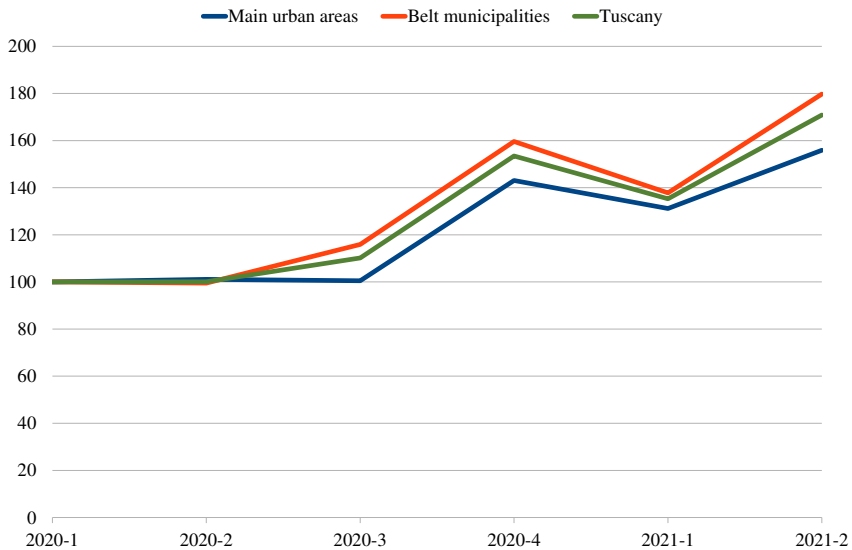
5. Scenarios Suggested by Changed Lifestyles

In light of the changed needs, individuals and families may review their location choices, with families searching for a better quality of life/cost ratio, while functions referred to sectors that experienced a bigger crisis during the pandemic, as well as those that can make greater use of remote working, may continue to express lower demand for urban locations. On the other hand, the cost of living for families is a relevant aspect with respect to the income received, with differences that are sometimes significant at regional level. It is not surprising that Tuscany is one of the regions with the highest bearing on family income (16%): the proportion of rent in Tuscany (real or figurative) to income is higher than the Italian average and other regions in the central north, affected by the highest house price levels in Italy and with one of the lowest internal variances (Figure 10).

Leaving aside these possible causes, we must ask how many families could potentially be affected by lifestyle changes and above all which territories might be involved (Table 5).

Looking at the convenience for families of relocating to municipalities in the belt of metropolitan cities such as Milan and Bologna, it is not surprising to note how, for both those seeking a home of the same size and those who want to find a

Figure 10 – Bearing of the cost of rent (real or figurative) on family income. Year 2018
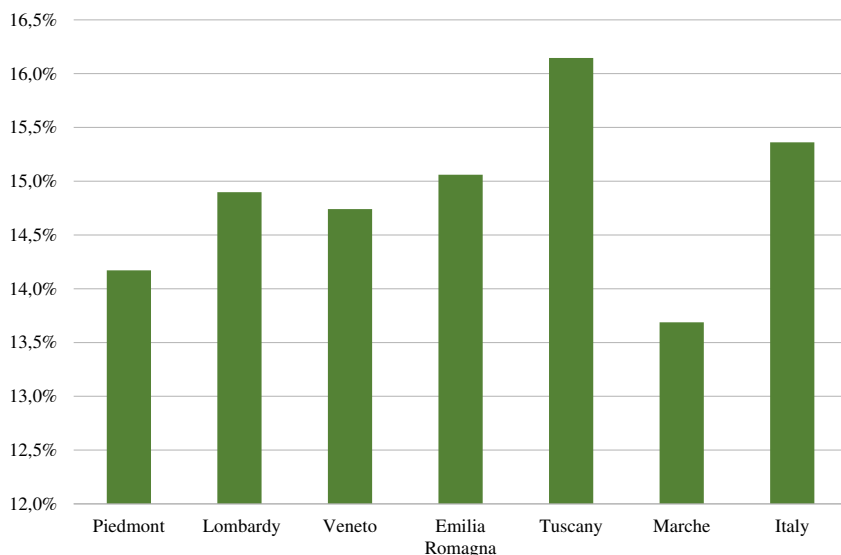
Table 5 – Average cost saving (+) or increase (-) for each family deriving from travel from the main city to other municipalities

Province	Municipalities to move to. Home of the same size (number)	Municipalities to move to. Purchase of an extra room (number)	Number of municipalities in the province (number)	Maximum distance from main town (minutes)	Annual average family saving net of transport costs (in euro)
Turin	69	46	316	42.5	3,871
Genoa	9	7	67	25.2	3,744
Milan	111	111	134	31.1	22,262
Bologna	37	35	55	45.3	9,993
Florence	33	33	41	54.9	14,575

bigger living space, Milan is the city that offers the greatest alternatives in terms of potential territorial relocation and the greatest savings. This result suggests how the polarisation exercised by the city of Milan is higher than elsewhere, to the point where leaving the Lombardy capital results in average annual family savings of over €20,000. In cities such as Turin and Genoa, on the other hand, the presence in belt areas of both tourist areas and very peripheral areas reduces the possibility of relocation and savings. Florence and Bologna have similar scenarios as they both offer good options for relocation in the territory and economic benefits of the same magnitude, slightly higher for Bologna where the tourist accommodation pressure is lower.

However, in order to define more precisely those who could leave the major cities, at least potentially, and the destination of such households, we shall assume that the population most directly concerned is made up of those who have the possibility of remote working and that this condition will remain structural even after the health emergency is over. To do this, we shall use the estimate made for Tuscany of 37% of the active population residing in the city centre, who no longer have to travel to work on a daily basis and who could therefore decide to move outside of the city in order to meet their new needs and find more suitable living conditions for working from home, as well as more pleasant outdoor environments. As long as they can count on adequate digital accessibility, naturally. The lower (but not entirely eliminated) need to access the workplace and the simultaneous request for the availability of work space alongside living space might also drive some people to more distant areas which until now were considered inadequate for professional needs. Alongside this changed order of requirements and needs, we cannot forget the economic crisis that went hand-in-hand with the pandemic and the consequent need for many people to reduce the cost of living which we have seen to be particularly high in our region. To provide a territorial reading of the areas potentially affected by this phenomenon, first of all the households that might be driven to relocate was estimated, selecting them from those that reside in the provincial capitals, which coincide with the main urban centres in the region, and that work remotely (Irpet, 2021)[1].

For each household the economic benefit that would result from a different living choice was calculated, taking into account the cost differential between the centre and suburbs (or between a large and small urban centre) and assessing the trade-off between falling prices and rising transport costs the further one gets from the main centre. Leaving aside location, however, living costs are also linked to

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1. The estimate of remote working positions was transformed into households. Of these, only one-person households with the head of the household under 65 and childless couples with incomes between €15,000 and €120,000 per year were considered. Couples with children and households with an income at the two ends of the distribution were therefore excluded.

apartment size and quality of life. It follows that once the amount of income to be spent has been defined, this sum can be divided among the costs deriving from the location (size of the town and cost of transport) and those relating to the size of the apartment. Taking these considerations as a starting point, two scenarios were envisaged, one involving a more peripheral location as a result of moving to belt municipalities in the same provincial area; the other instead involving a new location as a result of a search for more domestic space and therefore improved living conditions[2]. The two options are intended to take into account households that move because they are driven by the need to save money on the one hand, and households that instead decide to raise their standard of living, on the other. To this end, in the first case reference is made to a situation where the home is of average size (80 m^2) and the family intends to move from the urban centre but maintain the same size home; whereas in the second case examined the choice is still to leave the city but to seek a larger living space. In both cases, the overall savings resulting from the difference in housing costs before and after the move, net of commuting costs, are assessed, depending on the location chosen for the new residence. Whereas, to identify the possible destinations, first of all the annual average savings resulting from the change of home are calculated (assuming that the overall gain ends after 10 years) deducting the commuting costs (calculated by applying the journey time indicated in the relative ISTAT matrix, a time cost spent in moving) taking into account that that there is less need to travel than before the pandemic (assuming that the worker will return to the workplace 3 days a week) but more need than there was during the most acute phase of the health emergency and when the greatest restrictions were in place (when instead smart working was carried out 5 days a week). Starting with the locations where this difference is still positive, those that offer "free" housing (where there is a surplus of housing with respect to resident families, both tourist areas and areas undergoing abandonment) and above all adequate conditions of intangible accessibility (connection speed of 50 Mega or more) are chosen since, as has already been pointed out, the possibility of working remotely is the condition underlying the move.

The total savings from moving house to the peripheral areas shown in Table 16 are the result of the trade-off between lower housing costs the further one moves from the city and increased transport costs, digital accessibility being equal (Table 6).

It is clear how on average the saving is proportional to the distance from the provincial capital, which represents the place that offers employment and where a series of rare tertiary services can be found. Moving to a distance that cor-responds to around 15 minutes of travel time, for a home of the same size, can

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2. The sample examined includes 4% of households resident in Tuscany's major cities, approx. 20,000 households.

Table 6 – Average cost saving (+) or increase (-) for each family deriving from travel from the main city to other municipalities by classes of travel time. Values in euro

	House of the same size	*Purchase of an extra room*
Up to 15 minutes	39,880	-2,276
From 15 to 30 minutes	49,555	14,347
Over 30 minutes	83,121	53,064
Tuscany	65,083	33,566

Source: processed by IRPET using immobiliare.it data

Figure 11 – Map of the annual benefit of relocation of households living in the urban capitals. Values in euro
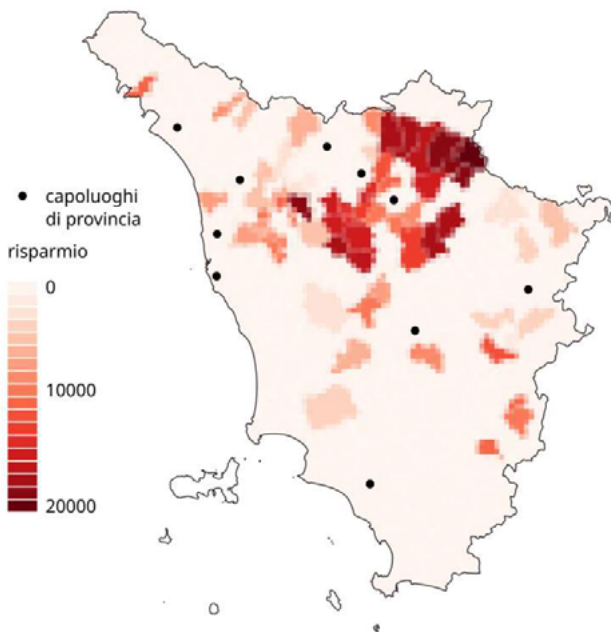
Source: processed by IRPET using immobiliare.it data

result in average savings of up to roughly €40,000. The further away one moves the greater potential for savings: at a distance of 15 to 30 minutes the savings are around €50,000, and over €80,000 when moving over half an hour away. If instead the reasons for the move are also driven by the search for a higher standard of living (exemplified in our case by an increase in the available living space), in order to also obtain an economic benefit the new location must be around 15 to 30 minutes travel time from the main urban centre; while at a distance of 15 minutes travel time from the main city no economic benefit would be obtained but only more living space. On the contrary, at a distance of over 30 minutes both benefits can be obtained, an economic one (around €53,000) and more living space (Figure 11).

Distributing the economic benefit resulting from a different choice of location over a ten-year period according to the two relocation possibilities, the size of home and increase in living space being equal, provides us a geography of advantages, shown in the map: in the case of the regional capital the classic trend of concentric circles of income (and of the isochrone) is fairly typical, while in the other territories the configuration is less clear because alongside the less attractive role of some urban centres there is the effect linked to the presence of second homes, which results in a different distribution of these benefits.

From a more territorial perspective, it is interesting to try to understand which areas might be the most attractive. The estimate assumes that some of the changes induced by the pandemic will become structural (remote working) therefore the parameters on which it is based are distance (assessed as transport cost considering 2 visits to the workplace per week), property value per square metre, intangible accessibility (only municipalities with connection speeds of over 50 Mega were considered) and the presence of empty homes. The property value changes according to the level of urbanisation as well as the level of tourism, and can be much higher in some coastal municipalities, for example, or in some rural areas that offer living contexts with high environmental and landscape value (Table 7).

Based on the parameters considered, we see how for an apartment of the same size, maintaining the double condition of adequate intangible accessibility and economic advantage, greater possibilities can be obtained by choosing a belt municipality. This type of location guarantees a significant advantage in terms of living costs (distributing the benefit over ten years corresponds to approx. €3,600 per year for an apartment of the same size) or does not require any financial outlay if a decision is made to increase the living space. At the same time this is the most numerous territorial category (45 municipalities in the first case and 33 in the second) where it is advantageous to relocate since the necessary intangible infrastructures are offered. This possible redistribution however excludes the peripheral areas, except for only a few cases, and the outlying areas as they lack the infrastructural profile. In this

Table 7 – Annual advantage of relocation for households (values in euro) and municipalities affected by the redistribution. Tuscan municipalities

	Home of the same size		Home with an extra room	
	No. of municipalities concerned	*Net benefit*	*No. of municipalities concerned*	*Net benefit*
A – Centre	5	4,477	5	974
B – Inter-municipal centre	6	4,117	4	-315
C – Belt	45	3,663	33	67
Main city	0	0	0	0
D – Intermediate	12	3,813	9	801
E – Suburb	3	5,198	2	2,877
F – Outlying region	0	2,137	0	-360
Overall total	71	3,786	53	634

Source: processed by IRPET using immobiliare.it data

perspective however, which assigns a different weight to factors that drive housing options, it is in any case advantageous to rethink one's choice if one opts for belt areas where transport costs remain low but does not rule out, at least potentially, the more peripheral areas from this possible geography of relocation, which could see their attractiveness increase if their intangible infrastructures increase.

This scenario is based on the assumption of the "structural" use of smart working, which nevertheless requires a presence in the workplace. These hypotheses, which unlike the most acute emergency phase in which the use of smart working was higher and in which people were more likely to be willing to accept less efficient connectivity levels, led to the assumption that the number of locations considered convenient would be larger, even involving the peripheral areas. In fact, during the lockdown there were those who chose to spend this period of isolation in non-urban locations, including in the more outlying areas. The scenario just outlined could in any case become an objective scenario to strive towards in the long term if these territories are adequately equipped with infrastructures and connectivity.

What we wanted to investigate here, as already stated, was the potential of the centrifugal phenomenon, namely the move away from cities in the assumption that certain changes to lifestyles will become structural and are able to accentuate the phenomena already underway. To this end, the results reveal a geography of the territories suitable to accommodate households in search of renewed living standards or those who are driven simply by the need to save, and those that could become so if certain infrastructural deficiencies were overcome. It is clear how the distribution of households in the territory depends on many factors, not

all of which can be exemplified in an exercise such as this. In addition, housing propensity, even if peri-urban, will have to deal with the fact that the city will continue to play an attractive role at least for some segments of the population and for many purposes. Nevertheless, the city's degree of attractiveness will depend on its capacity to take up the challenges and meet the needs that emerged during the emergency phase and that are set to persist over time.

6. Conclusions

This paper has analysed the main changes involving urban areas during the emergency phase, both in terms of altered attractiveness and functional changes, some of which have been expedited by the pandemic crisis. Starting with the transformations highlighted, some possible scenarios were outlined from a post-emergency outlook, analysing a different spatial configuration of the location choices of households and the implications, also in terms of opportunities, that may derive from them both for the more outlying areas and those within the belts and, last but not least, for cities. Moreover, we are coming from a long period of great confidence in urban areas – especially metropolitan ones – which have been handed great responsibility for determining the competitive positioning of entire regions, while attributing a less central role to the rest of the territory. In light of the changes that have occurred, the first final consideration suggests how it is necessary to endorse an integrated territorial vision capable of recognising that each category has a role to play and contributes to the achievement of greater and renewed territorial equilibrium. This perspective is all the more necessary because, in times of crisis, territorial disparities tend to widen in an extremely selective way. There is in fact a risk that if these disparities were to increase they would accentuate one of the distinctive traits of the Tuscan system which, while characterised by limited polarisation from an urban point of view, from a territorial point of view instead has a highly dualistic structure, concentrating functions, services and inhabitants in a relatively small portion of territory, giving rise to critical issues in terms of congestion/ saturation on the one hand and abandonment/depopulation on the other. In the proposed vision, based on a different housing demand and a different concept of proximity, we can in fact see an opportunity for our territory, both in terms of greater balance and the drive towards digitalisation and innovation. It is clear, however, that despite the changes that have taken place, not all territories are capable of significantly increasing their attractiveness as functional links with the main centre in addition to a good supply of services remain central, albeit mitigated by the reduced need to travel around. From this point of view, it is conceivable that the areas closest to the city, above all in the medium term,

will be able to better meet the needs of families in terms of housing stand-ards, further supporting the suburbanisation processes already taking place. As for the peripheral areas, if they are able to seize the opportunities offered, for example, by digitalisation, which is useful not only for smart working but also for the provision of services, they will be able to reverse the trend which, for a long time now, has seen them lose significant shares of their population. On the other hand, if cities are able to embrace change they could benefit from lower congestion and housing pressure, increasingly their attractiveness to a younger and more dynamic population, thus favouring an allocation of human resources and, subsequently, economic resources, that better serves agglomeration mech-anisms than that highlighted until now.

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La città in era post-COVID: tra tendenze centrifughe e cambiamenti funzionali

Sommario

La pandemia da COVID-19 ha rappresentato un momento di trasformazione, oltre che sul piano sanitario, anche su quello economico e dei comportamenti sociali alcuni dei quali in grado di indurre modifiche, talvolta permanenti. In particolare, il lockdown imposto per fronteggiare la crisi sanitaria ha determinato da un lato una crisi profonda di quelle attività soprattutto terziarie dipendenti dalla mobilità delle persone e dall'altro la consistente diffusione di altre prima poco sviluppate quali lo smart working, l'e-commerce e la didattica a distanza. È lecito ipotizzare che lo svolgimento a distanza di

attività di lavoro, consumo, istruzione, seppur ridotto nella fase post-emergenza, non scomparirà del tutto. Per questi motivi da un lato possiamo immaginare che la città possa, almeno in parte, cambiare la propria configurazione funzionale e dall'altra che alcuni territori potranno diventare più attrattivi di quanto non lo siano stati fino ad oggi. Il contributo propone a tale scopo un approfondimento relativo a tali temi richiamati attraverso l'analisi di un caso di studio riferito al contesto toscano.

How's Life in the Village? Economic Resilience and Reaction During Pandemic Lockdowns

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Abstract

Although pandemics have been a recurring problem in history, the COVID-19 pandemic has some characteristics never experienced before. The human being has survived wars, nature catastrophes and economic shocks, always showing resilience in adapting to new situations. In this paper we want to check if this attitude is still strong. Our research question is: How do we react to emerging situations? In this paper we try to answer this question analyzing a dataset of Twitter messages collected through the second and third COVID-19 pandemic waves in Italy regarding everyday life during strict lockdowns and people's opinion on these situations. The small villages are our starting point, questioning first about the reactions in the population during severe restrictions and secondly looking at the responses to social and economic changes without any reference to the lockdown period; we focus then to the resilience behaviors considering the areas in the North, Center and South Italy thanks to the Twitter messages' geo-localization.

1. Introduction[1]

The impact of the COVID-19 pandemic over people's everyday life has been (and still is) devastating over many dimensions. It spread all over the globe on such a scale that, as of February 2022, it took almost 6 million lives from its beginning in late December 2019[2] (the so-called "Russian flu" in 1889-1990 and "Spanish

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1.   We would like to thank Guido Ravasi for his comments and suggestions on a first draft of this paper and for his precious help in developing the code for this work, and Flavio Verrecchia, National Italian Statistical Institute, for inviting us to present this work in a special session of the XLII Conference of the Italian Regional Science Association. We also would like to thank Emanuele Morales for his counselling on developing the Python code.
2.   https://coronavirus.jhu.edu/map.html accessed on February 6th, 2022.

flu" in 1918-19 were also global pandemics but with a lower level of spread due to more limited possibilities for travel and movement at the time, even if the Spanish flu is considered the worst pandemic of history with up to 100 million deaths worldwide caused mainly by lack of possibilities for sufficient health countermeasures – see Aassve *et al.*, 2021). Curbs to counter the spread of the virus have been adopted almost in all parts of the world: school closures, transport limitations, gathering restrictions are only a few examples of the many actions undertaken by the various national and regional authorities. Even in countries where at the beginning of the pandemic was decided to aim for herd immunity, such as Sweden, some containment measures were eventually taken. These measures have impacted on countries' economies on a large scale (Pak *et al.*, 2020). For example, in the European Union from the fourth quarter 2019 to the second quarter 2021 there have been two strong contractions in the average EU GDP (Figure 1), with the Euro area countries slightly more affected. All world markets have been affected, more than in the financial crisis of 2008 and in the great depression of 1929 (Bagchi *et al.*, 2020). All in all, the COVID-19 outbreak negatively affected the economy even in countries where no lockdowns have been introduced as in South Korea (Aum *et al.*, 2021).

However, it is at the local level and for small businesses that the COVID-19 pandemic has had the most disastrous effects, as several studies have examined the impact of COVID-19 or lockdown on economic and social aspects at local level, counties or small towns.

Figure 1 – Quarterly GDP growth, European Union (27 countries, black line) and Euro area (19 countries, gray line) – Q4 2019/Q1 2021
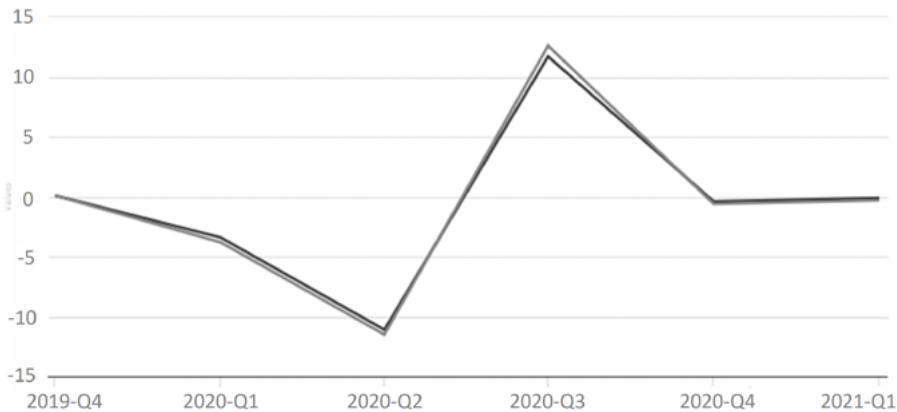
Source: Eurotat

The literature on the economic impact of the COVID-19 pandemic has of course flourished in the last one year and a half. Ur Rahman, *et al*. (2021) investigated the economic impacts of COVID-19 on households based on differences in the socio-economic status (SES). Household-level effects were determined by using income sources, types of industries, communities' resilience, household susceptibility, and relevant policy measures. Data were collected using an online survey questionnaire from different villages located in Sichuan and other provinces in China (475 in Sichuan, 80 from other provinces). The statistical analysis was performed by applying stepwise binary logistic regression analysis. Findings suggested the significant use of SES to detect the impact of COVID-19 on different households. Households with low SES tend to depend more on farmland income and transfer payments from the government, while high SES households focus more on business and local employment as sources of income generation. Due to that, poor households or communities are less resilient and more likely tend to suffer poverty due to the COVID-19 crisis, whereas the reverse situation happens for households with high SES.

Peters (2020) created a COVID-19 susceptibility scale at county level for the United States of America, considering 3,079 counties in the 48 conterminous states. Exploratory factor analysis (EFA) was used to construct this COVID-19 susceptibility scale. Also, the author assessed the health and socioeconomic resiliency of susceptible places across the rural-urban continuum, by applying multivariate general linear model (MANOVA) to estimate unconditional mean differences across several resiliency. Finding shows that 33% of rural counties are highly susceptible to COVID-19, driven by older and health-compromised populations, and care facilities for the elderly. Rural counties were more sensitive to COVID-19 critical situations as they lack social services which might to hinder local pandemic recovery.

Chirisa *et al*. (2020) examined the challenges experienced by poor urban communities during the lockdown in sub-Saharan Africa. This study is strongly focused on social and economic impacts of lockdowns on the poor and disadvantaged communities. Data was collected from secondary sources, i.e. from existing databases and published scientific works including Google Scholar, Bok.org and EBSCOhost. They used qualitative analysis tools such content analysis. The results showed that the COVID-19 scourge had a huge impact on the increase of urban poverty in sub-Saharan Africa. Many reach households continue earning an income similar to the pre-pandemic one working from home. Moreover, they save money by reducing commuting expenses for moving to workplaces, while households working in small business result more exposed to the risk of losing their jobs.

Karaye *et al*. (2020) examined the association between characteristics of infected COVID-19 people and social vulnerability in the U.S at global and local level using an ordinary least squares regression model at global level, and a geographically

weighted model at county level. Independent variables were the social vulnerability index (SVI), the household composition and disability, minority status and language, housing and transportation. All independent variables were significant to predict new COVID-19 cases, and the SVI and minority status and language were associated with an increased number of new COVID-19 cases.

Our approach diverts from the literature above, as it is aimed at exploring resilience and reaction through social network text analysis. In particular, we analyze Twitter messages (in Italian) collected from October 28th, 2020, to March 19, 2021, i.e., the period between the second COVID-19 wave and the start of the first vaccine campaign in Italy. We proceed with four levels of analysis: (i) analysis of COVID-19 tweets directly related to the small villages put on strict local lockdown in the period considered (we refer to this analysis using the acronym ANA1 in the following); (ii) analysis of COVID-19-tweets with general comments on the resilience and reaction to restriction measures affecting the economy and social status of small municipalities (ANA2); (iii) a more general analysis of COVID-19 tweets concerning resilience and reaction in general in Italy with no particular reference to lockdown situations (ANA3). We perform some social network analysis, term frequency analysis, sentiment analysis and topic model analysis on these three levels. Finally, (iv) we conducted a non-automatic analysis on a tiny subset of tweets for which we were able to collect geographical information to see if there are difference between macro regions and between rural and urban areas (ANA4). The aim of our analysis is to check for economic and social behavior and feeling when facing shocks experienced like in this pandemic.

This article is organized as follows. Section 2 describes the data collection process. Section 3 briefly presents the natural language process tools we used in the analysis. Section 4 presents the results of the analysis and Section 5 concludes the paper

2. Data Collection

2.1. Small villages in "Red Zones"

In this study, we collect tweet data related to COVID-19 and the economic situation and health behavior during the first period when a system of 4-color alert scale has been in place in Italy. This system was introduced on November 6th, 2020. The upper level (called in Italian "zona rossa" or "red zone") of this scale is the strictest one and can be considered as a full lockdown. We selected Italy for our study as it is one of the countries firstly and more severely hit by the pandemic, especially the small towns and villages.

Normally, the areas put in a "red zone" corresponded to administrative regions (EU NUTS-02), but in some cases small areas were declared "red zone". We

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decided to consider areas smaller than NUTS-02 regions with a population under 100,000 inhabitants. In this way we ended up with 83 small villages experiencing at least one "red zones" period between October 28th, 2020, and March 19th, 2021. We obtained the list of these small municipalities by scraping the websites of municipal and regional authorities and local newspapers and media. We refer to this list for the ANA1 analysis.

Figure 2 shows the distribution of small "red zones", i.e., small municipalities put under the highest restriction level. These red areas have been mostly concentrated in the two most southern Italian regions, i.e. Calabria and Sicily. The power to put local municipalities in this "red zone" status was in the hands of regional authorities which, in doing this, had to consider economic and social implications for the small communities of these villages. Probably the red zones were established

Figure 2 – Spatial distribution of small "red zones" in Italy – From October 28th, 2020, to March 19th, 2021

Source: authors' computations

easier in Southern Italy because the impact of these restrictions was considered less invasive than the average economic condition there. In the rich North, a lockdown action was considered more problematic because it more probably could disrupt the production process there. Moreover, as in Italy there exist a decentralized region-based health system and the regions of southern Italy have a less efficient and more critical health system, these extreme measures have been taken more easily than in other regions in order not to overwhelm the regional health system.

2.2. Tweet collection

To collect the tweets concerning COVID-19 we used the standard API that Twitter makes available to users provided that they submit a project in which these tweets are used. There are several problems with this API because it does not allow to exceed the limit of 500 thousand tweets downloaded for each project and does not give you the possibility to specify the date. However, one can indicate the date until he or she wants to go back in the retrieving the tweets, with a maximum limit of 7 days before the Twitter queries are submitted[3].

We started collecting Twitter data from the very beginning of the pandemic outbreak in Italy daily, in so doing avoiding the issue of the time limit. Once the APIs have been queried tweets were returned in JSON format, the results were first loaded into a non-relational DB (MongoDB) and then into a relational DB (PostgreSQL), taking care not to duplicate the records, which were uniquely recognized by the field 'tweet_id', and filtering only the fields that were strictly necessary for our research, in order to avoid storing limit problems. This methodology, together with the elimination from the non-relational DB of the tweets that are transferred to the relational DB, and the use of a server deployed in a firewall protected network, allowed us to contain the possibility that personal data attributable to the tweet's author could be breach. API's queries took place daily thanks to the use of a scheduler that launched the scripts automatically. The query strings used to collect these tweets were "COVID-19" and "Coronavirus" only, and we focused on tweets written in Italian. Tweets were collected from March 1st, 2020, to March 19th, 2021, but we focus on the period October 28th, 2020, to March 19th, 2021, corresponding to the first months in which the "color alert system" was implemented in Italy.

2.3. Keywords for tweet selection

From the huge twitter database created as described in the previous section, subsamples of tweets for ANA1, ANA2 and ANA3 analyses were created in the following way. For ANA1 we simply used the names of the villages in the queries and merged the resulting tweets. So, for example, if the village was "San

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3.   https://developer.twitter.com/en/docs/twitter-api/v1/tweets/search/api-reference/get-search-tweets.

Miniato", the resulting query were "('COVID-19' AND 'San Miniato') OR "('Coronavirus' AND 'San Miniato')". This was done for each of the 83 selected villages. The resulting dataset was formed by 1,116 records.

As for the ANA2 analysis, the "COVID-19" and "Coronavirus" keywords were added in an AND clause to keywords regarding more general comments about small villages or small cities and resilience/reaction/recovery. Table 1 contains all the query strings used in this analysis together with the resulting number of tweets retrieved. In the query we also included terms for indirectly detect comments on small environments. For example, "family shops" is more probable to be a key business activity in small villages rather than in big cities. Other possible queries were dismissed as they did not retrieve any tweets. Table 2 shows the query strings used in ANA3 analysis together with the resulting number of tweets retrieved. As these queries were more general on reaction/resilience/recovery to/from the COVID-19 pandemic, the number of retrieved tweets is by far larger.

3. Method

3.1. Pre-processing treatment

We use standard pre-processing techniques to clean, filter, stemming and tokenize the Twitter messages. In particular:

- We removed non-Italian words and retained foreign words which are currently in the standard Italian vocabulary ("lockdown" is an example). For this, we exploited the current Italian corpora embedded in some Python libraries.
- We performed text cleaning by removing punctuation, double spaces, hyperlinks, numbers, special symbols, etc. For this, we used the standard regular expression treatment in Python using the re library.
- We performed lemmatization (Prabhakaran, 2018), converting each word in its basic root ("ross" is an example of a lemmatization of "rosse", by removing the last letter "-e" stating in this case the gender and number agreement of words in Italian; in English this corresponds to getting "red" from "reds"). For this, we used the WordNetLemmatizer lemmatizer from the nltk Python library.
- We removed so-called stop words, i.e. articles, prepositions, and other function words which are not essential in this kind of analysis (Malik, 2020). For this, we used the list of the stop words in the Python nltk corpus.

3.2. Sentiment analysis

We used the Python TextBlob library used in multiple contexts (Loria, 2014; Schumacher, 2015; Hasan *et al*., 2018; Morales, 2021). TextBlob is a a Python

Table 1 – Query strings used in the ANA2 analysis

Query (in Italian)	English translation	No. of tweets retrieved
"(piccoli comuni) AND (rossa)"	"(small municipalities) AND (red)"	36
"(piccoli comuni) AND (lockdown)"	"(small municipalities) AND (lockdown)"	17
"(resilienza) AND (rossa)"	"(resilience) AND (red)"	10
"(resilienza) AND (lockdown)"	"(resilience) AND (lockdown)"	49
"(reazione) AND (rossa)"	"(reaction) AND (red)"	25
"(reazione) AND (lockdown)"	"(reaction) AND (lockdown)"	170
"(ripresa) AND (rossa)"	"(recovery) AND (red)"	33
"(ripresa) AND (lockdown)"	"(recovery) AND (lockdown)"	221
"(ristoranti) AND (rossa)"	"(restaurants) AND (red)"	516
"(ristoranti) AND (lockdown)"	"(restaurants) AND (lockdown)"	1,176
"(piccoli negozi) AND (rossa)"	"(family shops) AND (red)"	6
"(piccoli negozi) AND (lockdown)"	"(family shops) AND (lockdown)"	8
"(piccoli comuni) AND (economia)"	"(small municipalities) AND (economy)"	3
"(economia locale)"	"(local economy)"	26
Total		2,196

Source: authors' computation

Table 2 – Query strings used in the ANA3 analysis

Query (in Italian)	English translation	No. of tweets retrieved
"disoccupat*"	"unemployed"	430
disoccupazione"	unemployment"	466
"lavoro"	"job/labor"	16,088
"finanza"	"finance"	1,178
"reazione"	"reaction"	2,027
"ristori"	"compensation"	4,330
"piccole imprese"	"small enterprises"	405
"economia"	"economy"	7,077
"ripresa"	"recovery"	2,282
"resilienza"	"(restaurants) AND (lockdown)"	487
Total		34,770

Source: authors' computation

library for Natural Language Processing that is built on top of NLTK to achieve the "polarization" goal. It takes a corpus as input and takes into consideration the order of the words, being important in this context. The case of the words "great" and "not great" is an example where for "good" the polarity of the word is positive, but in the second case, with the negation, it becomes negative. The polarity will be given a value between -1 and 1 with negative values signifying negative polarity and positive values signifying positive polarity. According to the TextBlob help, "great" will receive a polarity of 0.8, whereas "not great" will receive a polarity of -0.4. Scores are not symmetric around zero to consider irony and other linguistic figures like the litotes (the use of "she is not so beautiful" to say in a politer way "she is ugly").

3.3. Topic modelling

We performed a topic model analysis on the three corpora resulting from ANA1, ANA2 and ANA3 tweet selection. We used the Latent Dirichelet Allocation (LDA) method (Blei *et al*., 2003) which is one of the most popular topic modelling methods. The LDA topic generative process works by assigning a score to a given topic within each document in a corpus, building on the concept that each document can be described by a distribution of topics and each topic can be described by a distribution of words. The number of topics to be chosen is given by the so-called coherence score which assign a level of coherence of words used in each topic. For example, a topic music has more coherence if it has "sound", "scores", "guitar", etc. rather than "sound", "noise", "vibration", etc. For implementing LDA we used the *gensim* package in Python 3.8.

4. Results

4.1. ANA1 analysis

In the ANA1 analysis we extracted the relative frequency of words from tweets related to resilience for each village which had classified as red-zone area during the lockdown period by the decision-maker.

Figure 3 displays the word clouds of the corpus formed by the negative and positive unigrams in the ANA1 dataset. In the negative cloud among verbs those expressing worry ("to worry", ["preoccupa"]), are the most frequent. Among nouns, those revealing the stress of the health system ("nurse", ["infermiere"]), economic crisis ("crisi" ["crisis"]) and those used in pandemic texts ("English variant", ["variante inglese"]) are among the most frequent. In the positive cloud among verbs those expressing resilience ("to face", ["contrastare"]), hope ("to hope", ["speriamo"]) and unity ("unity", ["unione"]) are the most frequent.

Figure 3 – Word clouds from the ANA1 corpus

(a) Negative tweets*   (b) Positive tweets

Note: * "Crocera", "stadium" and "crociera" in the world clouds refer to the social and sporting garrison located in Sampierdarena (GE), called "Crocera Stadium di Sampierdarena": see, for example https://www.genovatoday.it/attualita/coronavirus/piscina-crocera-stadium-sampierdarena-chiude.html (accessed March 21st, 2022). Being the world clouds constructed with unigrams (and containing sometimes also spelling errors as for "crociera" instead of "crocera"), only part of the garrison name is reported in them.

Source: authors' computation

Among nouns, those revealing the health "solution" for the pandemic ("vaccine", ["vaccino"]), responsibility ("responsibility" ["responsabilità"]) are among the most frequent. Adverbs revealing the need immediate action ("now!", ["subito!"]) are also a sign of positive attitude.

Figure 4 shows results from a sentiment analysis on the ANA1 corpus, after excluding the neutral tweets. We performed this analysis completely manually as the number of tweets in this corpus was relatively low and to check for the "average" vocabulary used in the tweets of this type. About two third of the tweets showed a rather negative sentiment and an attitude toward a gloomy mood with regard to the evolution of the pandemic and about the possibility of any recovery/reaction.

After using coherence analysis for determining the number of the most important topics, we ended up choosing 2 topics which, according to the most frequent words in them, we labeled "Political imposition" (as words like "government", "pd" – i.e, the Italian Acronym of the Democratic party, one of the government coalition party at the time – "regione", etc., were more frequent) and "Health system", as words related to healthcare and used to describe the coping of the epidemic were mostly used.

Figure 4 – Polarity of non-neutral tweets in the ANA1 analysis ("no" = negative; "yes" = positive)
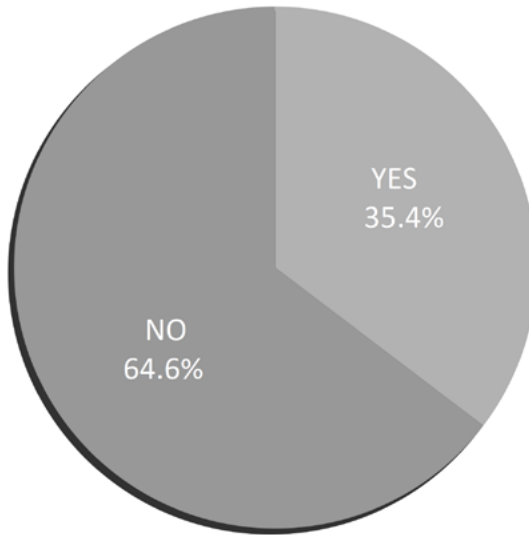
Source: authors' computations

In Figure 5 the inter-topic distance map of the two topics is showed together with the most frequent words in the topic "Health systems". The distribution of topics among the tweets was almost uniform resulting in 50% in the "Political imposition" topic and the same in the "Health system topic" (Figure 6).

4.2. ANA2 analysis

In the ANA2 analysis we extracted the relative frequency of words from tweets related to resilience and recovery in small areas without direct reference to the villages in red zone. Figure 7 displays the word clouds of the corpus formed by the negative and positive unigrams in the ANA2 dataset. Negative tweets were much more related to the lockdown condition and its time span ("due" is the Italian word for "two" which is the number of weeks or months regions or other territorial authorities have been locked down). The "two" word ("due" in Italian) assumes an important weight in this context, since, as a matter of fact, it is about fourteen days (in the case of *two* weeks) or sixty days (in the case of *two* months), a time in which people felt to be deprived of autonomy in everyday life.

Figure 5 – "Political imposition": the two most important topics for the ANA1 corpus. Areas of the circles are proportional to the word frequencies in the topics
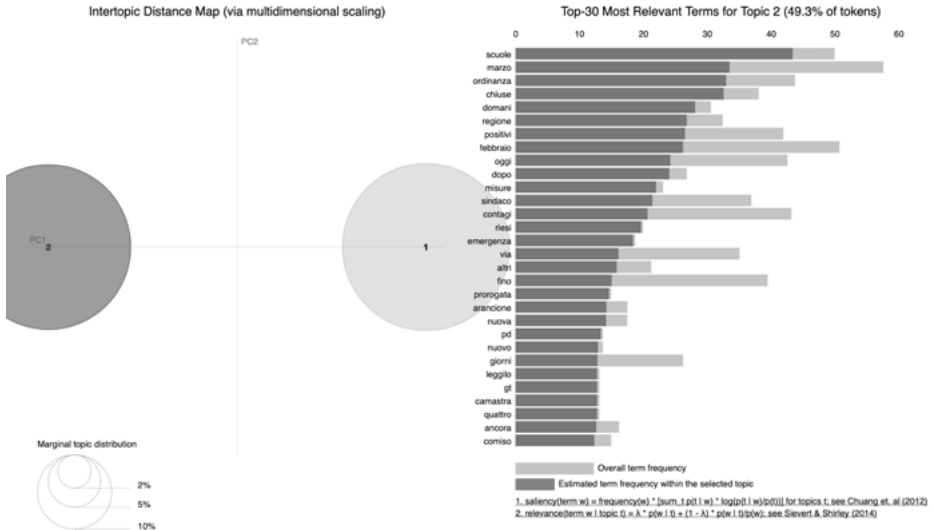
Source: authors' computations

"dpcm" stands for "Decree of the Presidency of the Council of Ministers" and is the apex institutional body in charge of the decisions for implementing restrictions. In positive weeks the word "chiusi" ["locked up"] is quite frequent like in the negative tweets but this time it is present in conjuction with the word "fine" ["end"], meaning a more optimistic attitude for the future. The world "ripresa" ["recovery"] means that this subgroup of tweets more prone toward seeing a light at the end of the tunnel.

Sentiment analysis showed again a more polarized attitude in the positive perspectives than in the ANA1 corpus, as about two third of the tweets showed a rather positive sentiment and an attitude toward a better mood with regard to the evolution of the pandemic and the possibility of any recovery/reaction (Figure 8). This analysis and the ANA3 analysis were performed automatically using the TextBlob technique.

Coherence analysis led us to choose two topics which, according to the most frequent words in them, we labeled "Political imposition" similarly to the ANA1 corpus and "Suggestion for recovery", as words related to healthcare and used to describe the coping of the epidemic were mostly used.

Figure 6 – Distribution of topics in the ANA1 corpus
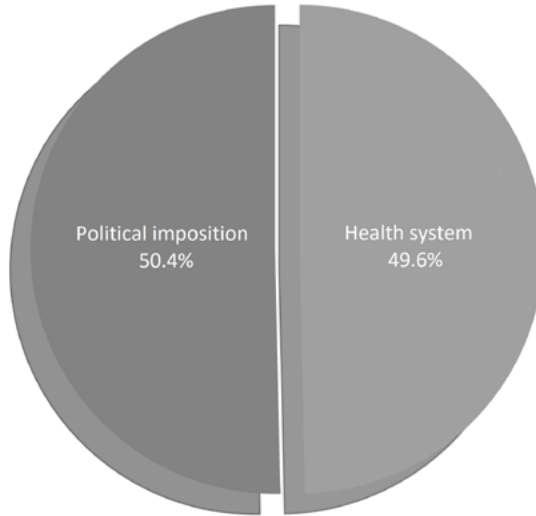
Source: authors' computations

Figure 7 – Word clouds from the ANA2 corpus – (a) Negative tweets; (b) Positive tweets

(a)

(b)

Source: authors' computations

*Figure 8 – Polarity of non-neutral tweets in the ANA2 analysis*
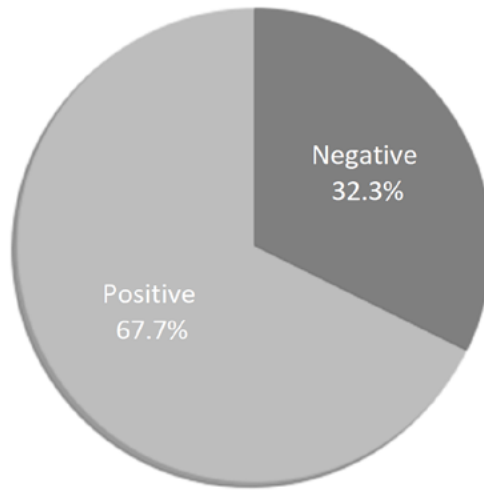
Source: authors 'calculations

In Figure 9 the inter-topic distance map of the two topics is showed together with the most frequent words in the topic "Suggestion for recovery". This time the distribution of topics among the tweets was quite unbalanced with almost 90% in the "Political imposition" (Figure 10).

4.3. ANA3 analysis

In the ANA3 analysis we extracted the relative frequency of words from tweets related to resilience and recovery in general with reference neither to small areas nor to villages in red zone.

Figure 11 displays the word clouds of the corpus formed by the negative and positive unigrams in the ANA3 dataset. In this case one word was present both in negative and in positive tweets: "vaccino" ["vaccine"]. The vaccination campaign started in Italy in January 2021, more or less in the middle of the considered period. The presence of this word in the two groups reveals how this word was considered important by both pessimistic and optimistic people. We found some examples like "il vaccino ci salverà" ["the vaccine will save us all"] and "il vaccino non risolverà i nostri problemi" ["the vaccine won't solve our problems"] in the positive and in the negative tweets, respectively, in any case revealing how the vaccine was a strongly debated topic all over the corpus.

Sentiment analysis was again in favor of positive tweets as almost 60% of the tweets were positive (Figure 12).

Figure 9 – "Political imposition": the two most important topics for the ANA2 corpus. Areas of the circles are proportional to the word frequencies in the topics
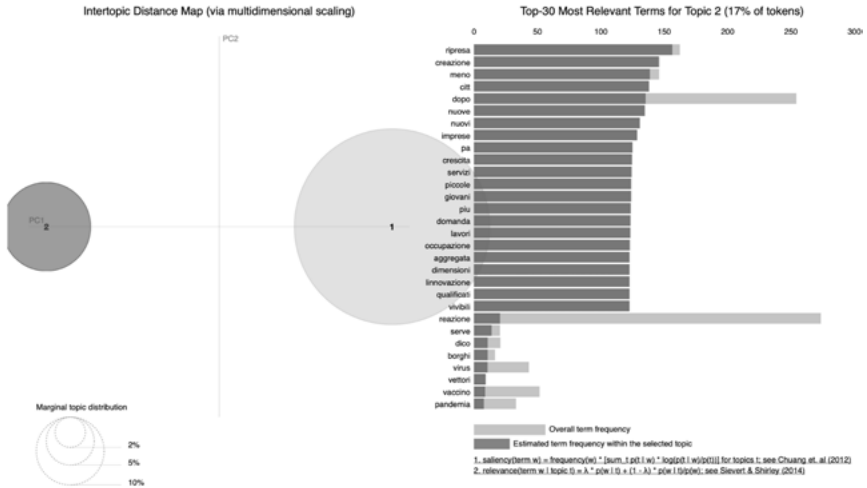
Figure 10 – Distribution of topics in the ANA2 corpus

Figure 11 – Word clouds from the ANA3 corpus

(a) Negative tweets (b) Positive tweets

Coherence analysis this time led us to choose three topics which, according to the most frequent words in them, we labeled "Suggestions for recovery" as in the ANA2 corpus, "Take action", and "Uncertainty for the future".

In Figure 13 the inter-topic distance map of the two topics is showed together with the most frequent words in the topic "Take action". In Figure 14 the distributions of tweets in these three topics is showed. "Take action" is the minority topic, whereas the "Suggestions for recovery" is the most frequent.

4.3. ANA4 analysis

The identification of the true geographic location where tweets are launched is one of the challenging tasks for researchers aiming at retrieving location space information, as the tweet location information fields, namely "user location" and "place name", are not reliable for many reasons, among which the following three are the most important: 1) they are set when the account has been opened and most probably they do not correspond to the true locations where the tweets have been launched; 2) users can give fake addresses on purpose; 3) users can give any other information not related to location (Kumar, Singh, 2019; Liu *et al*., 2020). It is possible to process the text string contained in these fields with machine learning tools (for example, see Indira *et al*., 2019), but still results on inferring the true tweet location applying this methodology are controversial.

Figure 12 – Polarity of non-neutral tweets in the ANA3 analysis

Positive
59.9%

Negative
40.1%
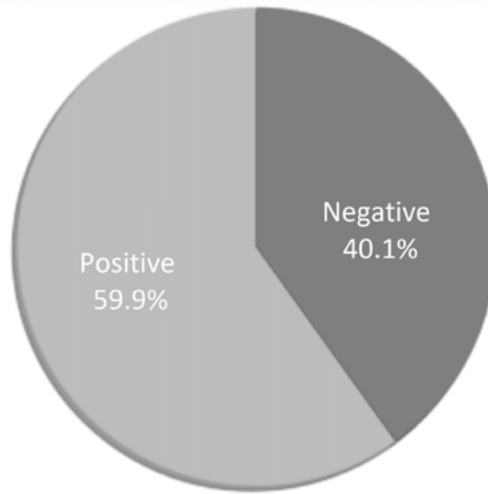
Source: authors' computations

Figure 13 – "Take action": the two most important topics for the ANA3 corpus. Areas of the circles are proportional to the word frequencies in the topics
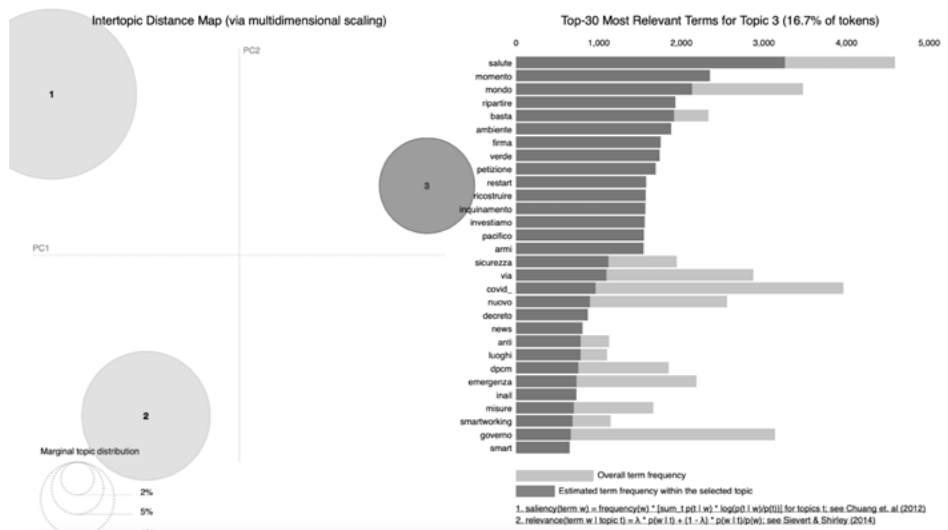
Source: authors' computations

Figure 14 – Distribution of topics in the ANA3 corpus
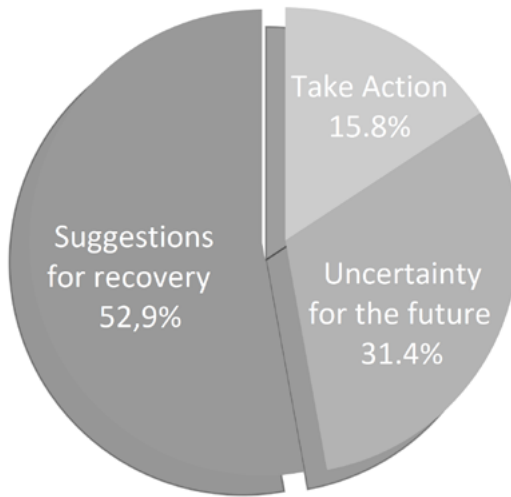
Source: authors' computations

The tweet field really trustable is only the "geo" field because it is filled with the geographical coordinates taken from the device used for tweeting.

Unfortunately, in our case, among the total 38,072 collected tweets we were able to retrieve information about true geotagging on only 74 tweets (rate: 0.2%). This low rate is in line with the most recent outcomes from the literature on social network analysis. For example, in a cross-country analysis about the use of geo-services and geotagging on Twitter, Sloan and Morgan (2015) found that only around 3% of the tweeters enables Tweets to geotag their tweets. However, Sloan and Morgan's work dates back to 2015 and since then Twitter have deeply reduced the possibility to geotag tweets. In particular, in a 2019 tweet, Twitter announced that they were reducing the geotagging option (Figure 15). As a result, the rate of geotagging tweets must have reduced further as a consequence of this decision.

Out of these 74 tweets, 32 were from Northern Italy regions (i.e., regions north the Apennine mountains, Liguria included) and 42 from Center-Southern Italy regions (rest of regions). Moreover, 30 were from rural areas, and 44 from urban areas if we consider as urban areas those corresponding to provincial capitals.

We performed a "manual" sentiment analysis by reading the tweets' texts. We also manually extracted the most important topics and the most common way to show disappointment, negativity and mistrust in the way problems are faced on one side, and, on the other side, trust, positivity and confidence.

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Figure 15 – Twitter support tweets on reducing geotagging

Table 3 summarizes our manual analysis for the two variables "Area type" and "Geography".

Polarity seems more positive in rural areas rather than in urban areas (53.6% positive tweets in rural areas vs. 41% in urban areas), whereas geography does not seem to be decisively discriminant for a positive attitude (46.7% positive tweets in the North against 45.9% in the Center-South).

As for the topic analysis, positive messages in rural tweets are more in the sense of an economic outlook based on resilience and proacting (especially with reference to some economic categories to rely on: "We want to be part of these numbers or better react by relying on professionals who do not make companies fail", referring to unemployment dramatic numbers at the time). Negative outlook in rural tweets come mainly from no-vax, no-green pass categories of tweeters, right-wing oriented ("The left seriously harms health, produces poverty. They say data on millions in poverty and absolute hunger… thousands of unemployed…companies… bankrupt… despair… divorces…. suicides… barbarians didn't do that", referring to the left-wing government at the time"). Tweets from urban areas were more neutral (probably because of some local news media reporting about COVID-19); positive tweet were focused in trusting the government ("only taxes would attract huge investments from abroad, would favor growth zero unemployment, debt reduction; the only political way is an adequate preparation") and recovery funds from the European Union and the government ("pills on government trust – recovery fund and Conte… no need of a task force; EU OK!... loans to Italy… USA requests for unemployment benefits"). Negative tweets from urban areas were

Table 3 – ANA 4 results on area type and geography

Variable	Category	Sentiment	Percentage	Percentage (only positive and negative)
Area type	Urban	Positive	36.4%	41.0%
		Negative	52.3%	59.0%
		Neutral	11.3%	
	Rural	Positive	50.0%	53.6%
		Negative	43.3%	46.4%
		Neutral	6.7%	
Geography	North	Positive	43.8%	46.7%
		Negative	50.0%	53.3%
		Neutral	6.2%	
	Center-South	Positive	40.5%	45.9%
		Negative	47.6%	54.1%
		Neutral	11.9%	

Source: authors' computation

more about inadequate school closures, conspiracy theories and a more general discussion about reasons causing the pandemic ("delay payments and repayments perpetually overlapping one another…. The big secret…. modern capitalist regime values finance ethics… debt…. capitalism crisis").

As for geography, difference are minimal and focused on economic arguments, more on development and recovery in the North and more on unemployment worries in the Center-South ("financial sector in a 'red place'; business development largely affected by the rest of the market; news related to circulation; banks, finance and insurance helping recovery…"; "'Unimpresa', Confindustria newspaper raises the alarm about loss of thousands of jobs; tourism sector highly affected…increase in unemployed people…"; "Recovery in the hands of artisans and retail sectors…").

5. Conclusions

Our analysis shows that the biggest concerns are expressed when it comes to areas affected by tight lockdowns. When the discussion becomes broader, embracing the whole country and without reference to the small areas placed in the red zone, the attitude is more positive. From the topic analysis it turns out that some tweets are against the government taking such drastic measures; they concern problems related to the national health service and more generally there are references to uncertainty in the future and the need to take urgent action to

put an end to the problems generated from the pandemic. In the georeferenced analysis a positive attitude is more spread in rural areas and slightly more in the North than in the Center-South. In the future a more semantic-based textual analysis will be implemented to better capture people's real feeling.

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Come va la vita in paese? Resilienza economica e reazione durante i *lockdown* pandemici

Sommario

Sebbene le pandemie rappresentino un problema ricorrente nella storia, la pandemia di COVID-19 ha alcune caratteristiche mai viste prima. L'essere umano è sopravvissuto a guerre, catastrofi naturali e shock economici, dimostrando sempre resilienza nell'adattarsi a nuove situazioni. In questo lavoro vogliamo verificare se questo atteggiamento è ancora forte. La nostra domanda di ricerca è: come reagiamo alle situazioni emergenziali? In questo articolo cerchiamo di rispondere a questa domanda analizzando un database di messaggi Twitter raccolti durante la seconda e la terza ondata di COVID-19 in Italia riguardanti la vita quotidiana durante i rigidi lockdown e le opinioni su queste situazioni. Le piccole città e i paesi sono il nostro punto di partenza, interrogando dapprima le reazioni della popolazione nel periodo di forte restrizione e secondariamente osservando le risposte ai cambiamenti sociali ed economici senza particolare riferimento al periodo di lockdown; sposteremo poi la lente sul territorio italiano a livello macro indagando i comportamenti di resilienza, ed infine daremo uno sguardo alle aree di nord, centro e sud grazie alla geo-localizzazione dei messaggi Twitter.

Urban Development in Rome: Illegal Housing Expansion, Inequalities and Governance

Keti Lelo*, Gianluca Risi°

Abstract

The aim of this essay is to trace the red thread linking the physical urban dimension of the city of Rome – heavily influenced by the phenomenon of abusiveness – with the economic and social aspects, highlighting the structural inequalities that its citizens experience and how these have been exacerbated in recent times and with the current pandemic crisis. Having initially underlined the importance and the implications of intra-urban inequalities in today's society, in the final part we will try to examine and reflect upon the effectiveness of the various policies implemented.

1. Introduction

In the last decades, the major Italian metropolitan cities have been affected by a process of depopulation of the central areas and the progressive increase of inhabitants in the peripheries and in the hinterland's towns. Recent urban expansion is not related to the demographic pressure, as it happened after World War II, but depend on processes of spatial reorganization involving the economic activities, which tend to spread through space, and services – many of which are linked to tourism – which continue to concentrate in city centres.

The marginal conditions of many neighborhoods no longer refer to the traditional center-periphery paradigm but are now related to accessibility conditions, presence of services, and mostly, to the capacity of the territories to contrast phenomenon such as urban segregation, physical degradation and territorial inequalities. In this scenario, the quality of the urban space resulting from processes of physical and social fragmentation, mostly located urban fringe areas, is the expression of complex factors ascribable to different matrices. Then, it goes

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without saying that defining and analyzing the forms of disparities in these contexts is a very demanding task that can an only be effectively described through the integration of different information levels. Traditional criteria of classification such as shape and density, spatial continuity, concentration and specialization of functions, should be considered jointly with criteria that take into account social and economic conditions such as poverty, access to services and functions for the socially vulnerable groups, housing market dynamics, but also issues of identity and bounding of social ties.

The city of Rome, at the center of this work, represents a privileged case study because the territorial dynamics occurred in the last decades can be considered as representative of global tendencies and, at the same time, bearers of original elements, strongly connected to the history of the territory. We will try to analyze the different forms of socio-economic inequalities in an objective way, through a critical study of data and indicators – an attempt that has had to deal with many problems and difficulties. Raw material of digital economy, data are also the main resource for the organization of services, spaces, and urban policies. In fact, for decades in many European cities have existed public offices dedicated to the collection and processing of up-to-date data and reports on all issues of citizen policy, from economic development to health, including environment and housing.

Nothing similar happens in Rome, where often data are missing, those available are not public, those that are public are not adequate and divided between bodies with different competencies that do not communicate with each other. The absence of public data, the lack of sharing and collaboration between these institutions, the deficiency in data processing and a poor culture of the latter make Rome – far from being a smart city – a challenging city to govern, seemingly impossible to know and, ultimately, hard to live.

The chapter develops as follows. In section 2, we put forward the theoretical ground of our analysis, Sections 3 and 4 present Rome's growth and its urban development. Section 5 discusses the urban policies addressing the problem of illegal housing expansion, and section 6 concludes.

2. The Theoretical Framework

Intra-urban disparities are becoming an increasingly important topic in regional sciences and economics. This is due to several reasons, as we will try to figure in the following.

Firstly, the world is in constant transformation; this is especially true nowadays since civil society and global movements have enlightened the climate change issue and the global leaders are expected to take crucial decisions in order

to change the current modes of production and growth direction. This transformation will also affect cities, where trade, production, workforce's structure and other main economic variables are going to evolve towards a more sustainable path. In this perspective, new changes bring new inequalities and, in addition, exacerbate the old ones. For this purpose, we need to be well conscious about the socio-economic inequalities that are impacting cities today; it must be done both to decrease the disparities in the present and to equally distribute the benefits of the incoming transformations. In other words, the implementation of a more sustainable way of life should not be achieved based on enlarged inequalities; so, measuring the impact on disparities carried out by the "green" policies becomes extremely crucial (Souche *et al*., 2016).

In second place, the so-called "information economy" (Porat, Rogers-Rubin, 1977) is mostly urban based, and it has disseminated different levels of inequalities among urban populations. These disparities are related to income gaps, social and ethnic ghettoization processes, and a new role of the "big city" in the metropolitan area. Scholars (Ninjman, Wei, 2020) argue that putting the focus on the urban spatial dimensions is fundamental to understand the actual disparity trends – especially intra-urban ones but also on large scales.

Indeed, the current inequality debate should be focused on urban studies; we must not forget that the urbanization process is proceeding rapidly worldwide, and urban issues are increasingly mixed with social and economic issues (Brenner, Schmid, 2014; Wang *et al*. 2012). In particular, Scott (2017) coined the expression "third wave" to refer to this urbanization process of the whole global economy, driven by new modes of production.

Lastly, we assess that this revolution brings with it new and growing disparities across different indicators. Current urban inequalities are certainly crucial to deeply understand the global urbanization process, and they are being pushed forward through three ways: larger differences within the working class and growing income disparities, more inter-urban inequalities and a "revival of central cities and urban centers that have become increasingly exclusionary, along with increased 'sorting' and inequalities between different suburban areas" (Nijman, 2015).

In a nutshell, this urbanization process driven by the information economy is being extremely uneven. Disparities are enlarging between different cities and within the cities themselves. Even when there are economic growth processes, the related benefits are not equally distributed, neither among citizens nor urban areas.

What are, therefore, the consequences and the implications of these growing inequalities within the cities? It is a matter of course that there are many, but in this work we will specifically focus on the relationship between inequalities and well-being, trying to find out in which way the quality of life is affected by the urban asymmetries and how they can influence aspects of life such as civic participation,

interpersonal interactions and active involvement in the public space, with a specific reference to the city of Rome (Lelo *et al.*, 2019). In fact, evidence shows that where common assets and relationships lack, the latter aspects are missing, and this is especially true for peripheral areas (Burkhalter, Castells, 2009). Scholars assess that if the urban governance can operate in multifaceted social and political environments, the opportunity to exploit the benefits of the territorial common assets is solid. Moreover, the attractiveness of the "urban milieu" – in terms of the capacity to produce "socialized" human capital – plays a key role to determine urban quality, along with more classic features like local labour, market dynamics and urban planning (Camagni, 1999). The location of the area considered is not a secondary factor; indeed, the quality of urban areas is strongly correlated with their centrality. Of course, this has severe implications in terms of policies: if the city government does not properly address these issues, the consequences will result in increased inequality and polarization and, ultimately, in deep territorial segmentation.

In this regard, what is the current framework of the city of Rome? What did the policies do in the past and what is desirable for the future?

3. Rome's Growth Model in the Last Decades

In the past decades, local public policies in Rome have failed to effectively manage the growing levels of inequality. Different demographic, social and economic indicators clearly illustrate the socioeconomic divide and appear geographically concentrated and sensitive to the distance from the city centre (Lelo *et al.*, 2021).

The 1990s began with a crisis of public administration, public investment and public spending, traditional engines of growth of the city. To contrast the negative trend, from 1993 to 2008 the left-wing administrations stimulated a process of structural change oriented toward the knowledge-based economy (KBE) – finance, advanced services, R&D -, culture and mass tourism, labelled as "Roman model" (Modello Roma) (McNeill, 2001; De Muro *et al.*, 2011). The roman KBE can be legible in economic terms as a prevailing post-Fordist feature (Jessop, 1994; Moulaert *et al.*, 1988; Moulaert, Swyngedouw, 1989) characterizing the most advanced World economies (Jessop, 2000; Martinelli *et al.*, 2011); politically, it was rooted in the social movements of the 1970s, which were able to produce in the following two decades cultural and political changes involving different economic and social actors (Di Feliciantonio, 2016).

Over the last thirty years the Roman model has triggered important achievements towards social innovation and democratic processes, such as the dialogue with the social movements, the participatory budget, the recognition of political rights to migrants and the decentralization of power from the city council to the municipalities. The economic response was positive in terms of GDP growth,

per capita income, tourist inflows, and international openness, until the advent of the global economic crisis (Molina, 2007; Di Franco, 2008). Yet, its neoliberal features failed to effectively address the polarization between central districts and peripheries, the inequalities and biases that characterise various sectors of the economy (D'Albergo, Moini, 2013). A new poor stratum has emerged, due to increased costs of living and booming of the housing prices, while acute forms of social exclusion have affected low income and unskilled slices of population, wheeling the increase of socio-spatial inequalities (Lelo *et al.*, 2021).

The centre-periphery divide in Rome is further accentuated by the uninterrupted process of building expansion that has pushed the extremities of the city up to and beyond the municipal boundary, generating new low-density settlements that often take on the character of sprawl and rely exclusively on private transportation (Di Zio *et al.*, 2010; Munafò *et al.*, 2010; Salvati, Morelli 2014; Salvati, 2015). This new urban development was driven by the dynamics of land rent and by the housing bubble, without reflecting real population growth, which remains stable at around 2.8 million inhabitants since the 1980s (Mudu, 2014), and – a typical characteristic of Rome – without following the guidelines of the urban plan (Lelo, 2015; Cellamare, 2014). In recent years centrally-located housing have become increasingly expensive, and are often targeted to a growing tourist market, or dedicated to luxury rentals, so that the city centre has undergone a generalized process of gentrification (Herzfeld, 2009). In contrast, the weakest social groups – young couples, temporary workers, immigrants, separated and divorced individuals – move where affordable homes are located: in the outermost neighbourhoods beyond the GRA (Rome's ring road). These neighbourhoods are physically isolated, often surrounded by agricultural land or by "junkspace", and far from public services, institutional structures, and workplaces, except for large shopping centres, which have arisen near or beyond the GRA in recent years.

These dynamics have marked the end of the suburb's "red belt" where the former Communist Party was hegemonic (Tocci, 2020). Since the 2000s, the centre-left parties and candidates are prevailing in elections in central areas and in the historical periphery, while the centre-right, and recently the new populist Five Star Movement (M5S), are receiving great support in the suburbs (Tomassi, 2013). Actually, the municipalities into which Rome is divided, endowed with few powers, do not seem able to address the complexity of the problems facing the city using effective forms of territorial cooperation and of polycentrism.

4. Urban Development, Illegal Housing Expansion and Inequality

The urban development of the city of Rome has taken place coherently from the years of the Unification of Italy until the recent days (Insolera, 1971). Except

for the efforts of the Nathan councils of the early twentieth century (visionary, for the time) and the so-called "red" councils (1976-85) – with public attempts at urban planning through instruments such as the Social Housing Plans (Piani per l'edilizia popolare, "PEEP") – contemporary Rome is the result of a fundamentally classist urban planning project, which scientifically divides the central parts of the city from its suburbs and, through spatial separation, the different social classes (Della Seta P., Della Seta R., 1988). This is not a new fact, and indeed it can be found in most of the greatest metropolises of the countries with advanced capitalism; what turns out to be a peculiar Roman trait is that the material mean of this separation was the phenomenon of abusiveness. In general, abusiveness is the product of the occurrence of two phenomena: on the one hand, the lack of a clear and far-sighted planning linked to the development of the territory, on the other, a policy of social housing lacking or in any case not sufficient to the needs of the population. According to its historical development, we can say that the Roman abusiveness is the result of the partial realization of both these processes. Therefore, today's Rome is the plastic result of this historical process: a fragmented city, two-dimensionally separated at a spatial level and profoundly unequal.

The interesting aspect that this work aims to underline is precisely the structural link between the spatial dimension and the "peripheral condition of life" (Caudo, Coppola, 2006). The fragmented urbanism of Rome has led a large part of the inhabitants to be effectively excluded, for lack of means and resources, from active and complete participation in the social and economic life of the city. Since the abusiveness has historically played a major role in Roman urban development, its distribution today accurately captures the spatial division inside the city (Figure 1). Looking at the maps we can notice a general presence of unauthorized areas all around the road ring (the so-called "G.R.A.") and in the suburbs of the Roman metropolitan area, with the partial exclusive of the north-east and south-west. In particular, the areas with the greatest incidence are concentrated in the east, mostly in the VI municipality (San Vittorino), in the south, in the VII municipality (Gregna) towards the sea, in the X municipality (Infernetto), and in the area to the north-west, in municipalities XIV and XV (Santa Maria di Galeria, Santa Cornelia, Prima Porta) Infernetto, San Vittorino, Tor Fiscale, Santa Maria della Pietà and Massimina.

Thanks to the work of Mapparoma (www.mapparoma.info), we can observe that, in a tendential line, abusive distribution in the city of Rome also corresponds to a social and economic marginalization. Indeed, in peripheral areas (which are also those in which abusive practices are most concentrated) we find the lowest socio-economic indicators of the quality of life, such as the percentage of graduates, the unemployment rate, the proportion of the family with potential economic hardship and the index of social hardship (Figure 2). Moreover – very explanatory

Figure 1 – Spatial distribution and population of informal settlements, 1978-2011
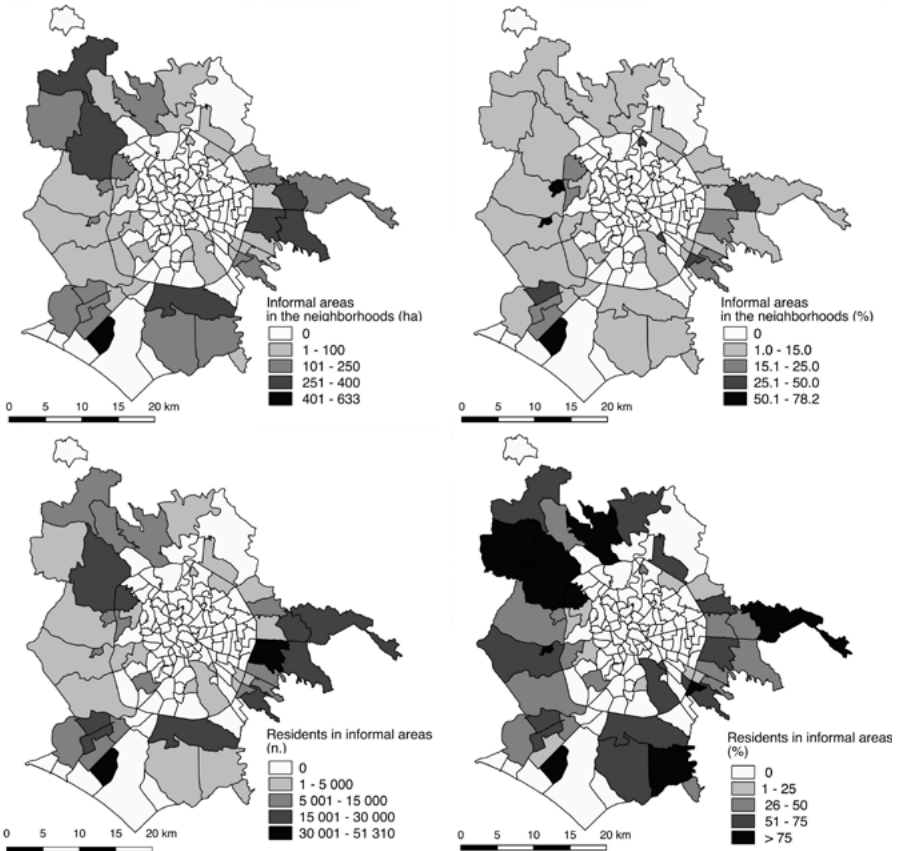
Source: authors processing based on Roma Capitale data

and interesting data – in these areas the electoral preferences speak for themselves: in the European elections of 2019 the urban areas with the highest abusive density voted much more the right-wing parties than those of the left (Figures 3), going against the historical Roman trend for which the poorer and excluded working-class suburbs have always voted massively left forces (Figure 4).

In this complex situation the advent of COVID-19 pandemic and the related sanitary and economic crisis, has accentuated existing dynamics – the desertification of the historic center, the crisis in some areas of neighboring trade, the housing emergency... – contributing to the increasing inequalities, and the emerging of new needs that policy has proved unprepared to address. There

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Figure 2 – Quality of life indicators, 2011
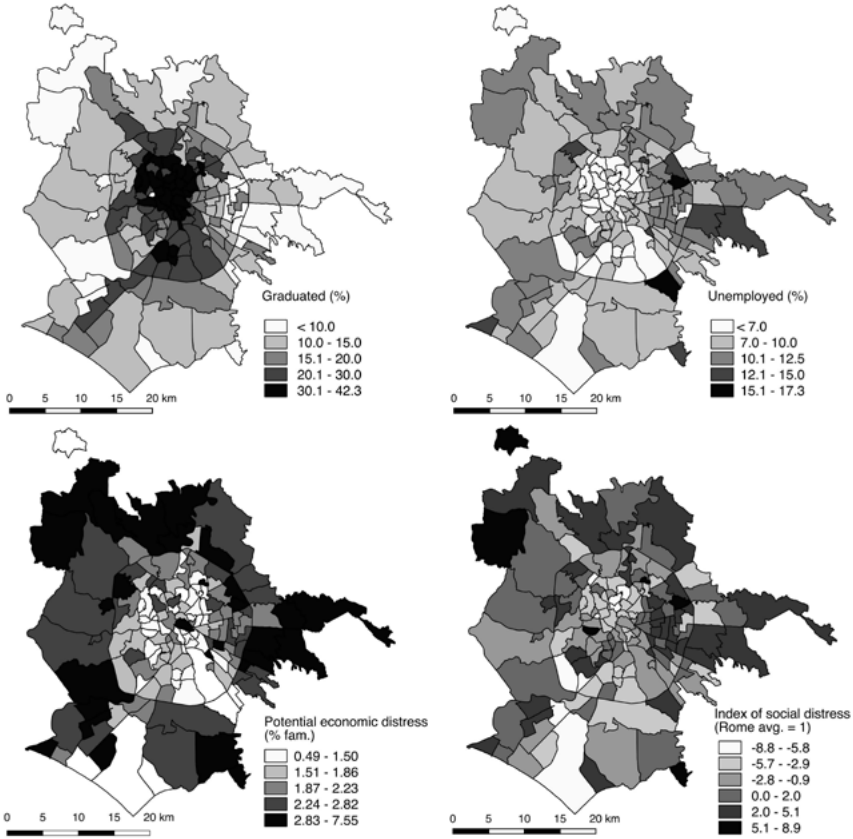
can be a vicious circle between poverty and health: poverty, generating health problems, feeds itself. In Rome, mortality rates are significantly higher in the municipalities of the eastern quadrant. This same area has the lowest per capita income and educational attainment of the entire city. According to some estimates, chronic disorders such as diabetes, obesity and cardiovascular disease are more persistent in poor and disadvantaged urban areas, where they affect residents many years earlier than the average population. It is now established that the mortality rate due to COVID-19 is considerably higher in the presence of health problems such as those listed above. Those segments of the population living in conditions of physical and social marginality would therefore be more likely to contract chronic diseases and, as a result, be at greater risk of becoming

Figure 3 – European election preferences, 2019

Votes for the PD Democratic Party (%)
- 13.0 - 20.0
- 20.1 - 25.0
- 25.1 - 30.0
- 30.1 - 35.0
- 35.1 - 50.0

0 5 10 15 20 km

Votes for Lega (%)
- 13.3 - 20.0
- 20.1 - 25.0
- 25.1 - 30.0
- 30.1 - 35.0
- 35.1 - 42.0

0 5 10 15 20 km

Votes for M5S (%)
- 5.8 - 10.0
- 10.1 - 15.0
- 15.1 - 20.0
- 20.1 - 25.0
- 25.1 - 28.0

0 5 10 15 20 km

Votes for Forza Italia (%)
- 3.0 - 5.0
- 5.0 - 7.0
- 7.1 - 9.0
- 9.1 - 12.0
- 12.1 - 16.3

0 5 10 15 20 km
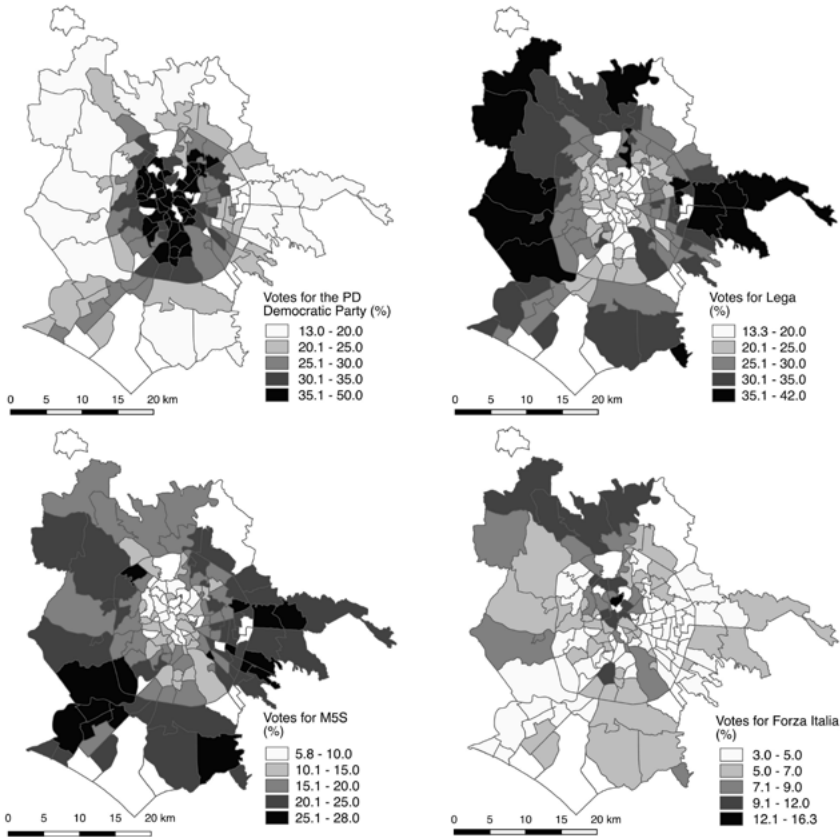
Source: authors processing based on Roma Capitale data

victims of the virus. The worst environmental conditions in which they live and the type of work they do contribute to increasing health risks in the most disadvantaged groups. For instance, just think of Parisian banlieue as Saint Denis, with a mortality rate for COVID-19 among the highest in France, where they live clustered in huge apartment buildings of the seventies thousands of people commuting with Paris, performing mostly humble but fundamental jobs for the capital especially in this period: the cashier of the supermarket, the bellboy, the garbage man. In Rome, among the most affected by the total number of infections is the Tor Bella Monaca district located in the eastern quadrant, with a strong presence of social housing of the eighties, known for being among the most physically degraded, socially disadvantaged and insecure neighborhoods

Figure 4 – Results of parliamentary elections in the Roman working-class suburbs, 1953 and 1958

	Flezioni politiche 7-6-'53 Sinistre			Elezioni politiche 25-5-'58 Sinistre		
	PCI	(PCI + PSI)	DC	PCI	(PCI + PSI)	DC
Acilia	37,5	50,3	22,1	33,7	48,6	25,7
Forte Aurelio				32,1	47	34,4
Gordiani	55,9	63	15,4	55,2	72,7	14,6
Laurentina	40,9	50,8	34	31,4	44,3	30,9
Magliana	43,2	54,6	22,2	45,5	58	25,2
Pietralata	43	54,6	22,2	46,3	62,4	22,1
Portonaccio	39,1	49,6	23	35,3	51	25
Primavalle	47,6	56,9	20,5	42,6	56,4	21,7
Quadraro	36,6	48,6	22,8	34,4	50,8	24,4
Quarticciolo	43,5	55,4	20,6	48,1	62,8	18,7
San Basilio	46,9	53,5	26,3	46,3	57	24,4
Tiburtino III	49,3	60	18,3	49,4	63,7	18,8
Torpignattara				35	50,5	29,5
Maranella	36,3	46,5	27,6	33,8	50,1	28
Trullo	37,3	47,6	25,2	39,3	56,9	25
Val Melaina	41,3	51,9	23,3	32,2	44,7	28,7
Valle Aurelia	50,5	57,5	24,5	61,2	71,5	18,1
Villa Certosa	42,1	52,4	21,3	45,1	60,1	22,7
Villa Gordiani				45,7	59,9	21,8
RISULTATI GENERALI PER TUTTA LA CITTA':	23,5	32	33	22,1	34,6	32,5

Source: Berlinguer, Della Seta, 1976

of the capital. Then, there are – like in all the big cities – the very poor, those who do not have a home and live on the street or in illegally occupied buildings, and then temporary settlements such as gipsy and refugee camps, where it is extremely difficult to ensure adequate hygienic conditions and where the possibility of social distancing is precluded. If it is true that COVID-19 can affect everyone, its lethality can depend very much on social differences. With regard to the territories, it can be said that the most disadvantaged areas offer fewer guarantees in case of spread of the infection, exposing the poorest population groups to greater health risks induced by the pandemic. This is not to say that the wealthiest are protected from risk; rather than, after the initial outbreaks, often in affluent territories, those in worse economic conditions have fewer opportunities to successfully cope with the disease and can more easily become a vector for the multiplication of the contagion.

As we can see from the map shown in figure 5, in fact, on April 8, 2021 the most affected urban areas are those in the eastern quadrant of the city (historical direction of the Roman expansion towards the Agro) in particular the areas of Grottarossa west with 979 per 10 thousand inhabitants, followed by Gregna 843, Omo 818 and Appia Antica nord 799. They all follow suburbs of the eastern quadrant: Giardinetti-Tor Vergata, Barcaccia, S. Alessandro, etc. There is therefore a certain prevalence of cases in the suburbs around and especially outside

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Figure 5 – COVID-19 incidence in the neighborhoods of Rome, 8 april 2021
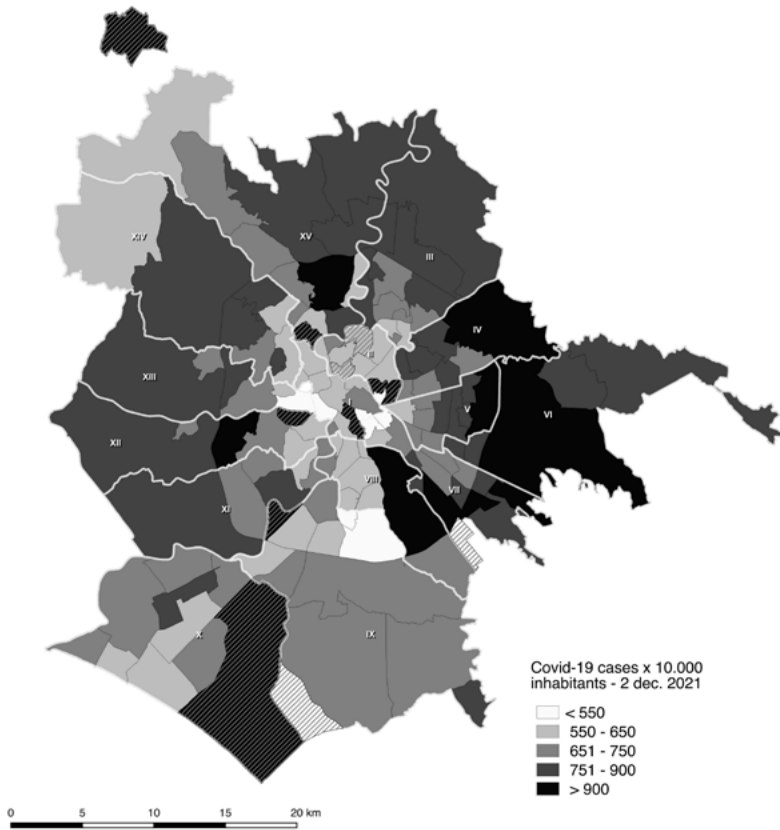
Source: authors processing based on Roma Capitale data

the GRA where residents grow, socio-economic hardship is greater, the average age is lower and families are more numerous.

This happens mainly due to four reasons, namely the socio-economic factors that are most related to the spread of infections. The first is the average age of residents, with a negative inclination to indicate a lower probability of infection among older Romans (correlation coefficient equal to -0.51 and R framework 0.26), less present in the suburbs outside the GRA, even if for them the disease is more dangerous. The second is the proportion of graduates in the population, always with a negative inclination because education is also higher in the central districts than in the peripheral ones (correlation coefficient equal to -0.50 and R framework 0.25). The other two reasons concern the type of professional: with

positive inclination the share of employees in the trade on the population, both because at greater risk of contagion not being able to use the agile work and having to move often with public transport, both because more concentrated in the peripheral areas; with a negative inclination the share of school or university workers, because on the contrary more concentrated in the semi-central areas (correlation coefficients respectively equal to 0.52 and -0.49 and R respectively 0.27 and 0.24).

5. Urban Policies As a Response to Illegal Housing Expansion

As stated above, abusiveness is a constant phenomenon in Rome's urban expansion. Nowadays, it no longer responds to the mere housing necessity, nor only affects the socially disadvantaged classes, but constitutes "a real system of construction of the city" (Cellamare, 2013). This is even more true from an historical point of view; more than a third of the built city, derives from illegal activities and still more than a third of the population resides in areas that were originally abusive. Abusiveness is therefore an important social phenomenon that influences the socio-economic structure of the city.

In today's Rome coexist several dynamics that are intertwined and that are the basis of the phenomenon of abusiveness. On the one hand, the lack of incisiveness of the Roman spatial planning, on the other, an uncontrolled neoliberalism pushing towards processes of self-building the city by citizens, in an atmosphere of laissez-faire tolerated by an audience that, devoid of any kind of project or political design of development, is limited to act as an intermediary between the different subjects.

Current abusiveness results from the stratification of several previous waves, dating back to the birth of the phenomenon towards the end of the nineteenth century, passing through a post-war explosion. The reasons for its genesis are essentially three: the strong increase in housing demand; the inability of the institution to give answers and govern the phenomenon; abusive allotment and, in general, speculative activity of landowners.

The phenomenon has been progressively transformed with respect to its origins, passing also for three building condones (L.47/1985, L.724/1994, L.326/2003) which have in fact strengthened and legitimized the already present mechanism of implicit acceptance of abusive practice by the competent institutions.

In the second post-war, public policy has attempted to seriously contrast the phenomenon of abusiveness through the activity of INA-Casa (The National Institute of Public Housing) that, as part of the so-called Fanfani Plan ("Piano Fanfani") has realized in Rome numerous social neighborhoods between 1949 and 1963. At the municipal level, the first impressive measure, both in economic

and physical terms, was achieved with the approval of the First Peep (Plan for economic and social housing), dating February 1964. This measure was developed during the drafting of the first post- war urban General Development Plan (PRG 1962-65) and envisaged 73 zone plans. As part of the I PEEP were built, mostly during the '70s and '80s, 48 huge new complexes of social housing in peripheral areas, that include some well-known ones, such as Laurentino 38, Casilino 23, Vigne Nuove and Corviale. This plan sanctioned, on a material level, the class separation mentioned above: it effectively renounced any project of social and urban integration of the agglomerations that had been built in areas separated from the center and Indeed, precisely in those areas already heavily invaded by abusive of all kinds gave rise to new settlements of low quality and very not enjoyable from the point of view of housing and life, among the worst that Rome saw since the post-war period.

The PRG of 1962-65 represented an attempt by the public administration to govern the spread of abusiveness by trying to bring it back into legal public management. The plan delimits the first abusive areas, marked as "F1-urban renovation areas – partially built-up areas". These areas have undergone profound transformations and are now an integral part of the consolidated city. But these interventions did not interrupt illegal building activities taking place in peripheral areas. The "Variante" to the PRG adopted in 1978 and approved definitively in 1988 delimited new perimeters of abusive areas marked as "Zones O-urban recovery areas". Since then, a complex process of recovery plans and interventions is still going on. A further "Variante" to the PRG adopted in 1997, the so-called "plan of certainties" ("piano delle certezze") located on the map other abusive areas, called "toponimi", whose perimeter was drawn indicatively for the first time in the PRG of 2008, but the final projects and definitive dimensions of interventions are still waiting to be accomplished.

It is interesting to look at the composition of these areas. First, the three categories mentioned above (Zone F1; Zone O; toponimi) have different extensions (Cellamare, 2013): compared to a total of 123km² of areas of illegal origin, the toponimi occupy "only" 18km², while the Zones F1 (those of older abusive and now belong to the consolidated city) 48km² and Zones O 57km². As for the type of soil, most of these areas have an urban fabric; in fact, out of the total urban areas in Rome, 37% of them are of illegal origin. Moreover, compared to this percentage, we see that only 6% of "artificialized" areas not corresponding to urban tissues are of "abusive origin". A phenomenon that therefore has an important impact on the urban dimension of the city. Finally, it is important to make an analysis of the population; in Rome in 2001 it appears that as many as 41% of the entire city population resides within areas of illegal origin (corresponding to 946,195 inhabitants). Of this 41% we note that 25% belongs only to

F1 Zones – as it is logical – or to that part of the illegal city that is now part of the consolidated city. The data on population density insists in this direction: the density of Zones F1 is in fact the highest, with 19,616 ab/km², against the 6,821 of Zones O (10%) and the 4,648 of the place names.

In addition to their size and composition, it is essential to understand the quality of life in areas of abusive origin and to what extent their urban history affects the social relationships and lives of the people living in them. An example is that of the places of socialization (often connected with the presence of green spaces) that most often are absent. The lack of public spaces inside the inhabited nucleus means that these areas could hardly become proper "neighbourhoods".

The situation is rather different as regards the older areas of illegal origin. In such cases, in fact, a process, although partial, of social integration with the rest of the city has taken place and is being consolidated over time. The F1 areas, in addition to being the oldest, are also the closest to the historic center of the city. These neighbourhoods are still characterized by a spirit of collective life and solidarity typical of the first forms of abusiveness, and thus recreate the living conditions similar to those of a small country. On the other hand, the Zones O, where the recovery interventions have concentrated mostly on the margins of the inhabited nucleus due to the lack of spaces, often remain physically and socially isolated.

In general, we could say that the abusive origin of the areas leaves traces not only for what concerns the social life but also in the spatial organization. Often these areas seem to be parts of the city lacking something, indelibly marked by the "modus" of their origin, bearers therefore of a structural backwardness, difficult to recover in itinere.

The attempts of the municipal administration to govern and manage abusiveness, continue with the new PRG for the city, dating back to 2008. After more than forty years, the city of Rome finally received new rules to regulate its development, whose cardinal principles are the metropolitan horizon, the defense of the environment and the historical and cultural heritage, decentralization and polycentrism, investment in iron, adding new services and increasing urban functions in the suburbs.

Despite these achievements and advances in terms of planning the development of the city, there were important contradictions that according to some have undermined the very foundations of the plan. For example, the plan did not fully clarify the relationship between public and private. In the climate of neoliberal ideological offensive that dominated in those years, the safeguard variant was excessively planning, recalling the traditional public modalities and prerogatives that at that time were no longer considered so essential, emptying the public service in favor of a transfer of these prerogatives to private subjects. Thus,

was born the so-called "urban compensation": a part of the building forecasts removed from the safeguard variant were reintroduced but leaving, this time, to the private subject the freedom to choose a new urban territory on which to realize the prospects that could no longer be realized elsewhere.

Another contradiction is represented by the beginning, in parallel to what has been described above, of an extensive experimentation of "project" urban planning programs. This tendency, first strongly criticized by the Roman urban planning school, at that moment becomes a symbol of the "new" that advances, and is practiced systematically, canceling the preventive and generalized public planning, so much so that the expression of the "planning by doing" ("Verso il nuovo piano regolatore. Le città di Roma" – Comune di Roma, 1999).

Compared to the 1965 zoning plan, the last PRG cancels the expansive planning to the east of the city, based upon the so-called "Eastern Directional System" (SDO). The new plan builds upon the idea of "centrality", as defined officially: "University Centers, public management centers, exhibition spaces, centers with tourist, receptive and recreational functions. In the 18 urban and metropolitan centres – all far from the centre, all served by public transport on iron, all qualified by valuable functions – lives the polycentric organization of the city. A system that lays the foundations for the autonomous development of the future metropolitan municipalities and for the exploitation of existing local resources."[1]

The new plan therefore entrusts to these poles scattered around the city the definition of the urban structure of the millennium, based on the logic described above. The fact that emerges, however, in the reality that of all these centers only those built with planning and public intervention are really existing as planned and functional to the intended purpose, namely the two universities of Tor Vergata (east of Rome) and Roma Tre (in the south quadrant). Where the management was instead entrusted to large private subjects, they have come less than the intended purpose – emblematic in this sense the episode of the centrality of Bufalotta, destined to large tertiary structures and then became a residential center without any opposition from the municipality. The legacy of fifteen years of progressive councils, despite the very favourable initial conditions, is distressing. The most important promises seem to have been disregarded, and the long-awaited turnaround has not arrived, indeed. This administrative period left Rome with more than 70 million cubic meters of concrete: what Paolo Berdini called "the new urban sack of Rome" (Berdini, 2008).

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1. http://www.urbanistica.comune.roma.it/prg/prg-struttura/prg-struttura-descrittivi/prg-struttura-descrittivi-centralita.html.

6. Conclusions

Cities in economically advanced countries are facing a long and complex transition period, during which established urban models are undergoing radical changes. The frequent use of neologisms such as post-industrial, post-Fordist, post-modern reflects, through the reiteration of the same prefix, the difficulties in interpreting the new paradigms of urbanization.

In the last thirty years Rome has achieved significant milestones of economic growth, innovation, and social inclusion, nevertheless failing to rebalance historical inequalities and territorial polarizations which, in the aftermath of the pandemic crisis, result further exacerbated.

Sprawl and illegality have given to Rome the connotations of a functionally and socially disconnected city, causing the progressive loss of its green areas. Physical growth takes place in a context of demographic stalemate: a centrifugal urban explosion, bringing the population to settle in traditionally agricultural land, transformed into territories of the "diffused city" or "urbanized countryside". This phenomenon of expulsion is further accentuated by the tendency towards the dispersion of productive and tertiary activities, located in nodal positions with respect to the main axes of metropolitan viability.

This complex and ever-changing urban organism has produced dynamic areas and depressed areas, which do not necessarily respond to the usual center-periphery paradigm; there are areas located on the margins, where the historical socio-economic gap is decreasing despite the physical isolation and the structural lack of services, but there are as well central motionless areas that do not experience any real development despite their social characteristics and urban amenities. However, these "outliers" do not concern areas largely affected by illegal housing, or the huge social housing complexes often located close to each other, where conditions of severe socio-economic distress remain persistent.

To what extent the political and economic conjunctures of the last decades have influenced the irrational socio-economic geographies of Rome is a subject that deserves further attention. Rome is a complex urban system growing beyond its administrative boundaries, containing a multitude of cities, each one with a proper story. The re-emerging of inequalities raises numerous problems in terms of empirical interpretation, theoretical implications, and policy efficiency.

The administrative system struggles to keep up with the urban transformations. The current PRG is tackling on a municipal scale concerns that are typical of a metropolitan scale. But the attempt to selectively solve the problems by assigning "ordinary" planning tasks to the municipalities, despite their very limited administrative powers, prevents them from an effective management of territorial problems. Furthermore, the concept of "centrality" (local,

urban, or metropolitan), on which the PRG relies on to "implant the city effect" in the degraded and disadvantaged peripheries, has not yet shown its concrete effectiveness.

We can extend these arguments to a more general context. Indeed, many Southern-Europe cities experienced a huge urban sprawl in recent years and these changes carried out similar dynamics: for instance, the urban and economic development has spread through policies based on deregulation and informality. We have seen how much this is relevant in the case of Rome, but we can assess that it is a common feature shared by big cities in this macro-region as well. At the same time, at the basis of these expansions we find a set of many dynamics promoted by different local agents (each one with his peculiarity) among which stand out a critical non-compliance of land prices and zoning processes and massive speculative procedures – according to this, we underlined the huge role played by abusiveness in Rome.

As far as inequalities are concerned, the new knowledge-based economy – that affected big cities in last years – has permitted significant economic growth, on one hand, but it has encouraged processes of social exclusion and polarization within the same city, on the other, fostering a two-speed development between central healthy districts and peripheral deprived suburbs. The consequences are that a new poor sector has arisen in most of the world big cities, also affecting the middle class. In fact, fragile classes have poorly enjoyed the benefits of tertiary sector growth.

From the beginning of the 20th century, Emile Durkheim and other sociologists describe social solidarity and cohesion as collective processes supported by proximity and concentration. These spatial characters have the effect of mixing social and cultural hierarchies; that is the same effect created by the process of modernization. But in most of the cases, the roman peripheries have experienced modernization without true development, while social equilibrium continues to change and spatial inequalities keep growing, in absence of territorial policies capable of taking on them.

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Sviluppo urbano a Roma: tra abusivismo, disuguaglianze e governance

Sommario

L'ambizione di questo saggio è di rintracciare il filo rosso che lega la dimensione fisica urbana della città di Roma – pesantemente influenzata dal fenomeno dell'abusivismo – con quella economica e sociale, evidenziando con particolare enfasi le strutturali disuguaglianze che i suoi cittadini sperimentano e come queste si siano esacerbate nei tempi più recenti e con l'attuale crisi pandemica. Dopo aver inizialmente evidenziato l'importanza e le implicazioni delle disuguaglianze intra-urbane nella società di oggi, cercheremo, nella parte conclusiva, di esaminare l'efficacia delle varie policy implementate e di porre alcuni elementi di riflessione a tal proposito.

Part 2

Drivers of Regional Inequalities and Disparities

Uneven Growth Opportunities from Industry 4.0 across European Regions

Roberta Capello*, Camilla Lenzi*

Abstract

This work investigates conceptually and empirically the impact of the technological transformations enabled by Industry 4.0 on regional economic growth. The work claims that the adoption of the technologies underpinning these transformations positively affects regional growth but with differences across space, according to the degree of penetration of such technologies. In particular, it is interesting to measure whether such technologies exhibit increasing or decreasing returns to adoption. This work investigates these claims in an analysis on European NUTS2 regions in the period 2008-2017.

1. Introduction

A new technological revolution has been taking place in recent years based on the creation and large scale diffusion of technologies such as artificial intelligence, robotics, internet of things, 3D printing, smart sensors, just to name a few of them (Brynjolfsson, McAfee, 2014; McAfee, Brynjolfsson, 2017; Schwab, 2017).

These new technologies are pushing a radical transformation in businesses and, consequently, in society, commonly known as Industry 4.0. Specifically, Industry 4.0 refers to the process of increasing digitalisation, robotisation and automation of the manufacturing fabric, boosted by the development of digital value chains and the exchange of inputs with suppliers and customers, as well as between business partners (Lasi *et al.*, 2014; Antonietti *et al.*, 2022). The manufacturing environment is increasingly based on the integration of physical and virtual systems, pushing a paradigm shift in production processes and business models, as well as requiring the development and upgrading of managerial competencies within organizations (Paiva Santos *et al.*, 2018; Ciffolilli, Muscio, 2018).

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These phenomena have profound transformative effects on businesses, and on the traditional ways people work, generating a deep feeling of disruption. Uncertainty surrounding the creation and adoption of emerging technologies is high, as well as the worries for likely social threats (Frey, Osborne, 2017; Rullani, Rullani, 2018). Still, there are high expectations about the growth and productivity potentials stemming from the deployment of the new technologies, as their adoption opens new sources of value and wealth creation and, therefore, economic growth (Brynjolfsson *et al.*, 2019).

Achieving a balanced view and assessment of the impact of technological transformations on economic growth is not an easy task, neither conceptually nor empirically. In fact, concurrent, interrelated and even opposite mechanisms are simultaneously at play, making difficult to anticipate their overall outcome. This complexity is even greater when one shifts from the firm to the regional level of analysis. Regions in fact may be subject to multiple and simultaneous transformations (each characterised by a different degree of penetration) which may interact and coevolve, with important spillover effects occurring from one transformation to the other.

It comes not at surprise, then, that the territorial dimension of the economic effects of these transformations has been largely overlooked in the literature. Even if the empirical evidence is expanding relatively rapidly in the very last years, it does so in a fragment way frequently dealing with specific technologies, specific areas or specific European countries (De Propris, Bailey, 2020; Barzotto *et al.*, 2019, Büchi *et al.*, 2020; Horváth, Szabó, 2019; Acemoglu, Restrepo, 2020).

This work then aims at filling these gaps conceptually and empirically. On conceptual grounds, this work proposes a framework through which to examine the economic effects of Industry 4.0 that may occur in regional economies because of the localisation of firms adopting the new technologies. The adoption of the new technologies produces not simply direct economic effects on the adopting firms, but also indirect ones. These latter depend on the existence of input-output and demand-supply interdependencies, linking adopting firms with the local socio-economic tissue, especially relevant for small spatial entities. When adoption becomes pervasive in a region and involves a critical mass of adopting firms, then the direct and indirect firm-level effects can cumulate and affect the regions' economic performance, i.e. GDP growth. These effects could not be grasped if the analysis were conducted at the firm level. On empirical grounds, this work examines the spatially heterogeneous impact of Industry 4.0 on regional GDP growth European NUTS2 regions in the period 2008-2016.

The rest of the work is organised as follows. Section 2 discusses the channels through which Industry 4.0 enable new sources of value creation and therefore economic growth in regions. Section 3 describes the logic and the empirical

strategy to detect Industry 4.0 transformation in European regions. Section 4 describes the econometric framework and Section 5 discusses the results. Section 6 concludes the work with some final remarks and suggestions for policy.

2. The Impact of Industry 4.0 on Regional Economic Growth

The technological transformations enabled by Industry 4.0 deeply affect the way in which value is created in the economy, new markets are opened and adopting firms can expand their market size and share, leading to aggregate economic growth (Brynjolfsson *et al.*, 2019).

Even if a general positive association between Industry 4.0 on the one hand and economic growth on the other can be expected, also at the regional level, the value creation channels mobilised to achieve these expansionary effects are, however, multiple. In fact, value creation may depend on multiple sources and on the implementation of different complementary strategies by adopting firms (Table 1).

Table 1 – Effects on local adopters and on the whole local economy from the adoption of Industry 4.0 business models

Effects on local adopters	Effects on the whole local economy
• Increasing market shares of manufacturing adopters through new business models • Enlargement of market size through digitalisation of traditional products • Co-innovation based business practices	• Local I-O multiplying effects • Increasing market shares for I-O related firms • Local acceleration effect on firms' investments • Increased profits and consumer surplus • Local consumption multiplying effects • Disruption of competitor market share

Source: Adapted from Capello, Lenzi, 2021

First, the adoption of new business models based on Industry 4.0 principles and the implementation of the smart factory model, can help enlarging market size and market share (Buchi *et al.*, 2020). Industry 4.0 in fact enables mass customised production (Wang *et al.*, 2019) and in extreme cases the production of individual products ('batch size one' as defined by Lasi *et al.*, 2014). The new technologies enable combining the advantages of scale with those of scope. The integration and orchestration of distant machines along the value chain, the flexible batch production network, the systemic integration of advanced manufacturing, digital technologies and related novel service solutions favour the penetration if not the opening of unexplored market niches and

a general expansion of market size and share (De Propris, Bailey, 2020). Many scholars have documented the positive effects of the adoption of new business models on the market share of adopting firms with robust results across sectors and countries (Dauth *et al*., 2019; Humlum, 2019; Acemoglu *et al*., 2020; Szalavetz, 2019).

Second, the digitalisation of traditional products (e.g. printed and recorded media as well as CD albums and several information goods) allows a considerable expansion of market size since the same good can be sold worldwide to users located in different parts of the globe. This mechanism can take place because digital products present three simultaneous characteristics: a nearly zero marginal costs of reproduction, copies that are the same as the original, and an immediate and global distribution (McAfee, Brynjolfsson, 2017). The combination of these three features enables expanding market size with unprecedented value creation opportunities. Additionally, digital goods, differently from analogue ones, can be unbundled into single pieces to be priced and sold one independently from the other as well as bundled in groups. The example of CD albums is useful in this respect. In fact, the shift from material to digital goods opened the possibility to offer single songs à la carte or under subscription. This strategy was completely unfeasible when CD albums were material and sold as collection of songs, most of which not of interest to the buyers. However, this strategy became superior once songs become digital for three main reasons. First more consumers can be attracted, thus enlarging market size. Second, the variety of offers expands with two consequences: consumers can enjoy greater surplus and utility, and firms enjoy greater opportunities to implement differentiation strategies. Third, digital products present strong complementarities (i.e. smartphone and apps), thus amplifying the possibilities to expand market size and (consumer) surplus.

Last, a distinctive trait of the Industry 4.0 technological transformation resides in the blurring of the boundaries between technology suppliers and users. The fusion of the two roles of supplier and user of technology represents an important source for firms to increase their market size and profitability (Müller *et al*., 2018; Horváth, Szabó, 2019). Co-innovation processes based on user-producer interactions (Von Hippel, 2005) but especially on crowd-based platforms, i.e. crowdsourcing, are becoming increasingly popular (Brynjolfsson, McAfee, 2014). Crowdsourcing enables to develop more innovation of greater quality and more targeted to the needs of the final users, boosting utility for users, reducing R&D costs and enlarging profits for suppliers. The combination of these effects lead to increased value creation and surplus.

All this enables concluding that Industry 4.0 transformation can generate positive economic effects on adopting firms and, by extension, on the places where they are located. Additionally, adopting firms are frequently superstar firms that

can contribute disproportionately to the economic fortunes of the place where they locate (Autor *et al*., 2020). Importantly, growth spillovers effects may be at place and benefit co-located firms. Such spillover effects can take two main channels, i.e. input-output linkages and demand-supply-income feedbacks. Suppliers and customers linked to the expanding firms can in fact experience improved and enlarged market opportunities, if not an increase of their respective market shares. Higher market shares, revenues and profits can also accelerate investments. The greater wealth created in a region can ultimately also activate consumption multiplier effects and increased consumer surplus.[1]

Therefore, Industry 4.0 is expected to deliver growth advantages to regions. However, not all regions are likely to be subject to such transformation nor to experience the same intensity of transformation. It is reasonable to expect that the greater the intensity of adoption of Industry 4.0 specific technologies, the higher the pervasiveness of transformation and the impact on economic growth. Consequently, positive effects are expected and 4.0 technologies are likely to exhibit increasing returns. However, not all sectors exhibit advantages in adopting Industry 4.0 technologies. Our empirical analysis takes this aspect into account, and measures the pervasiveness of the regional adoption in different sectors. Our analysis looks for the effects of such regional sectoral adoption on GDP growth. When regions are highly specialised in adopting sectors, it is reasonable to expect growth advantages. Instead, when regions are not specialised in adopting sectors, GDP growth advantages can in any case be generated through intersectoral interdependences with adopting sectors. In this case, we claim that spillover advantages exist.

The next section details the logic and the empirical strategy to detect Industry 4.0 transformation in European regions.

3. A Methodology for the Identification of Industry 4.0 Transformation in European Regions

The presence, the intensity and, consequently, the impact of Industry 4.0 transformation in each European regional economy depends on the regional degree of sectoral adoption. Sectors, in fact, differ considerably in the profitability gains from adoption (Malerba, 2002). Therefore, the greater the regional adoption in those sectors in which profitability gains from adoption are high, the greater the local direct

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1. The expansion of the market size and share of firms adopting the new technologies and shifting to new businesses models can take place at the expenses of competitors, especially those operating in the same local economies, pushing them out of the market, as documented for US and French metropolitan areas (Aghion *et al*., 2019; Acemoglu *et al*., 2020). Important competitive dynamics can be at place, and the ensuing market turbulence can lead to sizeable firms' market shares reallocation within local economies, with potentially ambiguous effects on local wealth creation and GDP growth.

and indirect effects stemming from Industry 4.0 transformation. In this respect, manufacturing sectors can be conceptually clustered in three main groups (Perez, 1983):

- the *technology manufacturing sectors*. They include those industries that manufacture and/or supply the new technologies and therefore are in charge of maintaining and increasing the relative cost advantage of such technologies, the latter being sources of their profitability, and ultimately shape the rhythm of penetration of Industry 4.0 transformation;
- *the carrier manufacturing sectors*. They represent the most intense and active users of Industry 4.0 technologies and, thus, are those best positioned to grasp the advantages of the new production styles. Importantly, these industries can even become user innovators if not providers of the technology. The great advantages foreseen from adoption can represent important incentives to become inventors and technology providers themselves. In this sense, these sectors are carriers of new opportunities, in terms of both new ideas and adoption;
- *the induced manufacturing industries*. They group those sectors that are users of the new technologies but enjoy relatively more limited advantages from the technological revolution. These sectors adopt the new technologies (though less intensively) to provide their products. Adoption enables profitability gains, even if less than in carrier sectors.

Accordingly, the higher the regional specialisation in technology and carrier manufacturing sectors, the greater the potential of transformation in the manufacturing production, i.e. Industry 4.0, in each region.

On empirical grounds, the classification into technology, carrier and induced sectors (according to the NACE Rev 2.2 classification at the 2-digit level) follows the OECD partitioning of sectors according to their digital intensity level (Calvino *et al*., 2018). Specifically, technology and carrier sectors are those with high or medium-high digital intensity, whereas induced sectors are those with low or medium-low digital intensity. Additionally, technology and carrier sectors were distinguished according to the degree of 4.0 patent intensity[2] in each NACE Rev 2.2 sector.[3]

Regional specialisation in technology, carrier and induced sectors has been measured on the basis of location quotient (LQ) indicators by using employment data in the three different groups of manufacturing sectors. Data on regional sectoral employment at the NACE 2-digit level has been obtained from Eurostat Structural Business Statistics in the 2008-2016 period. Employment in the technology (respectively, carrier and induced) sector has been obtained by summing up employment in each of NACE 2-digit level sector defined as technology

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2. For the identification of 4.0 patents, see Laffi and Lenzi (2021) and Capello and Lenzi (2021) and Capello and Lenzi (2022).
3. The exact sectoral classification is available in Appendix A.

(respectively, carrier and induced) sector (see Appendix A). LQs have been computed by applying their well-known formula.

Importantly, the comparison of Figures 1 to 3 highlights that regions can be specialised in all sectors, in only one, or in none of them, suggesting that Industry 4.0 can exist in real local economies with different pervasiveness depending on the intensity of 4.0 technology adoption but also that regions may lack any technological transformation.

However, sectoral specialisation might not be a sufficient condition. The second element to be taken into consideration is the intensity of adoption in those sectors making a more profitable use of the new technologies. As noted above, in fact, two elements are necessary to make technological transformations realise and none of them is, in isolation, sufficient. Therefore, sectoral specialisation has to match a high intensity of local adoption of 4.0 technologies in technology and carrier sectors. In fact, technological transformations are not the mere outcome of changes in the regional sectoral mix in favour of technology and carrier sectors, but rather the outcome of learning, innovation and adoption processes within the existing technology and carrier sectors.

The indicator chosen to measure 4.0 technologies adoption, consistent with the literature, is robot penetration at sectoral level (see Dauth *et al.* (2019) for Germany, Humlum for Denmark (2019), Acemoglu *et al.* (2020) for France, Acemoglu and Restrepo (2020), Autor *et al.* (2020) for the US and OECD countries, Szalavetz for Hungary (2019).

Data on robot adoption has been obtained from the International Robot Federation (IFR). The IFR classifies robot sales by groups of industrial sectors and country of the purchasing firm. Data are at the national level for all EU countries with the exclusion of Luxembourg and Cyprus, starting from 2004. For previous years, the sectoral breakdown is unavailable for most of the countries. The yearly robot stock has been computed by applying the perpetual inventory method with a 12% depreciation rate as recommended by the IFR, as follows:

$$Robot_{r,t} = (1 - d) Robot_{r,t-1} + Robot_{r,2004} \qquad [1]$$

Specifically, $Robot_{r,t}$, the capital stock of region r at time t, is obtained as the sum of the robots purchased in the previous periods with a constant (across regions and over time) 12% depreciation rate (d). The robot stock value for the initial year was that of 2004.

- National data have been apportioned at the regional (NUTS 2) and sectoral level aggregated by technology, carrier and induced sector, by applying the simple average of a set of three weights accounting for the following aspects:
- the relevance of the sector in the region in comparison with the country. The use of this weight is common in the scientific literature (e.g. Acemoglu, Restrepo,

Figure 1 – Regional specialisation in technology sectors
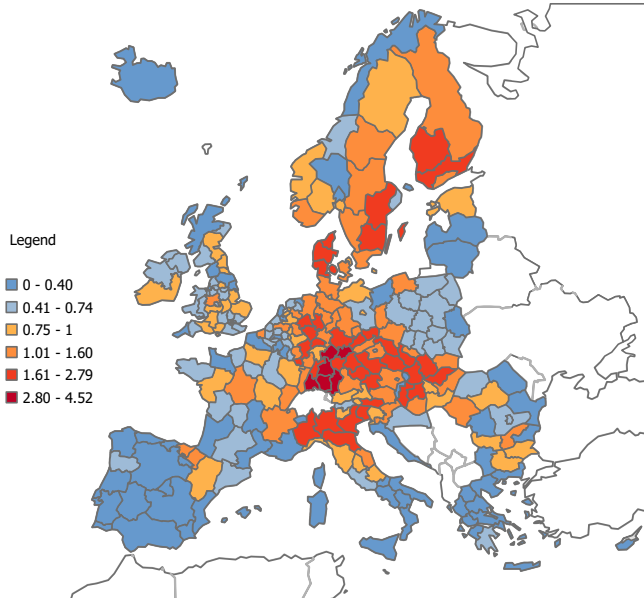
Figure 2 – Regional specialisation in carrier sectors

Figure 3 – Regional specialisation in induced sectors

Legend
- 0.15 - 0.55
- 0.56 - 0.81
- 0.82 - 1
- 1.01 - 1.40
- 1.41 - 1.86
- 1.87 - 2.75
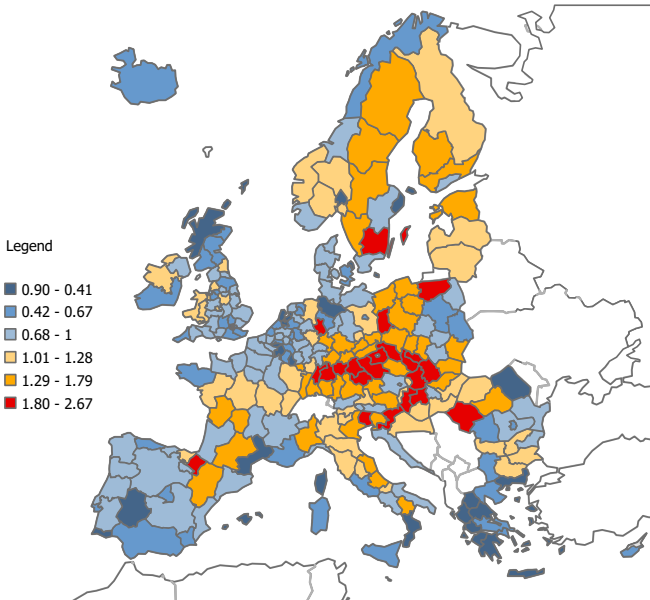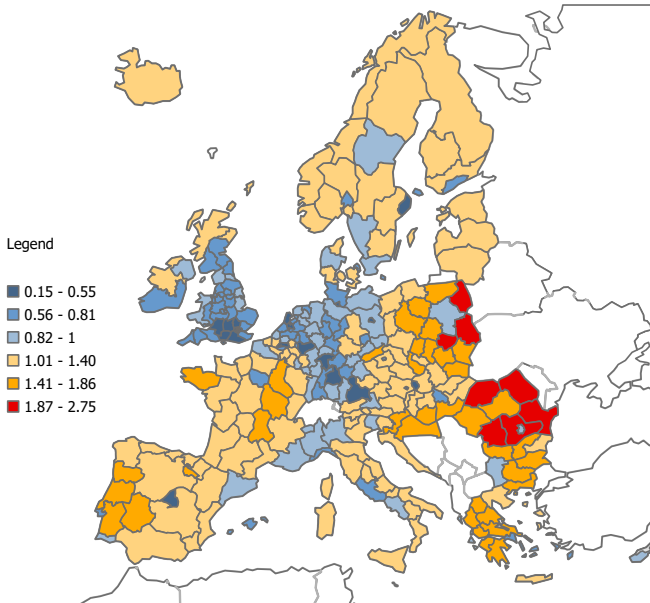
Source: Adapted from Capello and Lenzi (2021)

2020) and follows the expectation that regional sectoral robot adoption depends on regional sectoral specialisation, i.e. regions that are more specialised in a specific sector contribute more to national robot adoption in the same sector;

- the level of broadband penetration in the region compared with the country. The use of this weight follows the expectation that robot adoption is more likely in more digitalised regions, i.e. in regions more prone to adopt new technologies;
- the relevance of manual occupations in the region compared with the country. The use of this weight follows the assumption that robot adoption is meant especially to replace manual routine occupations, i.e. regions with a larger proportion of such occupations are more likely to adopt new robots.

This approach improves upon existing methods applied in the literature, in which regional apportionment is based on the sectoral dimension only (Acemoglu, Restrepo, 2020). By using only a sectoral weight, in fact, robot adoption turns out to be affected simply by the regional sectoral mix. The inclusion of two additional elements, instead, enables us to take into consideration the fact that regions with the same sectoral mix can show different adoption rates depending on the jobs (i.e. occupations) affected by the adoption process and the general level of technological readiness of the region (i.e. digitalisation).

The source of data is Eurostat and, in particular, Sectoral Business Statistics (SBS) for sectoral employment data, the Labour Force Survey (LFS) for data occupational employment data. In particular, the three weights have been computed by applying the following formulas:

$$w_1 = \left(Emp_{r,s} \,/\, Emp_{n,s} \right) \qquad\qquad [2]$$

where *Emp* stands for the number of employees, *r* the region, *n* the country, *s* the sector (i.e. technology manufacturing sector, carrier manufacturing sector or induced manufacturing sector, respectively);

$$w_2 = \left(Pop_r,bb \,/\, Popn,bb \right) \qquad\qquad [3]$$

where $Pop_{r,bb}$ stands for the number of inhabitants in region *r* having access to broadband and $Pop_{n,bb}$ stands for the number of inhabitant in country *n* having access to broadband. Eurostat makes available only the share of persons with broadband access. In order to compute w_2, the number of inhabitants in the region (respectively, the country) with broadband access was obtained by multiplying the shares provided by Eurostat times the regional (respectively, national) population;

$$wr = \left(Empr,o \,/\, Empn,s \right) \qquad\qquad [4]$$

where $Emp_{r,o}$ stands for the number of employees in region *r* in manual occupations (ISCO group 8 – Plant and machine operators, and assemblers) and $Emp_{n,o}$ stands for the number of employees in country *n* in manual occupations (ISCO code 8).

Because of data gaps in SBS at the regional/sectoral level, data on regional robot adoption is averaged over a three-year time window in the 2008-2016 period.

The next section presents the econometric framework applied to examine the impact of Industry 4.0 transformation on regional GDP growth.

4. The Econometric Framework

In order to examine the effects of Industry 4.0 transformation on GDP growth, we estimated a stylised regional growth equation, as follows (Eq. 5):

$$\Delta GDP_{r,t1-t0} = F\left(X_{r,t0} \right) + Sectoral\ specialisation_{r,s,t0} + Adoption_{r,s,t0} + \varepsilon_{r,t0} \quad [5]$$

$\Delta GDP_{r,t1-t0}$ is the regional GDP growth rate measured between the last (t_1) and the beginning year (t_0) of each of the two periods considered (i.e. 2007-2012 and 2013-2018) and made dependent on a series of regional level determinants $X_{r,t0}$ and a random error term $\varepsilon_{r,t0}$ for each period. The first period accounts for the years of the crisis with the dependent variable measured in the period 2007-2012 and the

explanatory variables measured at the beginning of the period (i.e. 2007, or the least recent year when this was not feasible). The second period accounts for the years of the recovery with the dependent variable measured in the period 2013-2017 and the explanatory variables measured at the beginning of the period (i.e. 2013).

- According to the existing literature in the field (Rodríguez-Pose, Crescenzi, 2008; Capello, Lenzi, 2019), the regional level determinants, all measured at the beginning of each period, $X_{r,t0}$, includes variables accounting for the following aspects:
- the initial level of GDP per capita,
- the initial level of population,
- a dummy variable capturing the period of time,
- a dummy variable flagging EU15 countries,
- the share of employment in services,
- the quality of government,
- the FDI penetration rate,
- the regional population educational attainment level,
- the regional innovativeness level,
- regional sectoral specialisation in technology, carrier and induced manufacturing sectors,
- regional sectoral adoption in technology, carrier and induced manufacturing sectors.

As described in Section 3, s*ectoral specialisation*$_{r,s,t0}$ is measured through LQ indices computed on employment data in technology, carrier and induced manufacturing sectors of each region. *Adoption intensity*$_{r,s,t0}$ is measured for each region as robot penetration indices in each of the three manufacturing sectors. Description and summary statistics of all variables are available in Appendix B.

In total, three pairs of models have been estimated. Each model captures the effects of a specific specialisation in technology, carrier or induced manufacturing sectors, of the adoption of a sector-specific 4.0 technology, namely robots, and of their interaction terms. The different sectors have been treated separately in order to mitigate multicollinearity issues.

The interaction term is especially relevant because it allows understanding whether, given an average regional sectoral specialisation, the effect on GDP changes with the increase in the adoption intensity.

In particular, the computation of marginal effects of the different sectoral adoption variables over time and at different adoption intensity provides an indication of the heterogeneous spatial impacts of Industry 4.0 transformation on GDP growth.

The econometric analysis was performed in the frame of a random effects panel setting consisting of two periods. Random effects rather than fixed effects

were adopted because of the presence of time-invariant explanatory variables (i.e. the different types of technological transformations and the EU15 dummy variable). In consideration of the possible spatial interdependencies across regional units, we followed the general-to-simple model selection rule and the test procedure proposed by Elhorst (2010) to decide whether and which spatial model is the most appropriate in the present empirical context. We start by estimating an SDM by using a row-standardized spatial weight matrix whose elements, the w_{ij} spatial weights, represent the row-standardised inverse distance between the centroids of the i and j regions. In all model specifications, the significance of the spatially lagged dependent variable (tested in the SDM specification) is rejected, as is the joint significance of the spatially lagged independent variables. In this case, Elhorst's (2010) method suggests that the disturbances should be tested for spatial dependence. In the present model specification, tests do not allow rejecting the null hypothesis of absence of spatial dependence in the disturbances, supporting the use of Generalised Least Squares (GLS) random effects estimates. The estimates reported below, then, are based on robust GLS.

The following section discusses the results of the econometric analysis.

5. Spatial Heterogeneity in the Impact of Industry 4.0 on GDP Growth

Estimates of the impact of robot adoption of on GDP growth are reported in Table 2. Control variables show the expected sign and significance, highlighting a process of convergence, a recovery in the second period, a more intense growth in Eastern Europe and the importance of the quality of institutions, education and innovation.[4]

The model specifications without interaction terms (Table 1, Models 1, 3 and 5) highlight two results. First, specialisation in technology and carrier manufacturing sectors is positively associated with GDP growth while specialisation in induced manufacturing sectors is negatively associated with GDP growth. Therefore, regions specialised in transformation-prone sectors are better positioned to deliver GDP growth advantages than those specialised in sectors more resistant to technological change. Second, robot adoption seems to be especially beneficial for growth in carrier and induced sectors; unexpectedly, robot adoption in technology sectors per se does not have similar effects.

Interestingly, the joint effect of sectoral specialisation and adoption suggests a more complex interpretation of these results (Table 2, Models 2, 4 and 6). Robot adoption in technology manufacturing sectors affects GDP growth only when it matches a high specialisation in the same sector (Table 2, Model 2). In fact, the

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4. The variable for employment in manufacturing has been excluded, to avoid collinearity issues with the sectoral specialisation variables.

interaction term is positive and significant while the non-interacted terms are both insignificant suggesting that neither adoption nor sectoral specialisation *per se* are able to produce a statistically significant effect on GDP.[5] A similar remark applies to the case of robot adoption in induced manufacturing sectors, i.e. robot adoption boosts GDP growth but only if specialisation in the same sectors is high. The case of robot adoption in carrier sectors is, instead, different. The effect on GDP growth is positive regardless of the specialisation intensity in the region. In fact, both the adoption and the specialisation variables keep their significance while the interaction term is not significant.

By computing the marginal effects of sectoral robot adoption on GDP growth for each period, it is possible to highlight more in details the role of the intensity of technology adoption for each sectoral specialisation on GDP growth. As anticipated in Section 2, the growth advantages from robot adoption are expected to be particularly high in regions specialised in the most transformative manufacturing sectors and with the highest adoption intensity.

Table 3 confirms these intuitions to a certain extent and highlights important differences across sectors. Robots adoption in technology sectors provides strong positive effects primarily in regions with the low to medium adoption in technology manufacturing sectors. Surprisingly, instead, no effects are present at very high levels of adoption suggesting the existence of some decreasing returns. Constant returns, instead, are visible in carrier sectors. The positive effects of the adoption of robots are comparable across regions with different adoption intensity. The high complementarity of carrier sectors with all other sectors in the local economies can explain this result and confirms their importance as engine of the present socio-economic transformation leading to sizeable important spillover effects within regions (Table 3).

Finally, regions can benefit from the adoption of robots in induced manufacturing technologies in terms of GDP growth despite their adoption rate, however with sizeable heterogeneity. In fact, the growth advantages reduce considerably with the increase in the adoption intensity, confirming the existence of decreasing returns from adoption.

The relatively higher magnitude of the effects of robot adoption in induced sectors with respect to the others can be striking at a first glance. A possible interpretation is that induced sectors are in an early stage of 4.0 technology adoption compared with the other two sectors. They might be therefore subject to higher marginal returns from adoption and thus a noticeable effect on GDP growth given the large diffusion of these sectors across regions.

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5.   When including interactions, the estimated coefficient of each variable (e.g. robot adoption in technology manufacturing sectors) indicates the impact this variable has on GDP growth when the other variable (e.g. specialisation in technology manufacturing sectors) is set at 0.

Table 2 – The impact of Industry 4.0 technologies adoption on GDP growth

Dependent variable: real GDP growth	1	2	3	4	5	6
GDP (log)	-0.009***	-0.010***	-0.009***	-0.009***	-0.013***	-0.014***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Population (log)	0.013***	0.014***	0.012***	0.012***	0.016***	0.017***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
EU15 dummy	-0.020***	-0.021***	-0.021***	-0.021***	-0.021***	-0.021***
	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)
Dummy period	0.023***	0.038***	0.022***	0.022***	0.022***	0.022***
	(0.001)	(0.006)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in services (%)	0.001	0.002	0.002	0.002	-0.009**	-0.009**
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Quality of institutions	0.007***	0.006***	0.007***	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
FDI	-0.000	0.000	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education	0.000**	0.000**	0.000***	0.000***	0.000**	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Innovation (trademark intensity)	0.035***	0.033***	0.033***	0.033***	0.033***	0.035***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)
Robot adoption in technology sectors	-0.065	-0.325				
	(0.352)	(0.446)				
Sectoral specialisation in technology sectors	0.002**	-0.001				
	(0.001)	(0.002)				
Robot adoption * sectoral specialisation in technology sectors		0.876*				
		(0.469)				
Robot adoption in carrier sectors			0.287***	0.287***		
			(0.057)	(0.109)		
Sectoral specialisation in carrier sectors			0.003**	0.003		
			(0.001)	(0.002)		
Robot adoption * sectoral specialisation in carrier sectors				-0.000		
				(0.126)		
Robot adoption in induced sectors					1.484**	0.401
					(0.580)	(0.941)
Sectoral specialisation in induced sectors					-0.007***	-0.009***
					(0.002)	(0.003)

(Table 2 continue)

Dependent variable: real GDP growth	1	2	3	4	5	6
Robot adoption * sectoral specialisation in induced sectors						1.606
						(1.091)
Constant	-0.156***	0.180	-0.149***	-0.149***	-0.169***	-0.176***
	(0.032)	(0.223)	(0.035)	(0.036)	(0.034)	(0.035)
Wald test – spatial lag of the dependent variable (p-value), SDM	0.59	0.32	0.85	0.86	0,94	0.94
Wald test (joint) – spatial lag of the independent variables (p-value), SDM	0.16	0.04	0.49	0.57	0.39	0.46
Wald test – spatial lag (p-value), SAR	0.55	0.47	0.64	0.64	0.59	0.59
Wald test – spatial lag (p-value), SLX	0.12	0.04	0.40	0.48	0.31	0.37
Wald test – spatial error (p-value), SEM	0.85	0.59	0.99	0.99	0.97	0.94
Spatial lags of Xs	NO	YES	NO	NO	NO	NO
Spatial lag of Xs – χ2 joint significance		0.01				
R2	0.57	0.59	0.59	0.59	0.59	0.59

Note: N = 522. Standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01

Table 3 – Marginal effects of robots adoption by sectors, periods and intensity of adoption

	Adoption intensity		
	Below p25	Between p25 and p75	Above p75
Robot adoption in technology sectors			
2007-2012	0.52	0.56	ns
2013-2017	ns	0.59	ns
Robot adoption in carrier sectors			
2007-2012	0.29	0.29	0.29
2013-2017	0.29	0.29	0.29
Robot adoption in induced sectors			
2007-2012	2.55	2	1.66
2013-2017	2.67	1.95	1.83

Note: N=522. Marginal effects significant a t conventional levels; ns=not significant. Figures measure the increase of GDP growth rates due to an increase of one robot per employee.

Table 4 indicates that the impact of robot adoption on GDP growth is characterised by important spillover effects. In fact, the positive impact of robot adoption in carrier and induced sectors takes place also in those regions that are not specialised in these two sectors. The exception is represented by robot adoption in technology manufacturing sectors that do not generate such spillover effects and its impacts are spatially bounded in those regions highly specialised in these sectors and showing a high adoption level in the same sectors (Table 4).

Table 4 – Marginal effects of robots adoption by sectors, periods and sectoral specialisation intensity

	Regional specialisation in technology sectors		Regional specialisation in carrier sectors		Regional specialisation in induced sectors	
	YES	*NO*	*YES*	*NO*	*YES*	*NO*
Robot adoption in technology sectors						
2007-2012	1.25	ns				
2013-2017	1.26	ns				
Robot adoption in carrier sectors						
2007-2012			0.29	0.29		
2013-2017			0.29	0.29		
Robot adoption in induced sectors						
2007-2012					2.60	1.54
2013-2017					2.59	1.54

6. Conclusions

This work has analysed the impact of the present Industry 4.0 transformation on the economic growth of European regions. This work has shown that the high expectations on the transformative impacts of Industry 4.0 are not misplaced and that the adoption of the technologies related to this transformation are actually associated with GDP growth. In fact, the greater its pervasiveness (i.e. the technology adoption intensity) the higher GDP growth. Increases in robots adoption do generate an increase in GDP growth rate.

Interestingly enough, technology adoption especially in carrier manufacturing sectors generates pervasive effects, confirming the relevance of such sectors as the engine of the present transformations. In the other groups of manufacturing sectors, however, the advantages stemming from technology adoption are somewhat uneven across regions and particularly high when the adopted technology matches the region's sectoral specialisation profile even if suffering from diminishing returns.

These results support the present policy efforts to sustain technological transformations in European regions. Especially in the case of the adoption of automation technologies, much of the 4.0 technological transformation and penetration depends on the types of sectors present in the region. Each sector in fact, makes use of and benefits from specific 4.0 technologies in different ways. The impact in a region, then, is higher when the adoption relates to the prevailing specialisation in the region. This result is fully aligned with the smart specialisation strategy adopted by the European Commission for the past programming period, which claims that a 'one size fits all' policy is impossible to design for all regions. This is also valid for the 4.0 technological transformations. Policies are required to have a region-specific nature and to be tailored to the 4.0 technological and sectoral profile of the region.

Importantly, these results highlight that the adoption of automation technologies in transformative manufacturing sectors deliver unbalanced growth advantages across regions, favouring in some cases the regions most prone to the most advanced manufacturing transformation, possibly widening existing disparities and gaps in technology adoption.

Whether the new technologies are expected to enlarge or reduce territorial disparities remains a compelling research and policy issue that we are committed to examine in our future research.

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Industria 4.0: asimmetria nelle opportunità di crescita per le regioni Europee

Sommario

Questo lavoro analizza dal punto di vista concettuale ed empirico l'impatto delle trasformazioni indotte dalle tecnologie abilitanti i processi di Industria 4.0 sulla crescita economica regionale, con l'aspettativa che l'adozione di queste tecnologie conduca effettivamente a dei vantaggi economici in termini di crescita ma con effetti diversi tra regioni e settori. In particolare, preme analizzare se i vantaggi dell'adozione esistono, e se registrano rendimenti crescenti o decrescenti. Queste aspettative sono testate in un'analisi empirica condotta sulle regioni NUTS2 Europee nel periodo 2008-2017.

Appendix A – Definition of Technology, Carrier and Induced Sectors

Table A1 – Technology, Carrier and Induced Sectors in Manufacturing and Services

	Technology and carrier sectors	Induced sectors
Industry	Manufacture of wood and paper products and printing, furniture (16-17-18-31)	Manufacture of food, beverages, tobacco products (C10-11-12)
	Manufacture of computer, electronic and optical products (C26)	Manufacture of textiles, wearing apparel, leather (C13-14-15)
	Manufacture of electrical equipment (C27)	*Manufacture of coke and refined petroleum products (C19)*
	Manufacture of machinery and equipment (C28)	*Manufacture of chemicals and chemical products (C20)*
	Manufacture of transport equipment (C29-30)	*Manufacture of pharmaceutical products (C21)*
	Other manufacturing, repairs of computer (C32-33)	*Manufacture of rubber and plastics products, and other non-metallic mineral products (C22-23)*
		Manufacture of fabricated basic metal and fabricated metal products (C24-25)

Notes:
1) Sectors are defined as technology or carrier if in at least one of two periods examined by the OECD (i.e. 2001-2003 or 2013-2015) they are classified as of high or medium-high digital intensity.
2) In bold, technology sectors, i.e. high patent intensity in 4.0 technologies.
3) In italics, sectors with high patent intensity but at the margins of the 4.0 transformation because based on continuous rather than batch production processes. 4) Nace Rev. 2.2 2-digit code in parentheses.

Appendix B – Variable Description and Summary Statistics

Table B.1 – Description of the Variables

	Measurement	*Years*	*Source*
GDP growth rate	Average annual compound growth rate	2007-2012; 2013-2017	Eurostat
GDP (ln)	GDP (million euro)	2007; 2013	Eurostat
Population	Annual average population growth rate	2007-2009; 2010-2012	Eurostat
Urbanisation	Share of population living in metropolitan areas	2007; 2013	Eurostat
Employment in services	Share of total employment	2007; 2013	Eurostat
Quality of government	European Quality of Government Index	2010; 2013	Charron *et al*. (2014)
FDI	Amount of FDIs per 1,000 inhabitants	Two values: 2003-2005 and 2005-2007	FDI-Regio, Bocconi-ISLA
Education	Share of 25-64 age population with tertiary education	2007; 2013	Eurostat
Trademark intensity	Number of trademarks per 1,000 inhabitants	Average 2008-2010 and 2010-2012	Eurostat
Specialisation in technology manufacturing sectors	LQ on employment in technology manufacturing sectors	Average 2008-2010 and 2011-2013	Eurostat
Specialisation in carrier manufacturing sectors	LQ on employment in carrier manufacturing sectors	Average 2008-2010 and 2011-2013	Eurostat
Specialisation in induced manufacturing sectors	LQ on employment in induced manufacturing sectors	Average 2008-2010 and 2011-2013	Eurostat
Robot adoption in technology manufacturing sectors	Number of robots per 1,000 employee in technology manufacturing sectors	Average 2008-2010 and 2011-2013	IFR, Eurostat
Robot adoption in carrier manufacturing sectors	Number of robots per 1,000 employee in carrier manufacturing sectors	Average 2008-2010 and 2011-2013	IFR, Eurostat
Robot adoption in induced manufacturing sectors	Number of robots per 1,000 employee in induced manufacturing sectors	Average 2008-2010 and 2011-2013	IFR, Eurostat

Table B.2 – Summary Statistics

	Mean	Std. Dev.	Min	Max
Dependent variables				
GDP growth rate	2.18	1.60	-8.04	11.74
Labour productivity (GDP on total employment)	0.91	1.57	-7.84	8.34
Explanatory variables				
GDP (ln)	51,218.77	59,497.67	2,572.94	642,906
Population	1,904,182	1,529,511	127,844	11,200,000
Urbanisation	48.78	34.24	0.00	100
Employment in services	37.88	6.63	19.19	58.25
Quality of government	0.306	0.920	-2.598	1.761
FDI	140.67	306.50	0.48	3,365.33
Education	27.53	9.38	11.20	69.80
Trademark intensity	0.127	0.150	0.001	1.844
Specialisation in technology manufacturing sectors	0.944	0.794	0	4.463
Specialisation in carrier manufacturing sectors	0.985	0.513	0.069	2.604
Specialisation in induced manufacturing sectors	1.059	0.422	0.142	2.748
Robot adoption in technology manufacturing sectors	4.77	6.78	0	54.3
Robot adoption in carrier manufacturing sectors	9.85	9.46	0	60.75
Robot adoption in induced manufacturing sectors	1.58	1.33	0.02	6.76

The Economic Effects of COVID-19 in Italian Regions. Evidence, Expectations, Policies

Anna Clara Monti*, Carmelo Petraglia°, Domenico Scalera*

Abstract

The effects of COVID-19 on the Italian economy were uneven across regions, with a slightly more severe impact in the North and a slower recovery in the South. The main determinants of the observed differences are investigated, focusing on regional structural factors such as sectoral composition, propensity to remote working, availability of human capital and technology, international openness, participation in global value chains. The analysis on short-term resilience in 2020 is complemented by a discussion on perspectives of growth for the 2021-2024 period, highlighting the elements of weakness of the Southern economy and the role possibly played by public policies.

1. Introduction[1]

Like many other big shocks, pandemics differently strike individuals, activities, industries and regions, leading in most cases to significant increases in inequality (Furceri *et al.*, 2021). The COVID-19 crisis does not seem to be an exception. The scant evidence already available testifies that the geographical impact of the pandemic across countries and regions has been remarkably differentiated, with uneven effects on both rich and low-income areas (Miguel, Mobarak, 2021). In Europe, "asymmetries in the shock and the recovery are becoming apparent. While the initial shock of the COVID-19 crisis was largely indiscriminate, the impact has now become more uneven with investments recovering at different speeds" (European Investment Bank, 2021, p. 2).

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1.   We would like to warmly thank Francesco Trivieri for his fruitful comments to a previous version of this paper, and SVIMEZ for kindly providing regional data on GDP and Value Added.

Preliminary evidence confirms that similar considerations hold for Italian regions as well. Because of the large long-lasting economic divide between the more developed Centre-North and the lagging-behind South, Italy is a case of particular interest to investigate the geographical effects of the pandemic in a national context with a heterogeneous socio-economic structure of regions.[2] According to several sources (Banca d'Italia, 2021; Confindustria, SRM, 2021; SVIMEZ, 2021a), the impact of COVID-19 and the related containment measures was slightly more severe for some Northern regions in 2020 while the recovery in 2021 seems to be slower in the South (Confindustria, SRM, 2021).

The heterogeneous regional effects of the COVID-19 crisis across Italian regions and the features of both short- and medium-term recovery at the regional level are the main topic of this paper, which in particular focuses on the possible factors determining the observed differences in the impact of the pandemic and the consequent rebound. The likely relevant variables, singled out by the extant literature (i.e. sectoral composition of the regional economy, propensity to remote working, availability of human capital and technology, international openness) are considered to evaluate their importance for regional resistance and the ability to recover from the pandemic shock. Given the paucity of data on regional Gross Domestic Product (GDP) and Value Added (VA) for the most recent months, the level of economic activity in 2021 is proxied by international trade. Moreover, we complement our analysis on short-term resilience in 2020 with a discussion on available forecasts on real GDP growth for the 2021-2024 period, to highlight the regional specific factors either fuelling or hampering medium-term recovery in the Centre-Nord and the South.

A central point of the analysis is whether, even in the case of COVID-19, like for past crises, the impact of the shock has followed a clear North-South pattern, i.e. whether the effects exerted by the pandemic have been uneven among the two macro-regions (Centre-North and South) and similar across regions within the same macro-region. Our investigation confirms this hypothesis, documenting through a principal component analysis (PCA) presented in the Appendix, that Southern regions share a lower ability to recover because of their common structural weakness. On the other hand, in comparison with the global financial crisis of 2008-2012, this time the reaction of Southern economies seems to be less problematic, thanks to the expansionary fiscal policy stance. Expectations for the near future are shaped by public policies as well: if, as expected, in the next few years the support to aggregate demand in the Southern regions is adequate, we

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2. As customary in the literature on the Italian economic divide, the North is meant to include the regions Piedmont, Aosta Valley, Lombardy, Liguria, Veneto, Trentino Alto Adige, Friuli Venezia Giulia and Emilia Romagna; the Centre is made by regions Tuscany, Umbria, Marche and Latium; the South comprises the peninsular regions of Abruzzo, Molise, Campania, Apulia, Basilicata and Calabria plus the islands Sicily and Sardinia.

will not observe a sizeable enlargement of the Centre-North/South gap, despite the dynamics of household consumption, which are forecast to be slow especially in the South.

The paper is organised as follows. After this introduction, Section 2 focuses on the possible reasons which explain differentiated effects of the pandemic, presenting a short survey of recent literature. Section 3 analyses the available information on the size of the shock caused by COVID-19 in Italian regions, and studies the uneven geographical impact of the pandemic through the lens of regional characteristics, in terms of sectoral specialization, international openness, participation in international production networks, technological endowment. Section 4 discusses the 2021-2024 real GDP growth forecasts, highlighting the asymmetries in the speed of the post-COVID-19 recovery between Centre-North and South, and the contribution given by different aggregate demand components (private consumption, export, private investment, and public expenditure). The section also focuses on suitable policies needed to alleviate the conditions of structural weakness behind the difficulty of Southern regions to recover from the crisis. Section 5 draws the main conclusions of the paper.

2. The Uneven Effects of the COVID-19 Pandemic

A broad strand of the economic literature on COVID-19 (McCann, Ortega-Argiles, 2021; Gardiner *et al.*, 2021) has emphasised the possibility of significant asymmetries in the consequences of the pandemic and the related containment measures (lockdown, social distancing and green pass to access indoor venues) across different activities, industries and geographical areas.[3] A widespread argument is that, even when applied uniformly over regions and economic sectors (with obvious exceptions for the "essential activities" satisfying the basic needs of the population), social distancing is likely to affect individuals, firms and territories to a different extent, in line with some structural features of the production process and the involved economic agents (Conte *et al.*, 2020).

A first factor which is likely to give place to uneven effects of the pandemic on economic activities is the intensity of the social contact required by the productive process and/or output delivery to buyers. The argument is that the more social closeness is implied in the production and distribution of goods and services, the stronger is the expected economic impact of lockdown. As a result, productive sectors such as consumer services, household activities, tourism and public transport, cultural and creative industries, for which social contact is

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3. More generally, the COVID-19 pandemic has also involved uneven consequences in terms of income distribution across groups of workers (Adams-Prassl *et al.*, 2020, for US, UK and Germany; Aina *et al.*, 2021, for Italy,) and firms (Cevik, Miryugin, 2020).

essential for production and/or consumption, are likely to bear the worst consequences of COVID-19 (Immordino *et al*., 2021).

Secondly, the effects of the pandemic can be heterogeneous according to the different degree of technological advancement of the production process and the level of human capital and workers' abilities, which are essential in determining the technical suitability and economic profitability of remote working. Since the endowment of technology and human capital differs across firms, industries and geographical areas, the actual substitutability of face-to-face with tele-working, and therefore the impact of containment measures is likely to be different. This in particular implies that relatively backward regions, characterised by a specialization in traditional industries, a larger presence of small firms (often endowed with lower technical and organizational abilities and a less advanced ITC equipment; Bartik *et al*., 2020), and a worse telecommunication infrastructure, are basically more vulnerable and therefore destined to undergo the heaviest consequences of social distancing.

A third important factor of heterogeneity is connected to the diverse international openness of regions, and unequal integration of areas and economic sectors in local and international production networks. Inter-firm connections facilitate the propagation of shocks across sectors (Carvalho, Tahbaz-Salehi, 2018), which spread out to downstream and/or upstream industries (Barrot *et al*., 2021), over and above the direct effects of lockdown and social distancing. The development of Global Value Chains (GVCs), occurred since the mid-1980s, has made local and national productive systems increasingly interconnected, thus exposing to a supply-chain contagion even those areas where, from a medical viewpoint, the pandemic was less severe.

The twofold nature of supply and demand shock of the pandemic (Guerrieri *et al*., 2020) implies that contagion can diffuse both the ways, from upstream to downstream sectors, and vice versa. Indeed, in the COVID-19 crisis both the kinds of propagation mechanisms seem to have taken place (Coveri *et al*., 2020). On the one hand, the interruption of GVCs owing to containment measures involved the negative externality consisting in more difficult and expensive sourcing for client industries. On the other hand, the demand reaction to the pandemic brought about slowdown in production, increased unemployment, and a drastic worsening of expectations, which from final markets was conveyed and amplified through GVCs to upstream sectors.[4]

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4.   A typical mechanism of propagation takes place through inventory adjustment. Following the fall in the demand for final goods, firms not only decrease their demand for inputs but also reduce inventories so that their purchases of intermediates diminish more than final demand. The initial shock is therefore magnified for suppliers along the entire value chain, generating the so-called bullwhip effect (Alessandria *et al*., 2011).

Finally, uneven effects of COVID-19 across territories are possibly a consequence of economic policy. Following the opinion of many economists (Baldwin, Weder di Mauro, 2020) sharing the view that "the case for fiscal stimulus was overwhelming" (Krugman, 2020, p. 213), policy support from European institutions, central governments and local authorities has been massive and prolonged in the last two years. Public intervention may have had different effects across regions and helped to counteract the crisis in a more or less effective way.

The discussion on the regional effects of COVID-19 is particularly interesting in the case of Italy because of the peculiar long-lasting economic dualism characterizing that country. At the end of 2019, the relatively poor Southern regions still had per capita GDP at around 64% of the national average, and the unemployment rate at 17.6% versus 8.7% in the Centre and 6.1% in the North. How the COVID-19 shock has affected and in the near future will affect the Italian regional socio-economic divide is certainly an issue of great interest for scholars and policy makers. Currently, the scarcity of updated and reliable data prevents from giving a satisfactory response on the point. On the other hand, the first evidence collected in the next pages is useful to draw a preliminary picture on the regional differentiation of the impact of pandemic and its consequences on the Italian North-South dualism.

3. Resilience and Recovery in Italian Regions

The pandemic crisis involved a fall in the 2020 Italian GDP sharper than the European average (-8,9% in Italy versus -6,1% in Europe), presumably owing to both the specific productive structure of this country, and the weak productivity dynamics of the Italian economy in the previous decades.

At the regional level, the first evidence shows limited but significant differences in the territorial impact of COVID-19 in terms of changes in GDP, employment, firm sales and investments (Banca d'Italia, 2021; Confindustria, Cerved, 2020; Confindustria, SRM, 2021; Istat, 2021a, 2021b; SVIMEZ, 2021a). Unlike the case of the global financial crisis,[5] the pandemic does not seem to have affected more severely Southern regions. This can be due to the stronger intensity of the pandemic in the Northern regions, which at the end of 2020 recorded more than 1,270,000 cases and almost 54,000 deaths (respectively corresponding to 4.58% and 0.19% of resident population) against 354,000 cases and 9,600 deaths in the Centre (2.93% and 0.08% of resident population) and 480,000 cases and 10,600 deaths in the South (2.32%

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5. Between 2008 and 2014, the yearly average growth rate in the South was -1.6% against -0.9% in the rest of Italy (SVIMEZ, 2016, pp. 16-17).

and 0.05% of resident population).[6] Also, the greater international openness of Centre-North may have been somehow harmful, favouring the diffusion of the shock through supply chains. On the other hand, as we will see later, the structural weakness of the Southern economy, characterised by a long-dated gap in productivity and competitiveness with respect to the rest of Italy, and specialised in industries (consumer services, tourism and creative sectors) more exposed to the consequences of the pandemic, has probably caused a more difficult recovery in 2021.

Figure 1 shows percentage decreases in per capita GDP, total VA, industry VA and services VA recorded between 2019 and 2020 in Italian regions. In each map, darker shades denote stronger drops of the variable considered. For example, the change in GDP, being on average at around -8.9%, is larger in Centre-North (and particularly in Trentino, Veneto, Tuscany and Marche) and smaller in the South (panel A). Most of the least severely hit regions, showing decreases less than 8.5%, are in the South (Molise, Campania, Apulia and Sicily) with the exceptions of Friuli and Latium, the capital-city region, which enjoys a relatively large presence of public administration services.

The drop in overall VA (panel B) is mainly driven by the industry, falling by about 11% at the national level and slightly more in Centre-North (panel C). Concerning industrial sectors, SVIMEZ (2021a) documents that "Textile and Apparel" (-23.3% in Centre-North and -21,8% in the South) and "Mechanics, Electrical Appliances and Transportation Means" (on average, -13,9% for Centre-Northern and -14,5% for Southern Italy) record the worst performance, while the Food industry is the most resilient (-1.7% in Centre-North and -2.3% in the South). Changes in the Value Added of service sectors are displayed in Figure 1 (panel D). Services turn out to suffer less than industry from the COVID-19 crisis, although less suitable to substitute in-presence with remote working and therefore in principle more vulnerable to social distancing. In the case of services, Aosta Valley in the North and Sardinia in the South appear in the quartile of the most severely struck regions.

In general, the evidence of a larger fall in industrial VA suggests that the major effects of the pandemic derived from the drop in aggregate demand following lockdown rather than from the supply shock in itself. As a matter of fact, a contraction of demand for durable consumption goods and firm investments and inventories (i.e. industrial goods) larger than for consumption services may have engendered the observed stronger impact on industry than services. According to this interpretation, the worse dynamics of GDP in Northern regions could be ascribed to the

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6. For the year 2020, correlation coefficients between regional changes in per capita GDP and COVID-19 occurrence are around -0.29 and -0.30 respectively for the number of cases and deaths. With respect to per capita Value Added changes, the correlation coefficient is -0.27 with cases and -0.29 with deaths.

Figure 1 – Per capita GDP and Value Added (total, industry and service sectors) % decreases 2020/2019

A. Per capita GDP decrease %
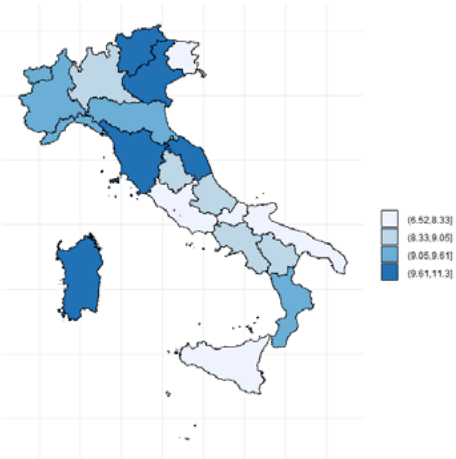
B. Per capita total VA decrease %
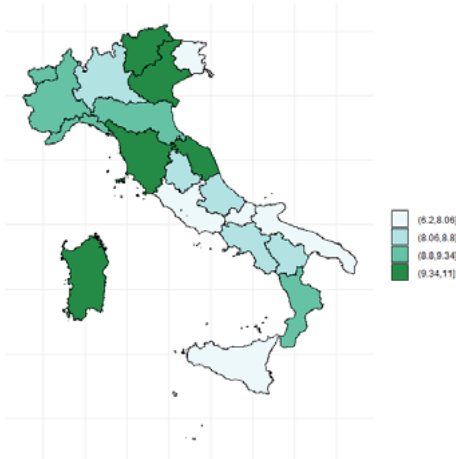
C. Per capita industry VA decrease %

D. Per capita services VA decrease %

Source: Data on regional GDP and VA are drawn from the SVIMEZ dataset.

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Table 1 – Correlation coefficients between regional performance (by rows) and regional specialization (by columns)

Panel A	% of VA in industry	% of VA in Services	Tourism	Culture	S1	S2
GDP%	-0.350* (0.065)	0.323* (0.082)	-0.233 (0.161)	-0.143 (0.274)	0.195 (0.205)	0.135 (0.285)
VA%	-0.349* (0.066)	0.326* (0.080)	-0.234 (0.160)	-0.141 (0.277)	0.192 (0.209)	0.133 (0.288)

Panel B	Industry	Services	Tourism	Culture	S1	S2
Wexp	0.300* (0.099)	-0.212 (0.185)	-0.117 (0.312)	-0.222 (0.173)	-0.422** (0.032)	-0.452** (0.023)
Wimp	0.161 (0.249)	-0.093 (0.348)	-0.211 (0.186)	-0.326* (0.080)	-0.452** (0.023)	-0.399** (0.041)

Note: Row labels GDP% and VA% denote percentage changes in per capita GDP and per capita total value added between 2020 and 2019; Wexp and Wimp are percentage changes of regional exports and imports (for the period January-September 2021 with respect to the same period of 2020), both weighted by the share of export or import on regional GDP. Column labels "% of VA in industry" and "% of VA in services" are the VA shares on total VA. Tourism and Culture are Hoover coefficients calculated as $h_{ij}=q_{ij}/q_{i0}$, where $q_{ij}=e_{ij}/\sum_i e_{ij}$, e_{ij} is the number of employees in sector i and region j, and 0 denotes the whole country; the greater h_{ij} the stronger the presence of industry i in region j. $S1$ and $S2$ are coefficients of regional specialization (dissimilarity) calculated as $S_j = 1/2\sum|q_{ij} - q_{i0}|$; the greater S_j, the more specialised the region (i.e. the more different from the average national sectoral structure). $S1$ refers to the only manufacturing industries; $S2$ to all sectors.
Directional p-values in brackets. * and ** respectively stand for 10% and 5% statistical significance. The test statistic is $r\sqrt{n-2}/\sqrt{1-r^2}$, approximately distributed as t with $n-2$ degrees of freedom, with r denoting the coefficient of correlation and n the number of observations.

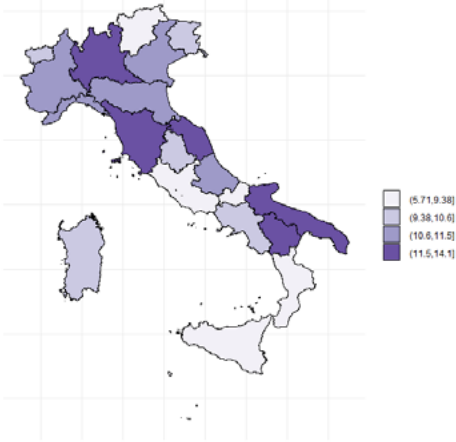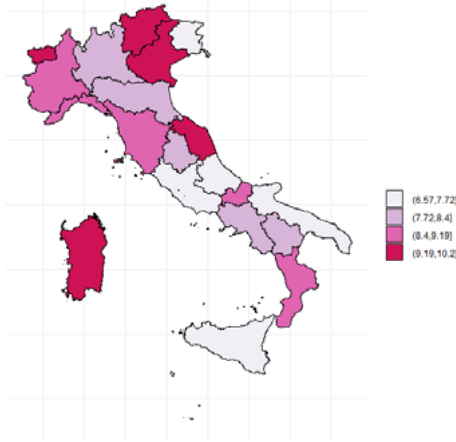*Source:* The data on regional GDP and VA are drawn from the SVIMEZ dataset; those on regional exports and imports, updated to September 2021, come from the website of the ICE-ITA agency www.ice.it/it/statistiche/short_stat.aspx. The data on sectoral distribution are retrieved from the Registro Statistico delle Imprese Attive (ASIA), available on the website dati.istat.it/OECDStat_Metadata.

bad performance of Northern industry, whereas a relatively larger presence of the services sector may have somehow protected the Southern regions.

To address this issue more in detail, Table 1 (panel A) shows the correlation coefficients of *percentage changes*[7] in regional per capita GDP and total VA between 2020 and 2019 with the regional: a) share of industry VA on total VA (at the column named *% of VA in industry*); b) share of services VA on total VA (*% of VA in services*); c) Hoover coefficients of touristic services (*Tourism*); d) Hoover

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7. Correlation coefficients between *absolute* changes in per capita GDP and VA and indexes of specialization and technology adoption have been considered as well. Since they are very similar to those calculated for GDP and VA *percentage* changes, they are not reported in Tables 1 and 2.

coefficients of cultural and sport services (*Culture*); e) industrial specialization (*S1*) and f) overall specialization (*S2*) indicators.[8] The latter variables are also considered in Table 1 (panel B) where their correlation coefficients with the rate of changes of regional exports and imports between the months of January and September 2021 and the same period of 2020 are displayed. In this way, the analysis is able to deal not only with the regional resilience, i.e. the aptitude to curb the consequences of lockdown in 2020 (panel A), but also the ability of Italian regions and macro-regions to recover from the crisis (panel B).[9]

The coefficients displayed in the first two columns of panel A confirm the indication of Figure 1 about the stronger impact of the pandemic on industry than services, as correlation between changes in GDP or VA and the share of VA in industry (services) comes out to be negative (positive) and statistically significant at 10% level. On the other hand, in panel B the last two rows show that a greater specialization in industry (services) has somehow favoured (hampered) the 2021 rebound, even if correlation coefficients are small and just in one case barely significant. As expected, in the third and fourth columns the coefficients are always negative (but never statistically significant), verifying that specialization in tourism and cultural services has to some extent aggravated the crisis and made recovery more difficult. Finally, regional specialization is also measured by an indicator assuming higher values when the regional sectoral structure is more specialized in specific manufacturing industries (S1) or sectors (S2). In Italy this occurs in the case of small (Molise, Basilicata, Aosta Valley) and less central (Sardinia, Calabria, Sicily) regions plus the capital-city region Latium. The intensity of specialization does not seem to have impacted on the severity of crisis while, in accordance with the literature (McCann, van Oort, 2009), larger industrial variety may have helped less specialised regional economies to better recover from the crisis, as shown by the negative and significant correlation coefficients displayed in panel B.

Another source of possible interregional heterogeneity is the diversity in the adoption of new technologies, the endowment of human capital and the attitude toward R&D activities. Indeed, as argued in Section 2, higher worker capabilities, better technological facilities, greater suitability to remote working, and

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8. Details on the sources of data and the construction of Hoover and specialization indexes are given in the Note to Table 1.

9. Precisely *Wexp* and *Wimp* denote percentage changes of regional exports and imports; both are weighted by the share of export or import on regional GDP. Data on the growth of regional exports and imports are used to estimate the size of the after-pandemic recovery in the absence of other more detailed information on regional GDP or VA for 2021. The choice of international trade variables is justified by the important role that in the past export has often taken in the recovery of the Italian and especially Southern economy, in the presence of a binding domestic-demand constraint.

Table 2 – Correlation coefficients between regional performance (by rows) and indexes of technology adoption (by columns)

Panel A	Internet	Devices	R&D-Exp	R&D-Empl
GDP%	0.461** (0.0204)	0.112 (0.0319)	-0.094 (0.3467)	-0.156 (0.2557)
VA%	0.463** (0.0199)	0.112 (0.0319)	-0.084 (0.3624)	0.148 (0.2667)

Panel B	Internet	Devices	R&D-Exp	R&D-Empl
Wexp	-0.254 (0.1399)	0.328* (0.0790)	0.536*** (0.0074)	0.461** (0.0204)
Wimp	0.120 (0.3072)	0.431** (0.0289)	0.355* (0.0623)	0.246 (0.1479)

Note: Row labels GDP% and VA% denote percentage changes in per capita GDP and per capita total value added between 2020 and 2019; Wexp and Wimp are percentage changes of regional exports and imports (for the period January-September 2021 with respect to the same period of 2020), both weighted by the share of export or import on regional GDP. Column labels: 100 Mb/s Internet is the share of firms using fast Internet connection (not less than 100 Mb per second); Devices is the share of firms equipping their workers with personal electronic devices; *R&D-Exp* is the ratio of firm private *R&D* expenditure to GDP; *R&D-Empl* is the ratio of firm employment in *R&D* to total employment.

Directional p-values in brackets. *, ** and *** respectively stand for 10%, 5% and 1% statistical significance. The test statistic is $r\sqrt{n-2}/\sqrt{1-r^2}$, approximately distributed as *t* with *n*-2 degrees of freedom, with *r* denoting the coefficient of correlation and *n* the number of observations.

Source: Data on regional GDP and VA are drawn from the SVIMEZ dataset. Indicators on regional exports and imports, updated to September 2021, are supplied by ICE-ITA agency at the website www.ice.it/it/statistiche/short_stat.aspx. The data on the adoption of ICT and R&D activities in Italian firms are retrieved respectively from the Rilevazione sulle tecnologie dell'informazione e della comunicazione nelle imprese and Rilevazione statistica sulla ricerca e lo sviluppo nelle imprese italiane, available on the website dati.istat.it/OECDStat_Metadata.

flexibility to changes in market conditions may have helped more advanced regions to mitigate the impact of lockdown and recover more easily.

To investigate this aspect, Table 2 reports the correlation coefficients of percentage changes in regional per capita GDP and total VA with two indicators of the degree of adoption of ICT and two proxies of the intensity of R&D. In particular, we use the regional: a) share of firms using fast Internet connection, i.e. not less than 100 Mb per second (*Internet*); b) share of firms equipping their workers with personal electronic devices such as smartphones, tablets, laptops and so on (*Devices*); c) ratio of firm private R&D expenditure to GDP (*R&D-Exp*); d) ratio of firm employment in R&D to total employment (*R&D-Empl*). Figures in Table 2 basically support our hypotheses. Focusing on statistically significant

coefficients, we can conclude that regions with more advanced productive structures in terms of ICT and R&D have undergone less disrupting effects (column 1, panel A), and better recovered (column 2, 3 and 4, panel B) from the crisis.

Finally, Table 3 aims at checking whether the regional impact of COVID-19 and the subsequent rebound can be associated to region international openness and its integration in international production networks such as GVCs. Unlike Tables 1 and 2, in this case even *absolute* changes in per capita GDP and VA are also considered (beside *percentage* changes) as correlation coefficients take considerably higher values.

As recalled in Section 2, there are a number of reasons to expect that exposure to international trade and especially participation in GVCs may amplify the shocks (both positive and negative) and therefore, in the case of the pandemic crisis, may have magnified the impulse of closures and the consequent contractionary reaction of aggregate demand. In Table 3, correlation coefficients between GDP and VA changes on one side and regional international openness and integration in GVCs on the other are reported. In particular, propensity to international operations is measured by *Openness*, i.e. the ratio of half the sum of exports and imports to GDP, while *GVC1* and *GVC2* are two indicators of regional firm participation in GVCs, respectively indicating the share of regional firms belonging to a broad-sense GVC and a relational GVC.[10]

As a matter of fact, the correlation coefficients in Table 3 have signs consistent with predictions and the previous evidence of Tables 1 and 2. Greater openness and integration in GVCs involve larger effects on GDP and VA and therefore a sharper fall in 2020, as proved by negative and statistically significant correlation coefficients in panel A. However, regions more internationally integrated are also those with greater capability to recover from the crisis, as shown by the positive, large and statistically significant coefficients displayed in panel B. Interestingly, a more qualified participation in GVCs (i.e. a higher value for the indicator GVC2) turns out to bring about worse effects in the contractionary stage and a weaker bounce during the recovery. Thus, the disruption in supply

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10. The indicators *GVC1* and *GVC2* are based on microdata supplied by the surveys on industry and production services conducted since 2006 by the independent economic research centre MET (see MET Economia | English Section (met-economia.it)). They are built up on a sample of about 15,200 Italian firms by adopting the same criterion that Agostino *et al*. (2019) use to distinguish between belonging to broad-sense GVCs and relational GVCs. In particular, in Table 3, *GVC1* is the share of firms located in the region which are in (at least) one of these conditions: a) exporter of intermediate goods; b) both exporter and importer; c) exporter or importer *and* keeping long-lasting relationships with foreign counterparts. *GVC2* is the share of firms which beside being in one of the previous conditions, is also highly involved in the conception, R&D and/or design stages of production of the final good. We do not adopt macro indicators of participation in GVCs based on value added components of inter-regional trade flows because at the regional level the last available information needed to compute these indexes refers to 2012 (Bentivogli *et al*., 2019).

Table 3 – Correlation coefficients between regional performance (by rows) and indexes of international openness and GVC participation (by columns)

Panel A	Openness	GVC1	GVC2
GDP%	-0.230 (0.1647)	-0.307* (0.0940)	-0.385** (0.0468)
VA%	-0.223 (0.1723)	-0.300* (0.0994)	-0.365* (0.0568)
GDP	-0.525*** (0.0087)	-0.601*** (0.0025)	-0.793*** (0.0000)
VA	-0.522*** (0.0091)	-0.597*** (0.0027)	-0.788*** (0.0000)

Panel B	Openness	GVC1	GVC2
Wexp	0.709*** (0.0002)	0.647*** (0.0010)	0.359* (0.0600)
Wimp	0.622*** (0.0017)	0.472** (0.0178)	0.252 (0.1419)

Note: Row labels GDP and GDP% are changes in per capita GDP respectively in absolute and percentage terms; VA and VA% are changes in per capita total value added respectively in absolute and percentage terms; Wexp and Wimp are percentage changes of regional exports and imports (for the period January-September 2021 with respect to the same period of 2020), both weighted by the share of export or import on regional GDP. Column labels: Openness is the ratio of half the sum of exports and imports to GDP; GVC1 and GVC2 are indicators of regional firm participation in GVCs, respectively indicating the share of regional firms belonging to a broad-sense GVC and a relational GVC (for further details see footnote 13).

Directional p-values in brackets. *, ** and *** respectively stand for 10%, 5% and 1% statistical significance. The test statistic is $r\sqrt{n-2}/\sqrt{1-r^2}$, approximately distributed as t with n-2 degrees of freedom, with r denoting the coefficient of correlation and n the number of observations.

Source: Data on regional GDP and VA are drawn from the SVIMEZ dataset. Indicators on regional exports and imports, updated to September 2021, are supplied by ICE-ITA agency at the website www.ice.it/it/statistiche/short_stat.aspx. GVC1 and GVC2 are constructed from data supplied by the MET surveys on industry and production services (see MET Economia | English Section – met-economia.it).

chains caused by lockdown appears to be spread out along the whole production network penalizing more the most important actors, committed with the highest value-added segments of the production process.

Summarizing, the evidence displayed in Figure 1 and Tables 1-3 points out that the effects of COVID-19 have been actually uneven across Italian regions, that specialization in industrial sectors, technology gap and international openness has made some areas more vulnerable to the crisis in 2020, but also that openness and integration in GVCs, better technological endowment and attitude to R&D have helped territories to recover faster in 2021. All these results are consistent

with the first indications of Banca d'Italia (2021) and SVIMEZ (2021a). Clearly, the observed asymmetric impact of COVID-19 across regions has a straightforward implication in terms of the Italian North-South regional divide. Given the strong diversity of Northern and Southern regions in the characteristics (specialization, openness, integration, technology) relevant to determining regional resilience and recovery, the previous analysis can be immediately translated in North-South terms: Northern regions were hit by the crisis (slightly) more but the South encountered the heaviest difficulties in recovering.[11]

4. Beyond the Rebound

So far, our discussion has focused on regional asymmetries observed during the pandemic shock and the first months of the rebound. Using the forecasts recently released by SVIMEZ (2021b), and reported in Table 4, we now take a step forward and look at medium-term perspectives,[12] considering also the impact of policies, that in the post-pandemic years will be certainly particularly important.

Overall, despite the growth slowdown which is expected to follow the 2021-2022 rebound (see Table 4), the medium-term post-COVID-19 scenario (2021-2024) should be strikingly different from the period following the 2008-2013 crisis. In that case, recession was deeper and more persistent, and the recovery much weaker in the South than in the Centre-North, with GDP increasing between 2015 and 2019 by 5.4% in the Centre-North and only 2.5% in the South. Asymmetric territorial effects of fiscal consolidation at those times were a major reason for such a diverging pattern across regions. Conversely, for the period 2021-2024 the aggregate GDP growth is estimated to be at 12.4% and 15.6% in the South and in the Centre-North respectively, with a contribution of economic policy (i.e. the estimated share of growth directly imputable to public intervention), evaluated around 48% at the national level, at 58.1% in the South and 45% in the Centre-North.

Needless to say, the new policy approach emerged in Europe is behind these figures. The pandemic has urged extensive support by national European governments during the emergency and a common European strategy for the after-COVID-19 transition. The temporary suspension of European fiscal and State Aid rules together with the introduction of extraordinary flexibility in the use of unspent

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11.   To document that North and South deeply differ in the structural variables used by the correlation analysis of Tables 1-3, a Principal Component Analysis (PCA) was carried out, aimed at grouping regions according to those variables. As shown in detail in Appendix, the results of this analysis confirm a clear North-South pattern, fully consistent with the considerations exposed in the main text.

12.   This paper was completed in February 2022, before the outbreak of the war in Ukraine. The effects of that event on European economies are unpredictable, depending on scale and duration of the war and economic sanctions imposed to Russia. Of course, the medium-term perspectives for Southern Italy may be heavily affected as well.

Table 4 – Annual % changes of GDP, private and public consumption, export and investment, 2021-2024 forecasts

	South				Centre-North				Italy			
	2021	2022	2023	2024	2021	2022	2023	2024	2021	2022	2023	2024
GDP	5.0	4.0	1.9	1.5	6.8	4.2	2.6	2.0	6.4	4.1	2.4	1.9
Total domestic consumption	3.8	2.6	2.2	1.9	4.3	3.7	2.9	2.4	4.2	3.3	2.7	2.4
Private consumption	4.6	3.2	2.7	2.3	5.2	4.5	3.4	3.0	5.0	4.2	3.2	2.8
– goods	3.7	3.0	2.4	2.2	5.7	3.2	2.6	2.6	5.1	3.1	2.6	2.5
– services	5.6	3.5	2.9	2.3	4.5	5.7	4.0	3.1	4.7	5.2	3.7	3.0
Public Administrations expenditure in goods and services	2.0	1.1	1.0	0.7	1.4	0.7	1.2	0.6	1.6	0.8	1.1	0.6
Export (a)	14.3	4.7	5.6	4.8	16.5	6.7	6.1	5.0	16.3	6.6	6.1	5.0
Total investment	11.9	11.0	7.8	6.5	13.4	13.1	6.0	5.2	13.1	12.6	6.4	5.5
– Investment in machinery, equipment and transportation mean	7,4	4,8	3,3	1,8	11.4	11.3	5.1	5.9	10.7	10.0	4.8	5.1
– Investment in buildings	14,8	14,8	10,3	8,9	15.8	15.1	7.0	4.6	15.4	15.0	7.8	5.7

Note: Oil products excluded; current prices.

Source: SVIMEZ (2021b)

European structural funds have allowed European Member States to mobilize massive public resources to counteract the socio-economic impacts of the crisis.

The unexpected radical change of direction of European institutions towards an EU common response to the crisis materialized in the Next Generation EU (NGEU), a temporary program additional to the funds of the 2021-2027 UE budget, designed to boost the recovery through the largest fiscal stimulus package ever financed in Europe. Apart from the size, NGEU presents three main groundbreaking novelties in EU macroeconomic governance. First, the European Commission borrows on the market on behalf of the European Union up to 750 billion euro (in 2018 prices) to be allocated in grants and loans to Member States that in turn use these resources to finance their national Resilience and Recovery Plans (RRPs). Second, country allocation follows needs-based rules that imply a sizeable financial support for countries facing the greatest economic and fiscal challenges as a result of the pandemic. Third, RRPs define broad packages of investments and reforms aimed at improving social and territorial cohesion, that is at reducing internal gaps among more and less advanced regions. Finally, the "new" European approach is at the core of the Italian national interest for the conditionality imposing to link national growth strategies to the reduction of regional development gaps.

In 2020 the Italian government deficit escalated to 158 billion euro (9.6% of GDP). In 2021-2022 the expansionary stance of fiscal policy will continue to give rise to large government deficits: about 99 billion euro in 2021 and 56 billion euro expected in 2022. Government deficits are then forecast to fall significantly until 2024; the composition of public expenditure will change, gradually switching from current expenditure used to support workers, household and businesses, to public investment for the implementation of the Italian RRP. In particular, outlays around 90 billion euro of public investment are estimated for the 2021-2024 period, 40% of which allotted to the South according to the plans of the Italian RRP.

SVIMEZ (2021b) forecasts that Southern regions will participate in the 2021-2022 national recovery more actively than in the past. For 2021, real GDP growth in the South is estimated around to +5%, against +6.8% in Centre-North, a slower pace to be evaluated bearing in mind the Southern structural weakness, and the fact that the recession was worse in the Centre-North. According to SVIMEZ forecasts, the recovery will continue in 2022 at a lower speed at the national level (+4,1%) but quite homogeneously across the two areas (+4,2% in the Centre-North and +4,1% in the South). If confirmed by facts, such "hand in hand" dynamics represent an unprecedented event in recent times, which would allow the whole country to recover the pre-COVID-19 GDP levels before the end of 2022, and the South to avoid exacerbation of economic dualism, typically taking place in the uphill phases of the economic cycle.

As shown in Table 4, exports and the construction (especially buildings) sector are the main drivers of GDP growth in the 2021-2022 rebound; both aggregate demand components should return to pre-crisis levels already during 2021 in the Centre-North and Southern Italy. Because of the greater openness, exports exert a stronger expansionary effect in the Centre-North than the South, while investments in construction and infrastructure boosted by policy interventions have a more significant multiplying effect on Southern local economies. In 2023 Italian GDP is expected to increase by 2.4%, precisely: +2,6% in the Centre-North and +1.9% in the South. In 2024, national growth will further decelerate to +1.9% while the Centre-North/South growth differential should remain constant around half a percentage point (+2% in the Centre-North compared to +1.5% in the South).

In this scenario, the boosting effect of policies, mainly due to public investment financed by the national RRP, becomes the main driving force of real GDP growth. In the South, this effect should be even stronger. Once gone back to the pre-COVID-19 levels of economic activity, private demand components – both domestic consumption and exports – are expected to support GDP growth in the Centre-North. In the South instead only public investment is called to play this role while private consumption is unable to sustain economic expansion. The reasons for this forecast are several; primarily the flat growth of salaries. Italian wages are among the most stagnant in Europe and this inevitably translates into an anemic expansion of consumption. Stagnation of wages is even worse in the South due to the excess flexibility in local labor markets.

Summing up, SVIMEZ (2021b) forecasts draw a picture in which on the one hand in the South public investment supports GDP growth beyond the 2021-2022 rebound, unlike what happened in the case of the past financial crisis. On the other hand, such a boost is not strong enough to start a process of regional convergence, mainly because of stagnant dynamics of private consumption and exports. Therefore, even if the South grows a little less than the rest of the country, public support prevents the worsening of the regional gap, which instead occurred in the period after the 2008-2013 crisis.

Further boost to the Southern economy should come from the contribution of policies to the re-build of additional production capacity to absorb greater shares of domestic and foreign demand. Indeed, the relatively lower ability of the Southern regions to recover is due to structural criticalities remained unsolved for a long time. These are determined, on the one hand, by dimensional deficiencies and sectoral composition, and on the other hand by an adverse context depressing employment and firm performance in terms of productivity, innovative ability and international openness. This is the field of industrial policy, which today as never before is called not only to promote competition and set rules for the proper functioning of markets, but also make choices on the allocation of resources to achieve

strategic objectives. In the post-pandemic phase, increased firm size, international openness, strengthening of supply chains, support for research, innovation and technology transfer, development of green products and technologies, digitalization, will be certainly goals to pursue for overcoming territorial gaps.

5. Conclusions

The effects of COVID-19 on the Italian economy were uneven across regions, with a slightly more severe impact in the North and a slower recovery in the South. Structural factors such as sectoral composition, propensity to remote working, availability of human capital and technology, international openness, participation in global value chains shaped regional resilience and recovery.

In particular, regional specialization in tourism and cultural services exacerbated the crisis and made recovery more difficult, but in general the pandemic impacted more severely on industry than services, while on the other hand, a greater industrial specialization favoured the regional GDP rebound in 2021. Second, regions with more advanced productive structures in terms of ICT and R&D underwent less disrupting effects and recovered from the crisis more quickly. Third, international openness and integration in GVCs involved a sharper fall of regional GDP in 2020 but also a greater capability to recover from the crisis in 2021.

The perspectives of growth after the pandemic will be importantly affected by the structural weakness of the Southern economy and the action of public policies. The latter are called not only to promote competition and set rules for the proper functioning of markets, but also to intervene on the factors of weakness of the Southern economy, i.e. to increase firm size, favor international openness, strengthen participation in supply chains, foster research, innovation, technology transfer, digitalization and the development of green products and technologies, all crucial goals to pursue in order to bridge the Italian regional gap.

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Gli effetti del COVID-19 nelle regioni italiane. Evidenza, previsioni, politiche

Sommario

Il COVID-19 ha prodotto effetti differenziati sull'economia delle diverse regioni italiane. Nonostante l'impatto immediato sia stato più forte nel Nord, le regioni del Sud hanno mostrato le maggiori difficoltà nella fase di recupero. Le principali determinanti di queste differenze vengono individuate in fattori strutturali regionali quali composizione settoriale, propensione al lavoro a distanza, disponibilità di capitale umano e tecnologia, apertura internazionale e partecipazione alle catene del valore globali. Lo studio della resilienza di breve termine è seguito da una discussione sulle prospettive per il periodo 2021-2024, che evidenzia gli elementi di debolezza dell'economia meridionale e il possibile ruolo delle politiche pubbliche nel superamento delle difficoltà post-pandemia.

Appendix

This Appendix summarizes and discusses the main results of a Principal Component Analysis (PCA) on the structural variables determining resilience and recovery of Italian regions from the COVID-19 shock. The variables of the analysis are (see Tables 1-3): Industry, Services, Tourism, Culture, S1, S2, Internet, Devices, R&D-Exp, R&D-Empl, Openness, GVC1 and GVC2.

Table A1 – Principal components. Explained variance and correlation

Panel A	Proportion of variance	Cumulative proportion
Component 1	0.514	0.514
Component 2	0.189	0.703
Component 3	0.102	0.805
Component 4	0.058	0.863
Component 5	0.043	0.906
Component 6	0.037	0.943
Component 7	0.022	0.965
⋮	⋮	⋮
Component 12	0.001	1.000
Panel B	Component 1	Component 2
Industry	-0.774	-0.198
Services	0.687	0.127
Tourism	0.652	-0.608
Culture	0.662	-0.670
S1	0.897	0.004
S2	0.859	-0.108
Internet	-0.106	0.757
Devices	-0.600	-0.090
R&D-Exp	-0.812	-0.100
R&D-Empl	-0.828	-0.036
Openness	-0.864	-0.206
GVC1	-0.852	-0.355
GVC2	-0.138	-0.897

Table A1, panel A, displaying the proportion of variance explained by each variable, shows that the first two components cumulatively explain more than

70% of variance. As a consequence, the other components are not considered in the following analysis. Table A1, panel B reports the correlation coefficients of the structural variables with the two principal components. Inspection of the first column highlights that component 1 is positively correlated to specialization in tourism and culture, as well as overall services, and regional specialization (dissimilarity) indexes S1 and S2. Instead, negative correlation emerges with indicators of international openness and technology, as well as industrial specialization. Concerning component 2, it is negatively correlated to specialization in tourism and culture, and qualified participation in GVCs, whereas positive correlation comes up with access to fast Internet.

Figure A1 – Italian regions in a principal component analysis
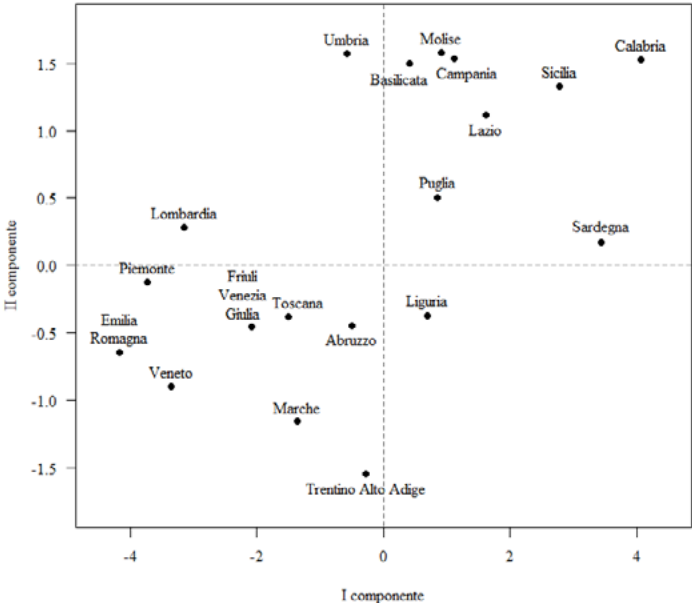
Italian regions are graphically represented with respect to the first two principal components in Figure A1. The graph displays a neat partition between Northern and Southern regions, respectively located in the lower left and upper right corner. Central regions are basically in the middle, together with Abruzzo and Liguria, while Trentino Alto Adige and Aosta Valley (the latter not reported to keep readability) are in the lowest part of the Figure, presumably because of their strong specialization in touristic services and low Internet connectivity due to the presence of mountain areas. The PCA emphasizes the geographical dualism between more developed Northern regions, characterised by industrial

specialization, international openness, a larger propensity to research and a better technological endowment, and the South, with opposite structural features.

The analysis of Sections 2 and 3 pointed out the importance of the considered variables in shaping the geographical impact of COVID-19 and the recovery of Italian regions from the crisis. The present PCA shows that Northern regions on one side, and Southern regions on the other are characterised by common features in terms of the analysed structural factors. It follows that the regions hit more seriously from the crisis were basically the Northern ones while those with the heaviest difficulties to recover were the regions of the South.

The Regional Effects of Public Spending on Active Labor Market Policies: Evidence from Advanced Economies

Jessica Faraci*, Davide Furceri°, Fabio Mazzola*, Pietro Pizzuto*

Abstract

This paper examines the regional effects of public spending on Active Labor Market polices (ALMPs). Using an unbalanced sample of 308 regions belonging to 29 OECD Economies for the period 1995-2011, we show that discretionary increases in public spending on active labor market policies at the national level have statistically significant short- and medium-term effect in reducing regional unemployment rate, while raising regional output. These effects tend to be larger during periods of low GDP growth, and when complemented by a larger share of cohesion fund expenditures.

1. Introduction[1]

The impact of COVID-19 on economic activity and employment levels has been unprecedent in terms of speed and severity. At the beginning of 2021, The International Labor Organization (ILO) estimated a striking worldwide loss of 255 million jobs as a result of the COVID-19 pandemic, with the unemployment rate rising by 1.1 percentage points – from 5.4 to 6.5 percent, and 81 million workers pushed out of the labor market (ILO, 2021). Many countries reacted swiftly in increasing support to the health sector and the deployment of vaccines, as well as significant fiscal stimulus (Deb *et al*., 2021), but worries are mounting on the scarring effects the pandemic is generating even at the regional level. The first EU-wide Annual Regional and Local Barometer (EU Annual Regional and Local Barometer, 2020) warns that the COVID-19 crisis is negatively impacting sub-national authorities'

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1.   The views expressed in this paper are those of the authors and do not necessarily represent those of the IMF or its member countries.

revenues and health systems with the risk of increasing regional disparities. Evidence from major epidemics and pandemics of the latest two decades supports this claim and suggests that the impact of health crises appears uneven across regions, with those having a poor matching in the labor market (denoted by high unemployment rates), more dependent on tourism and with a larger share of low-skilled workers being disproportionally hit (Aronica, Pizzuto, 2022).

Although regional growth and resilience are strictly affected by regional endogenous characteristics (see Capello, 2009; Martin, Gardiner, 2019; Mazzola, Pizzuto, 2020; for a broad review of studies), it is increasingly recognized that the factors determining regional performance should not be found only in each region's endogenous endowments but are also associated with some pervasive peculiarities of the national economy and its general performances and policies (Camagni, Capello, 2010).[2] In the context of the COVID-19 pandemic, active labor market policies (ALMPs) can play an important role in making regional labor markets more resilient to the current crisis as they can help displaced workers to find jobs more quickly and facilitate the matching of jobseekers with emerging job opportunities. While there is no agreed definition of the concept, the OECD defines ALMPs as aiming: "to bring more people into the effective labor force, to counteract the potentially negative effects of unemployment and related benefits on work incentives by enforcing their conditionality on active job search and participation in measures to improve employability, and to manage employment services and other labor market measures so that they effectively promote and assist the return to work" (OECD, 2003: p.132).

The effects of ALMPs have been largely assessed through both micro and macro studies. At the micro level, existing studies focus on individual behaviors, and use a range of methods to compare participants to activation programs and control groups, including experimental studies adopting random assignment of participants. The outcome variables in such studies are typically the exit rate for participants from benefits to a job and/or post-program earnings. The empirical evidence is mixed, with training programs, especially those tied to local labor market needs, being more effective than public sector job creation schemes (Martin, 2015 and references cited in therein).

At the macro level, the focus has been to understand if the policy actions are effective in reducing the structural unemployment rate, lift productivity by increasing skill-matching, increase output and strengthen resilience to exogenous shocks. Specifically, several studies (see Martin 2015, for a broad review) have shown that

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2. Recent studies have shown how both monetary and fiscal policies may have differential effects at a lower level of spatial aggregation (i.e. regions): See for example Furceri *et al*. (2019) and Pizzuto (2020) for the asymmetric effects of monetary policy, and Agnello *et al*. (2016) and Gbohoui *et al*. (2019) for the regional effects of fiscal policy.

ALMP spending seems to be effective in reducing unemployment and long-term unemployment, especially in the aftermath of negative shocks (Blanchard, Wolfers, 2000; OECD, 2009; Bassanini, Duval, 2006, 2009; Duval, Furceri, 2018).

While the effects of ALMPs have been largely assessed at both micro and macro levels, very little is known on the regional effects of public national spending on ALMPs. This paper tries to fill this gap by investigating the effects of public spending on active labor market policies on the performance of regional economies for a large sample of advanced countries. In detail, we estimate the dynamic response of regional unemployment rate and output, through Impulse Response Functions (IRFs) based on local projections of the effect of the national public spending shocks on ALMPs (Jordà, 2005). For each future period, the evolution of regional outcomes through time is regressed against our measure of shock, an autoregressive component to capture persistence, and a set of control variables. In addition, we augment the baseline specification to evaluate to what extent the impact of such spending shocks is heterogeneous across regions depending on their business cycle position and the share of cohesion fund expenditures to GDP.

We find that discretionary increases in public spending on active labor market policies have statistically significant short- and medium-term effect in reducing unemployment rate, while they raise output gradually. Consistent with the literature on time-varying fiscal multipliers at the national level (e.g., Auerbach, Gorodnichenko, 2012), we find that ALMPs spending have larger expansionary effects during periods of recession. In addition, we find that ALMPs have larger positive effects on the regional economies when complemented with cohesion fund expenditures: a larger share of cohesion funds fosters job creation and increases demand for labor (through investments in infrastructures, research and innovation, digital technologies), thus magnifying the response of regional outcomes to national spending on ALMPs. Overall, our results provide support for the important role that ALMPs can play in mitigating the adverse aggregate and regional impacts of the COVID-19.

The remainder of the paper is organized as follows Section 2 describes the data. Section 3 discusses the empirical strategy. Section 4 presents the results. Finally, Section 5 concludes discussing some policy implications.

2. Data

Our data relate to regional output and unemployment rates for an unbalanced sample of 308 regions belonging to 29 OECD Economies for the period 1995-2011. We complement the OECD data with the European Structural and Investment Funds expenditure data provided by the European Commission. Table 1 presents key descriptive statistics of outcome variables as well as of cohesion fund expenditures.

Table 1 – Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP growth (%)	3,372	2.12	3.68	-33.33	32.12
Unemployment rate change (ppt)	2,966	0.11	1.24	-4.38	8.09
Cohesion fund expenditures (% of GDP)	1,624	0.60	1.04	0.00	8.78

Data for public spending on active labor market policies (ALMPs), available for an unbalanced panel of 29 countries for the period 1995-2011, are taken from the OECD Social Expenditure database. As shown in Table 2 and Figures 1 and 2, ALMPs are quite heterogeneous across countries. Spending reaches higher peaks in Denmark and Sweden, with an average value of about 1.5% of GDP over the period under investigation. Unlike the former, in Sweden there is also higher variability in the distribution of such expenditures over the period considered. This is likely linked to the substantial policy interventions adopted to offset the negative consequences of the long-lasting recession that the country experienced in the 1990s, Conversely, countries that on average have lower ALMPs spending levels, such as Mexico or the United States, show very little variability over time, with average values of about 0.1 and 0.2, respectively.

In order to isolate discretionary spending shocks from automatic changes in spending driven by business cycle fluctuations, we follow an approach inspired by Perotti (1999) and Corsetti *et al*. (2012) and also adopted in Duval and Furceri (2018). Specifically, spending shocks are identified as innovations to economic activity as well as to expectations about current economic activity that is as the residuals from the following regression:

$$\Delta s_{it} = \alpha_i + \delta_t + \beta_i \Delta y_{it} + \beta_i \Delta y_{it}^E + \varepsilon_{it} \qquad [1]$$

in which Δs_{it} denotes the growth rate of public spending on active labor market policies; Δy_{it} is GDP growth; Δy_{it}^E denotes the OECD forecast for GDP growth at time t, made at $t-1$; α_i and δ_t are country and time fixed effects, respectively. Table 2 reports the key descriptive statistics of the spending shocks.

3. Methodology

To estimate the impact of public spending on active labor market policies on several regional outcomes over the period 1995-2011, we follow the method proposed by Jordà (2005) and estimate impulse response functions directly from local projections:

Table 2 – Descriptive statistics by Country

Country	ALMPs					Spending shocks				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Australia	17	0.38	0.10	0.29	0.72	17	-0.18	1.30	-2.63	1.67
Austria	17	0.60	0.14	0.38	0.84	17	0.14	0.66	-0.8	1.72
Belgium	17	1.20	0.16	1.02	1.59	17	0.19	0.92	-1.94	2.31
Canada	17	0.37	0.08	0.26	0.55	17	0.03	0.65	-1.40	1.15
Chile	4	0.13	0.02	0.10	0.16	2	0.00	0.22	-1.61	1.61
Czech Republic	17	0.20	0.06	0.10	0.33	15	0.00	1.28	-1.81	2.72
Denmark	17	1.74	0.23	1.34	2.26	17	0.06	0.99	-1.65	2.23
Estonia	9	0.12	0.08	0.05	0.24	3	0.00	4.68	-4.31	4.97
Finland	17	1.03	0.22	0.82	1.56	17	-0.09	0.92	-1.54	1.38
France	17	1.06	0.13	0.85	1.24	17	-0.18	0.73	-1.62	1.67
Germany	17	1.07	0.18	0.74	1.30	17	0.09	0.78	-1.54	1.14
Hungary	16	0.41	0.08	0.32	0.64	13	0.00	1.98	-5.30	2.30
Italy	8	0.49	0.07	0.41	0.63	7	0.00	0.85	-1.01	1.66
Japan	17	0.26	0.06	0.17	0.43	17	-0.02	2.02	-3.60	6.29
Korea	12	0.25	0.16	0.11	0.61	11	0.00	3.84	-5.12	8.32
Luxembourg	13	0.39	0.14	0.14	0.56	12	1.02	1.27	-1.01	3.78
Mexico	14	0.02	0.01	0.01	0.03	13	0.00	3.86	-6.12	7.39
Netherlands	17	1.32	0.16	1.06	1.55	17	0.12	0.73	-0.90	1.88
New Zealand	17	0.44	0.12	0.27	0.67	17	0.05	0.68	-1.48	1.61
Norway	13	0.76	0.20	0.55	1.25	13	-0.32	0.96	-1.83	1.37
Poland	17	0.43	0.12	0.22	0.69	15	0.00	2.36	-3.74	5.47
Portugal	17	0.6	0.08	0.48	0.77	17	-0.52	0.92	-2.17	0.84
Slovak Republic	17	0.37	0.16	0.21	0.75	11	0.00	2.33	-3.10	3.47
Slovenia	8	0.30	0.10	0.18	0.51	3	0.00	3.71	-4.20	2.80
Spain	17	0.71	0.17	0.38	0.94	17	0.11	1.37	-1.88	3.61
Sweden	17	1.51	0.55	0.85	2.44	17	-0.14	1.47	-2.14	2.59
Switzerland	17	0.62	0.10	0.47	0.83	17	-0.13	1.26	-2.58	2.21
United Kingdom	11	0.32	0.07	0.22	0.46	10	-0.18	0.8	-1.63	1.03
United States	17	0.16	0.02	0.13	0.19	17	0.16	1.23	-2.13	2.56
Whole panel	431	0.64	0.48	0.01	2.44	400	0.004	1.56	-6.12	8.32

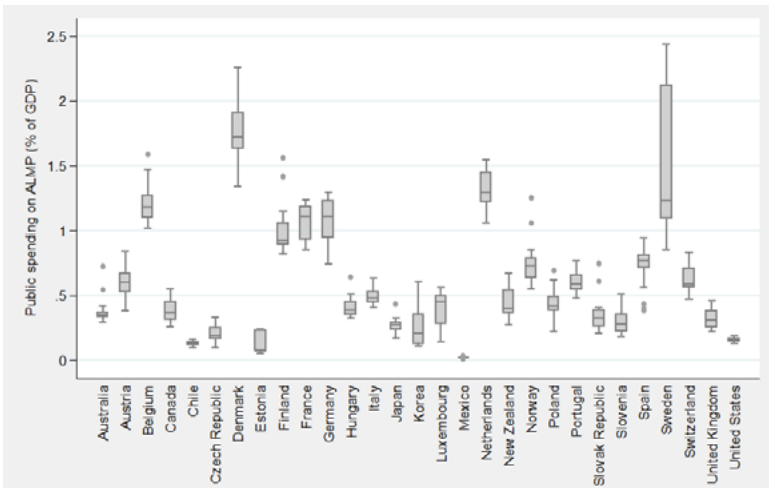*Note*: Data for public spending on active labor market policies are taken from the OECD Social Expenditure database; spending shocks are identified as innovations to economic activity as well as to expectations about current economic activity that is as the residuals from regression (1).

Figure 1 – Average differences in ALMP (% of GDP)
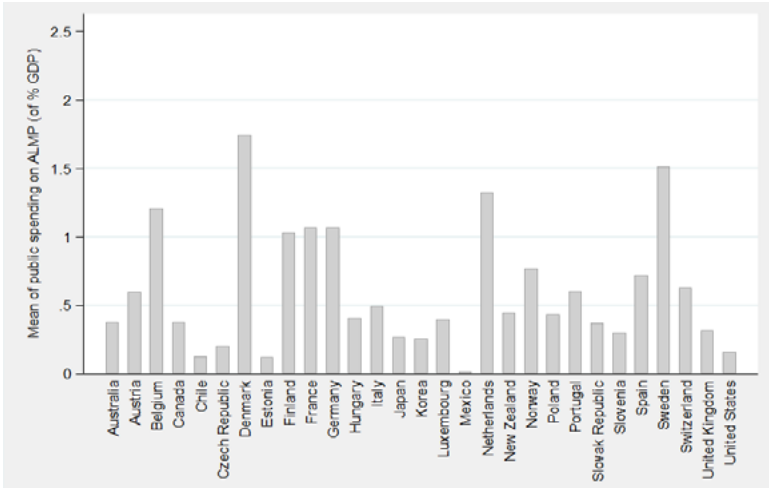
Figure 2 – Variability of public spending on ALMP (% of GDP)

$$y_{r,i,t+k} - y_{r,i,t-1} = \alpha_r^k + \delta_t^k + \beta^k spend_{i,t} + \theta^k X_{r,i,t} + \varepsilon_{r,i,t+k} \qquad [2]$$

where $y_{r,i,t+k}$ is the dependent variable of interest for region r in country i in year t (namely, the log of GDP or the unemployment rate); α_i are regional fixed effects included to control for unobservable regional specific factors which may affect regional outcomes; δ_t are time fixed effects, included to control for global shocks, as for example changes in the global business cycle; $spend_{i,t}$ denotes the spending shocks purged by any predictable component related to the current economic activity and its expectations – that is, the residuals of equation (1); $X_{i,t}$ is a vector of controls that includes three lags of the dependent variable and the spending shock.

Specifically, the local projection approach consists of running a sequence of predictive regressions – one for each time horizon – of a variable of interest on a structural shock (in our case, regional outcomes and ALMPs spending shocks, respectively). The impulse response function is then obtained from the sequence of regression coefficients of the structural shock. Thus, equation (1) is estimated for each horizon (year) $k = 0, \ldots, 5$. Impulse response functions are computed using the estimated coefficients β^k, and the associated confidence bands are obtained using the estimated standard errors of the coefficients β^k based on robust standard errors clustered at the regional level.

This baseline specification is then extended to allow the response to vary with business cycle position and the share of cohesion fund expenditures as follows:

$$y_{r,i,t+k} - y_{r,i,t+1} = \alpha_r^k + \delta_t^k + F(z_{rit})[\beta_L^k spend_{i,t}] + (1-F(z_{rit}))[\beta_H^k spend_{i,t}] + \theta_L^k X_{ri,t} + \varepsilon_{ri,t+k} \quad [3]$$

With
$$F(z_{rit}) = \frac{exp^{-\gamma z_{rit}}}{(1+exp^{-\gamma z_{rit}})}, \gamma = 1.5 \qquad [4]$$

in which, z_{rit} is a regional-level variable (i.e. economic growth or share of cohesion fund expenditures), normalized to have zero mean and unit variance, while the parameter γ controls the smoothness of the transitions from one regime to another with larger values being associated to immediate switches, and smaller ones implying a smoother transition (Auerbach, Gorodnichenko, 2012). We set $\gamma=1.5$.[3] The weights assigned to each regime vary between 0 and 1 according to the weighting function $F(.)$, so that $F(z_{it})$ can be interpreted as the probability of being in a given state. The coefficients β_i^k and β_H^k capture the regional impact of public spending on ALMPs at each horizon k in cases of lower output growth (or, alternatively, lower share of cohesion funds expenditures) – that is, when $F(z_{it}) \approx 1$ and z goes to minus infinity – and in cases of higher output growth (or, alternatively, higher share of cohesion funds expenditures) – that is, when $(1-F(z_{it})) \approx 1$ and z goes to plus infinity.

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3. Results are robust to different values of gamma.

4. Results

4.1. Baseline

Figure 3 shows the estimated dynamic response of real per capita regional GDP and unemployment rate to an unexpected increase in public spending on active labor market policies over the five-year period following the event. The shadow area denotes the 90 percent confidence interval around the point estimates. Discretionary increases in public spending on active labor market policies are found to have statistically significant short- and medium-term effect in reducing unemployment, while they raise output gradually. Particularly, a 10 percent increase in spending, generates a decrease in unemployment by about 0.1 percentage point one year after the shock and by about 0.4 percentage point after 5 years. The output effects, instead, materialize only in the medium-term with a peak effect on the level of output of about 0.4 percent after 5 years the shock (see also Table 3).

4.2. Robustness checks

We have carried out several robustness checks of these findings. The first is to include regional-specific time trends. The second is to include simultaneously in the regression several country-level control variables (proxies for the level of economic development and fiscal policy, as well as measures of trade and financial globalization) since national features may affect regional economic performances and may be correlated with shocks to ALMP spending. The results are reported in Figure 4 and are very similar to, and not statistically different from, the baseline.

4.3. Non-linear effects

The average response of output and unemployment rate to public spending on ALMPs may mask significant heterogeneity across regions depending on the position of the regions across the business cycle and the share of cohesion funds expenditures to GDP that may magnify (or crowd out) the effects of such public spending. To shed light on these issues, we re-estimate our model using equation (3). Figure 5 shows that positive shocks to spending on active labor market policies tend to have bigger effects in bad economic times. In recessionary periods, a 10 percent increase in spending increases output by about 0.5 percent in the medium term (after 5 years) – the effect is statistically significant at 5 percent – while does not have a statistically significant medium-term effect during booms. Similarly, the effects on the unemployment rate, though statistically significant

Figure 3 – Impact of public spending on ALMP on regional outcomes
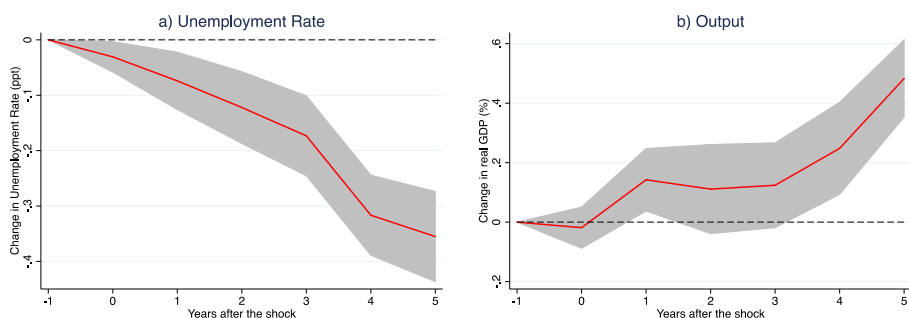
Note: The charts show the impulse response functions and the associated 90 percent confidence bands as shadow area; t=0 is the year of the public spending shock. Estimates based on equation (1) using a sample of 308 regions over the period 1995-2011.

Table 3 – Impact of public spending on ALMP on regional outcomes

	k=0	k=1	k=2	k=3	k=4	k=5
Output	-0.001	0.163***	0.132	0.119	0.196**	0.429***
	(0.042)	(0.061)	(0.085)	(0.083)	(0.094)	(0.078)
Unemployment rate	-0.036**	-0.086***	-0.142***	-0.191***	-0.332***	-0.366***
	(0.017)	(0.031)	(0.039)	(0.043)	(0.044)	(0.050)

Note: Estimates are obtained using a sample of 308 regions over the period 1995-2011, and based on $y_{r,i,t+k} - y_{r,i,t-1} = \alpha_r^k + \delta_t^k + \beta^k spend_{i,t} + \theta^k X_{r,i,t} + \varepsilon_{r,i,t+k}$. Standard errors in parentheses are clustered at the regional level. Regional and time fixed effects included but not reported. *** p<0.01, ** p<0.05, * p<0.1.

in both phases of the business cycle, are larger (i.e. greater reduction) during periods of slack than in expansionary periods.

This finding is consistent with the growing literature that points to larger fiscal multiplier effects during recessions (Auerbach, Gorodnichenko, 2012; Blanchard, Leigh, 2013; Jordà, Taylor, 2016; Abiad *et al.*, 2016; Duval, Furceri, 2018). Indeed, labor market reforms that often involve short-term fiscal stimulus, like ALMPs, have a greater payoff when economic conditions are weak.

We then examine the heterogeneity in response in relation with cohesion fund (CF) expenditures. As known, regional policy is designed to promote convergence, increase regional competitiveness, reinforce the attractiveness of lagging regions, with the ultimate goal to strengthen the economic and social cohesion

*Figure 4 – Impact of public spending on ALMP on regional outcomes –
robustness checks*

i) Regional-Specific Time Trends ii) Additional Controls
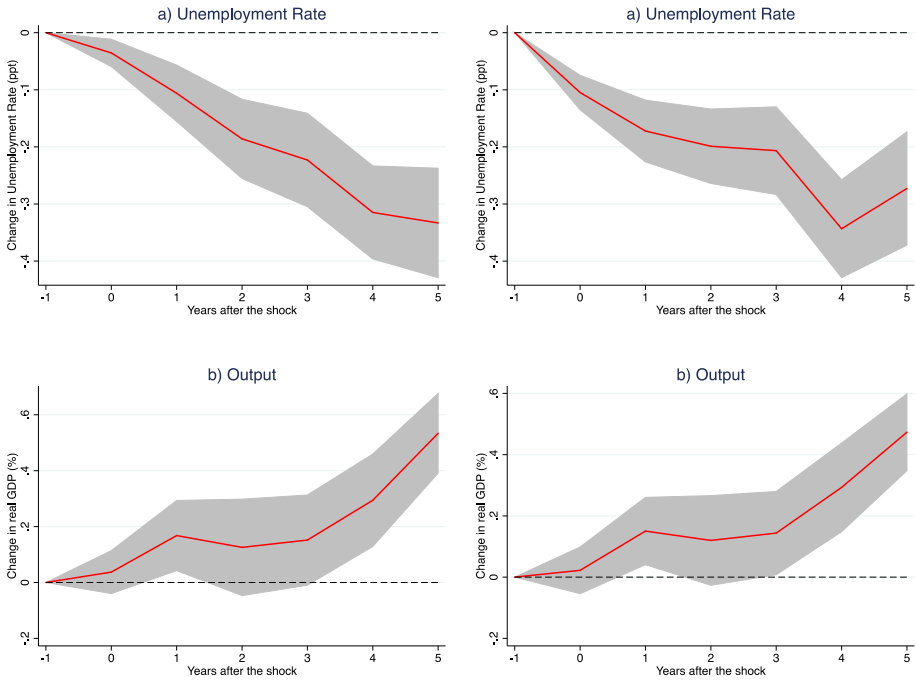
Note: The charts show the impulse response functions and the associated 90 percent confidence bands as shadow area; t=0 is the year of the public spending shock. Estimates based on equation (1) using a sample of 308 regions over the period 1995-2011

of the European Union. The empirical evidence on its role (i.e. through European development funds) in reducing regional disparities is mixed, though most of the studies tends to suggest that development funds had helped the regional convergence process (Aiello, Pupo, 2012; Ederveen *et al*., 2003; Cappelen *et al*., 2003; Furceri *et al*., 2022 we show that economic downturns are associated with a significant and long-lasting reduction in regional inequalities. Expansionary fiscal policy as well as higher share of the European development (cohesion).[4] At

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4. Boldrin and Canova (2001) and Dall'Erba and Le Gallo (2008) support the opposite idea finding non-significant effects.

*Figure 5 – Impact of public spending on ALMP on regional outcomes –
low vs high growth periods*
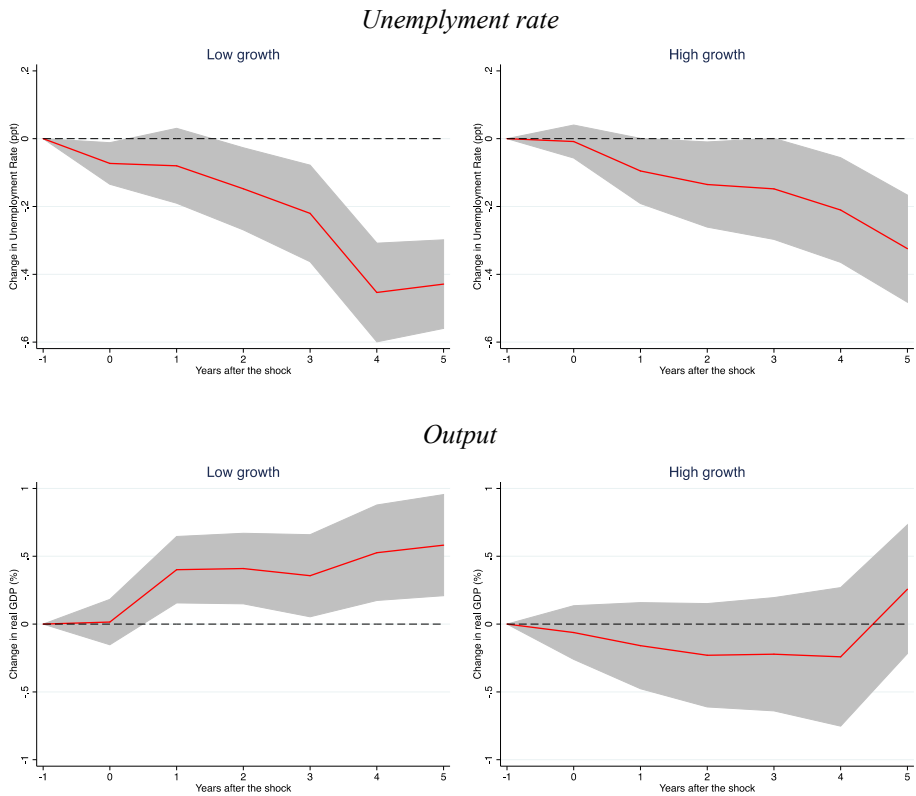
the same time, it is also recognized that cohesion policy works differently in very different local economic and social contexts (Crescenzi, Giua, 2020) but very little is known on the interaction effect between "spatially targeted" (like Cohesion Policy) and "spatially blind" policies (like ALMPs). Indeed, the effect of macroeconomic policies, may be magnified (or crowded out) by that produced by cohesion policy. To shed light also on this issue, we re-estimate our model using equation (3) with the variable z being the share of cohesion fund expenditures to GDP. Figure 6 shows that positive shocks to spending on active labor market policies are more effective in increasing output and reducing the unemployment rate when complemented by higher CF expenditures. In particular, we find that a

Figure 6 – Impact of public spending on ALMP on regional outcomes – low vs high share of cohesion fund expenditures
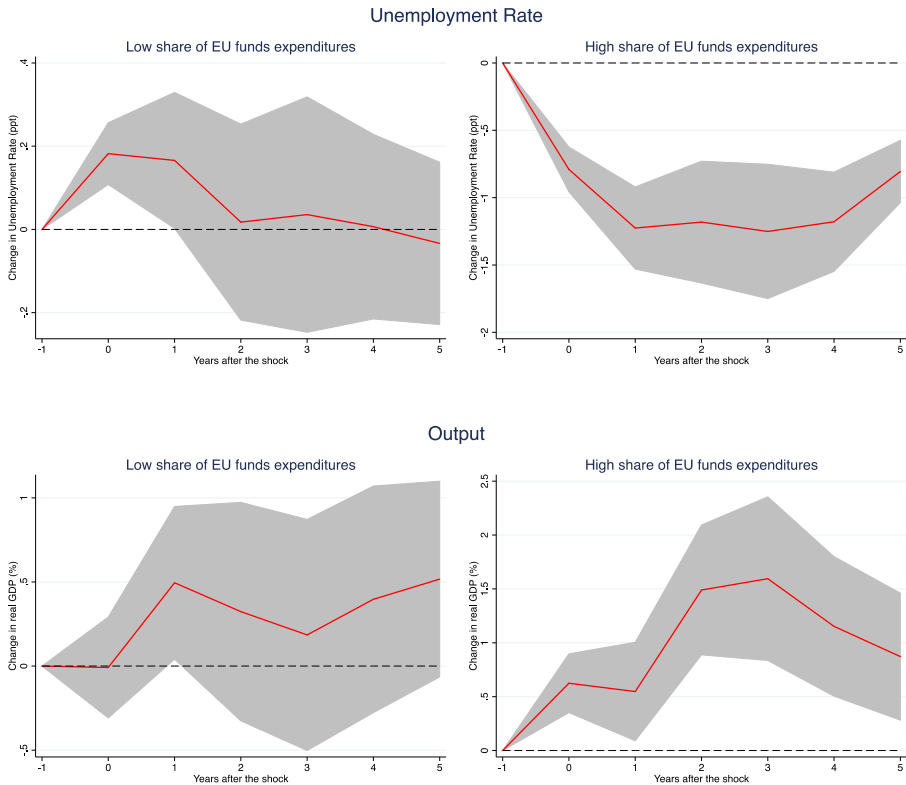
10 percent increase in spending increases output by about 1.0 percent in the medium-term (after 5 years) in case of higher cohesion fund expenditures and reduces the unemployment rate by about 1.0 percentage point. Conversely, the effects are statistically not different from zero when the share of cohesion fund expenditures is lower. These results suggest strong complementarity between ALMPs and Cohesion Policy. A potential explanation of this result is that complementing the investments in up-skilling and re-skilling of unemployed and displaced workers with the likely job creation and increasing demand for labor that can be stimulated by the expenditures related to the European funds (through investments in

infrastructures, research and innovation, digital technologies), magnifies the original response of regional outcomes to national spending on ALMPs.

5. Conclusions

In response to the COVID-19 crisis, governments are putting into place medium to long-term strategies to boost the jobs recovery and strengthen the resilience of their labor markets. While it is too early to assess the adequacy of public spending on unemployment benefits and ALMPs in response to the current crisis, such policies can have heterogeneous effects across regions even belonging to the same country. In this paper, we focus on the regional effects of public spending on active labor market policies (ALMPs) and we show that discretionary increases in public spending on ALMPs at the national level have statistically significant short- and medium-term effect in reducing regional unemployment rate, while they raise regional output gradually. Such positive effects tend to be larger during downturns, and when complemented by a larger share of cohesion fund expenditures. Our results thus provide support for the important role that ALMPs can play in mitigating the adverse aggregate and regional impacts of the COVID-19 and also on the potential complementarity between and "spatially blind" (Active Labor Market) and "spatially targeted" (Cohesion) policies.

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Gli effetti regionali della spesa pubblica sulle politiche attive del lavoro: evidenze dalle economie avanzate

Sommario

Questo contributo studia gli effetti regionali della spesa pubblica sulle politiche attive del lavoro (ALMPs). Usando un campione non bilanciato di 308 regioni, appartenenti a 29 economie OCSE nel periodo 1995-2011, mostriamo che un aumento della spesa pubblica per le politiche attive del lavoro a livello nazionale ha un effetto significativo di breve e medio periodo nel ridurre il tasso di disoccupazione regionale, aumentando l'output della regione. Questi effetti tendono ad amplificarsi durante i periodi di bassa crescita del PIL, e quando si accompagnano a più elevate quote di spesa del Fondo di Coesione.

Innovative Ecosystem and Territory in the Apulia Region

Rocco Vincenzo Santandrea*, Alessandro Lombardi*, Alfredo Lobello°

Abstract

An ecosystem made up of innovative companies is a complex environment. Innovative start-ups represent one of the fundamental components towards the creation of an innovative ecosystem (especially in the high-tech sector) and for a greater dynamism of territorial development. This work analyzes to what extend the effects of support policies for innovative start-ups, large companies and SMEs in the 2014-2020 programming period in Apulia are concentrated on the regional territory. A second objective concerns the analysis of possible elements of interaction between large, medium and small enterprises and innovative start-ups in the territories.

1. Background and Aim[1]

Regional development of an innovative ecosystem is influenced, among other factors, by the presence and the number of those large and medium-sized enterprises capable of investing in R&D and innovation in the medium-long term, by the birth rate of new technological and innovative enterprises, by their ability to survive, and by the effective long-term interaction between the different types of firms.

With reference to the development potential associated with the innovation processes of the regional production system, a recent study (Botta *et al*., 2021) has highlighted both positive aspects and difficulties of the interaction/cooperation process between start-ups and large and medium-sized enterprises. The study estimates the minimum threshold target of 250,000 euro in turnover of start-ups to develop an effective path of collaboration/cooperation with large and medium-sized companies. Below this threshold, start-ups are still in the consolidation and stabilization phase. Technological start-ups, however, constitute an

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1.   The views expressed in the paper are those of the authors and are not the responsibility of the authors' employing organizations.

important vehicle for the development of an innovative ecosystem at local and regional level, as they allow the transfer of technologies to the interconnected business system with greater timeliness than large companies, without the organizational, business and innovative culture constraints of large and medium-sized enterprises (I-COM, 2016; OECD, 2021).

Public policies supporting innovative start-ups have a decade-long history in Italy at the regional level. They help the creation of an innovative ecosystem (especially in the high-tech sectors) and support regional development. There are at least two lessons to be learned from this ten-year history of policies to support innovative start-ups. First, each territory has its own development path, which is different from that of other regions and – above all – may be different from that of other famous regions, which are often cited as examples to emulate (see the Silicon Valley). Second, despite the diversity of growth patterns, agglomeration is still a factor that fuels territorial development. The need to create agglomerations of significant size sometimes clashes with the need to promote more balanced territorial development.

Regarding the national policy supporting innovative start-ups, a recent survey (Manaresi, 2021) considers two criteria for the selection process and therefore for the effectiveness of the policy: high growth potential and probability of survival. In fact, due to the characteristics of these types of technological companies, successful ones have a high probability of survival. However, if they are truly innovative, they have an elevated risk of not making it due to financial, organizational and market sustainability problems. The policy is effective if it manages to reduce the threat to sustainability and increase the probability of survival of the technological start-up. In this light, the national policy has conducted a good targeting of the beneficiaries.

A recent study by the Bank of Italy regarding regional policies for innovative start-ups shows, on the one hand, a strong heterogeneity of interventions, which are not related to the regional production structure. The study highlights no effect of complementarity or substitution between national and regional policies emerges (Albanese *et al.*, 2019; Minister of Economic Development, 2022). In addition, the concentration of entrepreneurial initiatives seems to be linked to the presence of knowledge production centers (universities, research institutes, fab-labs), or social and physical infrastructures (Mazzuccato, 2021), from which companies can benefit. This occurs in particular in the fields of life sciences and advanced manufacturing, as well as agri-food.

Stemming from this literature, this chapter studies the distribution, across space and categories of beneficiary firms, of the EU regional policy undertaken in the 2014-2020 programming cycle in the Apulia Region. Such policies use the financial resources of the European Regional Development Funds (ERDF)

to promote local firms' competitiveness. More specifically, the Region, through these policies, have tried to pursue the following objectives:

- to develop a regional strategy aimed at strengthening a territorial ecosystem for R&D and innovation;
- to support research, development and innovation activities for large, medium and small enterprises through three measures: *Contratto di Programma* (CdP) oriented to medium and large individual companies or in groupings, also with foreign participation; *Programma Integrato di Agevolazione* (PIA) for medium and small businesses; innovative start-ups (TecnoNidi);
- to consolidate and increase employment through facilitated enterprises.

The policy supporting enterprises absorbs a significant part of the ERDF. It is a crucial element in accompanying the process of repositioning the regional production system towards productions with a higher R&D and innovation content. However, this policy has not considered the localization effects of companies that have often followed the "production history" of the different territorial areas such as the pre-existence of large and medium-sized companies. That significantly influences the localization processes of innovative start-ups.

The work analyzes: i) to what extent the companies that benefit from the public support are distributed/concentrated on the regional territory; ii) the interaction between large and medium enterprises and innovative start-ups; iii) the destination of investments among the various categories of companies in the last years is analyzed.

The chapter develops as follows. After a brief description of the Apulia business context (section 2), section 3 describes the policies under analysis. Section 4 and 5 discuss the effects of the territorial concentration of these policies.[2] Section 6 concludes.

2. Apulian Business System

2.1. Business and technology

The business system in Apulia consists of 271,363 Local Units (LU) for 843,446 employees in 2019, with an average size of three employees per LU (Table 1). The national average size is about two times higher than the regional average value in the macro manufacturing sector; the latter is significantly lower than the national one (9 employees per LU).

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2. The work takes up and deepens some results that emerged in the context of a broader research conducted by the IPRES Foundation on the Ongoing Evaluation of Smart Strategy Specialization in the 2014-2020 programming of the Cohesion Funds of Apulia Region.

Table 1 – Local Units and Employees in Apulia by technological and knowledge intensity. Average size of the Local Units per employee in Apulia and Italy – Year 2019

Macro sector	Technological and knowledge intensity	Apulia 2019 (Absolute Values)		Average size (Employees/LU)	
		Employees	*Local Units*	*Apulia*	*Italy*
Manufacturing Industry	HIT	7,900	1,220	6	11
	MHT	27,445	3,177	9	13
	MLT	38,976	5,031	8	9
	LOT	69,712	12,642	6	7
	Extractive-Energy	19,291	2,276	8	9
	Constructions	75,402	28,730	3	3
Services	HITS	28,585	5,619	5	5
	KWNMS	120,953	52,772	2	2
	Financial Services	19,792	5,896	3	4
	Other Services	435,389	154,000	3	3
Total		843,446	271,363	3	3

Source: Own elaborations on ISTAT data – ASIA

The classification of firms by level of technological and knowledge[3] intensity, shows that the employees in the manufacturing sector with high and medium-high technological (HIT and MHT in Table 1) intensity amounts to 35,345, equal to 25% of manufacturing employees and 4% of the total employees. In the field of services, high-tech knowledge intensive services (HITS) and knowledge intensive market services (KWNMS) have about 150,000 employees, equal to 25% of the employees in the services and 17.7% of the total. Thus, overall, employees in technology- and knowledge-intensive sectors account for just over a fifth of the total.

A comparison with the national situation, taken as a benchmark, allows us to highlight the technological positioning of the regional economic system. Considering the number of employees per 10,000 inhabitants, one can observe (Figure 1a) that, in manufacturing, the smallest gap (in percentage terms) concerns low-tech activities (LOT), while the gap for medium-high technology (MHT) activities is higher. In the services sector, the knowledge intensive market services (KWNMS) show the greatest gap.

In the period 2014-2019, Apulia recorded a growth path for manufacturing with high technological content (Figure 1b). There is a clearer improvement

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3. The classification uses Eurostat methodology of aggregation of manufacturing according to technological intensity and service to knowledge-intensive services based on NACE Rev. 2 at 3-digit level.

Figure 1a – Employees by technology and knowledge intensity in the LU per 10,000 inhabitants in Apulia and Italy 2019
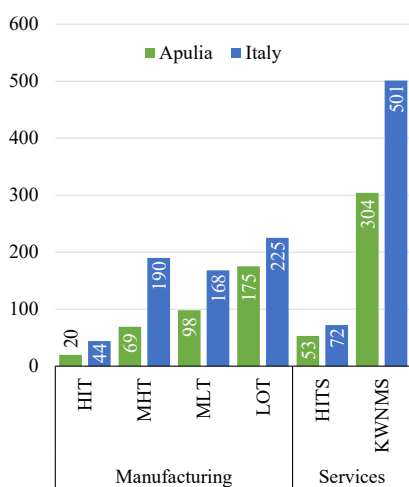
Figure 1b – % change in employees in the LU by technological and knowledge intensity. Apulia and Italy 2014-2019
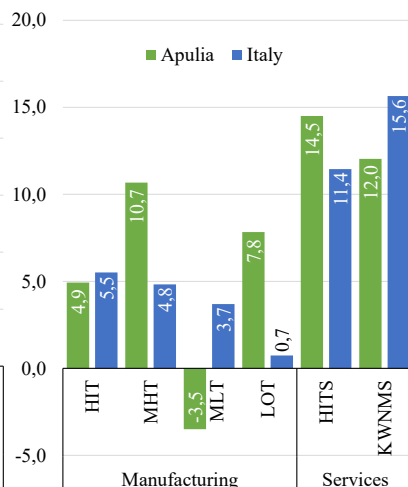
Source: Own elaborations on ISTAT data – ASIA

in MHT manufacturing, when compared to the national average. In high-tech knowledge intensive services (HITS), regional growth is above the national average, while a lower growth rate is observed in knowledge-intensive market services (KWNMS).

Employees in the high and medium technology (HIT+MHT) showed a growth rate two times higher than the total manufacturing macro-sector (9.3% against 4.9%). In services, the growth rate of employees in knowledge-intensive sectors is comparable to the overall rate.

Another aspect of particular interest is the territorial distribution of employees, due to its interrelationships with the results of the implementation of business support interventions.

The analysis of territorial distribution of LU employees uses the Local Labor Systems (LLS) as defined by ISTAT in 2011[4]. For each LLS, a comparison was made between the specialization in sectors with a high technological content of manufacturing (HIT and MHT) and specialization in high knowledge-intensive

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4. Local Labor Systems are defined by ISTAT based on the 15th population census using daily home / work trips.

Figure 2 – Relationship between employees in the high tech manufacture and knowledge-intensive services in the Apulian LLSs
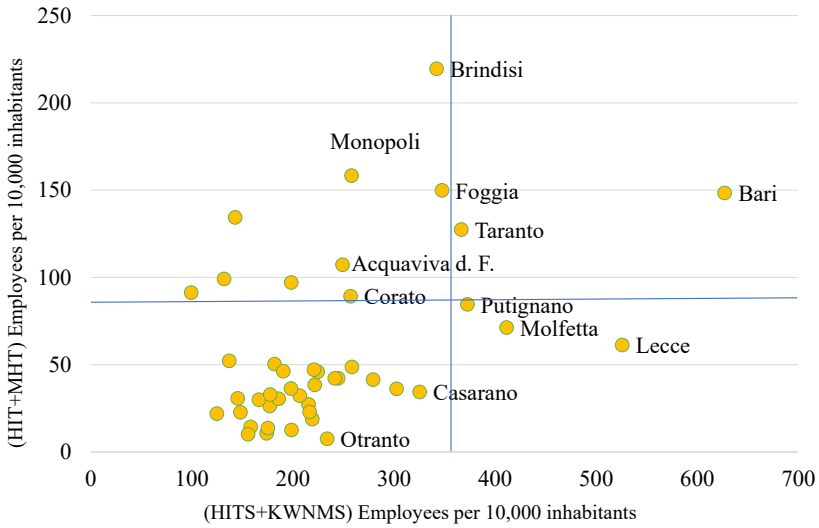
services (HITS and KWNMS). Empirical evidence on the specialization of Apulian LLSs in these two groups of activities is reported in Figure 2.[5]

Taking into account the respective regional average values, four groups of LLSs are identified. A first group has an endowment above the regional average in both components (e.g., Bari and Taranto). A second group has an endowment of employees above the regional average in the sector with a high technological content in manufacturing and a lower endowment in services with a high knowledge content (e.g., Monopoli, Foggia, Acquaviva della Fonti, Corato). A third group, much more numerous, has an endowment of employees below the regional average in the two sectors (e.g., Casarano, Otranto). A fourth group has an endowment above the regional average for the sector of high knowledge-intensive services and a lower endowment than the regional average for the sector with a high technological intensity in manufacturing.

If we consider the aggregate of in the sectors with high technological and knowledge content in manufacturing and services (Figure 3), the LLSs that exceed the regional average of employees per 10,000 inhabitants (444) are seven:

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5. The two measures of specialization are positively correlates, even if with a value of the coorelation index lower than 0.5.

Figure 3 – Employees per 10,000 inhabitants in the high tech manufacture and knowledge-intensive services in the Apulian LLSs
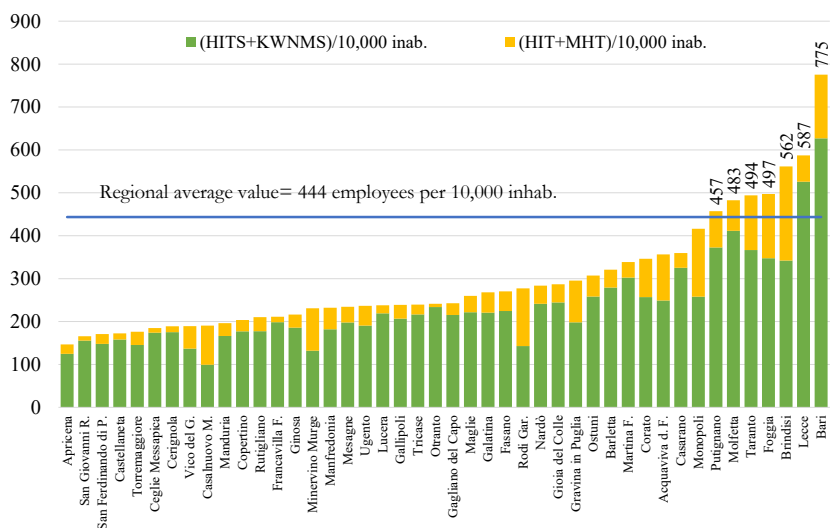
Source: Own elaborations on ISTAT data – ASIA

Bari, Lecce, Brindisi, Foggia, Taranto, Molfetta, Putignano), three of them with the presence of the respective provincial capital urban center and one with the presence of the metropolitan city (Bari).

Moving to the size of local units, Table 2 shows that the presence of medium and large sized LU (from fifty employees and more) is just 0.44% of the total (1205 LU) in Apulia which, however, employ the 21.08% of the labour force in these sectors (177,778 employees). These values are lower than the national average, which is equal respectively to 0.7% (for LU) and 28.6% (for employment).

From a dynamic point of view, on the other hand, Apulia shows (Table 2) growth rates clearly higher than the national average for LUs and employees in all size classes, for large companies.

Considering medium and large companies, seven LLSs exceed the regional average value (21.1%), as reported in Figure 4. Three of them incorporate the provincial capital urban center (Taranto, Brindisi and Foggia) while one incorporates the metropolitan city of Bari.

Figure 5 shows the geographical distribution of the LLSs specialization in technology-intensive manufacturing and knowledge-intensive services, while Figure 6 provides a map of the presence of medium and large LUs.

Table 2 – Local Units and employees in 2019 and percentage change 2014-2019

| Size class | Absolute Values 2019 | | % Change | | | |
| | Apulia | | Apulia | | Italy | |
	LU	Employees	LU	Employees	LU	Employees
< 50	270,158	665,668	1.5	6.9	–0.2	4.2
50-249	1,078	102,769	19.5	18.8	16.2	16.7
250 and +	127	75,009	29.6	28.3	19.2	18.9
Total	271,363	843,446	1.6	9.8	0.0	7.7

Source: Own elaborations on ISTAT – ASIA data

Figure 4 – Percentage incidence of employees in Local Units with 50 employees and more in the Apulian LLSs
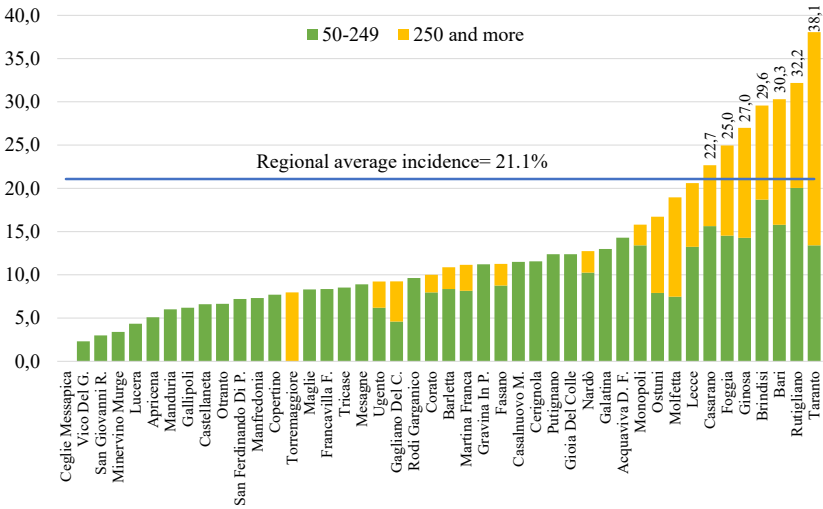
Source: Own elaborations on ISTAT data – ASIA

On the basis of the maps, we can make some considerations. First, territorial concentration of employees in technology-intensive manufacturing is higher than high knowledge-intensive services.

Four LLSs show a high concentration of employees in both sectors: three comprise the provincial capital town (Taranto, Brindisi, and Foggia) and one comprises the metropolitan city of Bari.

Figure 5 – Apulia: Employees per 10,000 inhabitants of the sectors with high technological and knowledge intensity in LLSs. Year 2019

Medium and high-tech manufacture   *Knowledge-intensive services*
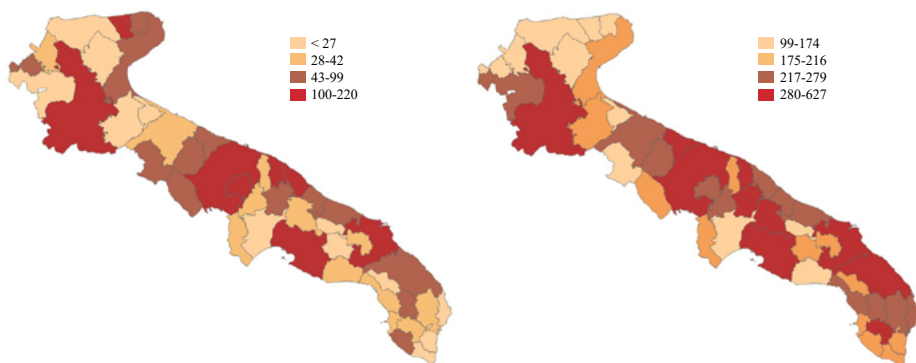
Source: Own elaborations on ISTAT data – ASIA

Figure 6 – Apulia: Employees per 10,000 inhabitants in medium and large enterprises in LLSs. Year 2019

Medium-sized enterprises   *Large enterprises*

Source: Own elaborations on ISTAT data – ASIA

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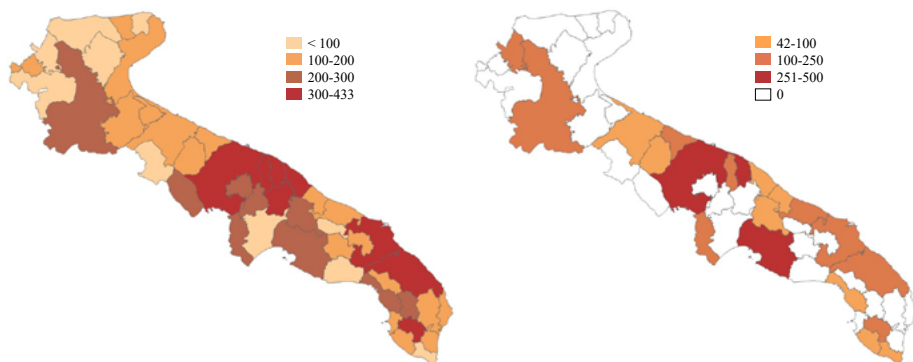
The territorial distribution of employees in medium and large-sized LUs shows a clearer territorial concentration in the LLSs that include the provincial capital and the metropolitan city of Bari. A significant presence of large companies concerns the SLLs of the North-Bari and South-Bari area.

2.2. The innovative start-ups

According to the data of the registrations in the specific register of the Chambers of Commerce extracted in July 2021, the innovative start-ups in Apulia amounted to 646 and 4.7% of the national total (1.6 companies per 10,000 inhabitants, against 2.3 at the national average level).

Figure 7 shows that the 64.1% of the registered firms started their activities in the three-year period 2019-2021. There was a strong increase in the number of start-ups from 2018 with a peak in 2020. Already in the first seven months of 2021, there were 105 new start-ups.

Active innovative start-ups are more concentrated in high-tech knowledge-intensive services (HITS, Figure 7). Moreover, more than 80% of innovative start-ups fall into the services sector. The firms that fall in the manufacturing sector amounted to 90 units (about 14% of the total), and more than half of them are classifiable in activities with high and medium-high technological intensity (HTS + MHT).

Figure 7 – Innovative start-ups by year of actual start of activity (a) and by technological and knowledge intensity (b).
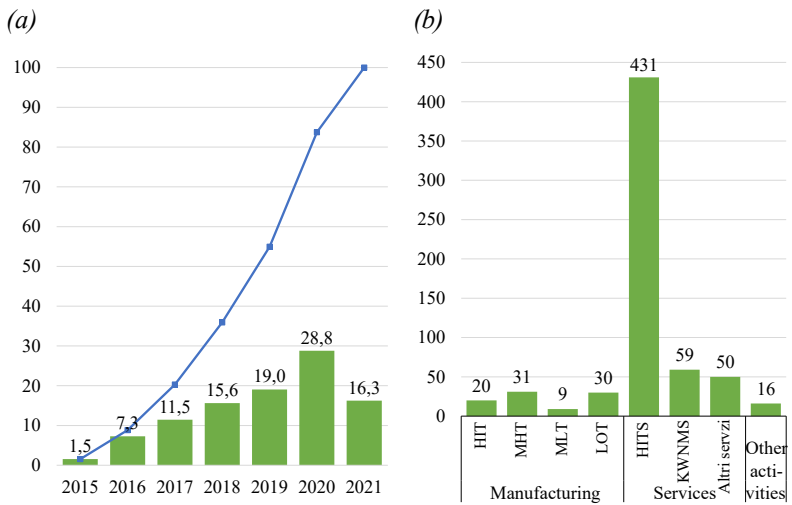
Source: Own elaborations on Innovative Start-ups Register. Data extraction as of July 19, 2021

If we consider the size of firms, and net of the unavailable data, over a quarter of the active innovative (26.9%) start-ups do not exceed four employees, while more than a third do not exceed 100,000 euro in turnover (Table 3).

However, there are also some innovative start-ups in the 20-49 employees' class and in the turnover class between 1 and 10 million euro.

As long as the spatial distribution is concerned (Figure 8), innovative start-ups are not present in five of the 44 LLSs, and they mostly concentrate in the

Table 3 – Innovative start-ups by class of employees and turnover. Percentage values – July 2021

Class of employees/ turnover	Not available	€ 0 -100,000	€ 100,001 - 500,000	€ 500,001 - 1,000,000	€ 1,000,001 - 10,000,000	Grand total
Nd	44.3	20.3	2.0	0.6	0.2	67.3
0-4	5.0	14.4	6.7	0.6	0.3	26.9
5-9	0.5	0.9	1.4	0.8	0.0	3,6
10-19	0.0	0.0	1.1	0.2	0.5	1.7
20-49	0.2	0.0	0.2	0.2	0.0	0.5
Total	49.8	35.6	11.3	2.3	0.6	100.0

Source: Own elaborations on Innovative Start-ups Register. Data extraction as of 19 July 2019

Figure 8 – Territorial distribution of innovative Start-ups: enterprises per 10,000 inhabitants, by LLSs. July 2021
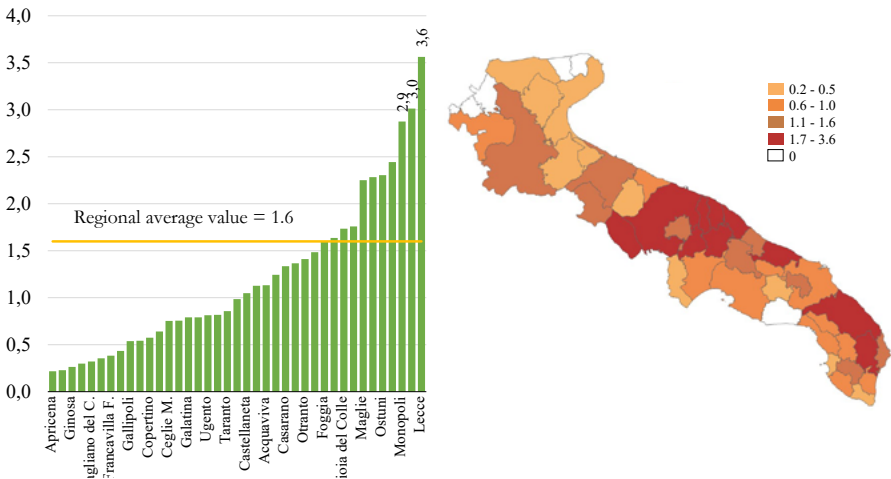
Source: Own elaborations on Innovative Start-ups Register. Data extraction as of July 19, 2021

province of Foggia. Ten LLSs exceed the regional average value (1.6 enterprises per 10,000 inhabitants); eight of these do not include provincial urban capitals. The LLSs of Bari and Lecce show the highest endowment.

3. Incentives for Business Innovation

3.1. Policy instruments

In Apulia, support for business innovation and R&D has been implemented through Contratti di Programma (CdP) for large enterprises, *Programmi Integrati di Agevolazione* (PIA) for SMEs, TecnoNidi for innovative start-ups. These policy instruments are financed by the European Regional Development Fund (ERDF)[6].

Investment programs must cover tangible assets integrated with research and technological innovation of products, processes and organization. In addition, investments in consulting services concerning the environment, social and ethical responsibility, business internationalization and e-business, as well as participation in trade fairs, may be financed. The procedure follows a negotiation process or through participation in public tenders.

The Contratti di Programma (CdP) is for large companies and for the partnership of SMEs that carry out investment programs based on the industrial project.

The PIA is for SMEs as individual firms and/or in partnership with large companies; it can also be extended to the collaboration of micro-enterprises.

As far as innovative start-ups are concerned, the support measure is "TecnoNidi". The measure is for new firms that, in the regional territory, intend to start and develop investment plans with technological content that provide for the proposal of new solutions for products and services. These new enterprises promote the economic exploitation of the results acquired through public and private research activities in the areas of innovation identified by regional planning. The measure provides for an initial allocation of 30 million euro, increased in 2020-2021 by a further 13.7 million euro. The procedure is by application, based on public notice setting objectives, presentation mechanisms and methods of evaluation of proposals.

3.2. Summary of implementation results

A summary of the main results of the intervention relating to the three measures, updated to June 2021, is reported in Table 4. The table shows a total investment (CdP + PIA) of about 2.192 billion euro, with subsidies of about 932

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6. See: Apulia Regional Regulation for aid exemption n. 17 of 2014 for aid compatible with the internal market.

Table 4 – Summary of implementation – January 2014 – June 2021

Indicators	CdP	PIA Medium	PIA Small
N. Initiatives	69	79	118
N. Firms	100	79	117
N. Firms with more than one loan	11	8	4
N. Firms with foreign capital	26	0	0
Total investment € of which	*1,234,226,347*	*504,182,669*	*454,126,107*
R&D	589,384,304	154,760,016	157,159,504
Innovation	830,450	8,447,872	9,868,740
Subsidies €	*486,894,800*	*212,656,354*	*232,623,593*
Increase Annual Work Units (AWU)	1,571	758	939

Source: Own elaborations on Puglia Sviluppo S.p.A. data

million euro granted for 266 initiatives and 296 firms. Some companies have participated in more than one initiative financed or under an appraisal process, while 26 are companies with foreign share capital.

The share of investments for R&D activities is 41% of the total, while 57% of investments are for tangible assets (such as machinery, plants, equipment and masonry).

It is important to underline the few investments that can be classified according to specific environmental objectives. In the new 2021-2027 programming of the European Structural Funds, the policy of support for investments in R&D and innovation, as well as tangible assets, must be increasingly oriented towards promoting the ecological transition or a neutral environmental impact, according to the EU Commission roadmap on 14 July 2021 (EU Commission, 2021).

The following analyses are net of the "Requests for access under evaluation" and "Expected final projects" for the *CdPs* (about 15% of the total investments) and the "Requests for access in preliminary appraisal" for the *PIAs* (about 16% of the total investments. These projects cannot become effectively operational – and thus capable of generating expenditure flows in the regional economic system – within a short time.

Figure 9 shows that investments are concentrated in companies of medium and high technology intensity manufacturing and knowledge-intensive services. High and medium-high technology companies in the manufacturing sector develop about 800 million euro of investments (42.3% of the total); while investments of about 480 million euro (26.1% of the total) concern companies with high knowledge intensive services. The CdP investments represent 66% of the

Figure 9 – Investments (CdP and PIA) in technological and knowledge intensity sectors. June 2021
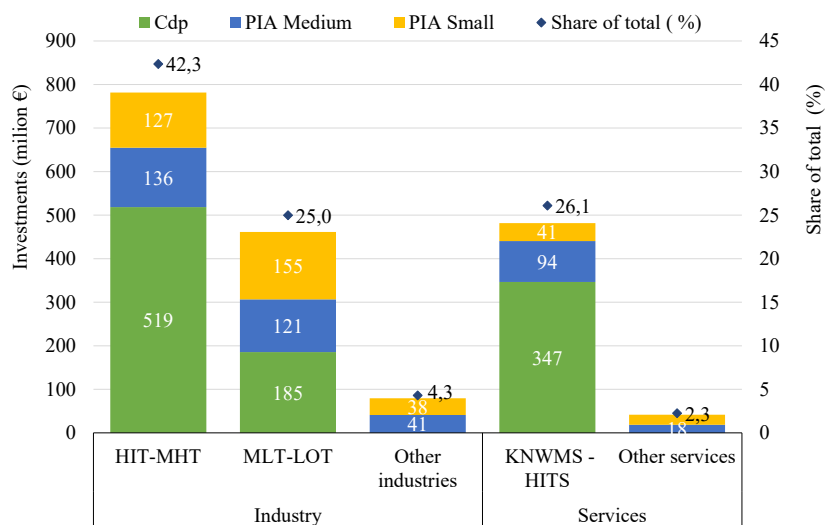
Source: Own elaborations on Puglia Sviluppo S.p.A. data. Values in the histogram bars are in million euro

total of high and medium-high technology intensity in the manufacturing sector and 72% of the total of high knowledge intensive services.

About 461 million euro of investments are developed by firms that fall into medium-low and low technology-intensive manufacturing sectors, with a similar percentage distribution among large, medium and small enterprises.

From a territorial point of view (Figure 10), the investments fall into 27 LLSs out of 44 (61% of the total), with a strong concentration in two LLSs: Brindisi and Bari that exceed 1,000 euro per inhabitant.

The investments are concentrated in five LLSs (Brindisi, Bari, Gravina in Apulia, Putignano and Monopoli) and are about 65% of the total.

3.2. Summary start-up subsidies: TecnoNidi

A specific focus on the measure TecnoNidi (Table 5) shows a total spending of 26 million euro between investments (about 15 million euro) and operating expenses (about 11 million euro). The total concessions amount to about 21 million euro, of which about 12 million euro (59% of the total facilities) are for tangible assets.

Investments in knowledge and intangible assets amount to about seven million euro (44% of investments); while about 5 million euro (47% of the total) of the operating expenses are used for qualified personnel.
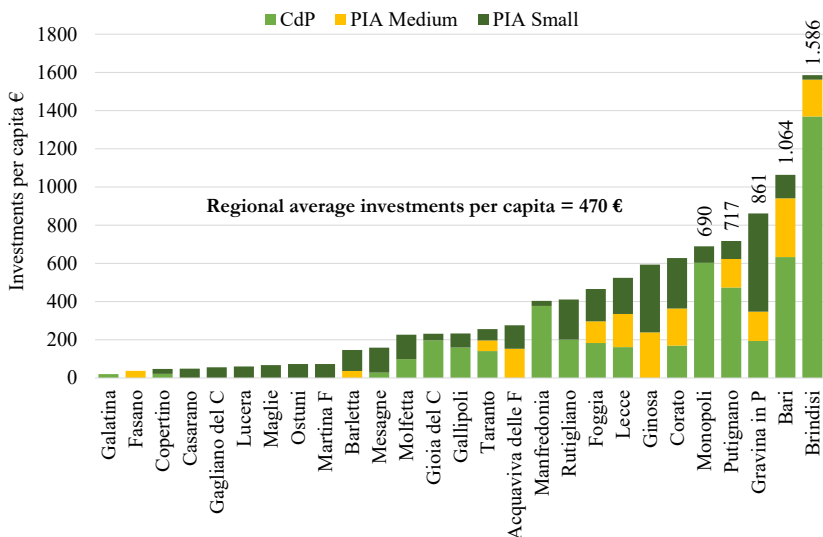
Source: Own elaborations on Puglia Sviluppo S.p.A. data

Table 5 – State of implementation of TecnoNidi. Absolute values. June 2021

	Concluded	*In progress*	*Total*
N. Initiatives/ Firms	15	98	113
Investments (€)	1,304,558	13,929,214	15,233,772
of which for Know How and intangible assets	*494,864*	*6,251,874*	*6,746,738*
Operating expenditure (€)	1,256,625	9,416,343	10,672,968
Total Facilitation (€)	2,048,946	18,652,054	20,701,000
AWU Increase	30	211	241

Source: Own elaborations on Puglia Sviluppo S.p.A. data

The number of employees, evaluated in terms of AWU, increased by 241 employees, on a starting basis of 164.

Analyzing the investments by level of technological intensity (Figure 11), the *High tech* and *knowledge intensive services* clearly stands out: it amounts to about 16.8 million euro, corresponding to two-thirds of the total. It is followed by *High and medium high technological intensive manufacturing*, which amounts to 3.8 million euro, corresponding to 15% of the total. Lastly, there is the Building Industry where only 670 thousand euro are the resources committed by the TecnoNidi measure.

Figure 11 – Investments and Operating expenditures by technology and knowledge intensity. Absolute Values (thousands of euro) and percentage share of the total. June 2021
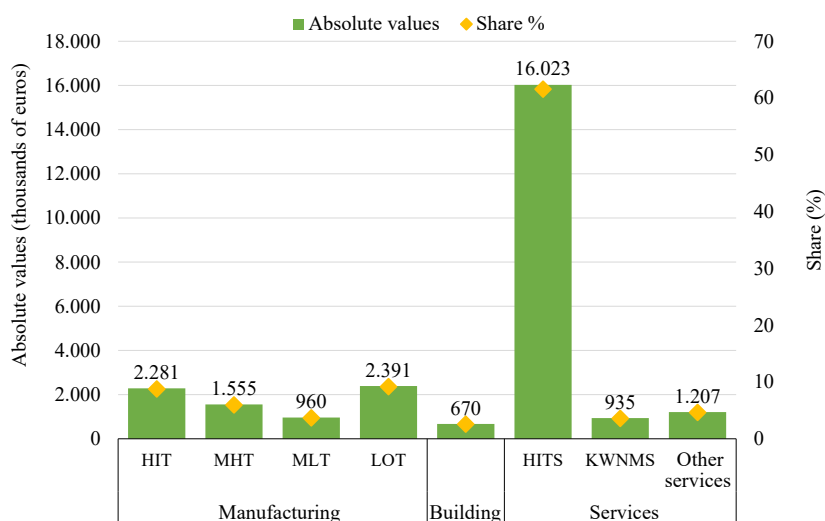
Source: Own elaborations on Puglia Sviluppo S.p.A. data

In terms of territorial distribution (Figure 12), investments for innovative start-ups fall into 23 LLSs (52% of the total); 13 LLSs exceed the regional average value of €6.6 per capita. Among the latter, only two LLSs comprise the provincial capital town (Lecce) and the metropolitan city of Bari.

4. The Spatial Association of Investments and Firms' Characteristics

We investigate the association between public investments and the characteristics of the local firms, with respect to size and presence of start-ups through the correlation matrix of following seven variables.

1. Invest. CP = CdP+PIA (investments per capita in euro);
2. Invest. TEC = TecnoNidi (investments per capita in euro);
3. MI = Medium Enterprises (employees per 10,000 inhabitants in LU with 50-249 employees);
4. GI = Large Enterprises (employees per 10,000 inhabitants in LU with 250 or more employees);
5. HMT = HT(high-technology) + MHT (medium-high-technology) (employees per10,000 inhabitants);

Figure 12 – Investments and Operating expenditures per capita for Apulian LLSs. Values in euro. June 2021
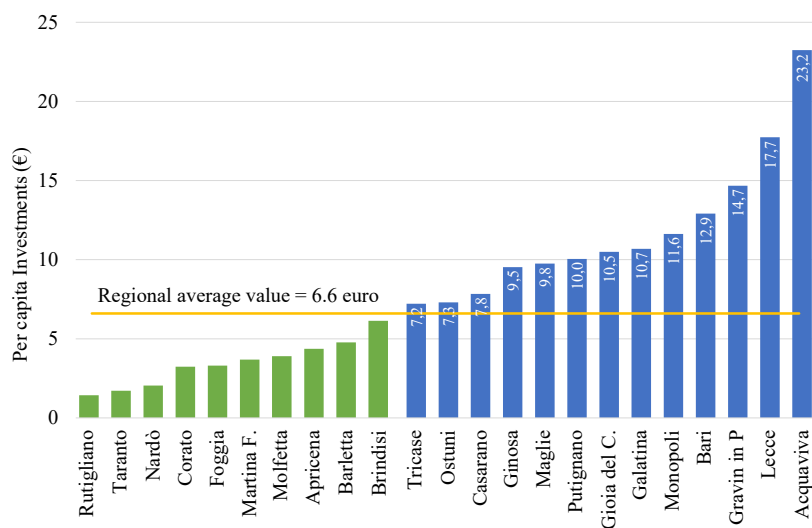
6. HKS = HITS (high-tech knowledge-intensive services) +KWNMS (knowledge-intensive market services) (employees per 10,000 inhabitants);
7. Start-up = Firms per 10,000 inhabitants

The first two variables represent per capita public investment of the measures analyzed. These two variables were associated with the other five variables concerning the main characteristics of the LUs established in the regional territory in terms of:

- company size: the number of employees per 10,000 inhabitants by size of Local Unit – Large Enterprise (GI) was considered for LUs of 250 employees and over; Medium Enterprise (MI) for LUs between 50 and 249 employees;
- high and medium-high-technology in the manufacturing industry (HMT); high-tech and knowledge-intensive market services (HKS): employees per 10,000 inhabitants per Local Unit were considered;
- start-ups listed in the national register of innovative start-ups: number of firms per 10,000 inhabitants

The results of a correlation analysis among these variables is reported in Table 6. The *CdP and PIA* (Invest. CP) measures show a high correlation with the variable relative to LUs employees of high and medium-high technology intensity in the manufacturing sector. Furthermore, there is a high correlation with medium-sized enterprises but low in relation to large enterprises. These results

Table 6 – Correlation Matrix

	Invest. CP	*Invest. TEC*	*Empl. ME*	*Empl. GI*	*Empl. HMT*	*Empl. HKS*	*Start-up firms*
Invest. CP	1.00	0.13	**0.61**	0.27	**0.79**	0.41	0.27
Invest. TEC		1.00	0.20	0.02	0.14	0.19	0.48
Empl. ME			1.00	**0.50**	**0.55**	**0.67**	**0.59**
Empl. GI				1.00	0.40	**0.54**	0.17
Empl. HMT					1.00	0.45	0.40
Empl. HKS						1.00	**0.61**
Start-up firms							1.00

Source: Own elaborations on Puglia Sviluppo S.p.A. data, ISTAT – ASIA, Innovative Startups Register

suggest that this type of public investment occurs in those areas where there are companies with high technology and intensive knowledge of services and medium-sized companies.

The TecnoNidi (Invest. TEC) measure shows a good correlation, albeit lower than 0.50, with the territorial distribution of innovative start-ups. Instead, there is no correlation with large companies, and a very low correlation with the other variables considered. This result could mean that the innovative start-ups financed with this type of measure seem to follow different localization paths.

It is worth underlining how, on the other hand, the start-ups listed in the national register of innovative star-ups show a high correlation with service companies with high technological and knowledge content (HKS) and with medium-sized enterprises (MI).It should also be considered that, in the national scenario, over 0.73 of innovative start-ups fall in just 7 regions (Lombardy, Piedmont, Veneto, Emilia Romagna, Tuscany, Lazio and Campania), so the concentration of companies with high technological intensity is found where the entrepreneurial fabric and the research system is more structured and where a certain entrepreneurial capacity is evident[7].

5. Discussion of the Main Results

Regional policy supporting research and innovation has allowed us to highlight a difference between medium and large enterprises and start-ups of technological

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[7]. 65% of the top 50 Italian provinces where the greatest entrepreneurial activities are recorded, belong to the regions indicated (cf. Institute for Entrepreneurship and Competitiveness-LIUC, Index of entrepreneurial ferment 2021, www.liuc.it)

enterprises from a territorial point of view. Support for medium and large enterprises tends to strengthen the system of enterprises with medium and high technological and knowledge content already present in the region. The efficiency factors are therefore strengthened through the process of accumulation, concentration and territorial agglomeration. Furthermore, large enterprises seem to find proximity less important than the medium enterprises (Arundel, Geuna, 2004).

The "territory" dimension – as a target of enterprise innovation support policies – does not seem to be a fundamental factor, despite having promoted eight technological cluster districts in Apulia[8].

The technological start-ups benefiting from the support policies show very different localization processes from those of medium and large enterprises with high technological and knowledge content. The proximity dimension seems feeble in relation to large companies, but of some importance due to the presence of other technological start-ups.

Overall, the empirical analysis has shown that the "territorial" dimension has remained rather unstable for the intervention actions analysed in this work (Caloffi *et al*., 2014). The options have been designed in relation to technological areas and to the ability to develop research projects by large and medium-sized enterprises.

However, this consideration is incomplete if we do not also consider the other policies that support technological innovation and businesses in a more general sense. In fact, the regional policy of support for technological innovation has been substantially articulated around the following axes of interventions: Research and development of innovation, technology transfer, networking of companies and research organizations, financing cooperative industrial research and experimental development projects of products / processes, and aid for the creation of new technology companies (Banca d'Italia, 2014).

Another set of business support interventions had more general and multi-sectoral characteristics. Support is also provided for start-ups with no technological content and with greater ease of access for disadvantaged people (Nuove Iniziative d'Impresa – NIDI)

All these interventions were able to mitigate processes of expansion of sub-regional territorial imbalances by increasing the internal diaries.

However, it should be emphasized that even in these cases the "territorial" factor, intended as a target, is quite negligible.

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8. DTA – Distretto Tecnologico Aerospaziale; MEDISDIH – Distretto Meccatronico Regionale e Digital Innovation Hub Scarl; D.A.Re. Scrl – Distretto Agroalimentare Regionale Soc. Cons.R.L.; DHITECH Scarl – Distretto Tecnologico High Tech; DITNE – Distretto Tecnologico Nazionale Energia; RITMA – Rete per l'Innovazione e le applicazioni dei materiali avanzati nell'industria manifatturiera italiana; H-BIO Puglia Scarl; INNOVAAL scarl;

Another aspect to consider concerns the opportunity to encourage, through digital services, the spread of the innovation ecosystem in peripheral areas. In fact, experimental initiatives are underway in economic sectors considered more linked to tradition or the Soft Economy, such as agriculture and the small agri-food industry, as well as crafts and tourism[9]. These initiatives are also receiving first signs of attention from corporate venture capital. Mazzucato (2020) noted: "*All the attention given to small businesses stems mainly from a confusion between size and growth. The most reliable data available indicate that it is not so much the small businesses that are important, but the young growth companies*".

To balance endogenous capabilities and exogenous resources in a context articulated by places and subjects, it would be necessary to provide tools aimed at the growth (and not only at the birth) of innovative start-ups and the hybridization between innovative start-ups and the entrepreneurial fabric.

This strategy could overcome the misunderstanding outlined by Mazzucato (2020) and limit the dispersion of resources in projects that are not capable of spreading innovation.

6. Conclusions

The territorial distribution of firms subsides shows a complex situation in Apulia. On the one hand, firms subsidized by CdP and PIA are localized mainly in the territories where there are already small, medium and large enterprises with high and medium-high technological and knowledge intensity. This phenomenon can be explained using two models, that can be interpreted in a complementary way: the model of "cumulative causation" of development à la Myrdal, which analyzes the conditions of the persistence of territorial gaps; and the model of path dependence[10], which highlights the importance of the history of the economic-productive system of a territory (dimensional biodiversity of companies, production diversification vs. domination of large specialized companies, R&D orientation, social and territorial roots of the company). Both approaches, for different reasons, would lead the policies to strengthen the places that were already stronger before the policies – at the same time – to leave behind the territories that were more marginal.

On the other hand, the firms financed by the TecnoNidi measure are more widespread in the territory and follow the pattern of innovative start-ups listed

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9.   From pioneers of innovation to serial entrepreneurs: see for example the IC406 thematic incubator created in Bari by Auriga SpA and the digital nursery space, animated by Macnil and Adatravel in Gravina in Apulia

10.   For the complexity of using this model and for misunderstandings see among others Page S.E. (2006).

in the specific register of Chambers of Commerce. The latter, then, show a pattern connected more with medium-sized enterprises and with employees of high technological and knowledge-intensive services.

Policy instruments for large firms, SMEs and innovative start-ups seems to have supported this phenomenon, highlighting the need of territorial rebalancing in support for productive activities.

For the development and consolidation of an innovative ecosystem, it should be noted that large companies make use of R&D and innovation activities more easily within the group, especially for R&D and innovation activities, compared to SMEs; while confirming the role of innovative start-ups in the activation of partnerships at local level with other companies, especially medium-sized ones, and with other regional public research and innovation bodies.

There are significant differences in the destination of investments between large firms and innovative start-ups. The former invests more in innovations related to Big Data and Technology Integration; the latter invest more in the Integration of technologies, the Internet of Thinks and the Cloud.

A further aspect to be considered more carefully is the possibility of developing cooperation/ partnership relationships of large and medium-sized enterprises with innovative start-ups. Very few start-ups in Apulia have a turnover of more than 250 thousand euro, which is a starting target for forms of partnership/ cooperation with large and medium-sized companies. Finally, the culture of collaboration[11] and the promotion of open innovation have yet to spread in the business environment[12] but the challenges posed by the pandemic crisis and climate change are questioning the modus operandi of "small is beautiful".

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11. Bessen J. (2022) noted the difficulties of the relationship between large companies and start-ups, also because of the consideration that the most important new technologies are proprietary, accessible only to a small number of large companies.

12. The Sixth Observatory Open Innovation and Corporate Venture Capital (Innovup, Assolombarda, 2021), announces that the 67,2% of the corporate members of the start-ups are concentrated in the North, where 54% of the corporate partners of the start-ups are localized, 3% of enterprises innovative. For the Apulian and Southern context, it is interesting to note that 80% of investors are PMI.

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Ecosistema innovativo e territorio nella Regione Puglia

Sommario

Un ecosistema formato da imprese innovative costituisce un sistema complesso. Le start-up innovative rappresentano una delle componenti fondamentali per la creazione di un ecosistema innovativo (specialmente nei settori high-tech) e per lo sviluppo territoriale. Questo studio analizza in che misura gli effetti di politiche di supporto a start-up innovative, grandi imprese e PMI della regione Puglia nel periodo di programmazione 2014-20 sono concentrati territorialmente. Il secondo obiettivo riguarda l'analisi dei possibili elementi di interazione tra imprese grandi, medie e piccole e le start-up innovative nel territorio regionale.

Part 3

Policies and Disparities in the post-COVID Era

Challenges Ahead for Territorial Policies in the Context of the New EU Investment Programmes

Andrea Conte*, Francesco Molica°

Abstract

In response to the crisis caused by the pandemic, the European Commission launched the Recovery Plan for Europe in May 2020, now referred to as Next Generation EU (NGEU). Among its main highlights, the strong thematic directionality towards the green and digital objectives and the governance at the central level have important implications for territorial policies, in particular with regards to the European Structural and Investment Funds (ESIF) and their future. This paper will discuss these issues with a focus on Italy by complementing available statistical information on investments under both the 2014-2020 and new 2021-2027 programming periods.

1. Introduction[1]

Since the beginning of 2020, the COVID-19 pandemic is causing an unprecedented economic crisis worldwide. As a result, EU economic growth sank at -5.9% in 2020. Following a recovery by around 5% in 2021, the EU economy is now expected to grow by 4% in 2022, as in the euro area, and by 2.8% in 2023 (European Commission, 2022a, Winter Economic Forecasts, 2022). In response to the crisis, the European Commission launched the Recovery Plan for Europe in May 2020, now referred to as Next Generation EU (NGEU). NGEU is a €750 billion (in 2018 prices – above €800 billion in current prices) temporary recovery instrument aiming at repairing the economic and social damage caused by the COVID-19 pandemic.

This paper will describe the main differences and complementarities between the NGEU and the European Structural and Investment Funds (ESIF). By

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1. The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

providing evidence on the implementation of ESIF in Italy in the 2014-2020 programming period, this paper discusses potential implications in terms of funding implementation of different governance settings across policies. In particular, implementation evidence gathered by the authors indicates that a decentralized governance and a strong place-based logic are critical to achieve more efficiency in the spending of EU funds.

2. Recovery and Resilience Facility versus Cohesion Policy

Since the Single European Act in 1986, the then-called European Community (now European Union) recognizes the strengthening of economic and social cohesion among its major policy objectives. As a result, cohesion policy has been progressively implemented since the mid-1990s. The related regulatory framework has changed over time – for instance – with the explicit inclusion of the third dimension of cohesion (territorial cohesion) in the Lisbon Treaty and the EU's policy strategy Europe 2020.

Table 1 below describes the current structure of the EU budget – including thematic headings (and allocations). This was due to operate alone in the foreseen 2021-2027 EU multi-annual financial framework (MFF) when the COVID-19 crisis abruptly erupted in 2020. The major health, social and economic crisis led to a coordinated economic response by European Member States via the establishment of the Next Generation EU (European Commission, 2020a). Its centerpiece is the

Table 1 – The EU's 2021-2027 long term Budget & Next Generation EU

Single Market, Innovation and Digital
149.5 (+ 11.5 from NGEU)

Cohesion, Resilience and Values
426.7 (+ 776.5 from NGEU)

Natural Resources and Environment
401 (+ 18.9 from NGEU)

Migration and Border Management
25.7

Security and Defence
14.9

Neighbourhood and the World
110.6

European Public Administration
82.5

Total
€2.018
trillion

Total: €2.018 trillion

NextGenerationEU
806.9

Long-term budget
1 210.9

Source: European Commission, 2021b

Recovery and Resilience Facility (RRF), with €672.5 billion in loans and grants (in 2018 prices) available to support reforms and investments undertaken by EU Member States. This comes on top of the foreseen budget for the seven-year EU multi-annual financial framework (MFF 2021-2027). As a result, the budget available raises above €2 trillion of funding over the entire programming period.

The Next Generation EU instrument is a major breakthrough in many respects. First of all, it has marked a paradigm shift on the revenue side of the EU budget by allowing the Commission, albeit temporarily, to borrow directly from the financial markets. The resulting debt is planned to be repaid by introducing new own resources whilst the strong interest and excellent ratings achieved with the first EU issuances show potential for making the mechanism (or part of it) permanent (Christie *et al*., 2021). Equally important is the influence that the NGEU, in particular the peculiar structure and delivery aspects of its main funding stream, will exert on the EU spending programmes in the future. Some elements of the RRF might become indeed common across other EU programmes in the post-27 MFF (European Commission, 2021a). As a result, the use of the RRF as a blueprint for future EU investment instruments is already gaining traction in the debate on the reform of the EU fiscal framework (Rubio, 2022)[2]. Cohesion Policy stands to be the most prominent candidate for a potential cross-contamination with the Recovery and Resilience Facility as the two funding streams have similar objectives and thematic commonalities (for instance, the similar regulatory framework under Heading 2 – Cohesion, resilience and values – of the European budget). However, the RRF is not the only component of the NGEU that may affect cohesion policy in the future. The junior instrument in the framework of the package is the REACT-EU, whose funds (€47.5 billion) have been channelled into existing cohesion policy programmes. Despite being overall subject to cohesion policy provisions for the period 2014-2020, the REACT-EU sits on a governance and operational aspects that are entirely novel for the cohesion funds. Because of the considerations above, this paper seeks to answer two questions. How the NGEU can influence the future governance of cohesion policy? Will this make cohesion policy more efficient? On the one hand, a trend towards centralizing certain aspects of ESI funds is already visible in the 2021-2027 regulations. On the other hand, the implementation experience of the RRF might have a bearing on the future design of ESI funds, leading to further centralization/nationalization.

As the centerpiece of Next Generation EU, the Recovery and Resilience Facility has been established on a temporary basis and with a specific purpose: support the recovery from the coronavirus pandemic by driving a structural transformation in the economy, especially towards delivering the so-called "twin transition" (digital

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2. There is a clear hint of this in the EC Communication accompanying the re-opening of the review of EU economic governance.

and green transition). It is important to notice that the NGEU highlights the need of strong directionality in economic policy towards these wide dual societal and economic objectives which represent the backbone of both the reforms and the funding lines identified in the national Recovery and Resilience Plans (RRPs) submitted in these months by Member States (European Commission, 2022b). Under the RRF, EU Member States have to submit national plans that spell out reforms and investments they plan to implement with the support of the available resources. More specifically, each RRP will have to include at least 37% of expenditure for climate investment and 20% of expenditure for digital transition. However, it is important to indicate that these objectives are not new per se to EU policies since they were intrinsically embedded into the thematic objectives of cohesion policy in the past and current programming period (European Commission, 2013). As a result, complementarities/synergies between policies will be highly relevant when assessing the path towards the "twin transition". Beyond the thematic orientation, several aspects are worth mentioning when focusing on territorial implications. First, since the very beginning (May 2020), NGEU has been presented has the largest stimulus package ever financed through the EU budget to respond to this pandemic-induced crisis – characterised by heavy macro-economic effects of highly heterogeneous shocks across EU sectors and territories (Conte *et al*., 2020).

On the one side, the design, governance and delivery mode of the RRF include dimensions that are novel compared to other EU existing spending programmes directed towards EU member states, notably cohesion policy (Corti, Nuñez-Ferrer, 2021). First, the RRF is totally performance-based with disbursements linked to the achievement of pre-agreed results. On the contrary, payments under other EU funds, including cohesion policy, remain largely based on actual costs incurred. Second, the RRF provides a clear and direct link between the European Semester and the EU fiscal capacity (Nguyen, Redeker, 2022) whereby the conditionality is centered on the implementation of reforms identified in Country Specific Recommendations (CSRs) (European Commission, 2020b). Although the relationship between cohesion policy and the European Governance Framework was strengthened throughout the past two programming periods, the experience accumulated so far does not suggest such a straightforward link between the two policy frameworks. Third, the delivery mechanism of the RRF bears similarities with the "budget support" mode used by the EU for external (third countries) aid. Contrary to shared management programmes (such as ESIF), the funding under the RRF is implemented essentially in accordance with the beneficiary's country financial management and monitoring system. Fourth, the governance of the RRF is centralized at the level of Member States. Contrary to cohesion policy, there is no direct requirement for Member States to involve local and regional authorities and social/economic partners in the design and

implementation of the National Recovery and Resilience Plan (NRRP). Member States shall only abide by a general obligation to provide in the plans a description of how these actors were consulted. This is a very different concept from the partnership principle underpinning the entire design of cohesion policy. Indeed, the degree of consultation varied significantly among Member States in preparation of their NRRPs. Last, the RRF does not entail a sub-national territorial dimension: its allocation methodology relies on national data whereas cohesion policy envelopes depend on NUTS2 data. In addition, Member States enjoy full discretion as to the domestic distribution of RRF resources while cohesion policy funds are bound to a territorial earmarking (per category of regions).

On the other side, despite these major differences, the RRF and cohesion policy bear strong commonalities in terms of priorities and regulatory frameworks (Dozhdeva, Fonseca, 2021) RRF resources are embedded into Heading 2 (Cohesion, resilience and values) of the EU budget – the same heading of the European Structural and Investment Funds (ESIF). This has important implications in terms of the established legal framework and financial regulations for the implementation of the different programmes (European Commission, 2020c). For instance, the criteria under which EU Member States have agreed on the methodology for the calculation of the maximum financial contributions under the Facility are similar to the ones used for Cohesion policy (European Commission, 2020c).

In particular, the method for calculating national shares takes into account the three following criteria (capped values in parenthesis):
• Population
• The inverse of GDP per capita (capped at 150% of EU average)
• The average unemployment rate over the past 5 years compared to the EU average between 2015-2019 (deviation capped at 150% of EU average – 75% in Member States with GNI per capita above EU average).

It is important to remind that article 175 of the TFEU represents the legal basis upon which the RRF is based (Molica, Lleal Fontàs, 2021). This article stipulates, inter alia, that additional instruments, outside the structural funds, can be set up to contribute to the economic, social and territorial cohesion. This latter is the stated general objective of the RRF in accordance with article 4 of the regulation. In addition, the six funding priorities of the Facility include a dedicated one on social and territorial cohesion. The other priorities partially mirror the Policy Objectives set out under the new cohesion policy (see Table 2 below). In addition, the National Recovery and Resilience Plans shall devote at least 57% of the funding to the first two priorities (the so-called twin transition): Green Transition and Digital Transformation. This indicates the strong thematic orientation designed into the RRF via the minimum spending shares of 37% for climate investments and reforms and 20% to foster digital transition. This

Table 2 – RRF vs. Cohesion Policy. Thematic Priorities
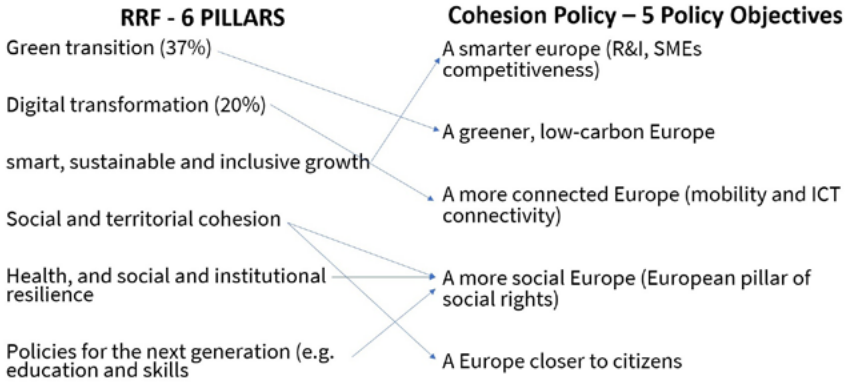
Source: Conference of Peripheral Maritime Regions (CPMR)

thematic earmarking is based on the same categories of interventions used for cohesion policy under Policy Objective 2 (a greener, low-carbon Europe) and Policy Objective 3 (a more connected Europe). This reinforces the occurrence of thematic overlaps between NRRPs and cohesion policy programmes.

In principle, the regulation requires Member States to spell out in the plans how they will ensure an optimal demarcation, and ultimately coordination, between the two funding streams. Nevertheless, most countries have provided little details for now.

3. Governance of the RRF versus Cohesion Policy. The Case of Italy

NGEU funding will be deployed simultaneously with the implementation of ESI funds programmes for 2021-2027. The amount of EU resources to be spent in a relatively short timeframe will thus be considerably higher than in previous MFF. Table 3 summarises the allocation of both ESIF and NGEU funding included in NRRPs across EU Member States. Last three columns indicate, respectively, the share allocated to climate and digital objectives (so called "twin transition") and the relative share of RRF over ESIF.

The use of Next Generation EU (NGEU) resources will have to comply with very stringent deadlines that require a high level of efficiency in the implementation of interventions. Italy is by far the main recipient of the programme (European

Table 3 – RRF and European Structural and Investment Funds (ESIF).
Country Allocation (Ml euro)

ESTAT Country Code	ESIF (Ml euro)	RRF	RRF % Climate	RRF % Digital	RRF/ESIF
AT	1,286.5	4,S500.0	45.2	40.6	3.5
BE	2,877.3	5,925.0	49.6	26.6	2.1
BG	11,453.7	-	-	-	-
CY	1,061.0	1,206.4	40.7	23.4	1.1
CZ	23,407.2	7,035.5	41.7	22.1	0.3
DE	20,935.6	26,519.2	40.2	50.8	1.3
DK	607.7	1,614.7	57.2	23.7	2.7
EE	3,680.3	982.5	40.9	21.2	0.3
EL	22,210.6	31,164.0	36.7	22.8	1.4
ES	36,256.7	69,533.3	39.7	28.2	1.9
EU	3,096.0	-	-	-	-
FI	2,121.0	2,094.9	50.1	27.0	1.0
FR	17,882.5	40,950.0	44.2	20.5	2.3
HR	9,258.0	6,392.7	40.3	20.1	0.7
HU	22,791.1	-	-	-	-
IE	1,282.5	990.8	41.8	31.6	0.8
IT	43,127.5	191,502.5	37.5	25.1	4.4
LT	6,813.3	2,224.7	37.9	31.5	0.3
LU	68.0	93.3	61.0	31.6	1.4
LV	4,804.2	1,826.0	37.5	21.0	0.4
MT	861.1	344.9	49.3	23.4	0.4
NL	1,921.6	-	-	-	-
PL	78,889.5	-	-	-	-
PT	23,802.9	16,641.4	37.8	22.1	0.7
RO	32,449.5	29,181.8	41.0	20.5	0.9
SE	2,081.2	-	-	-	-
SI	3,538.3	2,482.7	42.4	21.5	0.7
SK	13,314.2	6,575.1	41.5	20.2	0.5

Source: Authors' calculation based on European Commission (2022b) and ESIF Data Platform (European Commission, 2022c)

Commission, 2021c). This results from the choice to adopt RRF funding under both grants and loans whereas other Member States (for instance, Spain) have decided to use only RRF grants. Indeed, the issue of the optimal design of governance is crucial considering the existence of longstanding challenges in Italy in relation to the absorption capacity of the EU funds and the time profile identified for the volume of interventions under the RRF. As such, the optimal design of the governance / implementation / collaboration between different levels of governments becomes a crucial issue for an effective use of the available funding. The current setup will require much higher (administrative) capacity and coordination by all the actors involved into the policy and funding process to implement and monitor funding, reforms and the specific targets and milestones identified for each intervention. As an indication of this, Table 4 indicates the relative amount of ESI funding by strand of intervention or category of region available to Italy in the 2021-2027 period.

The complex governance of cohesion policy programmes, entailing the direct participation of local and regional authorities, is often considered one of the causes for the implementation delays affecting Italian programmes over time. This argument makes the centralized governance of the RRF look more effective. However, the initial assumption, according to which the implementation delays in the use of European resources would be attributable to too heavy governance due to the participation of decentralized levels of government, deserves a more in-depth discussion and investigation.

One way to assess this is by comparing the implementation rate of national and regional operational programmes under the last programming period 2014-2020. To demonstrate that a governance open to regions does not cause necessarily delays, this paper looks at data from the ESIF Open Data Platform (European

Table 4 – ESIF in Italy by category of Regions 2021-2027. Ml euro

Category of region / strand	Total	Percent
ETC cross-border co-operation	723.7	1.7
ETC transnational	224	0.5
JTF	1,029.7	2.4
Less developed	30,087.9	69.8
More developed	9,533.8	22.1
Transition	1,528.4	3.5
Total	43,127.5	100.0

Source: Authors' calculation based on ESIF Data Platform (European Commission, 2022c)

Commission, 2022c) on the implementation of the European Regional Development Fund (ERDF), which has policy objectives with a thematic composition similar to those of the Next Generation EU. By the mean of this analysis, the paper will seek to ascertain whether the current governance of ESIF funds, whereby local and regional authorities have a direct role in the design and management of programmes, can be seen as an actual cause for slow implementation rate. This has crucial implications for the future. On the one hand, a trend towards centralizing certain aspects of ESI funds is already visible in the 2021-2027 regulations. On the other, the implementation experience of the RRF might have a bearing on the future design of ESI funds, leading to further centralization/nationalization. This paper examines data on the implementation of the European Regional Development Fund (ERDF), with particular regards to the thematic objectives that are similar or identical with those of the Next Generation EU. The authors will specifically take a comparative look at implementation progress of regional and national programmes in a sample of countries with diverse characteristics, including Italy. In doing so, we limited ourselves to the pre-COVID-19 period 2014-2019 to smooth out COVID-19-specific effects such as the reorientation of the expenditure to face the health and economic crisis during 2020 (European Commission, 2022d). The following tables indicate the total certified expenditure (including co-financing) on the total allocated (planned) and committed resources ("total eligible cost of operations selected for support"). It is important to note that these two indicators – commonly used in this type of analyses – report the percentage of progress towards the goal of 100% spent/certified. As such, these two indicators are meant to proxy how smooth is the management/governance of the funds rather than an indicator of the quality and/or economic impact of these investments. The tables below compare spending evolution of EU funds managed at national and regional level. For comparative purposes, data from Italy are also compared with two other European countries with (a) similar (and complex) governance structures with both central and regional levels, (b) similar net ERDF beneficiaries as Italy and (c) with profoundly different institutional histories – namely, Spain and Poland. Table 5 compares performance across the three Member States by category of regions. On the one side, Spain and Poland have similar rates for certified expenditure over total costs decided (roughly 44%) whereas Italy appears to lag by 9 percentage points (pp) behind. On the other side, Spain and Italy appear to have a similar ratio if the ratio under attention is over the total amount planned (whereas Poland is well above at 44%). The three Member States have a different number of regional categories within their scope. Indeed, compared to Italy, Spain has also outermost regions while Poland does not have regions falling into the "transition" regional category. Table 5 highlights some interesting differences between Italy and the other two Member States in terms of implementation rates. Indeed, the national

Table 5 – ERDF Certified Expenditure (A) over Total Planned Amount (B) or Total Cost Decided (C) (Ml euro) (2014-2019)

| | Member State (2 digit ISO) | | | | | |
| | ES | | IT | | PL | |
Categories	(A)/(B)	(A)/(C)	(A)/(B)	(A)/(C)	(A)/(B)	(A)/(C)
National	25.0%	38.3%	27.6%	30.6%	37.6%	42.4%
Less Dev.	22.5%	30.4%	30.0%	33.6%	44.0%	43.7%
More Dev.	30.3%	53.2%	29.3%	36.9%	53.2%	60.0%
Transition	23.0%	37.0%	24.7%	39.0%		
Outermost	24.9%	24.4%				
Total	26.9%	44.3%	28.6%	35.0%	43.4%	44.2%

Source: Authors' calculation based on ESIF Data Platform (European Commission, 2022c)

level in Italy appears to underperform with respect to the relative ratios in Spain and Poland – especially over total costs decided (being this indicator closer to the actual implementation level). In this case, there are 8 and 12 pp differences respectively with Spain and Poland. In addition, more developed regions are driving implementation ratios in both Spain and Poland – a pattern much less evident in Italy where progress ratios are instead more homogeneous across regions. Finally, *less developed* regions (namely, regions with a GDP per capita below 75% of the EU average) in Italy show progress ratios on both indicators above the equivalent regional category in Spain.

In order to see more specific patterns in terms of investment progress, Table 6A and 6B below split the information in Table 5 by two categories (national and regional programmes) and by ERDF thematic objectives. Those thematic objectives closer to the intervention lines under the NGEU (TOs 1 to 7) do not display a clear pattern favoring the choice of implementation at the national level. On the contrary, results seem to be strongly country-dependent as well as thematic-oriented. In the case of Italy, the highest differences are found in TO7, TO3, TO2 and TO1 (fastest implementation by regional level except in the case of TO2). Major difference between Italy and the other two Member States appear in the relative implementation speed on TO1/TO2 as well as the relative delay at the central level on TO3 and TO7.

In light of this, it is important to capitalise on previous experience to design the optimal governance for managing funds and maximise their societal impact in the future. In the case of Italy, it appears unjustified, based on the experience of 2014-2020, to assume that the national level performs better than the regional level in relation to the implementation of programmes. It would be thus unmotivated to

limit the involvement of regional actors because of the argument on the implementation speed. On the contrary, the contribution of the subnational levels in the design and implementation of policies is very important. This is underlined by the European regulation on the Recovery and Resilience Facility, the main tool of the NGEU. Indeed, the legislative text requests that member states involve local

Table 6A – ERDF Certified Expenditure over Total Planned Amount (Ml euro) by Thematic Objective (2014-2019)

	Member State (2 digit ISO)					
	ES		IT		PL	
Thematic Objectives	*National Operational Programmes*		*National Operational Programmes*		*National Operational Programmes*	
	0	*1*	*0*	*1*	*0*	*1*
01. Research & Innovation	18.4%	30.3%	39.0%	26.3%	22.5%	32.2%
02. Information & Communication Technologies	29.9%	24.5%	31.6%	46.9%	33.1%	23.4%
03. Competitiveness of SMEs	41.3%	76.0%	38.3%	25.8%	55.2%	42.5%
04. Low-Carbon Economy	23.8%	11.6%	24.7%	29.2%	44.1%	
05. Climate Change Adaptation & Risk Prevention	28.5%		30.9%		9.9%	
06. Environment Protection & Resource Efficiency	22.6%	12.2%	27.4%	31.3%	31.5%	42.2%
07. Network Infrastructures in Transport and Energy	21.3%	50.5%	52.1%	28.1%	48.6%	51.8%
08. Sustainable & Quality Employment						
09. Social Inclusion	30.3%		21.8%	21.9%	37.2%	60.8%
10. Educational & Vocational Training	32.8%		37.2%	47.4%	70.0%	
11. Efficient Public Administration				25.3%		
MULTI. Multiple Thematic Objectives (ERDF/CF/ESF)	24.9%	1.8%	13.9%	2.8%	46.3%	58.3%
TA. Technical Assistance	22.8%	11.4%	34.8%	21.4%		24.5%

Note: In red, higher share within Thematic Objectives /country.

Source: Authors' calculation based on ESIF Data Platform (European Commission, 2022c)

and regional authorities appropriately (recital 34) by introducing the obligation to describe this process in the NRPs (articles 18 and 28). Furthermore, the six specific areas in which investments are spent pursuant to Article 3 are largely among the competing competences of the regions: for example, social, research and innovation, energy, environmental protection, policies, territorial governance. It is thus desirable that the management of funds develops not only centrally but synergies are actively pursued in both the programming and implementation phases. In addition, as stated, in the opening of a discussion with citizens on the implementation of individual projects is undoubtedly a good purpose. Indeed,

Table 6B – ERDF Certified Expenditure over Total Cost Decided (Ml euro) by Thematic Objective (2014-2019)

	Member State (2 digit ISO)					
	ES		*IT*		*PL*	
Thematic Objectives	*National Operational Programmes*		*National Operational Programmes*		*National Operational Programmes*	
	0	*1*	*0*	*1*	*0*	*1*
01. Research & Innovation	51.1%	39.4%	39.4%	26.7%	27.1%	29.1%
02. Information & Communication Technologies	45.9%	31.9%	35.9%	40.1%	37.9%	26.7%
03. Competitiveness of SMEs	54.4%	82.8%	44.6%	25.2%	55.2%	40.2%
04. Low-Carbon Economy	47.7%	62.6%	31.5%	33.9%	46.9%	
05. Climate Change Adaptation & Risk Prevention	33.8%		31.4%		40.9%	
06. Environment Protection & Resource Efficiency	49.1%	35.5%	31.7%	30.8%	32.9%	41.9%
07. Network Infrastructures in Transport and Energy	33.0%	63.3%	49.4%	29.3%	52.3%	50.6%
08. Sustainable & Quality Employment						
09. Social Inclusion	47.9%		29.8%	23.7%	44.0%	55.5%
10. Educational & Vocational Training	56.3%		35.8%	76.7%	61.7%	
11. Efficient Public Administration			20.8%			
MULTI. Multiple Thematic Objectives (ERDF/CF/ESF)	24.8%	9.7%	30.6%	10.2%	44.4%	58.2%
TA. Technical Assistance	33.0%	23.1%	45.8%	26.5%		59.0%

Note: In red, higher shares within Thematic Objectives /country.

Source: Authors' calculation based on ESIF Data Platform (European Commission, 2022c)

this is precisely the experience of regional authorities in this area, from consultation to co-planning through civic monitoring, developed during the 2014-2020 period that could come to serve the purpose of reinforcing the impact of policies in the current 2021-2027 budget cycle. As an example, the previous programming (2014-2020) and the current one (2021-2027) have introduced a series of ex-ante conditionalities for a more efficient and effective use of European funds. Among these, the mandatory nature of participatory mechanisms at the territorial level for the definition and implementation of the so-called "smart specialization strategies" with the aim of enhancing the sectors / niches where the territories must clarify comparative advantages through the involvement of universities, centres of research, industry, social partners, as well as Horizon 2020 beneficiaries.

4. Conclusions

This paper collected evidence on the implementation of ERDF over the years 2014-2019 that appears to indicate that a decentralized governance and a strong place-based logic are critical – at least in the case of Italy – to achieve in the future more efficiency in spending of European funds (such as ESIF and NGEU), not the other way round. Based on these findings, and with the goal of ensuring a faster implementation in mind, it seems sub-optimal to shift to a centralized only scenario as the way forward for implementing spending programmes in the current 2021-2027 budget cycle and, all the more, in the post-27 period.

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Le sfide nella nuova programmazione finanziaria europea per lo sviluppo territoriale

Sommario

In risposta alla crisi generata dalla pandemia, a maggio 2020 la Commissione Europea ha lanciato il Piano per la Ripresa dell'Europa, denominato Next Generation EU (NGEU). Sia la forte direzionalità tematica verso gli obiettivi verdi e digitali, sia la governance centralizzata di NGEU hanno importanti implicazioni per le politiche territoriali, in particolare in relazione ai Fondi Strutturali e di Investimento Europei (fondi SIE) e al loro futuro. Questo paper discuterà questi problemi con un focus sull'Italia integrando le informazioni statistiche disponibili sugli investimenti sia nel periodo di programmazione 2014-2020 che nel nuovo periodo 2021-2027.

The territorial dimension of the Italian NRRP

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Abstract

This essay is devoted to an analysis of the Italian National Recovery and Resilience Plan (PNRR), being implemented between 2021 and 2026, in its framework and in relation to its regional potential impacts with particular regard to the Mezzogiorno. It is organized as follows. The first paragraph briefly recalls some general characteristics of the Plan, the second outlines its size and the third its composition; the fourth describes the implementation processes. The author stresses the role of municipalities and their critical aspects and in a further way, the author discusses with particular attention the plan's investments dedicated to the Mezzogiorno. The main conclusion of the essay is that the Italian plan is a set of interventions of significant size but with allocative and implementational criticalities.

1. Introduction[1]

This essay is devoted to the analysis of the National Recovery and Resilience Plan (NRRP), to be implemented in Italy between 2021 and 2026. It describes the general framework of the Plan and its potential impacts on the regions, with particular reference to Southern Italy. It is organized as follows. The first paragraph briefly recalls some general characteristics of the Plan, the second describes its size, the third its composition and the fourth describes the implementation processes. After these extensive remarks, paragraph 5 discusses the role of municipalities and their criticalities, and the sixth the investments planned in the Mezzogiorno. The main conclusion is that this is a set of interventions of significant size but not without allocation and implementation problems.

2. The NRRP in the European Framework

The National Recovery and Resilience Plan (NRRP) represents the most important economic policy intervention of the XXI century and will condition Italy's development for a long time.

The NRRP is part of the European framework of the Next Generation EU (NGEU), and of the ensuing Recovery and Resilience Fund (RRF), which are also of particular relevance. In July 2020, under Franco-German pressure, the European Council decided to outline a response to the economic crisis caused by the COVID-19 pandemic. The current crisis is profoundly different from that which occurred after the international financial crisis of 2009. The European Council agreed to launch a large and coordinated investment plan for the revival and transformation of the European economy and society. The plan, to be implemented by 2026, financed jointly and with ad hoc allocation criteria, aimed primarily at the digital and green transformation of the Union. The Plan complements the European Union's budget allocations for 2021-27, which amount to approximately 1200 billion euro, defined during 2021 with the approval of the new "Financial Perspectives". The Plan is financed, for the first time, through a common European debt guaranteed by the future contributions of the Member States to the EU Budget, for about 800 billion euro: about 338 billion are grants and 386 loans, which will have to be repaid from the end of the Twenties. The Commission is engaged in reshaping the financing mechanisms of the Union post 2027: the identification of new revenues ("own resources"), especially related to the ecological transition, could allow the EU in the Thirties to deal directly with the debt, without increasing the contributions of Member States.

The Plan identifies common lines, which translate into allocation obligations for beneficiaries in the direction of green and digital transitions. The Plan allocates resources to Member States, both in the form of contributions and loans, on the basis of indicators related to their economic constraints and the impact of the COVID-19 crisis. In this way, it particularly favours Mediterranean countries, starting with Italy and Spain, to which particularly large resources are allocated.

The launch of the Plan comes at a particularly important time in terms of European rules. Due to the COVID-19 crisis, the rules on business incentives (subject to a Temporary Framework) and the same discipline of expenditure of the Structural Funds have been modified. The Stability Pact, on public finance rules, is being suspended until the end of 2022. This allowed Member States freedom of action to counter the pandemic and its economic effects. The discussion on common rules post-2022 is underway in Europe; it sees and will see growing opposition between those who suggest a return to the Fiscal Compact and those who suggest profound changes to fiscal rules and making the NGUE permanent.

For this debate, the implementation of the Italian NRRP will be of major importance, not only for its final results but also for what will happen during this decision-making process. All NRPs contain, in fact, implementation and spending targets that are well defined over time, the monitoring of which is delegated to the European Council and which are preliminary to the disbursement of subsequent tranches of payments. Therefore, fast implementation and compliance with targets by Italy are fundamental, both for the advancement of the Plan and to strengthen Italy's negotiating position in Europe.

3. The Italian Plan: Overall Dimension and Economic Aspects

The Italian NRRP (Presidency of the Council of Ministers, 2021) is of a particularly significant size, amounting to 235.14 billion. This is for several reasons. First, the distribution criteria allocate many resources to our country (191.5 billion) and Italy is the only large member state to have fully activated not only the grant component (68.9b), which is the largest in the Union together with Spain, but also the entire loan component of the RRF (122.6b), unlike France, Germany, Spain, and Poland (Darvas *et al.*, 2021). In addition, the Italian government has simultaneously programmed in the NRRP other resources, from a European source (from the European REACT-EU programme, valid for 2021-22 as a "bridge" between the programming of the 2014-20 and 2021-27 Structural Funds, for 13.5b) and from an Italian source, from a Complementary Fund (CF), built on budgetary resources, (for 30.6b). In the implementation decree of the Complementary Fund, an additional 10 billion is then allocated from budget deviations (not included among the previous ones and in the total Plan) for railway works.

However, not all of this amount is for new investments. This figure in fact, according to the official version of the Plan, contains an amount of 69.1 billion for "loans for existing projects"; the figure has been revised and it is not yet precisely defined (it should be between 50 and 55b). That is, these funds are used to finance projects already financed by other national resources already available. However, the NRRP does not provide a precise list of these projects. This suggests caution in evaluating the Plan's allocations for the various measures, given that they may, in varying but in some cases significant proportions, include resources already available. This has a twofold logic: firstly, since these projects are already underway, this allows Italy to report to the EU on progress already made as of 2020; secondly, this decision "returns" substantial resources to the national budget, so as to reduce the impact of the NRRP on the public deficit.

NRRP then "borrows" around 20 billion euro from the Development and Cohesion Fund (DCF), the fund that finances national cohesion policy, and

allocates 80% of its resources to southern Italy, especially for public investment. These funds have been "returned" to the DCF in order to replenish its endowment, albeit with a timeframe that is partly later than 2027. In the future it will be essential, especially for Southern Italy, to verify that these resources are actually committed and spent with the same territorial distribution criteria.

At the same time, it should be considered that, net of what has just been said, NRRP interventions are in addition to the normal national budget allocations and other European policies. Of particular importance, especially for Southern Italy, is the fact that the NRRP will be added to the Structural Funds (SF) for 2021-27 (which have grown in size with respect to the previous programming period, especially in the Centre-North), as well as to the DCF. The additionality of these interventions will not, however, be simple for a number of reasons. Both in Europe and in Italy, the implementation of the NGEU and the NRRP seems to have acquired a clear political priority with respect to traditional EU cohesion policies.

The definition of the European Regulations for the SF for the period 2021-27 has accumulated considerable delays, much greater than in the past, precisely because the Commission offices have concentrated on the NRRP. At the end of December 2021 (which theoretically should have been the first year of the new programmes) the Commission had then signed only one "Partnership Agreement" (with Greece) out of the 27 necessary to launch the interventions. In the Italian case, at the end of 2021 the Government approved its proposal for the agreement and officially sent it to the European Commission. It is reasonable to think that it can be signed in the first half of 2022; downstream of this official agreement, the implementing parties (Ministries and Regional Administrations) will provide for the precise definition and then the launch of the Operational Programmes on which these resources are allocated and their subsequent start-up. Therefore, the expenditure of the SF 2021-27 already starts with a significant accumulated delay, greater than in previous programming periods. Moreover, the implementation of the NRRP will place a significant additional burden on the same administrations involved in the SF, which – as will be argued below – have not been significantly reinforced. The need to report semi-annually on the expenditure of the National Reform Programme could then lead to the inclusion, as far as possible, of all the interventions being carried out within its scope, thus determining a possible relative lack of projects to be certified under the Structural Funds. Over time, political friction could also arise over priorities between the national government (which, as will be seen, has primary political and implementation responsibility for the Plan) and regional governments, which have a very significant share (around two thirds) of the political and implementation responsibility for Structural Funds. At the same time, it should be considered that a coherent programme and implementation of the NRRP and cohesion policies

could have a particularly positive impact on the country as a whole and, in particular, on the weaker regions.

The success of the Plan will also be influenced to an extremely significant extent by the ordinary budget policies that Italy will follow until 2026, and therefore by the rules of the European Stability Pact that will be defined as of 2023. In fact, the NRRP contains mainly capital interventions, physical infrastructure; in order for these to have a positive long-term impact on the quality of life of citizens and productivity of businesses, they must be accompanied by consistent budget allocations that make resources available for their current operation. Examples of these issues are already evident in the multi-year allocations that have already been made in the area of expenditure for the management and staffing of nursery schools and social services that will be implemented with the Plan.

The NRP includes a clear timeline for spending from 2021 to 2026. In particular, the Plan is linked to 527 implementation commitments, specified in the Annex to the Commission's approval decision of 22.6.21 then finally adopted by Ecofin on 13.7.21. The deadlines of the implementation commitments are crucial because they determine both the timing (and precedence) of the implementation of the NRP and the time frames for the achievement of the planned tangible achievements. Of these, 213 are defined as "milestones" and refer to qualitative results that can be checked as part of the process of implementing interventions, and 314 are "targets", i.e., quantitative, substantive results that can also be checked objectively. The former are concentrated in the early years of plan implementation (82% by 2013), the latter in the final three years (23% by 2023). The achievement of milastones and targets, as per European Regulations, on the disbursement of subsequent tranches of funding by the European Commission (except for the first tranche of 24.9 billion, already disbursed in the summer of 2021). Already in 2021, 49 milestones and 2 targets were reached, and at the beginning of 2022 the second tranche was disbursed.

4. The Italian Plan: Structure

The structure of the NRRP is affected by its drafting process, which was particularly complex, for several reasons: the relatively short time from the approval of the NGEU (July 2020) to the delivery of the Italian Plan to the EU Commission (April 2021); the lack of long-term planning in many important areas of public action (from industrial policies to health) to which reference should be made; the need for the Government to deal, in the same period, with the needs of pandemic management and to launch several emergency interventions; the change of government. On 1/15/2021 the Conte government sent an initial version of the Plan to the Parliament, which was fully involved for three months

in its analysis, including through hearings. Subsequently, the Draghi government sent a new version to the Houses of Parliament on 4/26/2021, requiring the immediate voting of a motion for approval by the majority, without any possibility of analysis or discussion. The Government then prepared a decree containing the allocation of resources and the indication of the CF interventions, which was approved (with modifications) by the Chambers. On the whole, the document was thus elaborated with a modest public discussion, with political representatives and economic-social partners.

The NRRP covers practically all areas of intervention and public regulation in Italy; it respects the minimum allocations foreseen by European decisions for green and digital transitions. The Plan is structured in a similar way to those of other European countries; also following the Commission's indications, in six major Missions. The 6 Missions are divided into 16 Components, in turn divided into 43 areas of intervention for homogeneous and coherent projects. The breakdown by Missions is somewhat general, because the content of each is relatively varied, and the Plan's measures can be regrouped in many different ways, as for example done by the Study Services of the Chambers (Servizio Studi del Senato e Servizio Studi della Camera, 2021).

The Plan contains 133 lines of investment. In practice, some of them include rather differentiated interventions, so that they can be more usefully quantified as 157 (Viesti 2021b). To these figures must be added the 30 investment lines provided for in the Supplementary Fund, for an overall total of 187. Of these, 87 are less than 1 billion, 33 are between 1 and 3 billion, 11 between 3 and 7 billion and 3 more than 7 billion euro (Transition 4.0; bonus for construction and high-speed rail lines).

It is immediately evident that this is a very wide-ranging intervention mode, which will pose clear problems in the implementation processes. Overall, about two thirds (62%) of the Plan's expenditure is in the form of public investment; one fifth (19%) is in the form of incentives to businesses and about one seventh (12%) is in the form of current public expenditure. The National Association of Building Contractors (ANCE) (2021), has calculated that the NRRP measures that result in construction interventions amount to 108.2 billion; much higher both in absolute value and as a share of the total (49%) than Spain (32%), France (21%) and Germany (20-25%).This is appropriate precisely for the expenditures for public investments, in the 2010s, dramatically decreased; especially by Local Authorities; but, given the very long lead times for public works in Italy, it represents a crucial element of criticality and attention.

In addition to the investments, there are 63 reform actions (subdivided into "horizontal" ones, i.e., relating to the entire national system, such as justice, "enabling" ones, functional to the realization of the National Reform Programme,

such as the simplification of public procurement, and "sectoral" ones, relating to specific themes), for which a precise timetable is also provided. The NRRP places special emphasis on their importance. Among these, those to which the Government attaches greater importance and a more accelerated implementation are those on justice, public administration and competition; the Plan outlines the main lines of these. The Plan also envisages two other important areas of reform: taxation and social security: however, no particular indications are given on these issues. Among other things, the Plan envisages (as the last reform, for spring 2026) the completion of the provisions of "fiscal federalism", particularly important for regions and municipalities in Italy.

The Government expects that the NRRP can give a significant boost to the economy's growth rate from 2021 to 2026, thanks to spending. Possible structural increases in productivity induced in the medium-long term by the interventions are difficult to estimate, and will depend to a significant extent on the businesses' and citizens' behaviour, especially investment, induced by the Plan. The impact on employment appears to be relatively more modest, especially by international comparison.

5. The Plan: Implementation

In order to implement the Plan, steps have been taken in several directions: the distribution of responsibility for resources among the various ministries has been defined and the governance framework has been established at the national level; a series of acts of simplification and the first reform measures have been implemented.

The governance of the Plan is highly centralized at the level of the national executive, and in particular at the offices of the Prime Minister. However, the various ministries have broad implementation responsibilities, and coordination of their initiatives by a central directorate presents itself as one of the most important and difficult challenges. In August 2021, responsibility for the Measures and related allocations were allocated among the Ministries. The Ministry of Infrastructure and Sustainable Mobility (MIMS) and the Ministry of Ecological Transition (MITE) play a central role. In some cases, the agreement of more than one Ministry is foreseen. Direct responsibility of the Regions is foreseen only for some measures, related to health and social services.

The NRRP organizational model was also defined in 2021 (with Law Decree 77). The Cabina di Regia (Steering Committee), set up at the Presidency of the Council of Ministers, plays a central role in implementation, because it: a) draws up guidelines for the National Reform Programme; b) monitors the state of implementation of interventions; c) examines critical points reported by ministries; d)

monitors interventions that require regulatory changes; e) sends a six-monthly report on progress to Parliament; f) informs and cooperates with the Permanent Table (see below); g) promotes coordination between the various levels of government; g) promotes coordination between the various levels of government; h) may activate substitute powers in the event of delays in the execution of projects. It is composed of the President of the Council of Ministers, the Minister for the Economy and other Ministers on a rotating basis. It has a Technical Secretariat and an Office for the Improvement of Legislation. A Permanent Table with the economic, social and territorial partnership has also been set up as a consultative forum. At the Ministry of the Economy, on the other hand, there is an office for operational coordination, monitoring, reporting and control of Plan implementation: a "Central Service for the NRRP".

With a series of decrees, the Government has issued an initial set of regulations to simplify the implementation of the Plan. They concern different areas (rules on substitutive powers, overcoming dissent in the implementation procedures, special procedures for major works, simplifications in environmental matters). As mentioned, a very important part of the NRRP provides for the implementation of multiple reform measures. The most important underway is that of justice. On September 21, 2021, the Senate approved a draft law to the Government "for the efficiency of the civil process and for the revision of the discipline of alternative dispute resolution tools and urgent measures for the rationalization of proceedings regarding the rights of individuals and families as well as regarding forced execution", which provides that the Government must exercise the delegation within one year. Another crucial measure was the Law for the Market and Competition 2021. It covers: local public services; energy (power plants); transport; waste management; business start-up; market supervision and removal of barriers to market entry (transparency and mapping of concessions, port services concession, natural gas distribution concession, hydroelectric concessions); health protection (accreditation of private health facilities, wholesale distribution of medicines, generic medicines, reimbursement price, medical managers); development of digital infrastructures (new generation infrastructures, subscription services offered by third parties); removal of burdens and equal treatment of operators (review of administrative procedures, simplification of controls on economic activities, insurance, strengthening of antitrust powers).

But how is expenditure for investment realized? The implementation mechanisms of the NRRP are quite complicated; they are often not defined in the Plan. The Parliamentary Budget Office (UPB, 2021) notes that "in some cases the annexes to the NRRP do not contain sufficient information about the procedures for implementing specific lines, not indicating an implementing party." The implementation process is, therefore, of the utmost importance, because

ministries are called upon to make choices of great relevance regarding the methods for implementing interventions, the choice of projects and the territorial allocation of resources. The overall picture is as follows:

a. a part of the Plan's resources is allocated directly by the Central Administrations, holders of the funds, to private individuals, businesses or citizens (as in the case of the large Transition 4.0 measure, aimed at increasing the adoption of digital technologies by the firms; and the measure providing incentives for building renovations); these are over-the-counter measures, directly accessed by citizens (e.g. through the "invoice discount" for building renovations) and businesses (e.g. through the tax credits guaranteed by Transition 4.0): it can be estimated that they cover about one-sixth of the available resources;

b. a part has already been attributed in the text of the NRRP or the Complementary Fund or will be attributed to major implementers belonging to the enlarged public sector, as in the very significant case of the resources allocated for railway networks, allocated almost entirely to the company Rete Ferroviaria Italiana (RFI);

c. a part is directly managed by the central administrations holding the funds, which are direct implementers of the measures (as in the case of interventions for the digitalization of the PA or those for justice);

d. again, a part of the resources is allocated by the Ministries responsible to public implementers (Regions, Local Authorities, Local Health Authorities) that provide the list of projects: this is the case, for example, of interventions for health;

e. Finally, a large part of the resources is and will be available through competitive tenders issued by Central Administrations; generally Municipal Administrations or other territorial public entities (or public-private partnerships) are called in. Among the first notices were those for kindergartens, those for urban regeneration and water infrastructures; for actions to promote research and innovation in the Component "From research to enterprise". In the case of interventions for schools and nurseries, the Ministry has provided for an initial preallocation of resources by region, to be followed by bids between local authorities within each region. The mechanisms for allocating and calling for tenders are very different from one to another.

Therefore, the implementation process is rather articulated and follows different processes from case to case. In some cases, preliminary planning activities are necessary, both for measures directly implemented by Central Administrations and for those by subjects (mainly local Administrations, but also water supply agencies or universities) participating in calls for proposals. In all cases there will then be the phase of direct implementation, in particular of public investments, which will involve the preparation and awarding of calls for tenders among the selected implementers, their award, the start and then the completion of the planned works, and the related testing, certification and reporting. All this

is made more challenging by the very high number, as mentioned, of intervention measures planned.

6. The Crucial Role of Municipalities

The NRRP is a "top down" type of economic policy intervention, characterized by a clear prevalence of the national executive. With respect to the normal execution of public policies, and in particular cohesion policies, it is evident that Regional Administrations will play a much less important role. On the other hand, municipal administrations will become increasingly important in the process.

According to Government evaluation, "Regions and local authorities are responsible for a large investments share envisaged by the Plan", quantifiable in 87.4 billion euro between the National Reform Programme and the CF, in particular in the missions relating to ecological transition, inclusion and cohesion and health. The Parliamentary Budget Office (UPB, 2021) has estimated that Regional and Local Administrations will be responsible for around 70 billion of new spending on public investments, especially in 2023-25 (excluding Complementary Fund resources); a figure well above the levels of recent years, although comparable with those of pre-austerity years. Municipal administrations have crucial responsibilities for the planning and then execution of many interventions.

This is the main implementation challenge of the NRRP, as municipalities have and will have serious design and operational difficulties. In the period 2010-19, Local Authorities (excluding health and special statute regions) lost 23% of their employees; they now have a very high average age (53 years) and low levels of education (UPB, 2021). Municipal administrations throughout the country appear to be significantly under-equipped with personnel, especially young people and those with higher professional qualifications. These shortages are considerably more accentuated in Southern Italy. Similarly, significant problems will arise in the future when Municipal Administrations will be called upon to activate with their own current resources new services made possible by the investments of the National Reform Programme; the actual technical and, above all, economic capacity to do so will have to be assessed, especially in the South (also in light of the aforementioned postponement to 2026 of the final definition of fiscal federalism). Added to this is the particular condition of difficulty of some administrations burdened by large past debts that limit their current spending capacity, including in important cities such as Turin, Naples, Palermo and Catania.

Relatively little has been done to remedy these critical situations. With the Decree Law D.L. 80/2021 the recruitment of one thousand professionals to

support Regions and Local Authorities has been defined, in addition to 2800 professionals being recruited from the resources of the cohesion policies for the South (even if the first announcement has allowed for the recruitment of only about one thousand professionals): but these figures are obviously completely insufficient. Consultancy activities for Municipal Administrations, still to be defined, have been planned by public bodies, in particular the Cassa Depositi e Prestiti. Furthermore, Decree Law D.L. 121/21 has instituted a "Fund for design competitions and ideas for territorial cohesion" (123.5 million euro) to strengthen the planning of municipalities in the South and in inland areas.

The capacities of administrations are also very different: there is a traditional gap between the South (and part of the Centre) and the North, where administrations are stronger and less indebted, territories are richer, and important players such as foundations provide support; but also between small towns and cities. In the territorial authorities of the South, staffing levels were reduced by 28% in 2008-18 (compared to -20% in the Centre and -18.5% in the North); staffing levels in municipal administrations as a percentage of the resident population in the regions with ordinary statutes in the South (excluding Calabria) are significantly lower than national averages; in 2018, only one fifth of staff had a university degree; only one fifth were under 50 years old (Viesti, 2021a). Moreover, in general, it may be easier to prepare projects to expand networks and facilities in situations where they already exist than in cases where they need to be designed from scratch.

This discrepancy is significant because, as mentioned, in many cases the NRRP is implemented through tenders: a uniform coverage of the territory is not guaranteed, nor is a significant concentration of resources where needs are higher. Investments will be made in those municipalities that present the "best" projects, according to the criteria defined by the Ministries. The choice of the method of competitive calls for tenders between public administrations to allocate many of the resources raises considerable doubts: while it may make it possible to select the projects deemed (by the criteria of each individual call for tenders) to be "best" or "most deserving", it risks penalizing the weakest areas and administrations. In this way, the central government does not assume responsibility for territorial rebalancing, as stated in the National Reform Programme; the territorial allocation of resources is not determined by a political choice, but by the outcome of competitive procedures. The scarce competencies existing in many Local Authorities can lead to two important, and not positive, consequences: to privilege the financing of projects that can be implemented quickly, regardless of their quality and importance; to concentrate resources towards a few administrations of greater size, also in terms of personnel and/or able to activate resources, including planning and/or implementation resources, private or from the third sector (and ex-banking foundations) (Viesti, 2021c).

7. The NRRP, the Territories, Southern Italy

The Plan has been designed by the national government, with a modest interlocution with the Regions, Local Authorities and economic-social representatives; this has implied, in particular, that (with a few exceptions) the interventions proposed by the Municipal and Regional Administrations have not been included as such, but can only be carried out in implementation of specific sectoral measures contained in the Plan: verification of this will only be possible when all the measures are activated. In other words, the NRRP does not include a design "from below", defined together with the Regions and Local Authorities involved, but is made up of a mosaic of interventions "from above" in the various lines (not by chance, the Government wants to characterize the interventions in the individual regions through "flagship" projects).

As seen, the allocation depends on different mechanisms, identified by the various ministries to which resources and competences have been attributed: therefore, the amount (and typological composition) of the interventions planned in each area, as just mentioned, is not defined ex ante but can only be known as the final outcome of the entire process. The allocation of investments in each region is highly structured because it tends to include a share of almost all of the 187 investment lines of the National Research Programme.

The NRRP aims to achieve three major "transversal" objectives: namely, the reduction of generational, gender and territorial inequalities. Note that the three aspects are significantly intertwined, given that the condition of young people and women is clearly worse in the regions of the South. How, in particular, will the third of these objectives, namely, territorial rebalancing, be achieved? It is not easy to tell, from a reading of the documents. The appendices to each of the Plan's missions, which give an account of their impact on the cross-cutting priorities, including the territorial one, are very general.

The Draghi government has made a significant commitment on the quantitative side of spending. In fact, the NRRP states that in order to aim for territorial rebalancing, "the Government has decided to invest no less than 40% of the NRRP's territorial resources (equal to around 82 billion) in the eight regions of Southern Italy". The Ministry for the South and Territorial Cohesion (2021) quantifies the percentage weight and amount of interventions in the Mezzogiorno in the individual missions; however, this quantification is not included in the official version of the NRRP. As a result of this spending, according to the NRRP, economic development in the South will be sensitive and its share of national GDP will rise from 22% in 2019 to 23.4% in 2026. Is 40% a little or a lot? There may be different opinions on this, given that the application between regions within the country of the criteria used by the European Commission to

allocate Recovery and Resilience Fund resources among member states would have resulted in a much higher share. On the other hand, these are substantial resources in a limited amount of time, and therefore the ability to "absorb" these resources, i.e. to carry out the planned interventions, must be taken into account.

The basic problem is that in the Plan, beyond the merely quantitative indication, there is a lack of clear political indications and precise targets, for the entire country as well as for Southern Italy, in terms of improvement in the living conditions of citizens (e.g., how many children from 0 to 2 years of age will attend nursery school) or availability of major services for the same citizens and businesses (e.g., how many trains will run every day between the cities of the South), which can determine criteria and guidelines for the implementation processes (Azzolina *et al.*, 2021).

A precise quantification of the investment in the Mezzogiorno is contained in 33 of the 157 measures of the NRRP (including five cases in which the Mezzogiorno is excluded) (Viesti, 2021b); then, 5 of the 30 Measures of the CF are territorialized. In this regard, it is very interesting to note that in two of these cases the territorialisation of resources was inserted following parliamentary amendments to the decree establishing the CF itself. These measures direct investments of around 19 billion euro (NRRP) and around 3 billion euro (FC) towards southern Italy, for a total of 22.2 billion euro. In the official documents, therefore, it is possible to identify only a little more than a quarter of the resources destined for the Mezzogiorno. These are mainly rail works: with 10,198 million, they cover approximately half of the total allocated. These are certainly positive interventions to strengthen and improve the available networks, as well as stations and means for regional railways.

It should immediately be pointed out that article 4 of Legislative Decree 59/2021 establishing the CF allocates additional budget resources to two major rail interventions, including 9.4 billion euro (up to 2030) for a number of lots of the new Salerno-Reggio Calabria high-speed railway (plus the Battipaglia-Romagnano lot that is funded by the NRRP for 1.8 billion). These resources are not formally included in the CF but can be assimilated to it. However, the decision to allocate such a large sum to part of a new rail route in Calabria would merit careful discussion: of its pros, and its cons, especially in terms of possible alternative railway routes. In addition to rail investments, the resources certainly earmarked for Southern Italy include other important infrastructure investments: on ultra-fast broadband networks, on electricity smart grids, on water networks, on school infrastructures, as well as 1 billion for the Lazio-Abruzzo motorways. In addition to large networks, the most significant investments come from the industrial policy measure referred to European projects (IPCEI) for which there is an explicit reference to the STMicroelectronics plant in Catania and the 630 million allocated to Special Economic Zones, exclusively in the South.

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However, it should also be remembered that the figures for the NRRP and CF measures also include already financed projects. This is certainly true for some high-speed sections in the South, for example the Naples-Bari (which in the NRRP is worth 1.4 billion), whose lots are all already financed and contracted.

Up to this point the measures in which the territorial allocation of resources is explicit. However, in another 22 measures of the National Recovery Plan and another 6 of the CF, there are indications that a part of the available resources will certainly be allocated in Southern Italy; in some cases there is talk of homogeneous territorial allocation, in others there are specific forecasts, even if not quantified numerically. On each of these measures, on the basis of the text of the NRRP and the content of the "sheets" as analyzed in the Study Services of the Chambers (2021), an estimate has been made (Viesti 2021b). What are they? There are still railway interventions, on nodes, on regional lines and on ERMTS safety systems. From this, it can be calculated that resources for railway investments by 2026 in Southern Italy (also considering the Salerno-Reggio Calabria) amount to almost 16 billion lire (including, however, projects already financed and underway). In terms of industrial policies, it is significant that the measure relating to the use of hydrogen in "hard to abate" sectors refers mainly to the steel industry in Taranto. Finally, there also appears to be some investment in major public services; this is the case for various measures in Mission 6 (Health), for which there is a clear indication of interventions proportional to population; the same is indicated for personnel for the administration of justice. But it is also the case for the measure on the reduction of territorial gaps in education. There are also indications for important interventions in urban areas: for urban regeneration interventions there is talk of a greater concentration in the cities of the South, and for public housing there is a regional breakdown.

In all the other 122 measures of the NRP and CF, for a total amount of over 185 billion euro, there is no indication of territorial allocation. This choice, in such an important document, cannot be accidental; also in light of the circumstance that, as we have just seen, this is not the case for the other measures. It was therefore a political choice. Of course, it is absolutely unimaginable that these resources will not flow to the Mezzogiorno as well. But the precise amount and type of interventions are not known with certainty a priori.

As mentioned, some measures to encourage business investment will be allocated on the basis of requests. Among these, the most important is certainly the measure on Transition 4.0 (13,380 million) for businesses. It is possible to consider, on the basis of the territorial allocation that has already taken place of the incentives of the "Industry 4.0" programmes (Bratta *et al.*, 2020), that the share of the South can be around 10%. This is not surprising, given that the use

of incentives depends on the number and size of existing firms. Such incentive measures by their very nature tend to enlarge, and not reduce, territorial disparities, concentrating new investments where there is already a stronger fabric of businesses. Precisely for this reason, the absence of territorial indications for the other industrial policy measures envisaged is surprising (and regrettable): development contracts in various industrial sectors, space economy, production of electric and photovoltaic buses, wind power, batteries, innovation and supply chain contracts in the agro-food sector.

Morevoer, in the Plan there is a lack of political direction towards the equalization of public infrastructural endowments and the availability of public services in the various areas of the country, in the presence of extremely wide territorial gaps, contrary to the wishes of Azzolina *et al.* (2021). It is well to remember that art. 117 of the Constitution, in the text reformulated in 2001, defines the State's competence in the matter of "determination of the essential levels of the services concerning civil and social rights that must be guaranteed throughout the national territory", and that in 2009 Law 42/2009 was approved, from which numerous implementing decrees have sprung. However, more than twenty years after the constitutional reform, the planned recognition of infrastructural disparities and the start of the relative equalization have not yet been carried out, nor has the definition of the essential levels of services that must be guaranteed throughout the country, i.e. the concretization of the constitutional rights that all Italians must enjoy. It seems truly surprising that in a document of such broad scope and perspective as the NRRP, the theme is almost completely absent. Even more surprising is the circumstance that the DL 77/2021 establishes that for infrastructural equalization a special "Infrastructural Equalization Fund" be destined, endowed with 100 million for 2022, 300 million per year for 2023-27 and 500 million per year for 2028-33. This means that in the years of implementation of the NRRP, while an annual expenditure for public investment that can be estimated around 30 billion per year, a fund of the indicative size of about one hundredth of the previous one will be active, with the aim of taking care of infrastructural equalization. In absence of political criteria towards equalization, the territorial allocation of resources is made by the Ministries in charge of implementing the measures. As mentioned, in several cases this will be done through mechanisms based on a call for tenders among the public administrations that are the final recipients. Noting this critical situation, the Government, with an amendment to one of its own decrees of July 2021, established that the allocation of 40% of the resources to Southern Italy should be indicated in each call for proposals for implementation; a provision not included in the text of the National Reform Programme.

This provision, while opportune, is not without its critical aspects, also due to its late introduction. The focus continues to be on a purely quantitative dimension, instead of introducing precise equalization targets: instead of indicating, with a political principle, that the new kindergartens should be implemented as a priority in all Italian municipalities that do not have them (throughout the country and, therefore, to a greater extent in the South), a merely financial criterion is used: which, in the case in question, is completely insufficient to achieve the objective. In other cases, the NRRP already identifies different distribution keys.

All this will be seen with the implementation processes of the interventions foreseen by the NRRP and CF. These critical points could have been overcome with a clearer orientation towards infrastructural equalization and reduction of territorial differences in the availability of services for citizens. In the impossibility of indicating individual projects ex ante, the use of quotas of resources earmarked for Southern Italy could have provided greater certainty of allocation. First official analyses of the implementation processes (UPB, 2022) show that the application of such a criterion is proving to be very complex, and that each Ministry is independently adopting different methods.

Analysis of the 15 calls for proposals available as of December 31, 2021 on the official website of the National Reform Programme, "Italia Domani", shows that a wide range of allocation methods have been used, which UPB places in three categories, which have been used at the discretion of the various ministries: national rankings with a 40% reserve; rankings by macro-area with a ceiling determined on the basis of the territorial constraint of 40%; regional rankings with a ceiling determined by the political objective to be achieved (UPB, 2022).

Consequently, the impact of the National Recovery Plan on the economy and employment in southern Italy, as presented in the Plan, is also at the moment only a hypothesis, linked to the circumstance that expenditure should actually reach the levels indicated: as mentioned above, this is possible, but not guaranteed.

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La dimensione territoriale del Piano Nazionale di Ripresa e Resilienza (PNRR)

Sommario

Questo saggio è dedicato all'analisi del Piano Nazionale di Ripresa e Resilienza (PNRR), in corso di attuazione in Italia fra il 2021 e il 2026, nelle sue linee generali e in relazione ai suoi possibili impatti sui territori del paese, con particolare riferimento al Mezzogiorno. È organizzato nel modo seguente. Il primo paragrafo ricorda brevemente alcune caratteristiche generali del Piano, il secondo ne illustra la dimensione e il terzo la composizione; nel quarto si descrivono i processi attuativi. Dopo queste ampie premesse, il paragrafo 5 illustra il ruolo dei Comuni e le relative criticità e il sesto gli investimenti previsti nel Mezzogiorno. La principale conclusione è che si tratta di un insieme di interventi di rilevante dimensione ma non privi di criticità allocative ed attuative.

COVID-19 Emergency and Reorientation of Italian Regional Operational Programs: a Contribution to the Ongoing Pre-evaluation

Carlo Torselli*

Abstract

The COVID-19 pandemic has affected the implementation of the EU Cohesion Policy and the 2014-2020 ERDF Regional Operational Programs. Logistics constraints, lockdowns, smart working, etc. have held back many funded operations, urging the European Commission to use the Programs to deal with the emergency. The funds, therefore, have been redirected towards new objectives which can be defined as anti-COVID-19 and it is therefore possible to evaluate the difference between before and after the advent of the pandemic. The contribution presents an in-depth analysis of financial and operational data useful to outline in real time the perspective change of the Italian 2014-2020 ERDF Regional Operational Programs. The analysis is made possible by the data of the pre-pandemic phase, related to 12/31/2019 and those of the post-pandemic phase, to the date of 08/31/2021. The paper also proposes an index of pandemic resilience in the comparison between Regions.

1. Introduction

The SARS-CoV-2 pandemic (hereafter, COVID-19) has affected the health, as well as social, economic and civil situation in Italy and other European countries. The European Union (EU) in general and the European Commission (EC) in particular have understood the extent of the phenomenon and promoted actions to counter it and mitigate its consequences. Therefore, even before creating ad hoc instruments, such as the Next Generation EU (NGEU), they have redirected the Regional and National Operational Programmes (OPs) financed by the Cohesion Policy – European Regional Development Fund (ERDF) and European Social Fund (ESF) – to respond to the emergency.

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This has resulted in a transformation of the 2014-2020 ERDF Regional Operational Programs (hereafter, Programs) between before and after 31 December 2019.

The NGEU has been compared to the Marshall Plan – European Recovery Program – of 1947 (e.g., von der Leyen, 2020), with the due adaptations to the changed political and socio-economic conditions. There are many similarities, not only for Italy: the effects of a devastation – war/pandemic – with very high losses of human life; the severity of an economic crisis in addition to wounds that have not completely healed from the Great Recession of 2008; the need for reforms of various kinds; the recovery of the Italian economy; Italy's position within EU and international dynamics.

The drivers of the NGEU, substantiated in Italy above all in the National Recovery and Resilience Plan (PNRR), are based both on contingent emergencies and on the periodic EC – Country Report "recommendations" – to the Member States, which are also the basis for the investments financed by the Structural Funds.

In this context, for the "revised" Programs, the investments activated by 2019 are analysed and, at the same time, the newly introduced ones are observed, in COVID-19 and non-COVID-19 terms. Moreover, the analysis is carried out when the Programs are at an advanced stage of implementation but not approaching the "closure" of the activities, when various technicalities (such as the recourse to the so-called coherent projects, or retrospective projects, etc.) allow physical and financial targets to be reached in a different way from what was originally planned. This could also be practically at odds with the multi-level and place-based approach (Barca, 2009) adopted at the programming phase.

The paper proposes an empirical analysis comparing the situation expected ex-ante with the results achieved by mid-2021. It is in line with the forms of "contextual" evaluation, as the third type of evaluation proposed by Fratesi (2020), in addition to those of "effectiveness" and "degree of effectiveness", for a more rapid improvement of policy design and implementation. We examine the state of the Programs as of 12/31/2019 and that prefigured and implemented in mid-2021. We have carried out ad hoc processing of monitoring data collected over time on the government portal opencoesione.gov.it for the classes of regions that are "more developed", "less developed" and "in transition". The analyses also constitute a sort of stress test of the aforementioned PNRR, which will have to be implemented very similarly to the OPs, apart from their different financial scale.

The parallelism between the PNRR and the OPs introduces new balances between the State and the Regions – in favour of the former – in the management of EU funds, which until now have been concentrated on those for the Cohesion Policy (CP) and for the Common Agricultural Policy. This would be in line with the wishes of some scholars (Crescenzi *et al.*, 2020), who are in favour

of Member States taking full responsibility and ownership of the CP, taking over a new leading role from the EC and the regions.

In this sense, even more explicitly, Crescenzi and Giua affirmed the need for a nation-based approach (Crescenzi, Giua, 2019), as a complement and balance to the place-based approach.

At least in the Italian context, the place-based approach has not had a full and widespread bottom-up development, as opposed to the top-down one, except in limited situations. On the contrary, much more often a hybrid approach, defined as co-design, has been adopted.

At present, the missions and financial resources of the PNRR, with regulatory and implementation logics similar to those of the Cohesion Policy, together with the underlying urgencies and the time frames set, which are more pressing than those of the structural funds, constitute the true direction of the 2021-2027 cycle of the CP, with respect to both regional and national programmes.

The initially quantitative approach leads to qualitative reasoning since the financial data derive from behaviours and situations that question the policies – ordinary and additional – of Cohesion.

The analysis, therefore, does not look at the final effects of the investments, for which it would be necessary to wait for the final balances of the Programmes, i.e., for the 2014-2020 cycle, at least 2025. In addition, the EC has clarified, at the technical level, that it will probably be impossible to have precise public data on the actual shares of EU and national co-financing before the final balances, due to the complexity inherent in the possible changes in shares in individual projects before, during and after the changes due to the COVID-19 emergency, and not only (e.g., for other reprogramming and for the Complementary Operative Programmes).

On the contrary, with the careful cross-reading of the main financial and temporal parameters, the aim is to provide an instantaneous contribution to the assessment of the explicit and implicit changes underway in the policies and capacities for the planning, management, and implementation of the Programs.

In Section 2 we explain some of the regulatory changes that affect the modification and implementation of Programs in Italy in the COVID-19 emergency, including cooperation between central Government and the Regions.

Section 3 clarifies our methodological approach and then looks at the Programs according to the macro-fields of intervention, to look at the programme proposal and implementation on 12/31/2019 and compare them with those on 08/31/2021, at the national level and for the aforementioned groups of regions. Then, a comparative mode is introduced between the individual regions as regards their programming and implementation capacity and their resilience to changes resulting from the pandemic.

Finally, in Section 4, the analysis is accompanied by a focus on the implementation of urban policies through the so-called urban axes of the Programs, because of the transversal nature of the urban issue with respect to all the priority axes and the concentration of resources established by the Community regulations for "integrated actions for sustainable urban development".

The Conclusions draw general indications from the above analysis, making some projections onto the next 2021-2027 cycle, whose programmes are currently being defined.

2. The COVID-19 Emergency and Changes in the Implementation of Programs

The effects of the COVID-19 pandemic began to be felt in the early months of 2020, and the EC, together with the European Council and Parliament, took note of the changed context for the implementation of Regional and National Operational Programs, due to difficulties that were also strictly practical, such as the blocking of construction sites, administrative problems, etc. At the same time, the regulations were amended, widening the possible fields of intervention and reorienting the programmes towards new health, economic and social emergencies.

31 December 2019 marks the annual deadline for the financial audits of the OPs – reorganised after the mid-term reviews of the performance framework defined in 2018 – linked to the so-called "N+3" mechanism, and stands as the point of separation between the pre-COVID-19 situation and what happened afterwards. At that date it was thus possible to speak of a "crystallisation" of the Programs (Torselli, 2021) before their reorientation.

This date will be an important reference for evaluation studies on CP, which has garnered so much interest from numerous scholars, and for the development of increasingly sophisticated investigation and evaluation techniques capable of taking on the complexity of the task. Whether they are effective declinations of the Regression Discontinuity Design (RDD), for example with the extension to the case of continuous treatment by Cerqua and Pellegrini (2018), or whether other methods are applied, such as those used by Crescenzi and Giua (2019), the aforementioned reorientation of the programmes has almost interrupted the original thrust of Cohesion, to face urgencies and emergencies with purposes other than the reduction of regional gaps and in favour of development. The actual time horizons of future research of the aforementioned types will therefore also have to be adjusted accordingly.

Returning to the amendments, the EC has first made European resources available in advance to the Member States and Regions holding OPs, thus freeing the OP investments from national co-financing for one year, to be used immediately

for anti-COVID-19 purposes. It has therefore made eligible for reporting with the changes following the anti-COVID-19 measures the expenses incurred since 1 February 2020 and proposed that those certified in the accounting year between 07/01/2020 and 06/30/2021 be fully charged to the EU share allocated to the programmes. At the time of writing, it seems almost certain that this opportunity will be extended to the 2021-2022 accounting year. In addition, the financial obligations of thematic concentration set out in the Regulations in the pre-pandemic phase are being considerably relaxed. Derogations are allowed (within certain limits) to the modification of the allocations of the Programs axes; a significant part of the anti-COVID-19 expenditure goes in the direction of the constraints (e.g., the so-called indemnities or refunds for businesses); the reduction of the national co-financing of the programmes, by increasing the EU share of the budget, makes it easier to reach the targets.

This refers to the concentration on the Thematic Objectives (TOs): 1) research, technological development and innovation; 2) ICT; 3) competitiveness of SMEs; 4) transition to a low-carbon economy. For the three groups of regions – more developed, transition, less developed – at least two of the four TOs mentioned above were to receive at least 80, 60 and 50% of ERDF resources respectively. TO 4 had to receive at least 20, 15 and 12% of ERDF resources respectively (EC, 2020).

In addition, where the "indicators" of the programmes were not suitable for describing the new expenditures (i.e., to better specify their anti-COVID-19 allocation), other indicators are introduced, also of a purely financial nature (e.g., of the "expenditures incurred" type), linked, precisely, to the pandemic emergency. Further significant innovations have also concerned aid schemes for businesses (e.g., the Coronavirus Response Investment Initiatives; CRII and CRII+ packages).

The Italian Government has acted in harmony and synergy with EU actions, starting with the so-called 'Decreto Rilancio' (in particular, Articles 241 and 242), involving the Regions and central Administrations in charge of OPs.

In particular, the Minister for the South and Territorial Cohesion proposed bilateral agreements (the so-called Provenzano agreements) to the administrations holding Regional and National Operational Programs in favour of recourse to EU certification in the 2020-2021 accounting period of significant expenditures incurred as anti-COVID-19 measures for 100% reimbursement with EU funds. At the same time, a mechanism has been introduced to safeguard operations that were originally borne by the OPs – perhaps with delays in launching or implementation – and that were removed from them to make room for COVID-19 expenditure. This safeguard can be provided with the national resources 'freed' from the OPs by increasing the Community share or with those of the Fund for Development and Cohesion (FDC) not used in the present or in the past programming cycles, or even in advance on the 2021-2027 cycle. These

resources feed into specific Complementary Operational Programs (COPs), like the OPs but with less limited time horizons than the European funds.

Among other things, the 100% certification in the EU share would mean that the Regional Operational Programs (and National ones) could exhaust the available budget ahead of schedule (2023), thus reducing the possibility or the need to launch new operations, except for small residual amounts.

In addition, there is another important indirect consequence: given the relatively modest level of expenditure reached at the end of 2019, by "saturating" the Programs with anti-COVID-19 expenditures, it would be possible to dispense with the not uncommon, laborious search for the so-called retrospective projects (Torselli, 2019a) in order to account for the expenditure according to the annual expenditure targets (the cited "N+3") and, above all, the final 2023 target. Finally, starting the 14-2020 Programs well in advance towards the formal closure of 2023 would avoid overlapping the usual frenetic activity of closing a programme cycle – 2014-2020 – with the demanding start of the new 2021-2027 season.

Certainly, there is a risk that 'crystallising' and reorienting Programs may distort the strategies or objectives originally pursued, even if this was already inherent or at least partly prefigured in the aftermath of the pandemic. The proposed mechanism for safeguarding operations through the Provenzano agreements and Complementary Operational Programs may limit the potential damage.

In this regard, the uninspiring experiences of these forms of parallel programming should not be ignored, starting with the Cohesion Action Plan (PAC), which also originated (approximately €11.5 billion out of a total of €13.5 billion) from the reduction in national co-financing for programmes financed by the Structural Funds for the 2007-2013 cycle. In fact, in the run-up to the Provenzano agreements, it was difficult to precisely assess the investments of the PAC and the substantial unspent residuals of the FAS (Fund for Underutilised Areas). This is without going into the details of expenditures that, not rarely, have lost any character of due "additionality" to meet ordinary needs and current expenditure.

3. Italian 2014-2020 ERDF Regional Operational Programs: state of implementation at the onset of the COVID-19 emergency

As previously stated, the implementation of the Programs in the pre-pandemic phase, as of 12/31/2019, is compared with that as of 08/31/2021 (last data available as of December 2021).

The starting point is the planning-financial framework obtained by examining the Priority Axes of each ROP as of 2019, and the fields of intervention that were intended to be activated (Tables 7 of the Regional Operational Programs), together with the resources allocated (*planned*). Given the large number of fields

of intervention – about a hundred possible for the Programs – they were then aggregated into "macro-fields" (Productive investments; Transport, environmental, energy infrastructures; ICT; Environment; etc.) as indicated in Regulation (EU) No. 215/2014, Annex I. They give a much more specific description than that of the Thematic Objectives (TO), some of which were originally subject to the financial concentration constraints, as well as better highlighting some policy and governance aspects. Moreover, since each operation must be associated with a specific field of intervention (as per EU Reg. 1303/2013; abbreviations in tables and graphs are by the author) – and therefore also with a macro-field – a precise picture of the underlying operations and policies can be built.

The empirical analysis was carried out on a dataset containing information from the OpenCoesione "Projects with extended track" database. The variables of interest for the analysis were:
- "Activated investments" (i.e., the "Total public funding" of operations launched and included in the monitoring system);
- the administrative and accounting "Commitments" for the implementation of the operations as of 12/31/2019 and 08/31/2021.
- the Payments incurred by the beneficiaries as of 12/31/2019 and 08/31/2021;

as well as specific information – year of activation of operations or procedures, output indicators, fields of intervention, presence or absence of EU co-financing – useful to specify the scenarios.

The territorial analysis has been developed at different levels, national, by groups of regions adopting the EC classification "more developed; in transition; less developed" (respectively MDR, ITR, LDR, below, or for single regions. The results allow qualitative considerations on policy implementation.

3.1. The implementation of the 2014-2020 ERDF Regional Operational Programs at national level

There are 22 Regional Operational Programs in Italy, with a total budget of about 23 billion euro, which has changed over time due to reprogramming and reductions in national co-financing. This has led the EU's share to progressively exceed 60%, a value that is growing further due to the adhesion to the aforementioned mechanisms (and related Complementary Operational Programs).

Apart from the latest financial adjustments, it should be noted that the transfer of resources from the Programs to the COPs had already previously amounted to almost 3.5 billion euro, for territories in which the speed, effectiveness and efficiency of investments are very important and should not be subject to dilatory practices. In particular, the phenomenon has affected Campania, Calabria, and Sicily since the beginning of the programming (see e.g. CIPE Del. no. 10/2015

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and no. 52/2017 for Sicily) and, for the three Programs, the EU share is respectively around 75%, 79% and 80%. Subsequently, Basilicata and Apulia also followed the same path, raising the EU co-financing to 75% and 80% respectively. This means that all the less developed Regions have had difficulty in investing the substantial resources allocated to them on time and have therefore transferred part of them to the parallel instrument of the COPs.

The empirical evidence of such limited resource absorption capacity by Operational Programs with large budgets has been verified in Cerqua and Pellegrini (2018). The two scholars, in fact, using a counterfactual evaluation approach, the regression discontinuity design, found that the impact on growth decreases when the intensity of EU support exceeds a certain value.

Table 1, below, contains elaborations of the data reported in absolute values in Table A1 in the Appendix, and shows the qualitative and financial dynamics of the Programs over time – through specific rates – and the macro-fields of intervention.

It should be noted that only the less developed regions can finance "Transport infrastructure", while the others are limited to "Sustainable transport". Moreover,

Table 1 – Investments and payments of 2014-20 ERDF ROPs in Italy (values in millions of euro and percentage values)

Macro-fields of intervention	Planned		2019		2021		
	M€	%	Investment activation rate	Investment share %	Investment activation rate	Investment share %	Payments/ Invest-ments %
Prod. inv.	1,746	7.3	1.10	13.8	2.19	16.2	53.9
R&D&I	3,352	14.1	0.58	14.1	0.89	12.7	61.1
Biz develop.	3,626	15.2	0.41	10.7	0.82	12.6	57.2
Transp. infr.	1,671	7.0	0.46	5.5	1.10	7.8	63.8
Sust. transp.	1,760	7.4	0.89	11.3	1.13	8.4	37.1
ICT infr.	1,288	5.4	0.62	5.7	0.64	3.5	44.3
ICT - app, serv.	879	3.7	0.51	3.3	0.80	3.0	53.3
S, H, E infr.	2,073	8.7	0.51	7.7	0.72	6.4	32.5
Energy infr.	2,047	8.6	0.40	5.9	1.19	10.3	45.9
Env. infr.	2,027	8.5	0.62	9.0	0.83	7.1	46.6
Environment	3,310	13.9	0.54	13.0	0.86	12.1	40.7
Total	23,780	100	0.58	100	0.99	100	49.9

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021). Activation rate is the ratio between commitments and budget, as discussed more in details in section 3.5.

for 'ICT infrastructure', the main infrastructure investments (especially Ultra Broadband networks) have shifted from regional responsibility to that of the MISE. Finally, the 'Planned' value as of 2019 is organised to satisfy the thematic concentration constraints characterising, as seen, the pre-COVID-19 phase.

It is noted that the investments activated differ from the total Programs budget by approximately 1% and, with the decrease in national co-financing for the "Provenzano agreements", at the end of the current reprogramming they could exceed the original total budget.

Moreover, in 2021, investments increased by almost 70% compared to 2019; new investments have been activated for about €9.7 billion, of which almost 4.4 for Productive Investment, Research and Development and Innovation, and Business Development, at least a large part for COVID-19 anti-emergency objectives, as will be specified later.

The "Productive investment" is very evident: in 2021 it is double the "Allocated budget". In general, the acceleration of investment and administrative effort are shown to be linked to the COVID-19 emergency. In fact, an analysis of the monitoring indicators shows that, out of the almost 86,000 total operations of the Programs, just under 24,000 have been expressly implemented as anti-COVID-19 measures and reported as such. However, other operations also contribute to the same objective, making use of indicators that were already originally codified in the Programs, without explicit reference to COVID-19 , or not listed as such. In addition, the 24,000 operations mentioned correspond to the mobilisation of resources amounting to approximately €1.85 billion, with commitments amounting to approximately €1.62 billion and payments amounting to over €1.17 billion (elaborations on OpenCoesione data, ed.).

However, when the financial data are cross-referenced with the time data of the new investments reported since the beginning of 2020, it emerges that of the approximately EUR 9.7 billion, only EUR 3.5 billion relate to procedures after that date. This means that the remaining resources have either refinanced procedures implemented earlier or concern additional retrospective projects introduced for the accounting benefits mentioned above. Furthermore, for these new investments, the opportunity of 100% EU reporting has only been partially taken, as the new commitments and payments amount to about €2.8 and €1.6 billion respectively. Almost half of the amounts concern the less developed regions. In particular, it emerges (Table A1 in the Appendix) that the leap in investments for Transport corresponds to new mobilisations for only about €82 billion, against additional retrospective projects added to the reporting for about €1.8 billion, in order to obtain accounting benefits independent from the emergency needs.

Overall, the investments related to the "competitiveness and enterprise" area, made up of the three macro-fields Productive investments, Research Development

and Innovation, and Business development absorbed about 41.5% of the investments by 2021. This area is central to the assessment of the Programmes' impact on regional realities and the contribution of the Structural Funds to European and national cohesion policies. Moreover, due to the increasing frequency of crises of various kinds, it will be increasingly necessary to integrate the analyses with that of the resilience of regional systems (Dal Bianco, Fratesi, 2020), as will be proposed below.

This suggests anticipating a part of the analyses conducted separately for the three groups of regions MDR, ITR, LDR by comparing their different evolution in this regard. This concerns the relative share of each of the macro-fields mentioned in the programming documents as of 2019 and with respect to the total investments activated up to 12/31/2019 and 08/31/2021.

In this sense, referring to Tables A2, A4, A5 and A6 in the Appendix, the comparison in question is provided in Figure 1.

It should be recalled, first of all, that the thematic concentration had oriented the MDRs towards more intensive support for competitiveness and enterprises than the other regions. In fact, it may be noted that the MDRs continued – even in the presence of the pandemic – to invest heavily in R&D&I, while the ITRs and LDRs focused mainly on maintaining the existing productive fabric, through the so-called indemnification or refunding of companies in crisis. In the first case, there is a look to the future; in the second, concern for the present. In this sense, the Cohesion Policy has sought to limit the increase in regional disparities rather than trying to eliminate them.

Moreover, analysing the behaviour of individual regions through per capita investments (Figure 2 and Table A3 in the Appendix), it emerges that they have been conditioned, rather than by policy choices, by the need for expenditure and by greater or lesser resources still uncommitted, as in the case of the less developed regions.

3.2. The implementation of the Programs in the more developed regions

There is a significant territorial breakdown of the priorities and management of European support aimed at bridging or reducing the gaps between regions. The "more developed" territorial areas are made up of 11 regions and 2 autonomous provinces: Valle d'Aosta, Piedmont, Liguria, Lombardy, Veneto, the Autonomous Province of Bolzano, the Autonomous Province of Trento, Friuli-Venezia Giulia, Emilia-Romagna, Marche, Tuscany, Umbria and Lazio. For these territories, which are not eligible to finance 'Transport infrastructure', the thematic concentration favoured investment in business and research and innovation, and lower carbon dioxide emissions, and this basic orientation remains.

In view of the above, a large part of the funding, shown in Table 2 below and in Table A4 in the appendix, also in the COVID-19 emergency, concerns the first

Figure 1 – Evolution of the "competitiveness and enterprise" area of the 2014-2020 ERDF ROPs in the three groups of regions
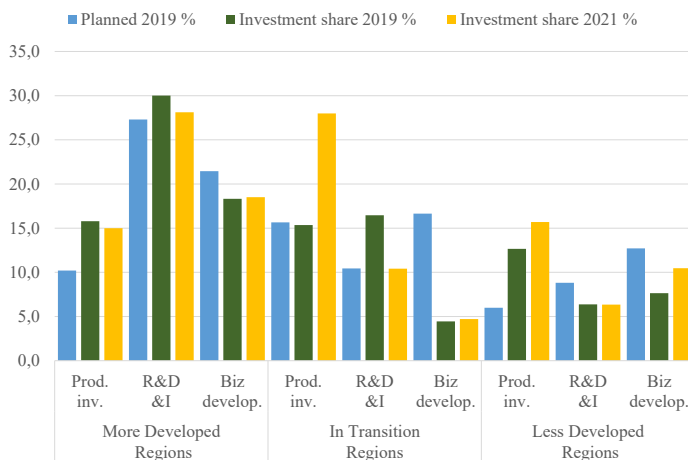
Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

Figure 2 – Per capita investments in the "competitiveness and enterprise" area by 2014-2020 ERDF ROPs until 08/31/2021 (in euro)

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 08/31/2021)

three macro-fields listed for business support in general. It is interesting to note the amount of investment in "Social, health and educational infrastructure" (S, H, E infr.), with the predominance of health infrastructure, which has increased fivefold compared to the initial allocation. The distribution of other resources is eloquent in itself.

Lastly, there is a general overbooking of investments compared to the financial allocation, which is currently being reviewed to adapt it to the 100% EU share reporting and the Provenzano agreements.

The overall data presented so far confirm what has been hypothesised: the reorientation of the Programs is based on reasons of urgency and emergency and not on the will or need to adjust policies. There is a sort of suspension of the propulsive impulse of the Cohesion Policy, which proceeds by inertia from what has already been started. The introduction of purely financial output indicators (the 'expenditures incurred') is an eloquent demonstration of this. Moreover, the loosening of thematic concentration constraints makes it possible to tackle the emergency without reference to territorial gaps, seeking to stem recessionary pressures and help safeguard the socio-economic fabric. Moreover, the pandemic

Table 2 – Investments and payments of the 2014-20 ERDF ROPs in the more developed regions (values in millions of euro and percentage values)

Macro-fields of intervention	Planned M€	%	2019 Investment activation rate	2019 Investment share %	2021 Investment activation rate	2021 Investment share %	Payments/ Invest- ments %
Prod. inv.	647	10.2	1.02	15.8	1.58	15.0	53.6
R&D&I	1,730	27.3	0.73	30.0	1.11	28.1	58.6
Biz develop.	1,360	21.5	0.57	18.3	0.93	18.5	63.1
Transp. infr.	0	0.0	0.00	0.0	0.00	0.0	0.0
Sust. transp.	354	5.6	0.41	3.5	0.58	3.0	61.4
ICT infr.	471	7.4	0.76	8.5	0.71	4.9	34.3
ICT - app, serv.	200	3.2	0.55	2.6	0.82	2.4	46.6
S, H, E infr.	116	1.8	0.79	2.2	6.11	10.4	31.2
Energy infr.	744	11.7	0.50	8.8	0.88	9.6	46.7
Env. infr.	10	0.2	0.40	0.1	1.43	0.2	29.6
Environment	707	11.2	0.60	10.2	0.75	7.8	35.5
Total	6,338	100	0.66	100	1.07	100	51.4

Source: Author's elaboration on Opendata by OpenCoesione (Regional Operational Programs data available on 08/31/2021)

has apparently affected the regions of the Centre-North more than those of the South. However, examining the 2007-2020 trend of various indicators shows that many centre-north regions had recovered earlier from the crisis phase following the Great Recession of 2008, while the southern regions continue to suffer the negative consequences (SVIMEZ, 2022).

3.3. The implementation of the Programs in transition regions

Abruzzi, Molise and Sardinia are the regions in transition. As in the more developed regions, the Programs do not invest in transport infrastructure but only in sustainable transport. The amount of 'productive investments' is significant, amounting to double the resources originally earmarked for them. The same applies to investments in ICT and health infrastructures, which are geared towards a better response to the COVID-19 emergency, by strengthening the computerisation of health and public administrations, as well as of the actual health structures. There is a certain overbooking of investments vis-à-vis the budget (Table A5 in the Appendix), as in the previous group, and the origin is also similar. Table 3 shows the situation.

Table 3 – Investments and payments of 2014-20 ERDF ROPs in transition regions (values in millions of euro and percentage values)

Macro-fields of intervention	Planned M€	%	2019 Investment activation rate	Investment share %	2021 Investment activation rate	Investment share %	Payments/ Invest- ments %
Prod. inv.	193	15.7	0.71	15.4	0.67	28.0	66.6
R&D&I	129	10.4	0.71	15.4	0.67	28.0	66.6
Biz develop.	205	16.6	0.19	4.4	0.44	4.7	44.1
Transp. infr.	0	0.0	0.00	0.0	0.00	0.0	0.0
Sust. transp.	50	4.1	0.65	3.7	0.32	3.5	31.9
ICT infr.	91	7.4	0.37	3.8	0.47	1.6	46.7
ICT - app, serv.	85	6.9	1.37	13.2	0.67	9.3	66.9
S, H, E infr.	135	10.9	1.03	15.6	0.44	13.4	43.6
Energy infr.	42	3.4	1.02	4.8	0.42	8.0	41.6
Env. infr.	30	2.4	1.00	3.3	0.33	2.7	32.7
Environment	273	22.2	0.63	19.4	0.41	18.5	40.8
Total	1,233	100	0.72	100	0.52	100	51.7

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

3.4. The implementation of the Programs in less developed regions

Italy's less developed regions for the European cohesion policy are the Southern regions: Campania, Puglia, Basilicata, Calabria and Sicily, and are the beneficiaries of most ERDF resources for Regional Operational Programs. This relative abundance of resources, however, as in the past, struggles to translate into rapid, efficient and effective spending. Therefore, as mentioned, to limit the risk of automatic decommitment due to the failure to reach the periodic spending targets, a significant part of the resources initially allocated to some Programs has been placed on the POCs or recourse has been made to the traditional more or less extensive insertions of retrospective projects (Torselli, Pira, 2017a) in the reporting. Such practices are lawful but programmatically dubious, also because of the possible distortion of place-based objectives/programmes and the compromise of the organicity of interventions. Although EU regulations have discouraged such technicalities, they are more successful than structural alternatives and remedies. The under-staffing of the beneficiary public administrations also affects the phenomenon, most of which are involved in ordinary activities. In fact, it should be considered that in Southern Italy the incidence of additional resources, in capital expenditure, is not much lower than that of ordinary resources, while the Italian average is around 25%. Moreover, this contribution of resources has remained almost constant in the past decades: it follows that the authorities' staff should take this into account, i.e. not be functional only for ordinary resources.

The inequality of per capita allocations of ordinary resources in the North persists (ACT, 2019), which leads the South to direct additional resources, if possible, towards ordinary uses and to prioritise distributional aspects rather than more ambitious development objectives that are less sensitive to the location of investments.

Another critical issue concerns the time needed to conduct public works, which is extremely long, especially when it is noted that the design phase and engaging a contractor occupy on average about 70% of the total time, underlining the slowness of a technical-administrative nature (ACT, 2018). For example, conducting works costing 0.5-1 M€ takes an average of 5 years, with a percentage distribution of activities like the one mentioned above. The time increases together with the cost of the works. Hence the further doubt between choosing to invest in more expensive and higher impact but slower operations, or to prefer less expensive and perhaps less effective but faster operations. If we add the selection of operations, the timeframe becomes unsustainable, considering the deadlines and rhythms set by the EU. The factors outlined above have an impact on Table 4, which shows a widening gap between programmed resources and incurred expenditure compared to the other groups of regions.

Table 4 – 2014-20 ERDF ROP investments and payments in less developed regions (values in millions of euro and percentage values)

| Macro-fields of intervention | Planned | | 2019 | | 2021 | | |
	M€	%	Investment activation rate	Investment share %	Investment activation rate	Investment share %	Payments/Invest-ments %
Prod. inv.	971	6.0	1.15	12.7	2.49	15.7	51.9
R&D&I	1,429	8.8	0.39	6.4	0.68	6.3	46.5
Biz develop.	2,061	12.7	0.33	7.6	0.78	10.5	53.7
Transp. infr.	1,671	10.3	0.46	8.7	1.10	12.0	63.8
Sust. transp.	1,356	8.4	1.03	15.9	1.27	11.2	34.3
ICT infr.	727	4.5	0.55	4.6	0.64	3.0	51.4
ICT - app, serv.	594	3.7	0.38	2.6	0.70	2.7	52.1
S, H, E infr.	1,823	11.2	0.46	9.5	0.34	4.0	29.9
Energy infr.	1,262	7.8	0.32	4.6	1.31	10.7	45.9
Env. infr.	1,987	12.3	0.61	13.8	0.82	10.6	46.9
Environment	2,330	14.4	0.52	13.7	0.87	13.2	42.0
Total	16,209	100	0.54	100	0.95	100	47.8

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

In general, similar dynamics to those already noted can be observed, above all for the entity of "Productive investments", but also for those for "R&D and Innovation", "Business Development" and "Social, health and educational infrastructures", clearly oriented towards dealing with the effects of the pandemic emergency.

On the other hand, different considerations can be proposed for "Transport Infrastructure" and "Sustainable Transport", which have exceeded the original total allocation of about 543 M€. This considerable increase refers to the well-known accounting benefits from retrospective projects. In fact, as partially anticipated, after 2020, only about 82 M€ of really new investments, 26 M€ of commitments and 24 M€ of payments have been included in the accounts. Environmental measures may also have benefited, to a lesser extent, from the same approach.

3.5. 2014-2020 ERDF Regional Operational Programs in individual regions

In addition to the analyses of the groups of regions, it is useful to provide a brief overview of the implementation of the individual Programs as of 08/31/2021, both with respect to their administrative and financial progress, and with respect to the behaviour generated to cope with the COVID-19 emergency.

To this end, indices are introduced to measure the activation and implementation rates of the interventions. The basic variables, calculated for each ROP, are the "Activation rate" and the "Implementation rate" of the programmes in 2019 and 2021, where:

$A_{r;\,2019}$ = *Activation rate* of ROP as of 2019 = C_{2019} / B_{2019}

$A_{r;\,2021}$ = *Activation rate* of ROP as of 2021 = C_{2021} / B_{2019}

$I_{r;2019}$ = *Implementation rate* of ROP as of 2019 = P_{2019} / B_{2019}

$I_{r;2021}$ = *Implementation rate* of ROP as of 2021 = P_{2021} / B_{2019}

The values used are:

C_{2019} e C_{2021} = *Commitments* made to implement operations

P_{2019} e P_{2021} = *Payment*s incurred in the implementation of operations

B_{2019} = *Budget* (available resources) pre-pandemic emergency and before any reprogramming

It should be noted that in the 2021 data, some Programs (Molise, Valle d'Aosta, A.P. Bolzano, Friuli-Venezia Giulia, Emilia-Romagna and Tuscany) have an overbooking of Commitments with respect to the Programme's Budget, which can be reabsorbed with the ongoing realignments of the financial frameworks (a small prudential overbooking is usual at the time of the closure of the Programs, but now this seems premature). So, the choice has been made to cancel the overbooking and to match Commitments and Budgets, since this is what will have to be done. The effect of this situation on payments is minimal or practically non-existent, since, in most cases, the operations to be removed from the Programs and safeguarded in the Complementary Operational Programs or in other planning instruments are those with implementation deficits and little or no expenditure.

By comparing the change in the activation and implementation rates in 2019 and 2021 with the original Budget, we obtain a concise description of the capacity to react, adapt and recover after a shock, i.e. the resilience shown by the Programs in the interval between the beginning of the pandemic and the first substantial drop after about 20 months (Aug. 2021, precisely).

This resilience is observed at the regional level, looking at the possible implications of geographical proximity through the concept of spatiality. That is, even for a narrow field such as the one under analysis, we ascertain whether a geographical unit can influence neighbouring units (Martini, 2020). Resilience is assessed from two perspectives: one of an institutional-administrative nature – referring to the behaviour of the Administrations that own the Programs – and one of a technical-administrative nature, depending on the implementation capacity of the public and private beneficiaries of the Programs.

In this respect, the values defined as Activation Resilience "$AR_{20\text{-}21}$" and Implementation Resilience "$IR_{20\text{-}21}$" of the Programs, referring to the emergency,

are calculated. This relates the dynamics of Commitments and Payments in the 2020-2021 period to what remains to be done to complete the implementation of the programmes. Figure 3 and Table A7 show the above-mentioned indices, calculated as follows:

$$AR_{20\text{-}21} = (C_{2021} - C_{2019}) / (B_{2019} - C_{2019})$$
$$IR_{20\text{-}21} = (P_{2021} - P_{2019}) / (B_{2019} - P_{2019})$$

An exceptional effort was made in the 2020-2021 pandemic phase to help counteract its effects and to seize the opportunity to report expenditure at 100% EU share. The cartographic representation in Figure 4 of activation resilience ($RA_{20\text{-}21}$) provides a better understanding of the Programs behaviour in the three groups of regions.

The comparison between Programs must consider the different starting conditions. It is the case that the regions with a larger implementation deficit have benefited from a wider margin of manoeuvre in the reporting of emergency expenditures. On the contrary, those with more advanced implementation, both for Commitments and Payments, have been able to create less space for anti-COVID-19 or emergency expenditure.

Nevertheless, the reaction of the less developed regions, on average and proportionally, was less incisive than the other regions. The activation resilience confirms the implications of geographical proximity mentioned above, proposing

Figure 3 – Activation Resilience and Implementation Resilience of the 2014-2020 ERDF Regional Operational Programs to 2021
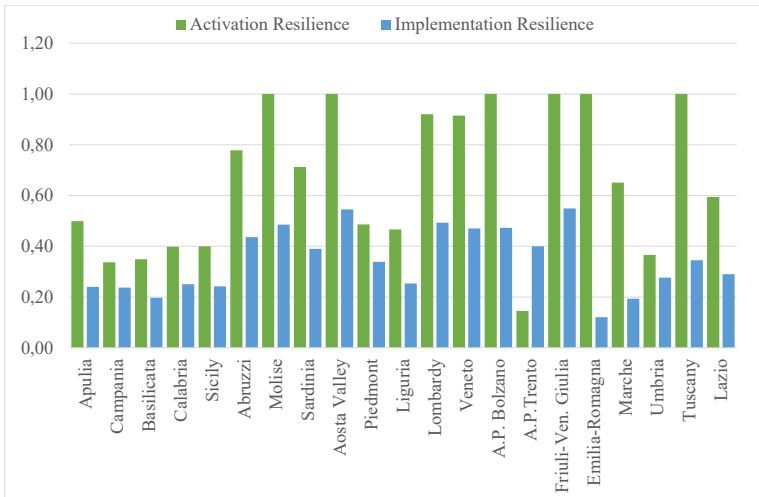
Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

Figure 4 – Regional distribution of the activation resilience of the 2014-2020 ERDF Regional Operational Programs in 2021
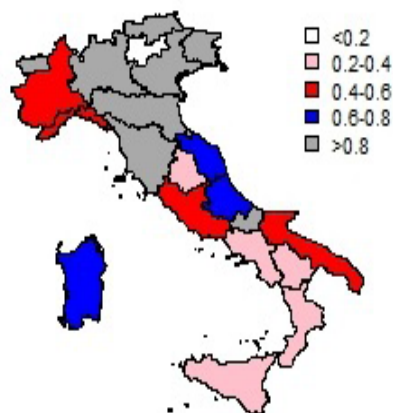
decreasing values for the institutional-administrative behaviour of the Programs from the more developed Regions to the less developed ones, and from those of the North to those of the South.

More generally, the elaborations highlight the heterogeneity of the financial, programmatic and managerial situations observed, especially with regard to implementation – i.e., in relation to payments – in line with the results of numerous evaluation studies on the Cohesion Policy. Indeed, researchers variously define heterogeneity, regardless of the techniques and approaches adopted, spatial areas, and case studies. It starts "at least" with the diversification of support schemes and the share of investment sectors and, above all, the impact of CP in policy contexts characterised by different territorial conditions (Bachtrögler *et al.*, 2019).

Similarly, increasing attention and emphasis are also given to the lack of harmonised and common data as well as to the presence of "many confounders" (Cerqua, Pellegrini, 2018) and "conditioning factors" (Fratesi, Wishlade, 2017), ranging from institutional or government quality (Rodríguez-Pose, Garcilazo, 2015) to the various forms of institutional, administrative, human resources capacity; and political support and stability (Surubaru, 2016).

4. 2014-2020 ERDF Regional Operational Programs and Urban Policies: the implementation of "urban" axes

The urban policies supported by the Programs are treated autonomously due to their multi-sectoral nature and the transversality of the Thematic Objectives that can characterise them. They should have benefited from useful European, national and international stimuli such as the Pact of Amsterdam – Urban Agenda for the EU (2016), the New Urban Agenda – Quito Conference (2016) linked to the UN 2030 Agenda for Sustainable Development, the launch of the homonymous National Strategy (2017), the (albeit unrealistic) Urban Agenda ambitions of the Partnership Agreement (PA) for 2014-2020 (Torselli, 2019b), precise, experimental or consolidated initiatives, sometimes brilliant, initiated mainly by local governments (Pasqui, 2016). On the other hand, treating urban policies at a "high" level is a stretch or a wish, both because of the current disappointing outcomes, set out below, and because of the topic's positioning in the 2014-2020 PA.

In fact, the "urban" theme is not dealt with directly, but as a declination of the "Integrated approach to territorial development", as if to prioritise method over substance. However, as a paradox, the absence of real urban policies ends up constituting a precise policy (Torselli, Pira, 2017b). Moreover, certainly the Metro NOP plays a significant role in meeting the thematic concentration, with an original allocation of ERDF resources of about 600 M€.

In this respect, according to EU Reg. 2014-2020 (n. 1301; 1303/2013; European Union, 2013a; 2013b), at least 5% of the ERDF resources allocated to each Member State must be assigned to "integrated actions for sustainable urban development", to be used in Integrated Territorial Investments (ITI) or specific Priority Axes or other forms of integrated or participatory approach. In Italy, 10 Programs have implemented ITIs (or similar) – approximately 700 M€ of resources (Torselli, Pira, 2017b) – while others have made use of traditional urban Axes, as reported in Table 5. In Table 6 we consider only the "Urban Axes" and not the ITIs, because the national monitoring system does not allow for a separate analysis of the financial performance of the latter.

The financial allocations vary from the regulatory minimum of 5% (e.g., Friuli-V.G.) for sustainable urban development to more ambitious percentages – which turned out to be unrealistic – such as 12% in Apulia. In fact, given the amount of resources available, it would be legitimate to expect incisive results in relation to the three development drivers indicated in the PA: production chains, services, social inclusion, plus a possible fourth driver for regional peculiarities, but this does not happen. Moreover, it would be desirable to highlight the interventions for sustainable urban development, and the logic of integration, by means of appropriate indicators, which are currently absent.

Table 5 – Financial allocations of the "Urban Axes" of the 2014-2020 ERDF ROPs by region (values in millions of euro)

Region	Budget (M€)	Co-fin. EU (M€)
Abruzzi	23.00	11.50
Campania	286.03	214.52
Emilia-Romagna	30.01	15.01
Friuli-Venezia Giulia	115.9	5.79
Liguria	40.00	20.00
Lombardy	60,00	30.00
Piedmont	58.29	29.15
Apulia	680.42	340.21
Tuscany	49.21	24.61
Umbria	30.82	15.41
Veneto	77.00	38.50
Total	1,346.37	744.69

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019)

Table 6 and Table A8 in the Appendix show the relative share of the investments activated through the urban axes in 2019 and 2021 and of the payments in 2021, with a greater degree of detail than before, analysing the single fields of intervention and not the macro-fields.

The values are in descending order of the investments activated as of 08/31/2021. Overall, they have more than doubled in about one and half years, while payments have increased by about 50%.

The types and categories of investment monitoring do not show a COVID-19 anti-emergency orientation, so that the increases are mainly due to the commissioning of some operations and the concern to maximise reporting to 100% of the EU share. Only the domains "Clean Urban Transport" and "Intelligent Transport Systems" show a reliable performance but are supported by the contribution of retrospective projects.

Moreover, the fragmentation of the areas of intervention and the absence of ad hoc indicators or classifications do not lead to the assessment of the potential integration between interventions – indeed, they point in the opposite direction – and the explicit focus on sustainable urban development. For this reason, only the most frequently used areas of intervention have been indicated, with the residual ones listed on a cumulative basis.

Table 6 – Investments and payments in Urban Axes of the 2014-2020 ERDF Regional Operational Programs by intervention fields (values in millions of euro and percentage values)

Intervention fields	Urban Axes allocation 2019 (M€)	Invest. share 2019 %	Invest. share 2021 %	Payments/ Invest. 2021 %
Other social infrastructure		2.6	10.7	18.3
Housing infrastructure		2.9	5.9	20.4
Energy efficiency renovation		1.2	4.6	30.8
Public cultural and heritage assets		1.9	4	29.1
Clean urban transport	1,346.37	1.7	3.3	87.7
Infr. early childhood educ. and care		0.2	1.8	4.3
Public tourism assets		0.3	1.4	18.9
e-Government serv. and app.		1.1	1.4	27.4
Intelligent transport systems		0.7	1.4	29
Other		3.5	4.9	29.5
Total	1,346.37	16.1	41.7	29.8

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

From an examination of the beneficiaries and operations, in fact, it is difficult to recognise sets of 'integrated actions of sustainable urban development' – rather unconnected, autonomous or episodic – or to grasp elements that suggest the seeds of a possible urban agenda (Torselli, Pira, 2017a). With reference to development objectives, the adjective 'urban' represents more a location than a set of peculiarities of development, context, problems, opportunities and solutions specific to urban realities. Hence the absence of a real urban agenda at national, regional or supra-local level.

In other words, what was foreseen in 2013 with the establishment of the Interministerial Committee for Urban Policies (CIPU, 2013), when the necessity and urgency of entrusting it with the task of "preparing and following a National Urban Agenda, taking into account and in coherence with European guidelines" (art. 12-bis, Law no. 134/2012) has not been followed up, as well as considering it essential to "overcome a fragmentary and sectorial governance of the problems of urban areas." Subsequently, the fall of the government interrupted this process. Thus, the development drivers for urban areas indicated in the 2014-2020 AP ended up being credited – improperly and unrealistically – as a national (and then regional, at least in the vulgate) Urban Agenda.

Over time, the exact opposite has occurred, i.e. the problems of urban areas have continued to be addressed – if possible – in an even more fragmentary and sectoral manner, not infrequently with a 'shopping list' logic (Calvaresi, 2014). It is enough to consider, in extreme synthesis, the Programs urban axes in question (1.35 billion euro), Programs ITI (680 million euro ERDF), Metro NOP 2014-2020 (600 million euro ERDF), 2014-2020 Pacts for the Metropolitan Cities (FSC, 2,880 million euro) (Torselli, 2017); as well as the so-called *Bando periferie* (2 billion€, national), the Master Plan for metropolitan areas and urban areas with a high level of population exposed to risk (DPCM 15 September 2015, pursuant to leg. decree no. 133/2014, converted with L. 164/2014), part of the Pacts for the regions (Torselli, 2018) and Regional Operational Programs-derived Complementary Operational Programs.

The panorama is completed by the Call for urban regeneration and decorum (Prime Ministerial Decree of 21 January 2021), with about 8.5 billion euro planned until 2034, of which almost 3.5 billion euro in the immediate future, with more than 3 billion euro to be paid by a further COP parallel to the PNRR; and the National Programme Metropolitan Cities Plus and Medium-sized Cities (about 1.88 billion euro from the 2021-2027 ERDF).

References to European planning and to precise territorial strategies to be built within the framework of cohesion policies are only formal. National resources end up financing lists of interventions on which, possibly and a posteriori, an approximate strategic plan will be built. The opposite should be the case: cohesion policies financed by the EU should be – by definition – "additional" to national policies, which are in short supply. In brief, the less rigorous management of the 5% financial reserve for the COVID-19 emergency, the investments mobilised and monitored so far are very modest in quantity and quality. In fact, those made by the Urban Axes now amount to about 42% of the available endowment and payments are about 12% of this value.

In this regard, it is worth noting the passage of the ERDF endowment of the "NOP METRO plus and medium-sized cities South" 2021-2027 from about 600 millions of euro in 2014-2020 to the current approximately 1,681 millions of euro (904 in EU share). we can almost detect the early exercise of a substitute power by the central administration for the prior assessment of the inability and inadequacy of the Programs – i.e., the Regions – to manage investments in urban areas and to contribute significantly to meeting the new minimum thematic concentration of 8% for sustainable urban development of the 2021-2027 ERDF resources allocated at the national level.

5. Conclusions

The representation given of the 2014-2020 ERDF Regional Operational Programs could be the almost final scenario of the programmes. Their reorientation against pandemic effects must now be followed by the completion of investments within the allowed timeframe. In fact, with the new mobilisation of resources amounting to almost 10 billion euro, the entire available budget has been practically exhausted – with procedures implemented and not just planned. Substantial resources have been earmarked for the COVID-19 emergency, and a strong incentive has come from being able to report, amid highs and lows, other expenditure at 100% EU share.

The strong increase in expenditure in the macro-sector of productive investments has been highlighted, even though the two macro-sectors of 'Research, Development and Innovation' and 'Business Development' are less committed. Defending what already exists has been a priority and now development initiatives should be strengthened in the 2021-2027 cycle. At the same time, the prominence of the other macro-fields has declined, except for those relating to transport, thanks to the impetus given by the less developed regions.

Thus, there has been a significant reaching towards or achievement of the expenditure targets for the coming years and the final ones, also thanks to the enhancement of quite a few retrospective projects.

The progress of the 2014-2020 expenditure has a positive impact on the 2021-2027 cycle, whose programmes could benefit from the reduced overlapping of activities related to the two cycles, one closing and the other starting.

The multiplication of parallel planning instruments – i.e. intervening in the same territorial and/or thematic areas, as well as at similar times – raises some concerns in relation to cohesion policies. In fact, alongside the traditional regional and national programmes financed by EU funds and the Pacts for the regions and metropolitan cities, there are new Complementary Operational Programs for safeguarding projects that have been removed from the Regional and National Operational Programs to make space for so-called COVID-19 emergency spending. Moreover, it is certain that there will be new COPs for the 2021-2027 programmes financed by the EU, with the usual reduction in the national contribution, diverted immediately after being acquired for the programmes. The introduction of the PNRR has further affected and enriched the landscape and complexity. Governance should take due account of the fact that the amount of resources invested turns out to be much higher than the ordinary absorption capacities of the national and regional systems and goes far beyond thresholds after which effectiveness – and efficiency – tend to decrease to the point of risking negative implications (Cerqua, Pellegrini, 2018).

It is also clear that fragmentation multiplies administrative activities and neglects useful single planning approaches. The latter cannot be pursued with simple summary funding tables of various kinds and responding to autonomous logic. Similarly, formal adherence to the EU-supported planning mentioned above cannot be sufficient, in the absence of at least a general strategic reference scenario, which in the past was provided, for example, by the National Strategic Framework.

The focus on urban policies has confirmed the negative aspects of fragmented and episodic interventions. They are often far removed from declared integrations and synergies, and do not help to overcome critical implementation issues in the name of a concreteness ("feasibility") that is little more than presumed.

Alongside the precise findings, there are also fundamental issues that emerge from opposing needs and schools of thought, regarding the essence of the Cohesion Policy and the nature of the Union, to question, to the point of distorting, the founding logic and consolidated practices of the EU.

 We refer to the possible negative implications of the progressive loss of value of the principle of "additionality" of the operations co-financed by the Cohesion Policy. This principle was clearly expressed in Reg EU 1303/2013, art. 95, paragraphs 2 and 3: "2. Support from the Funds for the Investment for growth and jobs goal shall not replace public or equivalent structural expenditure by a Member State."; "3. Member States shall maintain for the period 2014-2020 a level of public or equivalent structural expenditure on average per year at least equal to the reference level set in the Partnership Agreement." (European Union, 2013a). This emphasis has disappeared from the Reg. for 2021-2027.

In the EU and in Italy opposing tendencies prioritise one or the other of the aspects, instead of their joint and integrated consideration. A first reductive interpretation (from Paragraph 3) goes in the horizontal/financial direction, where additionality is substantiated by the flanking of Programs operations with others financed with non-EU resources, placed within containers of works, rather than real programmes, to be borne above all by the national resources of the Development and Cohesion Fund.

The further critical point, in contradiction with paragraph 2, denies the vertical and qualitative sense of additionality, i.e. there is no 'more' to elevate and qualify what has been implemented with ordinary resources. Moreover, especially in the South, EU resources sometimes make up for the scarcity of ordinary resources by introducing ordinary uses.

The pandemic has further reshuffled the dialectic between ordinary and additional, as the extraordinary nature of the event has also required ordinary EU support. Already in the past, in situations of global criticality – the economic crisis of 2008 for the 2000-2006 and 2007-2013 cycles, or the current pandemic

emergency for 2014-2020 and 2021-2027 – the indiscriminate use of ordinary, extraordinary and additional resources has been allowed or tolerated.

Now, also because of the greater integration between EU and national policies, the former inevitably take on "ordinary" needs because they are urgent and vital for beneficiaries and recipients, such as recent Programs expenditures for health equipment or personal protective equipment. In addition, it is not possible to safeguard the organic nature of the 2021-2027 programmes, which are organised into Policy Objectives and precise strategies, excluding a priori the coexistence of ordinary and additional investments in the noblest sense of the term. Hence the need to rethink the meaning of additionality, which in any case enhances the pursuit of excellence that goes beyond the ordinary.

Moreover, a deeper and more general integration of national and European policies could hardly avoid interventions that are a little less additional and a little more ordinary, as is already partially possible with the broader fields of intervention granted to the less developed regions.

These considerations, together with the financial and management analyses presented, have made it possible to affirm a sort of substantial suspension of the momentum of the Cohesion Policy in the current planning, without prejudice to the completion of what was started up to 2019.

About the implementation difficulties, it seems reductive to attribute the responsibility to administrative (in)capacity alone as a merely technical issue: the clarity and timeliness of policies are elements on which it is equally necessary to intervene as a matter of priority for the definition and implementation of programmes, hence with better governance, both technical and political. Indeed, we have emphasised that the field of confounding or conditioning factors – as well as their identification and measurement of their impact – has and should have significant scientific relevance in evaluative analyses of Cohesion Policy effects and impacts.

Finally, at the policy level, it has been confirmed that, despite the criticalities that have emerged and been pointed out, the Operational Programs are the only real set of multi-sectoral initiatives that are functional to an organic vision, which ends up guiding or directing national, regional or local investments as well – due to the programmatic weakness of the latter – instead of the contrary.

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L'emergenza COVID-19 e il riorientamento dei Programmi Operativi Regionali in Italia: un contributo alla pre-valutazione in itinere

Sommario

La pandemia da SARS-CoV-2 ha condizionato l'attuazione della Politica di Coesione UE e dei Programmi Operativi Regionali (POR) FESR 2014-20. Difficoltà logistiche, lockdown, smart working, ecc. hanno frenato numerose operazioni finanziate, sollecitando la Commissione Europea a utilizzare i POR per fronteggiare l'emergenza. Essi, perciò, sono stati riorientati verso nuovi obiettivi definibili come anti-COVID-19 ed è possibile prefigurare la differenza tra prima e dopo l'avvento della pandemia. L'analisi è stata condotta confrontando i dati raccolti nella fase pre-pandemica, riferiti al 31/12/2019, con quelli della fase post-pandemica, relativi alla data del 31/08/2021. Il contributo propone anche una sorta di Indice di resilienza alla pandemia nel confronto tra le Regioni.

Appendix

Table A1 – Investments and payments of 2014-2020 ERDF ROPs in Italy (absolute values in millions of euro and percentage values)

Macro-fields of intervention	2019				2021	
	Planned M€	%	Invest. activated M€	Payments M€	Invest. activated M€	Payments M€
Prod. inv.	1,746	7.3	1,923	915	3,819	2,058
R&D&I	3,352	14.1	1,957	994	2,998	1,831
Biz develop.	3,626	15.2	1,481	706	2,972	1,702
Transp. Infr.	1,671	7.0	767	838	1,846	1,178
Sust. transp.	1,760	7.4	1,575	668	1,984	736
ICT infr.	1,288	5.4	793	321	823	365
ICT – app, serv.	879	3.7	452	209	700	373
S, H, E infr.	2,073	8.7	1,062	492	1,499	487
Energy infr.	2,047	8.6	821	276	2,428	1,113
Env. infr.	2,027	8.5	1,252	555	1,673	780
Environment	3,310	13.9	1,803	864	2,842	1,156
Total	23,780	100	13,887	6,835	23,586	11,779

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

Table A2 – Evolution of the "competitiveness and enterprise" area of the 2014-2020 ERDF ROPs in the three groups of regions – rates

	Macro-fields of intervention	2019		2021	
		Planned %	Investment share %	Investment share %	Payments/ Investments %
More Developed Regions	Prod. inv.	10.2	15.8	15.0	53.6
	R&D&I	27.3	30.0	28.1	58.6
	Biz develop.	21.5	18.3	18.5	63.1
In Transition Regions	Prod. inv.	15.7	15.4	28.0	66.6
	R&D&I	10.4	16.5	10.4	50.9
	Biz develop.	16.6	4.4	4.7	44.1
Less Developed Regions	Prod. inv.	6.0	12,7	15.7	51.9
	R&D&I	8.8	6.4	6.3	46.5
	Biz develop.	12.7	7.6	10.5	53.7

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

Table A3 – Investment per capita in "competitiveness and enterprise" area by 2014-2020 ERDF ROPs until 12/31/2019 (in euro)

	Region	Investment per capita
Less Developed Regions	Apulia	412
	Campania	80
	Basilicata	513
	Calabria	184
	Sicily	401
In Transition Regions	Abruzzi	111
	Molise	64
	Sardinia	250
More Developed Regions	Aosta Valley	257
	Piedmont	136
	Liguria	132
	Lombardy	64
	Veneto	65
	A.P. Bolzano	71
	A.P. Trento	104
	Friuli-V. Giulia	177
	Emilia-Romagna	54
	Marche	132
	Umbria	185
	Tuscany	173
	Lazio	69

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

Table A4 – Investments and payments of the 2014-2020 ERDF ROPs in the more developed regions (absolute values in millions of euro)

Macro-fields of intervention	Planned M€	%	2019 Investment activated M€	Payments M€	2021 Investment activated M€	Payments M€
Prod. inv.	647	10.2	663	322	1,022	548
R&D&I	1,730	27.3	1,259	674	1,915	1,122
Biz. develop.	1,360	21.5	769	396	1,260	795
Transp. Infr.	0	0.0	0	0	0	0
Sust. transp.	354	5.6	145	103	206	127
ICT infr.	471	7.4	358	92	336	115
ICT – app, serv.	200	3.2	109	44	164	76
S, H, E infr.	116	1.8	91	19	705	220
Energy infr.	744	11.7	370	132	656	306
Env. infr.	10	0.2	4	3	15	4
Environment	707	11.2	427	185	531	188
Total	6,338	100	4,197	1,971	6,811	3,503

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

Table A5 – Investments and payments of 2014-2020 ERDF ROPs in transition regions (absolute values in millions of euro)

Macro-fields of intervention	Planned M€	%	2019 Investment activated M€	Payments M€	2021 Investment activated M€	Payments M€
R&D&I	129	10.4	147	49	145	74
Biz develop.	205	16.6	40	16	65	29
Transp. Infr.	0	0.0	0	0	0	0
Sust. transp.	50	4.1	33	12	48	15
ICT infr.	91	7.4	34	7	22	10
ICT – app. serv.	85	6.9	117	64	129	86
S. H. E infr.	135	10.9	138	39	186	81
Energy infr.	42	3.4	43	10	111	46
Env. infr.	30	2.4	30	8	38	12
Environment	273	22.2	173	76	257	105
Total	1,233	100	890	331	1,390	718

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

Table A6 – Investments and payments of the 2014-2020 ERDF ROPs in the less developed regions (absolute values in millions of euro)

Macro-fields of intervention	Planned M€	%	2019 Investment activated M€	Payments M€	2021 Investment activated M€	Payments M€
Prod. inv.	971	6.0	1,114	543	2,415	1,254
R&D&I	1,429	8.8	561	269	977	455
Biz develop.	2,061	12.7	672	294	1,611	865
Transp. infr.	1,671	10.3	767	838	1,846	1,178
Sust. transp.	1,356	8.4	1,397	553	1,724	591
ICT infr.	727	4.5	401	221	465	239
ICT – app. serv.	594	3.7	225	101	415	216
S. H. E infr.	1,823	11.2	832	435	611	183
Energy infr.	1,262	7.8	408	134	1,654	758
Env. infr.	1,987	12.3	1,219	544	1,633	766
Environment	2,330	14.4	1,203	603	2,039	857
Total	16,209	100	8,800	4,534	15,390	7,361

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

Table A7 – Activation Resilience and Implementation Resilience of 2014-2020 ERDF ROPs to 2021

	2014-2020 ERDF ROPs	*Activation Resilience*	*Implementation Resilience*
Less Developed Regions	Apulia	0.50	0.24
	Campania	0.34	0.24
	Basilicata	0.35	0.20
	Calabria	0.40	0.25
	Sicily	0.40	0.24
In Transition Regions	Abruzzi	0.78	0.44
	Molise	1.00	0.49
	Sardinia	0.71	0.39
More Developed Regions	Aosta Valley	1.00	0.55
	Piedmont	0.49	0.34
	Liguria	0.47	0.25
	Lombardy	0.92	0.49
	Veneto	0.91	0.47
	A.P. Bolzano	1.00	0.47
	A.P. Trento	0.15	0.40
	Friuli-Ven. Giulia	1.00	0.55
	Emilia-Romagna	1.00	0.12
	Marche	0.65	0.19
	Umbria	0.37	0.28
	Tuscany	1.00	0.35
	Lazio	0.59	0.29

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

Table A8 – Investments and payments in the "Urban Axes" of the 2014-2020 ERDF Regional Operational Programs by area of intervention (absolute values in millions of euro)

Intervention fields	Until 2019		Until 2021	
	Invest. activated (M€)	*Payments (M€)*	*Invest. activated (M€)*	*Payments (M€)*
Other social infrastructure	34.45	12.47	143.51	26.32
Housing infrastructure	39.66	11.61	79.26	16.18
Energy efficiency renovation	15.96	11.71	61.89	19.09
Public cultural and heritage assets	25.39	17.03	53.59	15.57
Clean urban transport	22.66	34.26	43.82	38.45
Infr. for early childhood educ. and care	2.75	0	24.22	1.04
Public tourism assets	4.67	2.1	18.99	3.59
e-Government services and app.	14.43	4.18	18.62	5.1
Intelligent transport systems	8.89	2.94	18.32	5.32
Other	47.49	16.96	66.20	19.50
Total	216.35	113.26	561.60	167.18

Source: Author's elaboration on Opendata by OpenCoesione. (Regional Operational Programs data available on 12/31/2019 and 08/31/2021)

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The XLII AISRe Conference, held online between 8 and 10 September 2021, called the Italian community of regional and urban scientists to debate on the long-term consequences, issues and challenges imposed by the coronavirus global emergency. These challenges concern the asymmetric consequences of the public health emergency across places and within societies. In fact, in a world already characterized by increasing social inequalities, the pandemic is likely to exacerbate the rise of disparities. Limited mobility, the restricted access to public services such as schools and hospitals, and the higher uncertainty generated by the healthcare emergency hit more severely those individuals in a condition of relative economic, occupational, and educational disadvantage.

The territorial implications of these phenomena are extremely relevant, and still understudied. They mainly concern two dimensions: the first one refers to the differentiated impact of the pandemic on the inequalities across places; the second one concerns the differentiated impact of the pandemic on the inequalities within places.

The effect of the Covid pandemic on inequalities cumulates with the one of other deep socioeconomic transformations, as those induced in the production sector and job market by the rise of the Industry 4.0 paradigm.

In such framework, the role of public policies becomes fundamental, in order to mitigate the undesired effects of these phenomena and to amplify the positive ones.

The present book collects a selection of the many interesting studies, presented during the XLII AISRe Conference, that were devoted to the abovementioned issues. More in details, the book is structured into three parts. The first section supplies fresh evidence on the levels and trends of socioeconomic disparities across and within regions. The second section investigates the determinants of these trends, pointing in particular to the role of the unprecedented transformations occurring in the economic structure and job markets of regions and cities. Finally, the third section of the book focuses on the policy tools to face the challenges emerged in the previous discussion.

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La passione per le conoscenze