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The Medium-Term Impact of the COVID-19 Pandemic on Population Dynamics: The Case of Italy

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Abstract: The COVID-19 pandemic has caused an abrupt break in economic, demographic and social dynamics, both in developing countries and advanced economies, perhaps with a more significant impact in the latter, though further evidence is needed to support this assumption. Unfortunately, earlier research on medium- and long-term impacts of the pandemic on urban and regional systems—with particular reference to the demographic dimension—have not yet reached a consensus on methodological and operational approaches. In the present study, we have applied an interpretative framework to the analysis of the demographic balance in Italy, one of the most affected countries in the world, before and during the COVID-19 pandemic. Specifically, we have compared a wide set of demographic indicators at two time periods of equal duration (2002–2010 and 2011–2019) and in two subsequent years (2020 and 2021), controlling for the regional context. These periods were chosen as sufficiently long to be representative of differentiated economic dynamics (2002–2010: economic expansion and demographic recovery; 2011–2019: recession and consequent demographic decline). Years 2020 and 2021 were assumed to reflect the short- and medium-term impact of the COVID-19 pandemic. The results of the statistical analysis highlight how the COVID-19 pandemic has exerted considerable pressure on population dynamics, determining short-term (mortality increase), medium-term (more volatile migration flows) and long-term (fertility decline) effects. Future studies should clarify the aggregate role of pandemics in population dynamics as a possible proxy of the decline of demographically fragile regions in advanced economies.

Keywords: economic downturns; population dynamics; indicators; multidimensional approach; Mediterranean Europe

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1. Introduction

A refined comprehension of population dynamics and the underlying socioeconomic processes may inform strategies to improve the sustainable management of regions [1] and measures enhancing socio-spatial cohesion and local developmental policies [2]. Economic downturns have variably affected the population dynamics response at a regional scale, possibly depending on social structures and the production base [3]. In a context of economic downturns, unemployment and urban poverty [4], the impact of exogenous shocks was assumed to have a variable but sometimes intense impact—both in the short and in the long term—that requires deep investigation [5]. With increasing socioeconomic uncertainty worldwide, the outbreak of unwanted—and hardly manageable—health crises negatively affected demographic structures and dynamics, determining asymmetries

in local job markets and a more polarized spatial distribution of businesses [6]. In such contexts, the final outcome of population transitions was supposed to be divergent across regions and countries, in both affluent societies and emerging economies [7].

The COVID-19 pandemic has caused an abrupt break in economic, demographic and social dynamics, both in emerging and advanced economies, perhaps with a more significant impact in the latter countries, though further evidence is needed to support this assumption [8]. The economic processes most sensitive to exogenous shocks were those that first responded (negatively) to the short-term effects of pandemics [9]. The pandemic has also had a significant impact on social behaviors at large, with short-term and medium-term influences being actively studied [10]. Recent works have also focused on demographic dynamics (e.g., [11]), initially focusing on the processes most directly involved in the pandemic (e.g., increase in differential mortality and consequent reduction in life expectancy) and, subsequently, on demographic phenomena more indirectly linked to COVID-19 (e.g., fertility, migration). Early in the pandemic, it was assumed that COVID-19 was a temporary phenomenon with no lasting consequences [12]. However, this pandemic could prove to have triggered a structural phenomenon in human history, whose potential impact on world demography should be examined explicitly. For instance, earlier studies have documented the effect of COVID-19 on mortality and, partly, fertility [1], but less attention has been paid to its impact on e.g., migration.

The present study documents the need to incorporate the multiple demographic effects of exogenous shocks such as the COVID-19 pandemic in a context of regional development and medium-term economic growth [13]. In this perspective, we assume the impact of policies implemented to curb the spread of the disease will nonetheless have medium- and long-term consequences for population dynamics at large [14]. Providing a comprehensive overview of the demographic characteristics affecting the resilience potential of regional systems, an indicator-based approach investigating selected demographic processes in affected countries may reveal latent interactions between socioeconomic development and local system resilience [7]. In an effort to develop future research and empirical tests of our assumptions, we identified data sources and key indicators for the analysis of the pandemic's impact on population dynamics over both time and space [9].

In this perspective, the medium-term effects of pandemics on regional demographic systems should be sought through the analysis of a sufficiently prolonged time series of population data. Comparative approaches that allow the investigation of entire economic, demographic and urban cycles seem to be appropriate to contrast them with the dynamics observed in heterogeneous phases of recent history. Unfortunately, research on medium- and long-term impact of the pandemic on urban and regional systems—with particular reference to the demographic dimension—has not yet experienced a sufficiently broad and shared methodological and operational development [15]. A refined knowledge of such dynamics requires a broad empirical effort aimed at understanding the persistence and intensity of these phenomena from a regional perspective. The most reasonable tool to understand this impact is a dynamic analysis of the different components of the demographic balance at a given territorial scale, e.g., comparing different contexts with diversified conditions of fertility, mortality, and migratory flows [16].

In this work, we have implemented the scheme of [1], applying it to the study of the demographic balance in Italy, one of the most affected countries in the world, controlling for the regional context. More specifically, we have compared a wide set of demographic indicators at two periods of equal duration, sufficiently long to be representative of differentiated economic dynamics (2002–2010: economic expansion and demographic recovery; 2011–2019: recession and consequent demographic decline), with the same indicators for the years 2020 and 2021. This time schedule was assumed to reflect the short- and medium-term impact of the COVID-19 pandemic in Italy.

2. Methodology

2.1. Study Area

Extending nearly 301,330 km², Italy is partitioned into three geographical regions (North, Centre, South) and 20 administrative regions [17] reflective of marked disparities as far as socioeconomic development is concerned [18]. Southern Italy was considered a marginal and economically disadvantaged region with a dynamic demography (e.g., high fertility). Northern Italy, one of the wealthiest regions in Europe, attracted a population from Southern Italy and abroad [16]. These characteristics made Italy a paradigmatic example of advanced economies with internal (socioeconomic) disparities [19]. As in other Mediterranean countries [20], the urban–rural divide in Italy is particularly accentuated, delineating different socioeconomic contexts from large (and mostly mono-centric) metropolitan areas (Rome, Milan, Naples) to hyper-rural areas along the Apennine mountain chain in Southern Italy [21]. This mountain extends to the largest part of the region, leaving little flat (or gently steep) land [22]. Apart from some port facilities, structural lacks in a modern system of railways and highways and a spatially fragmented network of airports limited the accessibility to Southern Italy and the major islands [23].

2.2. Data and Indicators

The website of the Italian National Institute of Statistics (ISTAT), which releases all the national statistics on population and demographic issues (www.demo.istat.it), was the data source of this study. We used a stabilized and fully comparable time-series of a vast dashboard of demographic indicators covering a relatively long time interval, between 2002 and 2021. Indicators were calculated from the national population register held and annually updated by ISTAT (e.g., [24–26]). We selected a restricted number of non-redundant indicators as informative of (i) the main changes in population dynamics (i.e., quantifying the change over time in the main dimensions of population balance by year) and (ii) additional demographic phenomena assumed to reflect an indirect (medium-term) impact of the COVID-19 pandemic. Population balance indicators calculated for each year included: (i) crude birth rate, (ii) crude death rate, (iii) the consequent natural balance (births–deaths), calculated as a per cent rate of native population growth, (iv) internal migration rate, (v) foreign migration rate, representing the consequent migration balance (immigrants–emigrants), calculated as a per cent rate of non-native population growth and, finally, (vi) population annual growth rate (%). Ancillary indicators of specific demographic phenomena—basically marriage, fertility, and aging—included: (vii) gross marriage rate, (viii) mean age at childhood, (ix) total fertility rate, and (x) mean population age. All these indicators were calculated for the country as a whole and separately, for three geographic partitions [16]: Northern Italy (including 8 administrative regions, namely Aosta Valley, Piedmont Liguria, Lombardy, Trentino Alto Adige, Veneto, Friuli Venezia Giulia and Emilia Romagna); Central Italy (Tuscany, Umbria, Marche, Latium); and Southern Italy (Campania, Abruzzo, Molise, Apulia, Basilicata, Calabria, Sicily and Sardinia).

2.3. Statistical Analysis

The indicators illustrated above were calculated as long-term averages for two-time intervals of equal length (2002–2010 and 2011–2019). These periods were taken as reflective of (i) economic expansion (2002–2010) and demographic recovery (mainly of fertility and immigration) after a relatively long and continuous decline in the late 1980s and the 1990s, and (ii) recession (2011–2019) with a slight economic and demographic decline [17]. These indicators were compared with the respective values observed individually for 2020 and 2021. Absolute and per cent differences were also calculated, for both Italy as a whole and separately for the three geographic partitions, with the aim at facilitating comparisons between different demographic contexts [19] and to delineate, at least partially, the short- and medium-term impact of the COVID-19 pandemic on population dynamics. Territorial

disparities within Italy were finally studied by computing a normalized ratio that compares the same time intervals as above and quantifies the absolute range in each indicator (the maximum value subtracted with the minimum value in the spatial series by year) to the respective total (i.e., country) value [16]. Being used largely in regional demography, indicators derived from this analysis were intended as statistically stable over both time and space and representative of the most relevant socio-demographic processes for Italy [27].

3. Results

Table 1 illustrates, at different time intervals, the distribution of selected indicators representative of distinctive socioeconomic conditions across Italian regions. As expected, birth rates and death rates showed an opposite pattern over time. Fertility declined continuously in the last two decades. With COVID-19, the last two years marked a further fertility slowdown, which hardly seems to be recoverable in future years. Death rates increased substantially, being the highest both in 2020 and 2021, with COVID-19 representing an additional cause of death in a context of population aging. A mild recovery was observed for 2021 as compared with 2020, although pre-COVID-19 values seem to be quite unreachable in the coming future. As a consequence of such dynamics, the natural balance was slightly negative between 2002 and 2010, decreasing in 2011–2019, consolidating to negative values in 2020, and weakly recovering in 2021. Spatial disparities in the first observation decade indicate the more intense demographic dynamics of Southern Italy, which was completely lost with COVID-19. Central Italy was the region experiencing the most negative natural balance rate.

Internal migration flows maintained the typical south-to-north axis in Italy throughout the study period, being more intense with the recession (2011–2019). The COVID-19 pandemic caused a moderate slowdown of internal migrations, preserving the traditional south–north flows supporting the residual demographic dynamism of Northern Italy. On the contrary, foreign migration balance decreased substantially over time, passing from highly positive figures in 2002–2010 to almost null values in 2011–2019. These values declined further in 2020. In this case, the impact of COVID-19 added to medium-term effects of economic crisis in Italy, lowering the economic attractiveness of regions and cities to foreign migrants. A moderate recovery was observed in 2021, in turn consolidating the traditional disparities between Northern Italy (more attractive) and Southern Italy (less attractive). Considering natural balance and migration rates together, total population growth moved from positive rates for 2002–2010 to weakly negative rates for 2011–2019, turning further to negative rates for 2020, with a modest recovery observed for 2021.

Table 1. Spatial distribution of selected demographic indicators by time and geographical region in Italy and absolute difference, with a reference period (2002–2010).

Indicator	Absolute Rate				Difference with 2002–2010		
	2002–2010	2011–2019	2020	2021	2011–2019	2020	2021
Crude birth rate							
North	9.5	8.0	6.7	6.7	−1.5	−2.8	−2.8
Centre	9.3	7.9	6.4	6.3	−1.4	−2.9	−3.0
South	9.8	8.2	7.2	7.1	−1.5	−2.6	−2.7
Italy	**9.6**	**8.1**	**6.8**	**6.8**	**−1.5**	**−2.8**	**−2.8**
Crude death rate							
North	10.2	10.5	13.6	11.9	0.3	3.4	1.7
Centre	10.4	10.7	12.0	12.2	0.4	1.6	1.8
South	8.9	9.9	11.2	12.0	0.9	2.3	3.1
Italy	**9.8**	**10.3**	**12.5**	**12.0**	**0.5**	**2.7**	**2.2**
Natural balance							
North	−0.7	−2.5	−6.9	−5.2	−1.7	−6.2	−4.5
Centre	−1.0	−2.8	−5.6	−5.9	−1.7	−4.6	−4.9

South	0.8	−1.6	−4.0	−4.9	−2.4	−4.8	−5.7
Italy	**−0.2**	**−2.2**	**−5.6**	**−5.2**	**−2.0**	**−5.4**	**−5.0**
Internal migration rate							
North	1.1	1.7	1.6	1.6	0.7	0.5	0.5
Centre	1.7	1.3	0.3	0.5	−0.4	−1.4	−1.2
South	−2.3	−3.1	−2.4	−2.5	−0.7	−0.1	−0.2
Italy	**0.0**	**0.0**	**0.0**	**0.0**	–	–	–
Foreign migration balance							
North	7.1	1.9	1.7	2.9	−5.2	−5.4	−4.2
Centre	7.5	2.8	2.3	3.3	−4.7	−5.2	−4.2
South	3.2	1.3	0.7	1.9	−1.9	−2.5	−1.3
Italy	**5.8**	**1.9**	**1.5**	**2.7**	**−4.0**	**−4.3**	**−3.1**
Total population growth rate							
North	7.5	0.9	−4.7	−2.8	−6.6	−12.2	−10.3
Centre	8.2	1.0	−3.8	−3.9	−7.2	−12.0	−12.1
South	1.8	−3.5	−11.5	−6.5	−5.2	−13.3	−8.3
Italy	**5.6**	**−0.6**	**−6.7**	**−4.3**	**−6.2**	**−12.3**	**−9.9**

Trends over time in ancillary indicators were illustrated in Table 2. All indicators delineate a progressive aging and a sudden fertility decline, both made more intense during 2020 and 2021. Gross marriage rate declined substantially between 2002 and 2010 and 2011 and 2019, and decreased further in 2020, with an evident recovery in 2021, likely because of marriage postponements. A more intense recovery was observed in Southern Italy. On the contrary, mean age at childhood increased almost linearly over time. COVID-19 was assumed to indirectly consolidate childbearing postponement all over Italy, with a more evident trend in Southern Italy. Total fertility rate was rather stable in the last two decades and a moderate decline was recorded in 2020 and 2021 (on average, 1 child less per 10 women per year). Fertility divides (higher birth rates in Northern Italy than in Southern Italy) consolidated over time, reverting the traditional interpretation of Southern regions as the (internal) demographic engine of the country. COVID-19 finally contributed to intense population aging, consolidating (and possibly exasperating) a long-term trend observed since the early 1990s in Italy. In comparative terms, population aging was more intense in Southern Italy, despite the mean age of population being systematically higher in Northern Italy.

Table 2. Spatial distribution of ancillary demographic indicators by time and geographical region in Italy and absolute difference, with a reference period (2002–2010).

Indicator	**Absolute Rate**				**Difference with 2002–2010**		
	2002–2010	**2011–2019**	**2020**	**2021**	**2011–2019**	**2020**	**2021**
Gross marriage rate							
North	2.8	2.2	1.6	2.7	−0.7	−1.2	−0.1
Centre	2.9	2.1	1.5	2.6	−0.7	−1.4	−0.3
South	3.5	2.8	1.7	3.8	−0.7	−1.8	0.3
Italy	**3.1**	**2.4**	**1.6**	**3.0**	**−0.7**	**−1.5**	**−0.1**
Mean age at childhood							
North	30.9	31.4	32.3	32.6	0.5	1.4	1.7
Centre	31.1	31.6	32.6	32.8	0.5	1.5	1.7
South	30.0	30.9	31.9	32.0	0.9	1.9	2.0
Italy	**30.5**	**31.3**	**32.2**	**32.4**	**0.8**	**1.7**	**1.9**
Total fertility rate							
North	1.38	1.41	1.27	1.28	0.0	−0.1	−0.1
Centre	1.33	1.34	1.17	1.18	0.0	−0.2	−0.2
South	1.36	1.31	1.24	1.24	−0.1	−0.1	−0.1
Italy	**1.37**	**1.36**	**1.24**	**1.25**	**0.0**	**−0.1**	**−0.1**
Mean age of population							

North	43.4	44.4	46.3	46.4	1.0	2.9	3.0
Centre	43.3	44.5	46.4	46.6	1.2	3.1	3.3
South	39.4	41.9	44.6	45.0	2.5	5.2	5.6
Italy	**41.9**	**43.6**	**45.7**	**45.9**	**1.7**	**3.8**	**4.0**

Spatial disparities in the selected demographic indicators were illustrated in Table 3. Almost all indicators outlined a marked increase in the divide between Northern and Southern Italy, with Central Italy positioning systematically in-between. Fertility divides (both considering crude birth rates and the total fertility rate) increased strongly and continuously, reaching the maximum imbalance in 2020 and 2021. On the contrary, COVID-19 had the indirect effect of levelling out the traditional disparities in death rates, being lower in Northern Italy before the pandemic but increasing substantially in both 2020 and 2021. Consequently, natural balance shifting toward negative values was also more homogeneous over space in the COVID-19 period. The same applies to internal migration rates. After a huge increase in spatial disparities in 2011–2019, foreign migration balance stabilized in the COVID-19 period to values already observed in the first decade (2002–2010). Mixing the spatial dynamics characteristics of natural balance and recent migration patterns, total population growth rates showed an increased imbalance in 2020, which was partly re-absorbed in the following year; however, it was positioned at a markedly higher level than 2002–2010. Increasing spatial disparities with the COVID-19 pandemic were also observed for gross marriage rate; conversely, mean age at childhood displayed similar values over time and mean population age showed decreasing spatial disparities over time.

Table 3. Spatial distribution of demographic indicators by time and geographical region in Italy and relative difference, with a reference period (2002–2010).

Indicator	Relative Rate				Difference with 2002–2010		
	2002–2010	2011–2019	2020	2021	2011–2019	2020	2021
Crude birth rate	0.50	0.56	0.75	0.71	0.1	0.3	0.2
Crude death rate	0.77	0.63	0.73	0.54	−0.1	0.0	−0.2
Natural balance	25.7	5.7	2.3	2.1	−20.1	−23.4	−23.6
Internal migration rate	15.9	13.4	12.1	12.9	−2.5	−3.8	−3.0
Foreign migration balance	2.09	7.32	3.27	2.44	5.2	1.2	0.4
Total population growth rate	4.27	3.82	8.75	3.95	−0.5	4.5	−0.3
Gross marriage rate	0.67	0.74	1.38	1.13	0.1	0.7	0.5
Mean age at childhood	0.086	0.076	0.084	0.080	−0.010	−0.002	−0.006
Total fertility rate	0.46	0.53	0.66	0.62	0.1	0.2	0.2
Mean population age	0.10	0.06	0.04	0.03	0.0	−0.1	−0.1

4. Discussion

Population dynamics were recognized to influence attractiveness and the economic performance of countries [28–30]. At the same time, the medium- or long-term impacts of exogenous shocks (such as pandemics) were demonstrated to affect the overall development path of regions and cities worldwide [31–33]. As it involves socioeconomic dimensions that are hard to characterize as factors of change [34,35], the latent linkage between demographic structures and local development requires a comprehensive analysis in economically advanced countries [36–38]. The COVID-19 pandemic provided a unique opportunity to investigate the medium-term impact on population dynamics across spatial scales [26,39,40], depending on the intimate interplay of demographic phenomena being affected differently by external shocks [41–43].

The impact of pandemics on specific components of vital rates (fertility, mortality) and migration flows was studied in the last two years more or less intensively, depending on the country. However, less consensus has been reached on the aggregate, multiple effects of pandemics on population balance and long-term growth rates, in turn affecting

the economic potential of countries and regions [44–46]. This means measuring (or estimating) the net impact that different processes exert on various time scales, e.g., a sudden increase of mortality rates together with a slower decrease of fertility, in turn connected with freezing migration flows, determining a stable—or even negative—population balance [25,47,48]. The prospective and comparative analysis of such conditions is particularly interesting in socioeconomic contexts characteristic of advanced economies—where the impact of exogenous shocks was relatively modest in past times [49]. This analysis is also meaningful for regions where the contingent demographic context was already fragile because of low fertility [29], intense aging following a long-term increase in life expectancy [50], and considerable immigration flows [51].

Our study tries to address these research issues by providing a rationale scheme based on six practical steps, possibly taken as an operational base for future studies on the same topics: (i) an extensive literature review was derived from different disciplines, representing demographic, sociological, economic and geographical thinking; (ii) a comparative assessment of the short- and medium-term impact of the COVID-19 pandemic on population dynamics, considering earlier periods characteristic of different economic dynamics; (iii) extensive use of official statistics at appropriate temporal and spatial resolutions, providing the highest informative value to a dashboard of demographic indicators; (iv) use of multi-dimensional indicators reflecting different economic dynamics and the impact of multiple demographic processes (fertility, mortality and migration together); (v) a refined analysis of territorial heterogeneity before and during the COVID-19 pandemic, possibly emphasizing the implications of such demographic dynamics for developmental policy and regional planning. These results assume that demographic imbalances across space reflect dynamic balances between population structures and changing socioeconomic environments (e.g., [52]).

Based on these premises, the results of the statistical analysis run on relevant demographic indicators definitely suggest how the COVID-19 pandemic has exerted considerable pressure on population dynamics, with short-term (mortality increase), medium-term (more volatile migration flows) and long-term (fertility decline) effects [15,53,54]. How much these effects can be reabsorbed in future population trends is a subject of intense research (e.g., [55]). A partial reabsorption of excess mortality and reduction in fertility was recently observed (e.g., due to postponement of birth rate mechanisms). However, a non-zero impact on demographic dynamics still oriented towards population shrinkage was hypothesized for various contexts, e.g., rural areas of Italy (e.g., [56–58]. This was basically dependent on the simultaneous reduction of the natural balance rate, which assumed negative values in the last few years [24,59,60], and migratory inflows.

Migratory flows slowing down [61] because of the pandemic's outbreak affected both disadvantaged and economically dynamic contexts, with the latter contexts having experienced a huge reduction in population growth rates. These dynamics occurred in a sociodemographic context that was already fragile before the pandemic, e.g., because of low fertility [23,62,63]. It is interesting that there is evidence of a systematic increase for almost all the indicators considered and of territorial disparities in Italy following the COVID-19 pandemic. These dynamics corroborate the idea that exogenous shocks, through the continuous interaction of relevant factors [64], create an important but spatially differentiated demographic deficit [65], which should be regulated by a specific local development strategy and supported by effective territorial cohesion policies [27].

In line with previous works grounded in different disciplinary approaches, the empirical results of this study stimulate a reflection on the complex issue of population dynamics in advanced economies as a possible measure of regional resilience to external shocks [66]. Reconnecting socioeconomic systems to regional disparities, demographic processes were taken as a specific aspect of resilience resulting from the intimate characteristics of population structures [21]. As a novel and timely approach to a more uncertain future—as far as socioeconomic development is concerned—our study delineates the relevance of integrated assessment frameworks for regional demography [22], suggesting

the importance of disaggregated spatial analysis that provides a better focus on enlarging the disparities driven by exogenous shocks [17]. Assuming demographic imbalances over space as reflective of a dynamic balance between population structures and the evolving socioeconomic context [67], highlighting latent transitions under different states of the system (reflected, in our case, in traditional economic downturns and the pandemic) is particularly meaningful in the present setting and for future comparisons and scenarios [20].

Investigating spatial similarities and differences in local demographic rates over distinctive development stages may shed light on the inherent transformation of countries and regions, evidencing territorial fragilities because of demographic shrinkage [19]. The time scale of the impact is also an important research field [68,69]. Temporary perturbations—as observed, for instance, in the gross marriage rate of Italy, recovering rapidly in 2021 after a huge (pandemic-driven) decline in 2020—can be re-adsorbed in a few years in demographically dynamic contexts. However, they could require more time in a structurally shrinking demographic context (such as the present one in Italy) to be fully re-adsorbed. Perturbations exerting their impact over longer time scales—for instance, the moderate reduction of fertility, adding to a long-term negative trend common to all Mediterranean countries—could exert perverse effects on total population growth rates. These effects may bring—at least in some fragile rural contexts—intense depopulation and unwanted economic decline in more dynamic urban contexts [32].

Pandemic-driven delayed marriage and childbearing postponement, in addition to a continuous reduction of foreign migration flows—because of direct measures of mobility reduction or the indirect effects of pandemics on the socioeconomic attractiveness of regions and cities—were latent causes leading to (or consolidating) the demographic decline of specific socioeconomic contexts [33]. If these local systems were already experiencing conditions of demographic fragility (low fertility, aging, and population shrinkage, e.g., in core cities [52]), the impact of pandemics could be particularly evident and disruptive for the production base and social dynamics, irreversibly altering the balanced development path of both metropolitan regions and rural districts [64].

The limitation of this study basically depends on the short time series representing demographic dynamics during the COVID-19 pandemic. While highly informative, the empirical results presented here can be therefore taken as preliminary and appropriate to inform short-term policies. Any strategy addressing medium- and long-term dynamics requires a broader interpretation of population trends based on a longer time series from official statistics. This rationale justifies a thorough improvement of demographic indicators and official statistics (e.g., better definition, conceptual precision, internal coherency, timely release, and high spatial resolution) at both the national and European (e.g., Eurostat) level [70–72].

A detailed spatial demographic analysis is particularly meaningful in such perspectives [40]. Demographic scenarios incorporating the short-, medium- and long-term effects of the COVID-19 pandemic based on different assumptions and hypotheses—and considering the multiple (possibly explosive) effects of fertility decline, mortality increase and migration slowdown—are especially necessary in an international context of heterogeneous social dynamics and increasing uncertainty for economic prospects [27]. These studies complement and go beyond an extensive analysis of the multiple impact of recessions on demographic patterns and processes in advanced economies [26]. The present work also refines country-level interpretative frameworks in line with earlier evidence collected at a broader scale in Europe [70,73]. Clarifying how exogenous shocks may interact with socio-demographic dynamics to shape regional development and local competitiveness, attractiveness, and sustainability, contributes to delineating the intrinsic mechanisms at the base of economic growth.

5. Conclusions

The approach proposed in this study identifies specific demographic patterns and processes over time and space in relation to the evolving socioeconomic context at the base of the COVID-19 pandemic. Dynamic balances between population and the evolving socioeconomic context highlight latent system transitions responding to specific drivers of change and shaping the overall resilience to external shocks. In this vein, the comparative analysis of a dashboard of demographic indicators may account for both territorial heterogeneity and socioeconomic transformations under exogenous shocks, shedding light on the intimate mechanisms regulating regional resilience and local sustainability, and indicating opportunities for (and constraints to) development policy.

As indicated above, the potential limitations of the study lie in the relatively short time series of population indicators, covering the last two decades of demographic history in Italy. A comparative analysis of demographic processes—usually changing less rapidly than other social and economic phenomena—may benefit from a longer time series encompassing complete population cycles or multiple historical phases in a given country or its regions. Official statistics in advanced countries should contribute to the continuous recovery of comparable and sufficiently long time series of key indicators at adequately detailed spatial scales (e.g., prefectures, provinces, local districts, municipalities, or other geographical/physical partitions of interested in urban science, applied economics and regional demography). Interpretation of the results presented in this work could also benefit from a refined and joint analysis of demographic, social and economic indicators at a more detailed spatial scale, especially focusing on the increased territorial heterogeneity of individual behaviors as far as, e.g., marriage and childbearing are concerned. Such processes, possibly associated with the COVID-19 pandemic, may lead to increasingly intense socioeconomic divides and more evident polarizations in demographically dynamic and shrinking regions. These findings have also a potential use in policy planning. As a matter of fact, national and regional strategies promoting a spatially balanced and socially cohesive development in a low-fertility context should consider the inherent impact of exogenous shocks.

To improve knowledge of the long-term evolution of socio-demographic systems adapting to exogenous shocks, future studies should address additional issues, including: (i) a more complete illustration of emerging demographic phenomena through selection of a broader dashboard of statistical indicators (for instance, gross marriage rates in recent decades are no longer fully representative of family formation and propensity for childbearing, since other forms of (formal or informal) cohabitation arose, possibly as a result of different social beliefs and moral values); and (ii) a refined forecasting approach to small-area population projections that incorporate the short-term effect of exogenous shocks, informing policy strategies and regional planning. The provisional demographic projections provided by ISTAT for all Italian municipalities and forecasting population amounts over a short time horizon (www.demo.istat.it) may represent a first meaningful exercise in this direction, provided that the medium-term impact of exogenous shocks—and not only long-term demographic trends—will be considered in the methodological framework.

While being increasingly associated with economic performances, future studies should also clarify the joint role of pandemics and geo-political/economic crises in long-term population dynamics, as a possible factor at the base of the demographic decline characteristic of some economically fragile regions. For instance, after a long stress caused by the COVID-19 pandemic, the impact of recent Ukraine–Russian conflicts on economically weak and demographically fragile local systems in European countries is still unknown, but it can be assumed to be non-neutral and worth deep investigation. Broadly speaking, local systems with low resilience may experience negative impacts from exogenous shocks, leading to population aging, unemployment, and emigration. Analysis of the multifaceted dimensions of socio-demographic resilience allows for estimating the

adaptive capacity of local systems to external shocks. With this perspective in mind, demographic patterns and trends reflect socioeconomic disparities hopefully better than other indicators, informing dedicated strategies toward cohesive and balanced regions.

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