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Evaluating the Impact of Long-Term Demographic Changes on Local Participation in Italian Rural Policies (2014–2020): A Spatial Autoregressive Econometric Model

Francesco Mantino [1,*], Giovanna De Fano [2] and Gianluca Asaro [3]

[1] Council for Agricultural Research and Economics, Centre for Policy and Bioeconomy, 00187 Rome, Italy
[2] Research Institute on Terrestrial Ecosystems, National Research Council (IRET-CNR), 00010 Rome, Italy; giovanna.defano@cnr.it
[3] Independent Researcher, 00100 Rome, Italy; gianlucasaro3@gmail.com
* Correspondence: francesco.mantino@crea.gov.it; Tel.: +39-06-4785-6430

Abstract: This study elaborates on a typology of demographic change and tests this definition at the lowest granular level (LAU2, municipality) with official data. This typology distinguishes between fragile and resilient municipalities based on population dynamics (in terms of duration and intensity) over 1991–2021. This study's second aim is to elaborate a spatial autoregressive econometric model to evaluate to what extent and in which direction the rate of participation of potential beneficiaries of the Rural Development Programmes (RDPs) of 2014–2020 is affected by demographic change and other explanatory variables. Regression models compare the results of the OLS (aspatial) and spatial autoregressive models (SAR) of four types of participation rates (all RDP schemes; all LEADER schemes; sectoral schemes of RDP and LEADER; non-sectoral schemes of RDPs and LEADER). This comparison makes it possible to understand the differences between centralised and decentralised management and between sectoral and broader rural-targeted schemes. The results of the models appear attractive in interpreting the role of RDP instruments in different regions and local areas. First, the rate of participation is strongly dependent on macro-regional differences. Regarding the demographic factors at the local level, this study highlights that demographic fragility does not necessarily hamper the use of RDP measures. Conversely, the participation rate in RDP policy schemes seems particularly significant in very fragile areas, whereas significance has yet to be proved in other demographic typologies. This result holds particularly true for the policy uptake of non-sectoral schemes. Furthermore, LEADER decentralised interventions fit the fragile areas more than resilient and vital ones due to the territorially targeted approach followed by the Local Action Groups.

Keywords: spatial regression models; rural policies; policy evaluation; EU common agricultural policy; long-term demographic change; policy uptake

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1. Introduction

Demographic Change in a European Setting

The regional economic development in Europe has led to increasing regional disparities [1]. The OECD reports [2] that inter-regional disparities in GDP per capita at the NUTS2 level became more significant in 2018 than in 2008. This process of increasing disparities has been reported notably in several European countries (Slovakia, Czechia, Italy, France, Spain, Greece, the UK, Belgium and Sweden). When observed at a more granular level (NUTS3), territorial disparities become even more pronounced due to "…an increasing concentration of economic activities in cities and the difficulties of small remote regions to keep pace with the national frontier" [2] (p. 55).

Territorial disparities in EU countries can also be observed in demographic transition processes [3–10]. In general, demographic trends in Europe are characterised by a marked ageing process; further progress in this direction is expected in the following decades.

A combination of factors has been feeding this global trend: the reduction in fertility rates, increasing life expectancy and decreasing migration rates. EUROSTAT long-term projections forecast a reduction in the European population by 2070 from 5.7% to 3.7% of the world's population [11]. However, these global trends are expected to have quite an uneven impact on its macro-regions (North-Western, North-Eastern and Southern Europe).

This demographic decline represents a crucial transition issue across Europe, forcing the European Commission to put forward their Green Paper on Ageing and their Long-Term Vision for Rural Areas [12–14]. The analysis of demographic changes strongly depends on the granularity level: trends at national and regional levels offer a partial and unclear picture compared to the municipal level [15,16]. This different point of observation allows us to explore demographic territorial diversity much better. Greater granularity is needed because demographic changes are not only dependent on more global dynamics, such as the ageing of the baby boomers and the decreasing fertility rate. They also depend on more localised and specific dynamics, such as "lifestyle/socio-political changes (suburbanisation in metropolitan regions, post-socialist transformation); economic/industrial changes experienced by all industrialised countries (de-industrialisation, de-urbanisation, de-corporatisation, spatial mismatches); environmental changes (environmental disasters and climate change); and externally imposed changes for political, religious or historical reasons (conflicts and wars, administrative changes/territorial re-classification, political changes such as regulatory enforcement)" [17].

By working at the NUTS3 level of granularity, Copus et al. [6] and the ESCAPE project [18] found that almost 60% of rural and intermediate regions (687 regions) suffer from substantial and sustained depopulation over a period covering one or two generations (e.g., 1993–2013 and 2013–2033). However, they also conducted a parallel analysis at the LAU level "since the socio-economic processes which result in shrinking operate at a range of geographical scales, very often smaller than [the] NUTS3 region" [6] (p. 13). Proietti et al. [16], working at the LAU level (municipality), confirmed a general depopulation trend in remote and rural areas in the 2001–2018 period, but put in evidence a similar trend occurring in some non-remote regions, notably in Southern European countries (Portugal, Spain, Southern Italy and Greece) and in areas around major cities (mainly Berlin, Bucharest, Madrid, Sofia, Tallinn and Vilnius), probably due to outmigration to adjacent peri-urban locations. From different studies at the local level [15,19,20], depopulation and ageing processes go beyond and across the rural/urban or mountain/non-mountain typologies and administrative boundaries and can be attributed to specific features of remoteness, access to services, economic opportunities, internal migration and attractiveness.

The impact of demographic change varies from community to community. Still, its influence covers a broad spectrum of aspects: economic growth and productivity, labour markets, public budget, quality of infrastructure and access to services, capability to respond to policy interventions, etc.

Regarding economic growth and productivity, the literature about European countries [15,16,21,22] found that the age structure of the population is an essential factor in shaping the economic development of each region. Empirical evidence from the most recent literature [15,23,24] suggests that the shift in the age structure towards older segments of the population, as well as the increase in old-age dependency on the working-age population, have a significant and negative impact on both per capita income and labour productivity at the regional level. This effect is particularly true in rural and depopulated regions.

Depopulation effects are immediately reflected in the shrinking working-age population and the need to create a larger and more inclusive labour market (for women, older workers, migrants, retired people, people with disabilities, etc.) [4,5].

Depopulation effects on the provision of infrastructures and access to services are likewise adverse [4,7,15,25,26]. Many studies emphasise higher and increasing costs of adequate infrastructure provision and access to services (private and public) due to the declining population. Declining demand also implies that fewer resources are available to finance the costs of public infrastructures like schools, child-care facilities, local transport, etc. At the same time, ageing creates a new demand for elderly care facilities and higher investments to expand social services and social inclusion.

While the most recent literature has devoted less attention to the impact on access to policy instruments and policy uptake, particularly for rural policies, this is an area of research that urgently needs to be addressed. Some specific works on the role of demographic variables have been conducted within the stream of econometric models (see Section 2.3 for a specific review). In general, econometric studies show that the increasing median population age or decreasing population density contributes to lower policy uptake. But the significance of these estimates is not always statistically good, and the insufficient number of studies does not allow the conclusion that this is a generalised outcome.

This study aims to take stock of the studies on the long-term demographic changes and the diversity of processes through which these changes have taken place in the Italian territory. This analysis of the stream of literature is comprehensive and functional to elaborate a typology of demographic change and test this definition at the lowest granular level with official data.

The second aim of this study is to elaborate a spatial autoregressive econometric model to evaluate to what extent and in which direction the rate of participation of potential beneficiaries of the Rural Development Programmes (RDPs) of 2014–2020 is affected by demographic change and other explanatory variables. The underlying hypothesis is that demographic changes in the long term can affect, in some way, policy uptake, either negatively or positively, depending on the capability to respond at the local level and, at the same time, other conditions, such as the delivery system set up for policy measures of the RDP.

Sections 2.1–2.3 describe the proposed typology of demographic change, as well as econometric models to explore its impacts on the rate of participation in Italian rural policy. Sections 3.1 and 3.2 analyse the main characteristics of the typology of areas based on demographic change, and Section 3.3 tries to answer the question concerning which variables influence the rate of participation at the municipal level. Finally, Sections 4 and 5 discuss the main results and conclusions/implications for policy.

2. Materials and Methods

2.1. A Typology of Long-Term Demographic Change

As previously mentioned, studies at the EU level have widely used demographic variables to explore territorial diversities in the EU context. The analysis of demographic change is based on constructing territorial typologies of shrinking European rural regions [6] and demographic profiles [27] using long-term population decreases/increases. Typologies were defined on the intersection of two main dimensions: (a) the duration of population decrease/increase, comparing changes in three or more decades to observe long-term changes; and (b) the intensity of population decrease/increase, using as an indicator the average population change [1] for the entire period under observation and setting some classes of change. The most advanced studies could benefit from a granular availability of population data, which means working at least to the LAU2 level (municipality).

Based on these two dimensions, a new typology of demographic change based on municipality data was defined (Table 1). The period 1991–2021 was divided in 3 decades (1991–2001; 2001–2011; 2011–2021), and four categories of duration were identified (3 decades of positive change, 2 decades of positive change, 1 decade of positive change, 3 decades of negative change). Then, we defined four classes of average annual population change [2] (splitting the decrease above or below the Italian median of −0.59% in the period 1991–2021 and the increase above or below the Italian median of +0.49% in the same period). Finally, seven categories of long-term demographic change were defined as follows:

- Vital (steady and highest global increase over the entire period);
- Resilient (steady and global increase but lower than Italian median);
- Semi-resilient (global increase but decrease for one decade);

- Semi-fragile (global decrease but positive for one decade);
- Fragile (steady and global decrease but lower than Italian median);
- Very fragile (steady and lowest global decrease over the entire period);
- Mixed (non-classifiable according to the previous categories).

Table 1. The typology of long-term demographic change.

Number of Decades between 1991 and 2021 and Related Trend	Annual Rate of Population Change between 1991 and 2021			
	≤−0.6	−0.59/0	0/+0.49	≥+0.50
Three positive decades			Resilient	Vital
Two positive decades	Mixed		Semi-resilient	
One positive decade	Semi-fragile		Mixed	
Three negative decades	Very fragile	Fragile		

Source: own elaboration of the authors.

The terms resilient and semi-resilient indicate clusters of municipalities which, although at a lower rate, succeed in maintaining the population's growth pace in the most vital communities. In this regard, we are following a stream of the literature that considers population dynamics intimately linked to local development processes [15,28]. Conversely, terms like fragile and very fragile indicate that decreases in the population at higher rates than the national one in the long term jeopardise local communities' economic and social survival.

2.2. Spatial Econometric Modelling

Econometric models have already been used to explain the main factors of policy uptake. Table 2 presents the most recent literature's main features dealing with econometric policy uptake models. Crucial differences occur between aspatial and spatial models. Spatial econometrics has gained an increasing role both in regional economics and policy evaluation. As shown in Table 2, studies have focused on different types of RDP schemes, with particular emphasis on agri-environmental measures.

Spatial econometrics must be introduced to correct problems of spatial dependence between the observation of the dependent variables and/or residuals varying systematically over the space (spatial autocorrelation). Anselin [29] demonstrates how Ordinary Least Squares (OLS) estimates are biased and inconsistent in these cases. There are two types of spatial models: (a) spatial lag models, which add a spatially lagged dependent variable among the explanatory variables to consider that policy uptake in one municipality is affected by the participation of the neighbouring areas. In this case, the value of policy uptake is jointly determined by neighbouring values, like a sort of "spillover effect"; (b) spatial error models, where spatial dependency occurs in the error terms, indicating that some unknown variables shared with the neighbourhood have been omitted.

In some of the studies considered here, both cases of spatial dependence were incorporated into the regression model [30,31,35]. Regarding the description of the model, spatial autoregressive models can be represented as an extension of a standard linear model [29,36,37] as follows:

$$r = \rho\,(W_1\, r) + X\,\beta + \varepsilon \quad (1)$$

$$\varepsilon = \lambda\,(W_2\,\varepsilon) + \mu \quad (2)$$

where r is the observed participation rate, W1 and W2 are $n \times n$ standardised matrices of spatial weights applied, respectively, to the lag-dependent variable r and errors, X is the $n \times n$ matrix of k explanatory variables, ε is the error term, ρ is the spatial lag parameter, λ is the spatial error coefficient and β is the regression parameter. When in Equations (1) and (2) $\rho = 0$ and $\lambda = 0$, Equation (1) becomes a standard linear regression model; when $\rho = 0$, Equation (1) becomes a spatial error model; and finally, when $\lambda = 0$, the Equation becomes a spatial lag model.

Table 2. Synthetic review of the most recent econometric studies focusing on the evaluation of RDP policy uptake.

Authors	Policy under Analysis	Dependent Variable	Territorial Explanatory Variables		Spatial Data Unit	Regression Model
			Demography	Other Territorial Variables		
[30]	RDP—measure 121	Participation rate: % of farms receiving payments/total number of farms per municipality	% of farmers ≥65 years old; % of young farmers (≤40 years); % of farms with potential successor	Less-favourable area (dummy). Regional and province priority	Municipalities (LAU)	OLS regression model
[31]	RDP—Agri-environmental schemes to reduce N fertilizer application rate	Change 2010–2001 in the N mineral fertilazer application rate(Kg/ha of UAA) per municipality	Population density. farmers of age 40–54 and ≥55	Natural Value Zones; Less-Favoured Areas; Altitude (mt)	Municipalities (LAU)	OLS regression model
[32]	RDP—Agri-environmental schemes	(a) Participation rate (% of participating holdings per parish) (b) Payments per UAA ha per parish	None	Large urban. other urban. accessible small towns. remore small towns. accessible rural. remote rural	Parish level (LAU)	OLS regression model forward-backward stepwise
[33]	RDP—Axis 3 (measures 311. 313. 322)	Participation rate: -% projects funded/total farms (M311 and 313); -projects funded/1.000 inh. (M322) Expenditure: -€ per UAA (ha) (M311 and 313) -€ per capita (M322)	Population density; share of population per age group; commuters; net migration rate	Share of less-favoured areas; Share of Flora-Fauna-Habitat areas	Municipalities (LAU)	Binary logit regression model
[34]	RDP—Axis 1 (competitive-ness schemes) and Axis 2 (agri-environmental schemes)	Participation in Axis 1 or Axis 2: dummy variable (1.0)	Farmer's age; Presence of successor	% of UAA in less-favoured areas; % of nature areas in the region	Farm level (Italian FADN 2006) and regional level	Mixed effects logistic regression
[35]	RDP—Agri-environmental schemes	Participation in agri-environmental schemes: dummy variable (1.0)	Farmer's gender	None	Farm level sample	Multinomial logit regression models

Source: own elaboration of the authors.

In the literature, policy uptake is represented as the participatory rate (% of projects funded by RDP schemes on the total number of farmers) or the expenditures provided by RDP schemes (expressed as monetary values per capita or per hectare of utilised agricultural areas) (Table 2). In logit regressions, policy uptake is given by a dichotomic variable, assuming 1 = uptake and 0 = no uptake. Territorial characteristics are always included among the explanatory variables for demographic aspects and territorial diversities in natural resources and/or local development opportunities. Territorial features are often taken as eligibility criteria to access funds by RDP operational rules. Notions of rural areas, less-favoured areas, high-nature-value areas, etc., are usually considered explicatory policy uptake factors. In some cases, a broader notion of territorial diversity was considered [38], including concepts of urban/rural differences and accessibility/remoteness. The most appropriate spatial units to implement econometric analysis were municipalities or farm samples, since simulating policy uptake at the territorial level requires a sufficient degree of granularity and statistical detail.

2.3. Data and Variables

This study utilises a spatial autoregressive regression (SAR) model, a key tool in explaining the participation rate for the various RDP schemes during the 2014–2020 period. The focus of this study is on the RDP support of investment in the agricultural sector and the broader rural context. Table 3 provides a comprehensive list of the general and specific schemes considered, along with the number of calls for tender examined in all Italian regions. These calls represent a substantial share of the planned RDP expenditures in Italy in the 2014–2020 period: about EUR 7 billion were allocated to 1352 calls across Italian regions, representing more than one-third of the planned RDP investments.

Table 3. List of RDP measures and sub-measures considered in the analysis of policy uptake.

Investment Sub-Measures	Measure Definition	Planned Expenditures (MLN Euro)	Calls for Applications Examined (no.)
4.1	Investments in agricultural holdings	2700	164
4.2	Investments in processing/marketing and/or development of agricultural products	1072	68
4.3	Investments in infrastructure related to development, modernisation or adaptation of agriculture and forestry	476	66
4.4	Non-productive investments linked to the achievement of agri-environment-climate objectives	269	66
6.1	Business start-up aid for young farmers	789	74
6.2	Business start-up aid for non-agricultural activities in rural areas	63	12
6.4	Investments in creation and development of non-agricultural activities	450	87
7.1	Plans for the development of municipalities and villages in rural areas and their basic services and of protection and management plans relating to Natura 2000 sites and other areas of high nature value	20	16
7.2	Small-scale infrastructure, including investments in renewable energy and energy saving	86	22
7.4	Local basic services for the rural population, including leisure and culture, and the related infrastructure	97	22
7.5	Recreational infrastructure, tourist information and small-scale tourism infrastructure	60	20
7.6	Cultural and natural heritage of villages, rural landscapes and high-nature-value sites including related socioeconomic aspects, as well as environmental awareness actions	88	33
7.7	Relocation of activities and conversion of buildings or other facilities located inside or close to rural settlements	1	1
8.1	Afforestation/creation of woodland	171	36
8.6	Forestry technologies and in processing, mobilising and marketing of forest products	163	51
19.2	LEADER schemes	294	610
	Multi-measure calls	126	4
Total		6924	1352

Source: elaboration of the authors from the database of investments of 2014–2020.

In a regionalised country like Italy, RDP measures are designed and implemented at the regional level via RDPs and related rules/criteria. Conversely, LEADER measures are usually designed and implemented at the local level (the Local Action Group), with significant differences in LAG autonomy from region to region [39]. Data on public and private expenditures according to measures and sub-measures are not systematically available at the national or regional level. This information gap requires intense and time-consuming work in gathering information from the publicly available lists of projects approved and funded by each region after the public call's issue. This work allows the gathering of detailed information on committed expenditures for approved projects by type of investment scheme and municipality.

RDP investment measures and sub-measures were grouped according to four homogeneous categories: (a) The first group includes all investment schemes planned in 21 Italian RDPs, excluding LEADER support. (b) The second group includes only interventions of investment support under the LEADER initiative for local development (M19). (c) The third group, which is a combination of (a) and (b), considers all those schemes addressed to the sectoral investment support (for the agri-food chain and forest sector). This group includes part of the (a) group and part of the (b) group since sectoral support can be provided under the RDP and LEADER measures. Table 4 illustrates in detail the sub-measures and interventions included under this category. (d) The fourth group comprises only the support for non-agricultural investments: diversification of the rural economy, rural infrastructures and services for the rural population. Even in this case, parts of (a) and (b) are considered, and sectoral schemes are excluded. In the case of the LEADER initiative, only interventions for farm diversification and the rural economy are considered.

Table 4. List of dependent variables used in this study.

Variable Name	Variable Description	Support Schemes Included
RDPbenpop	% beneficiaries of RDP total investment support/total population of municipality	M4; M6; M7; M8; M16
LAGbenpop	% beneficiaries of LAG total investment support/total population of municipality	M19
Invsect_benpop	% beneficiaries of RDP and LAG sectoral investment support/total population of municipality	M4.1; M4.2; M6.1; M6.2; LEADER (M19.2- only farm investments and processing and marketing)
Invservinfra_pop	% beneficiaries of RDP and LAG non-sectoral investment support/total population of municipality	M4.3; M4.4; M6.4; all M7; LEADER (M19.2- only farm diversification, services and infrastructures)

Source: own elaboration of the authors.

In practise, groups (a) and (b) split RDP schemes according to the responsibility of the management: regional for (a) and local for (b). Meanwhile, groups (c) and (d) distinguish RDP schemes according to the nature of policy support: sectoral for (c) and non-sectoral but addressed to a broader rural context for (d), following a larger definition of policy for rural areas [40,41]. We assume that the participation rate for these groups of schemes can be different across the national territory and be influenced differently by explanatory factors. Previous studies confirmed that there are differences between the management of RDPs at the regional/central level and LEADER at the local level [39,42], as well as between sectoral and non-sectoral measures, as regards the scope, potential beneficiaries and territorial targeting [43].

The participation rate is measured by the number of beneficiaries approved and funded after each region's formal selection by the RDP Management Authorities. Then, all beneficiaries are grouped by municipality (LAU2 level) and related to the population of each municipality. This variable represents the policy uptake at the local level of the RDP and LEADER schemes in the single municipality (the spatial unit of the model). The model's explanatory variables (Table 5) can be summarised in three main types: (a) long-term demographic change, (b) macro-regional differences and (c) features of the local agricultural system. Demographic differences at the municipal level can be represented by the typology described in Section 2.1. Demographic variables in the literature studying policy uptake (Table 3) focus on population density, age and presence of potential successors [30–34]. The concept of demography used in this study is considered a territorial factor (not limited to the agricultural sector) and is focused on long-term dynamics (rather than as a variable at one point in time). The demographic typology is included in the model under a dichotomic variable, taking a value of 1 for each category except for the mixed category, which takes a value of 0.

Table 5. Information on independent variables used in regression models.

Variable Name	Variable Description	Min	Max	Mean	StDev
Macro-regional variables					
North-West	Dummy variable = 1 if municipality belongs to North-West macro-region, 0 to the centre	-	-	-	-
North-East	Dummy variable = 1 if municipality belongs to North-East macro-region, 0 to the centre	-	-	-	-
South	Dummy variable = 1 if municipality belongs to South macro-region, 0 to the centre	-	-	-	-
Islands	Dummy variable = 1 if municipality belongs to Islands macro-region, 0 to the centre	-	-	-	-
Long-term demographic change (years 1991–2021)					
Vital and resilient	Dummy variable = 1 if municipality belongs to the vital and resilient cluster, 0 to the mixed cluster	-	-	-	-
Semi-resilient	Dummy variable = 1 if municipality belongs to the semi-resilient cluster, 0 to the mixed cluster	-	-	-	-
Semi-fragile	Dummy variable = 1 if municipality belongs to the semi-fragile cluster, 0 to the mixed cluster	-	-	-	-
Fragile	Dummy variable = 1 if municipality belongs to the fragile cluster, 0 to the mixed cluster	-	-	-	-
Very fragile	Dummy variable = 1 if municipality belongs to the very fragile cluster, 0 to the mixed cluster	-	-	-	-
Farming system					
PDOPGIshare	% of producers with Protected Designation of Origin or Protected Geographical Indication on total farms (year 2020)	0.0	200.0	37.5	27.8
Sharemarginfarm	% of producers under EUR 15,000 agricultural standard output on total farms (year 2020)	0.0	100.0	42.3	14.7
Farmoutputvalue	Average Agricutural Standard Output per farm (Euro) (year 2015)	284.0	3,074,000	50,152	97,268
UAAm	Average Utilised Agricultural Area per farm holding (Ha) (year 2020)	0.1	382.9	16.8	20.7
Densafarm	Number of farms per 100 inhabitants (year 2020)	0.2	720	44.1	46.1
Speedbroadband	Broad band speed from the fixed network (Mb/s) (2020)	0.18	475.9	56.2	43.8

Source: own elaboration of the authors.

The second variable is related to macro-regional systems. Different delivery systems, administrative efficiency and competitiveness levels reached by the regional agri-food systems can explain the differences in policy uptake. A proxy of these effects can be identified by a variable representing the five macro-regional divisions of the Italian territory (North-East, North-West, Centre, South and Islands). This variable is a dichotomic value for the macro-region to which the single municipality belongs (1 for North-East, North-West, South and Islands, and 0 for Central Italy).

The third type of independent variable, under the "local agricultural system" category, holds significant practical implications. Several authors have found that farm size and other organisational characteristics are of primary importance in explaining the policy uptake of RDP schemes, notably agri-environmental measures [30,34,35]. The collection of farm data at the municipal level is strongly limited by the availability of information issued by the most recent agricultural census. However, the model includes variables which are expected to generate a positive effect on the rate of participation at the municipal level, such as the presence of farms with PDO/IGP productions, the yearly farming turnover, the intensity of farm holdings and the presence of broadband service at the municipal level. Some other variables are expected to have a negative sign, like the share of marginal farms in the total farms.

Following Equations (1) and (2), the model considered here can be represented as follows:

$$r_i = \rho\,(W_1\, r_i) + \beta\, Dem_i + \gamma\, Reg_i + \delta\, \Sigma\, Farm_i + \varepsilon \quad (3)$$

$$\varepsilon = \lambda\,(W_2\, \varepsilon) + \mu \quad (4)$$

where Dem_i is the demographic typology of the i-th municipality, Reg_i is the macro-region including the i-th municipality and $\Sigma Farm_i$ is the set of "agricultural system" variables included in the model. The STATA programme creates the spatial weighting matrix W. This study applies the same matrix W to the lag-dependent variable and errors (W1 = W2). W is a symmetrical matrix 7900 × 7900 (the number of Italian municipalities) and a contiguity matrix with the same positive weight for contiguous spatial municipalities and, by default, a zero weight for all other units. Municipality contiguity was taken into account based on the communal code. W is also a spectral normalised matrix created by dividing the entries by the absolute value of the largest eigenvalue in the matrix [44]. In practise, the spectral normalisation produces estimates of ρ and λ in the range of −1 to +1 (with 0 meaning no spatial effects). To fit the model with endogenous regressors for cross-sectional data (as in the case of the independent variable), we used a generalised method of moments estimator known as Generalised Spatial Two-Stage Least Squares (GS2SLS) and STATA software v.18, which allows the estimation of all the regressor parameters jointly after creating the W matrix.

3. Results

This section is divided into two subheadings. The first describes the weight and differential characteristics of the demographic typologies in Italy to explore their evolution from 1991 to 2021. The main objective is to analyse the implications of demographic fragility/resilience in rural areas. The second subheading seeks to quantify statistical relations between demographic changes and the uptake of rural policy in Italian rural areas through an econometric model.

3.1. Typologies of Demographic Changes in Italy: Differential Characteristics

The Italian population revealed steady growth between 1991 and 2011 (from 56.8 to 59.4 million inhabitants), but in the last decade, this process was reversed (the total population decreased to 59.0 million in 2021). Over the 1991–2021 period, the very fragile cluster lost 1.4 million inhabitants (more or less, the fragile and semi-fragile groups decreased by the same amount). In contrast, vital municipalities gained 3.3 million new inhabitants (Figure 1).

The three types of fragile clusters represented 40% of the national population in 1991, but one-third in 2021, whereas all resilient groups moved from 37% to 43% (Table 6). The very fragile cluster is concentrated in mountain and hill regions and the smallest municipalities. Conversely, resilient and vital typologies focus on lowland regions and include notably small- and medium-sized municipalities (between 5000 and 50,000 inhabitants). Fragile and semi-fragile groups are significantly present among provincial and regional capital cities due to the counter-urbanisation process.

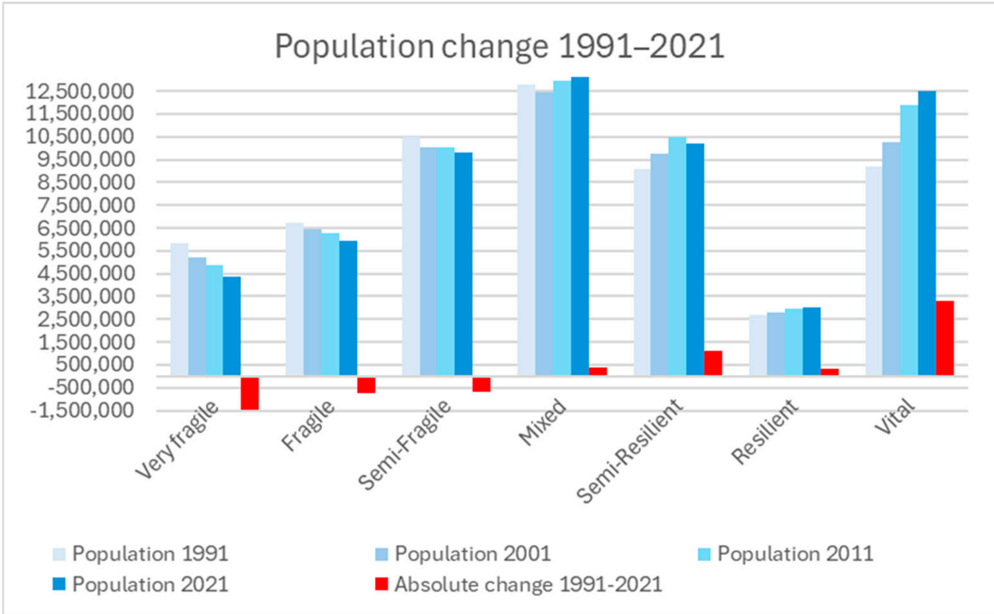

Figure 1. Population changes by decade in the period 1991–2021 and typologies of demographic dynamics. Source: authors' elaborations from Italian Census data.

Table 6. Distribution of population by typologies of demographic dynamics, altitude and municipal size.

Indicators	Very Fragile	Fragile	Semi-Fragile	Mixed	Semi-Resilient	Resilient	Vital	Total
Population % share 1992	10%	12%	18%	22%	16%	5%	16%	100%
Population % share 2021	7%	10%	17%	22%	17%	5%	21%	100%
Population by altitude 2021:								
- Mountain regions	38.1	10.3	13.4	7.5	11.7	13.5	7.9	12.2
- Hill regions	37.1	54.5	30.2	32.4	50.6	34.4	36.2	38.7
- Lowland regions	24.8	35.2	56.4	60.1	37.7	52.1	55.9	49.2
- Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Population by municipality size:								
- less that 2000 inh.	25.4	4.9	5.8	2.6	6.3	2.1	2.3	5.6
- 2000–5000 inh.	22.7	9.8	10.3	4.2	17.4	6.3	10.7	10.9
- 5001–20,000 inh.	14.8	22.6	18.7	14.8	41.7	36.5	53.4	30.2
- 20,000–50,000 inh.	4.5	10.4	13.5	16.9	21.5	36.2	21.9	17.6
- >50,000 inh.	4.2	3.8	4.6	7.1	6.0	4.4	6.6	5.7
- Provincial capitals	6.4	15.2	20.4	27.2	5.4	10.5	5.1	14.0
- Regional capitals	21.9	33.3	26.7	27.2	1.6	3.9	0.0	15.9
- Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: authors' elaborations from Italian Census data.

The dichotomy between the fragile and resilient clusters of municipalities emerges more clearly by analysing socio-demographic, agricultural and service accessibility indicators (Table 7). As we move from the vital to the very fragile group, the population density falls sharply from 300 to 55 inhabitants, and the internal composition of the population by age classes brings a predominance of older people due to an ageing process and outmigration of the youngest people. Employment opportunities are less frequent in the fragile and very fragile groups, which also implies fewer opportunities for the social inclusion of people coming from abroad, confirmed by the lower share of immigrants in the total population.

Table 7. Socio-demographic indicators by typologies of demographic dynamics.

Population Indicators (2021)	Vital	Resilient	Semi-Resilient	Mixed	Semi-Fragile	Fragile	Very Fragile
Population density (Inh./Km^2)	326.9	245.7	204.1	332.6	193.3	193.6	54.5
Structural dependency index	53.6	57.6	56.0	58.0	59.3	59.4	63.9
Ageing index	20.8	23.6	23.0	24.2	25.3	25.1	28.3
Old age dependency ratio	146.9	181.2	178.3	192.9	212.0	205.7	265.5
Employment rate	66.0	65.5	62.5	64.8	62.7	56.5	57.9
Immigrants per 1000 inhab.	95.6	90.8	70.7	109.6	97.3	57.7	55.5
Employees per 1000 inhabitants	293.1	316.4	263.1	338.2	328.0	253.7	219.2

Source: authors' elaborations from Italian Census data.

The strengths and weaknesses of the agricultural system can also be related to demographic change. The fragile and very fragile clusters tended to lose more farmland and farming units than the resilient and vital ones in 1990–2021. Sharper population decreases and lower land productivity in fragile areas imply more intense land abandonment than in other areas (Table 8). Land abandonment is often followed by the so-called "re-naturalisation" of previously cultivated land (pastures and cereals) and spontaneous and ungoverned forest expansion, a process frequently characterising Mediterranean internal rural areas in the most recent decades [45].

Table 8. Agricultural indicators by typologies of demographic dynamics.

Agricultural Indicators	Vital	Resilient	Semi−Resilient	Mixed	Semi−Fragile	Fragile	Very Fragile
TAA−Annual Change rate 1990–2020	−0.78	−0.68	−0.83	−0.75	−1.08	−1.07	−1.35
UAA−Annual Change rate 1990–2021	−0.58	−0.55	−0.58	−0.48	−0.76	−0.67	−0.83
UAA per farm (ha; 2021)	10.54	10.10	9.94	10.85	9.97	9.97	13.49
Farm holdings−Annual Change rate 1990–2021	−3.10	−2.82	−3.11	−2.92	−2.98	−2.68	−3.24
AWU per farm 2020	1.3	2.0	1.1	2.9	1.8	1.8	0.9
Forest hectares per 1000 inhabitants 2010	81.05	105.16	151.81	93.91	178.22	164.98	734.99
Share of abandoned land (%) 2020	0.23	0.16	0.30	0.44	0.58	0.80	1.29
Agritourist farming of total farms (2020)	3.42	3.37	2.40	2.13	12.99	1.45	21.40

Source: authors' elaborations from Italian Census data.

Relevant relations can be traced between demographic typologies and accessibility to services. Figure 2 confirms that higher fragility implies lower accessibility to essential services, such as primary and secondary schools, train stations and healthcare services. The average distance from these services of very fragile areas is more than double compared to the groups of resilient and vital ones. Dynamic economies and better transport infrastructures allow residents in vital and resilient areas to keep more frequent exchanges with nearby municipalities and for better mobility inside and outside their own municipalities. From a dynamic perspective, these disparities will widen so that service accessibility does not attract any more public or private investments due to the shrinking population.

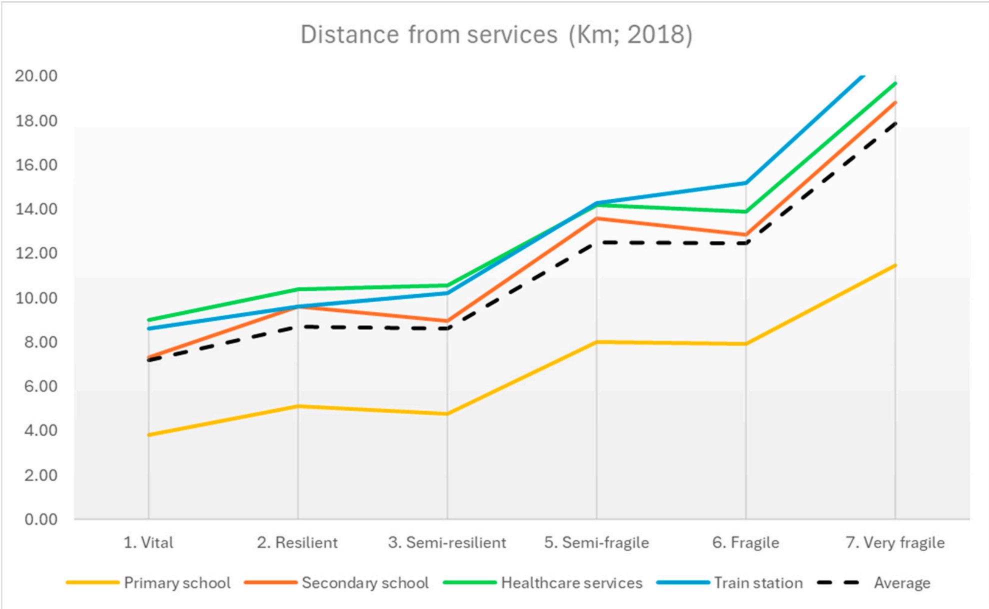

Figure 2. Average distance (Km) from different types of basic services by typology of demographic dynamics. Source: authors' elaborations from EU Rural Observatory.

3.2. *What Is the Role of Rural Policies?*

To answer the question about the role of rural policies, the allocation of funds for RDPs in Italian rural areas does not seem to be concentrated in specific demographic typologies (Figure 3). That means that there are no relevant differences between the resilient and fragile groups in the total allocation of funds. However, some interesting differences emerge, as the LEADER's share is more significant in fragile areas, whereas other integrated projects (notably integrated agri-food chain projects) gain more weight in resilient areas.

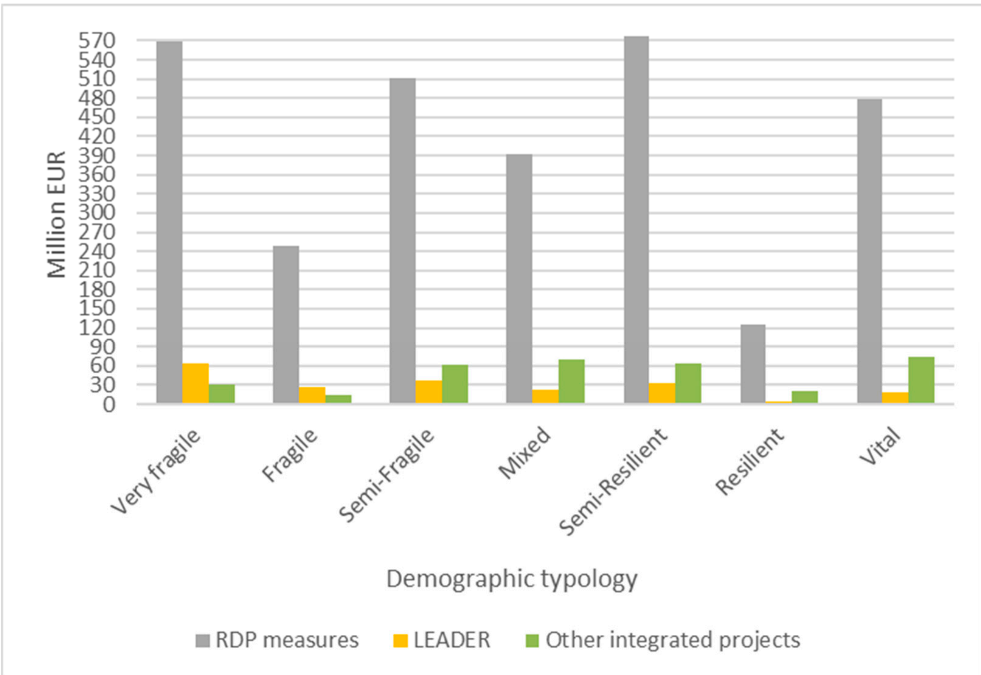

Figure 3. Distribution of RDP-committed funds (in EUR, 2014–2020 period) by typology of demographic dynamics. Source: authors' elaborations from the database of funded investment projects 2014–2020.

The allocation profile of rural development funds differs according to the type of demographic change. In the resilient clusters, more than three-quarters of total commitments are addressed to agri-food projects (Figure 4). Consequently, the allocation profile is typically sectorial. Conversely, investment support is more frequently delivered to essential services, village renewal and non-productive investments in the fragile and very fragile clusters. In this regard, the allocation profile is highly consistent with rural community needs, as the lack of social investments in public goods and services has become a relevant policy issue in the most fragile areas.

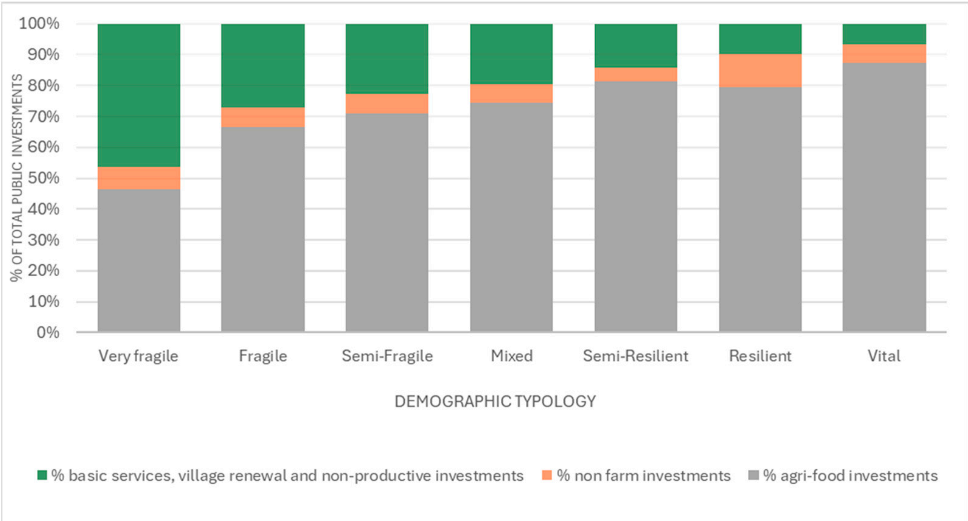

Figure 4. Distribution of RDP-committed funds (in Euro, 2014–2020 period) by type of investments within each demographic typology of area. Source: authors' elaborations from the database of funded investment projects 2014–2020.

The allocation profile of LEADER projects greatly differs from the mainstream sectoral-oriented RDP measures: basic services, village renewal and non-productive investments predominate in all areas involving LEADER initiatives and non-agricultural projects (Figure 5).

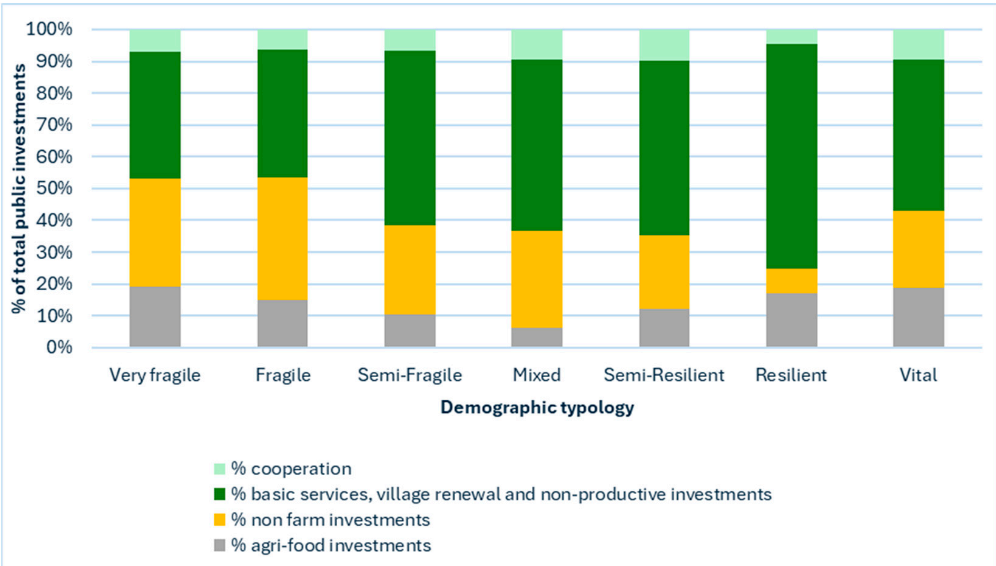

Figure 5. Distribution of LEADER-committed funds (in EUR, 2014–2020 period) by type of investments within each demographic typology of area. Source: authors' elaborations from the database of funded investment projects 2014–2020.

3.3. The Result of the Econometric Model

Tables 9 and 10 compare the results of OLS (aspatial) and spatial autoregressive models of the four types of participation rates (all RDP schemes; all LEADER schemes; sectoral schemes of RDP and LEADER; non-sectoral schemes of RDP and LEADER). This comparison makes it possible to understand the differences between centralised and decentralised management and between sectoral and broader rural-targeted schemes. These tables also include the estimated coefficients, giving the net impact of each explanatory variable on the rate of participation for the groups of the above-mentioned schemes.

Table 9. Comparison between OLS and SAR model regressions on RDP and LEADER participation rate at municipal level (2014–2020).

Independent Variables	Dependent Variable: PSRbenpop (% Beneficiaries of RDP Total Investment Support)			Dependent Variable: LAGbenpop (% Beneficiaries of LAG Total Investment Support)		
Regional Differences	**OLS−Aspatial**	**GS2SLS−SAR Model**	**SAR Total Impacts**	**OLS−Aspatial**	**GS2SLS−SAR Model**	**SAR Total Impacts**
North−West	1.10 ***	1.12 ***	1.22 ***	0.77 ***	0.71 ***	0.76 ***
North−East	0.99 ***	0.60 ***	0.65 ***	0.63 ***	0.53 ***	0.57 ***
South	−1.1	−0.81 ***	−0.88 ***	−0.71 ***	−0.75 ***	−0.80 ***
Islands	−0.26 ***	−0.17 *	−0.18 *	−0.71 ***	−0.80 ***	−0.86 ***
Demographic change						
Vital&resilient	−0.06	−0.05	−0.05	−0.41 **	−0.34 *	−0.36 *
Semi-Resilient	−0.06	−0.04	−0.04	−0.38 **	−0.29 *	−0.31*
Semi-Fragile	0.13 *	0.07	0.08	−0.01	−0.03	−0.03
Fragile	−0.10	−0.09	−0.09	−0.01	−0.06	−0.07
Very fragile	0.20 ***	0.11 *	0.11 *	0.34 **	0.23	0.25
Farming system						
Log_PDOIGPshare	0.06 ***	0.05 ***	0.05 ***	0.06 **	0.06 *	0.06 *
Log_Sharemarginfarm	−0.13 **	−0.15 ***	−0.16 ***	−0.39 ***	−0.31 **	−0.33 **
Log_Farmoutputvalue	−0.08 ***	−0.01	−0.01	−0.21 ***	−0.14 **	−0.15 **
Log_UAAm	0.12 ***	0.12 ***	0.13 ***	0.10 *	0.03	0.03
Log_densafarm	0.78 ***	0.80 ***	0.86 ***	0.51 ***	0.61 ***	0.65 ***
Log_speedbroadband	−0.20 ***	−0.15 ***	−0.16 ***	−0.42 ***	−0.37 ***	−0.40 ***
Constant	−3.30 ***	−4.17 ***		0.73	−0.46	
Spatial parameters						
ρ (spatial lag parameter)		0.15 ***			0.16	
λ (spatial error coefficient)		0.99 ***			0.94 ***	
Statistics						
No. Observations	4481	4481		961	961	
R^2	0.55			0.39		
Adjusted R2	0.55			0.38		
Pseudo_R2		0.53			0.37	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Source: authors' elaborations from their own database and STATA processing procedures.

Table 10. Comparison between OLS and SAR model regressions on sectoral and broader rural-targeted participation rate at municipal level (2014–2020).

Independent Variables	Dependent Variable: % Beneficiaries of RDP and LAG Sectoral Investment Support			Dependent Variable: % Beneficiaries of RDP and LAG Non-Sectoral Investment Support		
Regional Differences	**OLS-Aspatial**	**GS2SLS-SAR Model**	**SAR Total Impacts**	**OLS-Aspatial**	**GS2SLS-SAR Model**	**SAR Total Impacts**
North-West	1.41 ***	1.38 ***	1.46 ***	0.71 ***	0.59 ***	0.65 ***
North-East	1.25 ***	0.95 ***	1.00 ***	−0.15	−0.34 **	−0.38 ***
South	−1.79 ***	−1.66 ***	−1.76 ***	−1.09 ***	−1.04 ***	−1.16 ***
Islands	0.13 *	0.15	0.16	−0.57 ***	−0.61 ***	−0.68 ***
Demographic change						
Vital&resilient	−0.03	−0.02	−0.02	−0.08	−0.06	−0.07
Semi-Resilient	−0.02	−0.01	−0.01	−0.10	−0.05	−0.05
Semi-Fragile	0.12 *	0.09	0.09	0.23 **	0.15	0.16
Fragile	0.01	−0.02	−0.02	0.04	0.03	0.03
Very fragile	0.11	0.08	0.09	0.61 ***	0.44 ***	0.49 ***
Farming system						
Log_PDOIGPshare	0.12 ***	0.08 ***	0.09 ***	0.03 *	0.03	0.03
Log_Sharemarginfarm	−0.19 ***	−0.18 ***	−0.19 ***	−0.11	−0.10	−0.11
Log_Farmoutputvalue	−0.06 **	0.00	0.00	−0.31 ***	−0.24 ***	−0.26 ***
Log_UAAm	0.16 ***	0.15 ***	0.15 ***	0.19 ***	0.16 ***	0.18 ***
Log_densafarm	0.82 ***	0.82 ***	0.87 ***	0.47 ***	0.59 ***	0.66 ***
Log_speedbroadband	−0.18 ***	−0.15 ***	−0.15 ***	−0.39 ***	−0.29 ***	−0.32 ***
Constant	−4.12 ***	−4.76 ***		0.04	−1.12 *	
Spatial parameters						
ρ (spatial lag parameter)		0.11 ***			0.25 ***	
λ (spatial error coefficient)		0.95 ***			0.95 ***	
Statistics						
No. Observations	3431	3431		2317	2317	
R^2	0.64			0.41		
Adjusted R^2	0.64			0.41		
Pseudo_R^2		0.63			0.39	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Source: authors' elaborations from their own database and STATA processing procedures.

Macro-regional differences significantly affect the rate of policy uptake, positively in northern regions and negatively in southern Italy and the Islands. This contrasting effect can be attributed to two relevant factors: (a) on the one side, regional development differentials between the north and south create the conditions for more proactive participation in policy opportunities in northern regions; (b) on the other side, northern regions are more efficient than southern ones in ensuring that RDP implementation meets the needs of investment support for potential beneficiaries on time. This latter explanation seems confirmed by the higher expenditure rates shown by the most recent evaluation reports on RDP implementation in Italy [46]: whereas northern regions spent about 60% of their public resources (with Emilia-Romagna and Veneto reaching even 67–70%), all southern regions spent 53%, and some regions did not reach their planned targets, with consequent financial penalties from the European Commission.

The influence of demographic typology on RDP scheme uptake is less intense than expected. Very fragile areas positively and significantly impact RDP uptake, whereas vital and resilient areas have negative signs and no statistical significance. This result holds for

OLS and SAR models and implies that demographic fragility does not cause a lack of policy uptake. Conversely, RDP instruments seem more targeted to fragile areas than resilient ones. As emphasised in the previous paragraph, very fragile areas are mainly characterised as rural places (low population density, higher ageing and dependence rate, etc.). RDP measures are often implemented through selection criteria and eligibility rules rewarding remoteness and mountain features.

Applying regression models to LEADER schemes confirms parameter signs and significance but with interesting differences (Table 9). Since LEADER is mainly implemented in remote and inner areas and LAGs usually prioritise the needs of the most rural communities, parameter signs are significantly negative for vital and resilient areas and positive for very fragile rural areas. This result confirms that LAG interventions are purposefully more targeted to the most fragile areas than RDP schemes. This specific territorial focus is a fundamental component of the LEADER value added, which is confirmed across European countries by other studies [36,37]. It is worth noticing that the ρ parameter is not significant, implying that in LEADER territories, there is no spatial dependence in the policy uptake, probably because the beneficiaries are more distributed across the LEADER area than RDP schemes.

With regional development features and demographic dynamics being given, the agricultural system plays a relevant role in influencing the rate of participation in RDP policy measures: policy uptake increases as the organisational and structural capacity of the farming system increases. This capacity is supported by a higher share of PDO/IGP production, adequate farm size and a higher density of farm units in the municipal territory. These variables represent indicators of local agricultural viability and foster the participation rate of the RDP schemes. They also represent specific points of strength that can be present in individual farms in fragile areas. Conversely, marginal farms and annual farm turnover negatively affect policy uptake by potential beneficiaries. The former indicates that unviable farms have a low interest in accessing policy provisions. The negative sign of the farm turnover variable is due to eligibility and section criteria set by the regional managing authorities, which usually exclude from the public calls too-small and too-big farm units. Broadband speed, a variable defining the quality of networking services, is generally more available in urban and peri-urban areas than in rural areas [7], hence the significant but negative coefficient of this variable.

The regression model tested with beneficiaries of the sectoral measures as a dependent variable (Table 10) confirms the significance of most of the parameters and explains more than 60% of the total variance (R2 = 0.64%). However, in this case, most of the explanatory capacity is due to regional differences and agricultural systems, whereas the demographic typology is not significant, regardless of the regression model. Sectoral schemes do not prioritise beneficiaries localised in fragile and very fragile areas. Even for these schemes, the northern regions perform better than the southern regions and the Islands. The administrative capacity of northern regions is evident for all types of schemes, whether sectoral or not.

Regarding the agricultural system, it is worth noting that variables related to competitiveness (farm size, PDO/IGP productions, farming density) show the highest impacts on the sectoral participation rate. This result implies a high and positive correlation between farm competitiveness and access to sectoral schemes. Furthermore, in this model, it also appears clear that farm competitiveness identifies a more robust set of explanatory factors than territorial competitiveness.

The results differ when the share of beneficiaries of non-sectoral supporting schemes is the dependent variable. In this case, the explanatory capacity of demographic typology improves since the parameters and statistical significance of very fragile municipalities are higher than the previous models. Non-sectoral schemes are prioritised by regional managing authorities of RDPs in remote and inner areas [40], and this model confirms that these measures play a more significant role for beneficiaries in very fragile areas because they respond to the real needs of the rural population.

4. Discussion

Population shrinking and ageing have been emphasised as an essential gap in the analysis of differential competitiveness between Europe and the United States. In the coming decades, Europe's population is projected to lose about 21 million people (by 2070). Conversely, the US population is projected to grow during this period [47]. As a result of these demographic trends, the working-age population will be 41 million people smaller in 2070. These effects have been estimated at the aggregate level but will be more significant in the poorest European regions and rural areas. Most policies are designed in the European and national framework without a specific territorial focus; place-based policies are an exception rather than a significant rule in national strategies. Consequently, analysing how demographic changes influence policy uptake at the territorial level becomes crucial to disentangling the capability to reach the poorest areas. The contribution of this study seeks to face this task with a focus on rural development policy.

Demographic change affects social and economic development across Europe as a result of global dynamics and, simultaneously, localised and specific transformations. This study focused on understanding long-term demographic changes at the local level and proposed a typology of dynamics (structured in seven categories) that goes beyond the usual dichotomy of rural/non-rural areas. This study proposes a demographic typology that distinguishes between fragile and resilient municipalities based on population dynamics (in terms of duration and intensity) over 1991–2021. Fragile clusters characterised, as expected, mountain and hill regions, small–medium-sized municipalities, and some provincial and regional capital cities. However, population shrinking has further constrained the opportunities for Italian growth over time, reduced the working-age population and larger and inclusive labour markets, and decreased the adequate provision of infrastructures and access to services.

This study focused on the effects of long-term demographic changes on policy uptake, particularly on RDP instruments. The analysis of the literature shows that a series of studies have been conducted, based on econometric models, where policy uptake is explored in a multivariate context and, given the frequent spatial correlations in policy uptake, many authors have adopted SAR as the most appropriate approach to avoid biased and inconsistent coefficient estimates. This work compares the regression results achieved through OLS and SAR models. Summarising the differences between the two methods, we can conclude that SAR models often imply lower coefficient values and sometimes the loss of significance of the independent variable. Parameters ρ and λ, indicating, respectively, the spatial dependence of the lagged dependent variable and correlations of errors, are positive and significant (excluding ρ in the LEADER support), justifying the need for SAR model adoption.

The results of the models appear attractive in interpreting the role of RDP instruments in different regions and local areas. First, the rate of participation is strongly dependent on macro-regional differences. The evident gap between positive signs in northern areas and negative ones in the southern regions and the Islands confirms the vast disparities between macro-regions in Italy, put forward by the broad regional economics literature [1,48,49]. This study emphasises, on the one hand, factors related to disparities in the administrative capacity of regions and, on the other hand, territorial and social capital. The independent variable of the models most likely represents the former type of factors since territorial capabilities are partly reflected in the "agricultural system" set of variables. However, the model's proxy variables should be improved through a more appropriate identification of some variables representing institutional capacity at the regional level, which is quite relevant in a country like Italy, where RDP policies are fully decentralised to the regional administrations.

Regarding the demographic factors at the local level, this study highlights that demographic fragility does not necessarily hamper the use of RDP measures. Conversely, the participation rate in RDP policy schemes seems particularly significant in very fragile areas, whereas significance has yet to be proved in other demographic typologies. This result holds particularly true for the policy uptake of non-sectoral schemes. Furthermore, LEADER decentralised interventions fit the fragile areas more than resilient and vital ones due to the territorially targeted approach followed by the Local Action Groups. These findings are consistent with recent evaluation studies on the balanced territorial impacts of CAP across European rural and non-rural territories [36,39,50]. Working at a finer territorial level and through a triangulation of surveys, interviews and case studies, they proved that LEADER and non-sectoral schemes could reach remote and sparsely populated areas, and thus ensure easier access to public funds for local beneficiaries. This outcome is more evident than that ensured by the CAP farm-targeted subsidies and other European Funds (like European Regional Development Fund—ERDF; and European Social Fund—ESF). Two institutional factors can explain this differential capacity: (a) the specific eligibility and selection criteria set by regional managing authorities, which prioritise rural areas and give a special reward to applications presented by mountain/remote areas; (b) the animation/information activities and the closeness of LAGs to the population, setting up an enabling environment for the hard-to-reach potential beneficiaries, small-size projects and disadvantaged applicants [51]. Both factors contribute substantially to improving the capacity of RDP schemes to cover, although partially, essential needs at the very local level.

5. Conclusions: Implications for Research and Policy Design

Institutional definitions of rural areas are often used to test policy uptake and impact. However, "institutional" definitions, as proposed by the current policy delivery systems, consider broad categories of rural areas and sometimes with high internal heterogeneity. The literature has emphasised the concept of demographic transition and long-term dynamics. By combining different sources of information at the appropriate level of granularity, this study identified a set of significant variables affecting policy uptake and long-term dynamics, which were most notable in the most fragile areas. This result suggests a series of policy implications that should be carefully considered in the design, implementation and evaluation of RDPs in the coming years.

First, given the importance of LEADER and non-sectoral schemes for hard-to-reach communities, increasing the budget allocation for these interventions would mean safeguarding adequate funding to target the most fragile rural areas. Second, specific criteria or earmarking procedures must shape the implementation phase to ensure that fragile areas can access RDP funds. These two solutions do not require changing the present regulations governing the functioning of rural development policies but rather simply require applying them with a more substantial territorial approach focusing on demographically fragile areas. The CAP Strategic Plans' (SPs) 2023–2027 analysis shows that choices, although differentiated from country to country, do not seem to prioritise fragile rural areas [50,52]. Furthermore, few countries adopt a rural vision in local development interventions since sectoral vision prevails. Apart from France, Spain and Italy, no other country addresses specific policies for areas suffering from high depopulation rates. Furthermore, there is a need for a more place-based integration between rural development and cohesion policy since the service and infrastructural gaps between fragile and resilient areas require the contribution of other European policies (e.g., funded by ERDF and ESF).

A further relevant implication concerns the role of animation as a tool to involve potential beneficiaries in the most fragile areas. This tool is supported under the title "cooperation" of the CAP SPs and is related to EIP Operational Groups and LEADER. Some authors calculated that the cooperation's share in the CAP SPs at the EU level reaches 10% of the total planned expenditures of the second pillar [52]. This share falls to 8% in the Italian case. Some policy adjustments seem necessary in the coming years to ensure that, as regression outcomes have proved, rural development policies can provide positive redistributive effects at the territorial level.

Finally, this study highlights the need for improving variable specification in regression models to enhance the explanatory capacity of the econometric models dealing with policy uptake in rural areas. Regression models need some improvement by considering the following options: (a) Including variables identifying the quality of government and policy efficiency. These improvements could be relevant to better define the gap in institutional capabilities, both among macro-regions and between regional and local governments. (b) Expanding the model to relevant policies like regional development and social policies, which have similar objectives of reducing territorial disparities through different but complementary policy instruments.

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Data Availability Statement: Data were collected by the regional websites of the Department of Agriculture and Rural Development in the 21 Italian Regions and autonomous provinces. Further data were collected from the public archive.

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Notes

[1] The average annual population change rate is the result of a composed rate according to the following formula: r = 100 × $\sqrt[t]{Pt/Po}$ − 1, where *t* is the duration period, Pt the population at time t and Po the population at time 0.

[2] Estimates of net impact identify the total impacts of independent variables on the reduced-form mean of the dependent variable. Each coefficient says what is the numerical effect of 1% of change in the independent variable on the dependent one.

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