THE CAUSES AND CONSEQUENCES OF DEPOPULATION
29 November – 1 December 2021

DEPOPULATION AND POPULATION AGEING: AN UNSUSTAINABLE RELATIONSHIP?

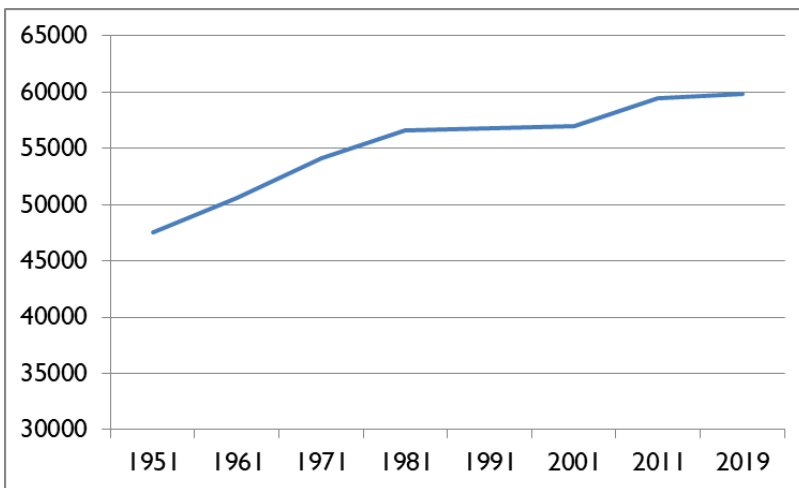*Reynaud Cecilia*, Miccoli Sara***

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Introduction: demographic trend

Since the Second World War, Italy has experienced major demographic changes: increasing survival, decreasing fertility, and the change from a country of emigration to one of immigration

Population at the census data. Italy, 1951-2019

Source: Authors' calculation from ISTAT data

Population growth (*1,000 inhabitans). Italy, 1951-2019
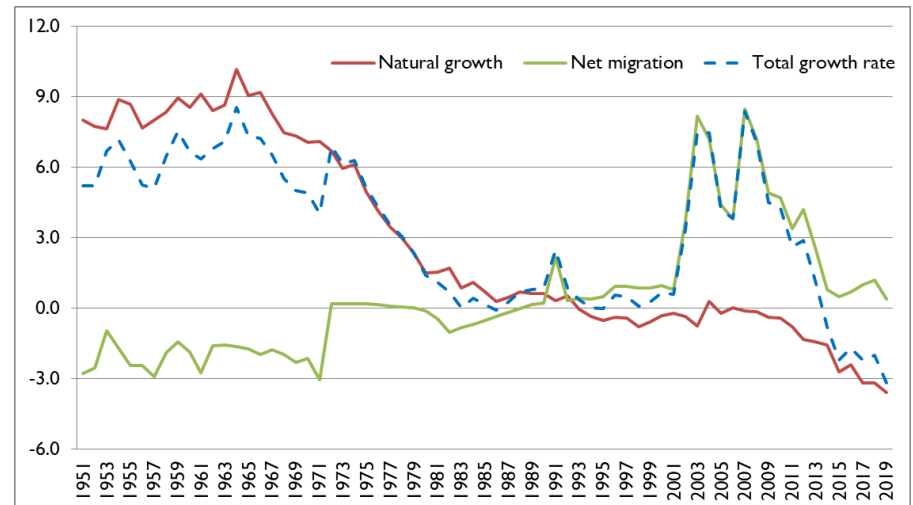
Source: Authors' calculation from ISTAT data

Territorial level

Italy is divided into major socio-economic regions (NUTS 1), regions (NUTS 2), provinces (NUTS 3), and municipalities (LAU)

Italian socio-economic regions

Italian municipalities

2011 census
8,092 municipalities

Resident population
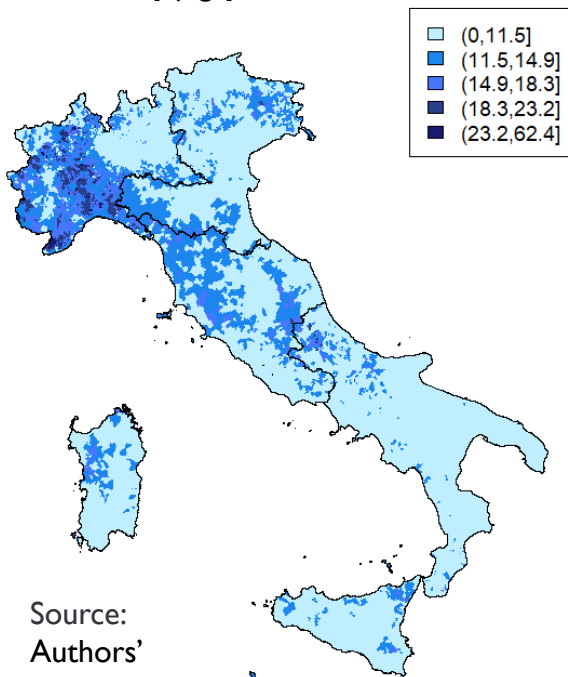min. = 30
max. = 2.6 million

Km^2
min. = 0,12
max. = 1,287

Population dynamics differ widely at different territorial levels

Population ageing in Italy

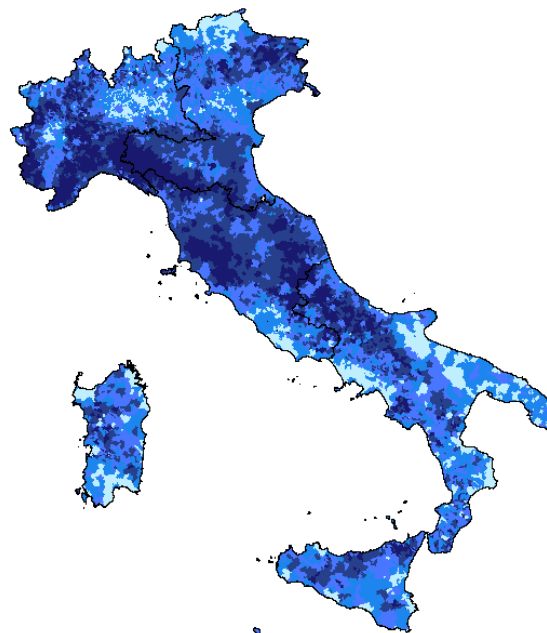The proportion of the 65 + population. Italian municipalities. Census 1961, 1991, 2019

1961	1991	2019
Max: 32.0%	Max: 61.9%	Max: 62.3%
In 4 municipalities P65+ >30%	In 751 municipalities P65+ >30%	In 1348 municipalities P65+ >30%
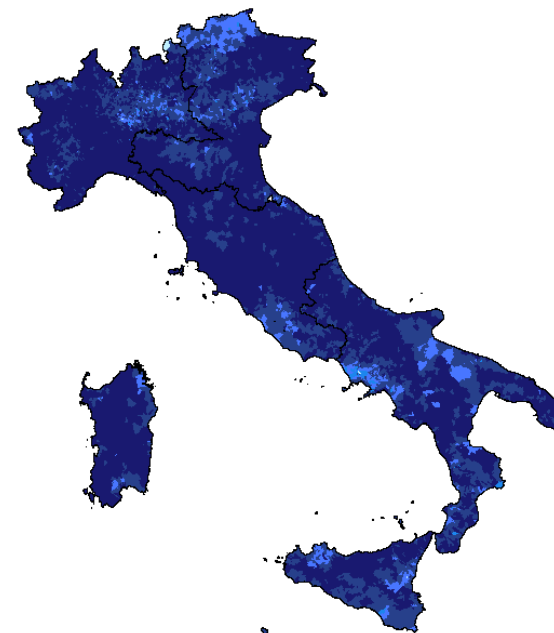
Legend:
- (0,11.5]
- (11.5,14.9]
- (14.9,18.3]
- (18.3,23.2]
- (23.2,62.4]

Source: Authors' calculation from ISTAT data

The % of the population 65 years+ was 9.5% in 1961, 15.2% in 1991, 23.2% in 2019 (18.8 in Europe)

Population trend

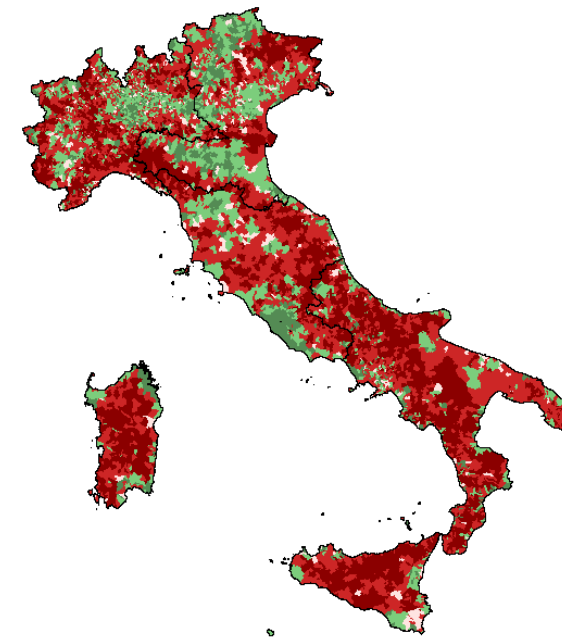The intercensal population growth rate *100 inhabitants. Italian municipalities.
Census 1961, 1991, 2019

1961-1971	1991-2001	2011-2019

(-10.8,-0.862]
(-0.862,-0.09]
(-0.09,0]
(0,0.624]
(0.624,22.3]

Source:
Authors'
calculation from
ISTAT data
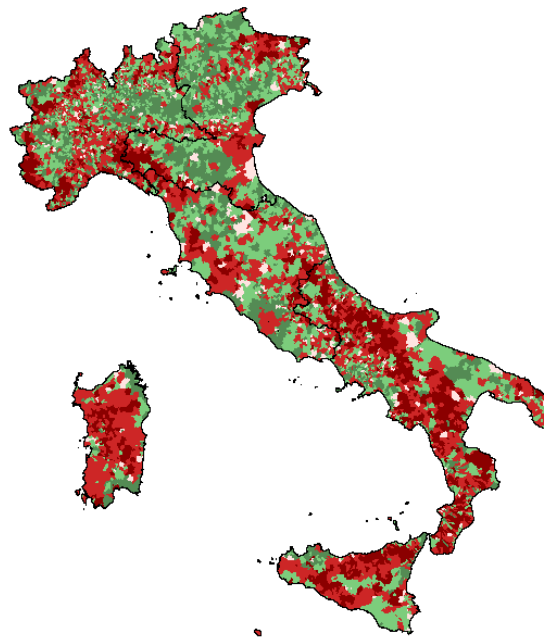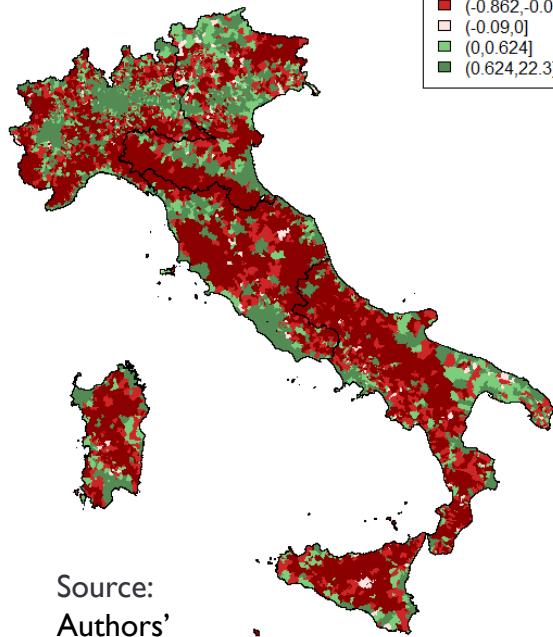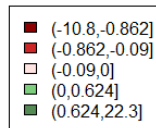
	1961-1971	1991-2001	2011-2019
Mean	-0.59	0.07	-0.52
% municipalities <0	65.4	46.1	70.1

Aim

- To study the phenomena of depopulation and population ageing in Italian territories in the period 1961–2019
- to study the relationship between depopulation and population ageing
- to verify how depopulation contributed to population ageing in different time periods in Italian municipalities
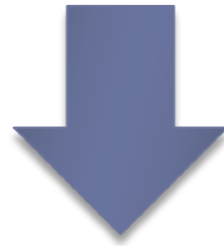
To understand the sustainability of depopulation and the ageing population combined

Research questions

1) Is there a relationship between the level of population ageing at the beginning of a given period and the variation of population in the same period?

2) Is there a relationship between the variation of population in a given period and the level of population ageing at the end of the same period?

Data

8,092 Municipalities (LAU)

2011 borders

Census data of the population
1961, 1971, 1981, 1991, 2001, 2011, 2019*
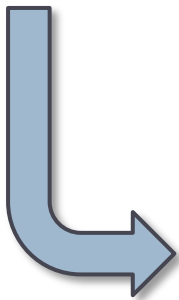
Six inter-census periods

1961-1971
1971-1981
1981-1991
1991-2001
2001-2011
2011-2019

* Italian Population census → Italian «Permanent Census» of Population

Methods

Intercensal population growth rate

$$r_{i(t,t+10)} = \ln(\frac{P_i(t+10)}{P_i(t)})/10$$

depopulation r<0

i = i-th municipality $1,2,…, 8092$

t = census data

$t+10$ = next census data

P = total resident population

Proportion of the population over 65 years

$$\%P_{65+i(t)} = \frac{P_{65+i}(t)}{P_i(t)} * 100$$

population ageing

i = i-th municipality $1,2,…, 8092$

P_{65+} = Resident population over 65 years

P = total resident population

Methods

➢ *Pearson's correlation coefficient and the test for association between two variables was applied using Pearson's product moment correlation coefficients*

➢ *Regression linear model*

➢ *Moran's index*

➢ *Spatial autoregressive model*

Ageing and depopulation

$\rho \ (\%P_{65+(t)}, r_{t,t+10})$

r(t,t+10)	$P_{65+}t$	Signif.
1961-1971	-0.30	***
1971-1981	-0.50	***
1981-1991	-0.52	***
1991-2001	-0.46	***
2001-2011	-0.54	***
2011-2019	-0.54	***

Signif. codes: 0 '***' 0,001 '**' 0,01 '*' 0,05

Source: Authors' calculation from ISTAT data

Depopulation and ageing

$\rho \left(r_{t,t+10}, \%P_{65+(t+10)} \right)$

r(t,t+10)	$P_{65+}(t+10)$	Signif.
1961-1971	-0.53	***
1971-1981	-0.64	***
1981-1991	-0.63	***
1991-2001	-0.62	***
2001-2011	-0.61	***
2011-2019	-0.67	***

Signif. codes: 0 '***' 0,001 '**' 0,01 '*' 0,05

Source: Authors' calculation from ISTAT data

Depopulation and ageing

The moran's indexes of proportion of the population over 65 years are always positive and statically significant

Parameter estimates of spatial autoregressive model

	%P$_{65+(t+10)}$					
	1971	**1981**	**1991**	**2001**	**2011**	**2019**
Interc.	13.01***	16.66***	18.43***	21.48***	17.09***	23.50***
r$_{t,t+10}$	-1.34***	-2.58***	-3.33***	-3.85***	-2.13***	-3.84***

Lambda: p-value < 2.22e-16

Signif.: *** < 2.2e-16

Conclusion and future developments

▸ The relationship between population growth and ageing exists and is increasingly important

more depopulation → more and more population ageing

= link that is leading to a vicious circle

This is a work in progress

➢ Improve the model

▸ different areas of the country

▸ other exogenus variables

➢ The population growth

▪ naturale balance

▪ net migration of Italian population

▪ net migration of foreign population

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THANK YOU VERY MUCH FOR YOUR ATTENTION

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