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CONSUMPTION EXPENDITURE OF THE ELDERLY IN THE EUROPEAN UNION: CONVERGENCE AND IMPACT ON GDP

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Abstract: *In the context of an ageing population, the aim of this study is to analyze how the consumption expenditure of the age group 50 plus affected the GDP growth rate during the period 2005-2019, at the level of the European Union countries. Using spatial econometrics, we study the convergence process of both the consumption expenditure of the 50 plus age group and the GDP. Furthermore, we analyze the relationship between the two variables and its evolution in time. We conclude that there is a bidirectional relationship between the studied variables: an increase in the growth rate of the 50 plus age consumption significantly and positively impacts the GDP growth rate and vice versa. At the level of Western European states where the share of 50 plus population is the highest, the impact on GDP growth rate is stronger. The results are relevant for further identifying possible economic opportunities created by the ageing population while supporting the European Union cohesion policy through the convergence process aimed at reaching an overall harmonious development within the member states and regions.*

Keywords: *ageing population; consumption; spatial analysis; economic convergence*

JEL Classification: *J14; C31; E20*

1. Introduction

European countries are currently facing an ageing population as a result of declining fertility rates and increasing life expectancy of their inhabitants. Eurostat forecasts indicate a continuous increase in the old dependency ratio (the ratio between people aged 65 years and over to those aged 20-64) which will reach 59% in 2070, an increase from 29% in 2010 and 34% respectively in 2019 (European Commission, 2020).
The phenomenon of population ageing has been analyzed in the academic, research and business environment from multiple perspectives, aiming at: 1. Identifying the effects of population ageing, both economically and socially; 2. Identifying the policies meant to counteract the negative effects of the ageing population, as well as the possible economic opportunities created by this phenomenon.
From the perspective of economic opportunities, the awareness of an ageing population has raised the interest to analyze the economic impact of these demographic changes through the development of new goods and services for the elderly, leading to the emergence of the concept of Silver Economy.
According to the European Commission, Silver Economy represents “the economic opportunities arising from the public and consumer expenditure related to population ageing and the specific needs of the population over 50”. The Silver Economy is proving to have significant economic potential, estimated at $ 7 billion per year, making it the third largest economy in the world (European Commission, 2015).

There are differences in the consumption of the population aged over 50. At EU level, a significant difference between the consumption of the new EU Member States compared to the old ones has been observed, the main reasons being determined by the difference in salaries and pensions, savings and how to save, but also cultural and geographical factors. Thus, the 50+ age group represents a significant cohort in terms of consumption potential in countries such as Germany, Austria, France, the Mediterranean countries, the Nordic countries and the Benelux (Pauhofova and Dovalova, 2015).
At the same time, at the level of the Eastern Europe, the consumption pattern is determined by the fact that the old consumers aged 65 and over, accounted in 2016 for almost a third of the lowest income social class (Euromonitor, 2017).
Demographic changes represent an important factor influencing the phenomenon of reducing disparities in the EU Member States (European Commission, 2019). In the context of the need to identify actions to support the cohesion policy in Europe, various research has been done on the relationship between ageing population and economic development. We use the convergence theory in order to evaluate how both the GDP and the consumption of the 50+ age group have evolved in time and how they conditioned one another. Results confirm the convergence theory according to which when analyzing economies for a long span of time, poorer economies grow faster than richer economies, leading to the alignment of the economic indicators (Zaiț, 2006).

2. Methodology and Data

To achieve the goals of this research in assessing the relationship between GDP and the level of consumption of the 50+ age group, we have conducted two types of analysis.
The first analysis is related to the fact that significant cross-section dependence is to be found on the European Union countries, especially for the fact that they have common rules and regulations. This can be translated into significant and important convergence processes. While the field's literature is abundant in studies emphasizing significant convergence of the GDP, in all forms and at different spatial levels (see, for example, Mare (2014) for country level, or Dall'Erba & Le Gallo (2008) for the regional level) there is a lack in terms of other aspects and fields. We apply the standard beta-convergence methodology to assess the existence of the convergence process for both the GDP and the consumption expenditure of the 50+ group (C50+).
The first step is the assessment of absolute beta-convergence, given by eq. (1) (Mare et al, 2016). Results are given by equations 1 and 3 in Table 1.

$$\frac{1}{T} \times \ln\left(\frac{y_{iT}}{y_{i0}}\right) = \alpha + \beta ln\,(y_{io}) + \varepsilon_i$$

eq. (1)

where:
T- number of years in the analysis
i – index of the country
y_{i0} - the variable at zero moment (year 2005) in country i
y_{iT} - the variable in 2019 in country i
β- regression coefficient
α- intercept
ε- error

The convergence speed, which evaluates the intensity of the convergence process, may be computed based on eq. (1), using the following formula:

$$b = \frac{-\ln(1 + T \times \beta)}{T}$$

But the goal of the present research is to assess the impact of the 50+ group in the economy, which is why we also introduce the growth rate of each of the other variable in the convergence model and transform the analysis into a conditional one (eq. (2)) (equations 2 and 4 in Table 1):

$$\frac{1}{T} \times \ln\left(\frac{y_{iT}}{y_{i0}}\right) = \alpha + \beta ln\,(y_{io}) + \lambda \ln(X) + \varepsilon_i \qquad \text{eq. (2)}$$

In the second part of our research we estimate the simple linear relationship between the GDP and C50+, for each of the years considered in the analysis. This is meant to evaluate if the significance of the relationship and its characteristics are time persistent. Results are presented in table 2. No spatial effects were emphasized by the spatial diagnostics tests for the distance matrix employed.
All post-estimation procedures were applied to evaluate the validity of the results.

Analysis was conducted in GeoDa 1.14, using Euromonitor data on GDP and consumption expenditure of the population aged 50 and over, during the period 2005-2019.

3. Results

3.1. Analysis on the growth rate of the 50+ group consumption expenditure

We first constructed the quartile map using data on the consumption expenditure of the population aged 50 and over (further on abbreviated C50+), during 2005-2019, at the level of the European Union.

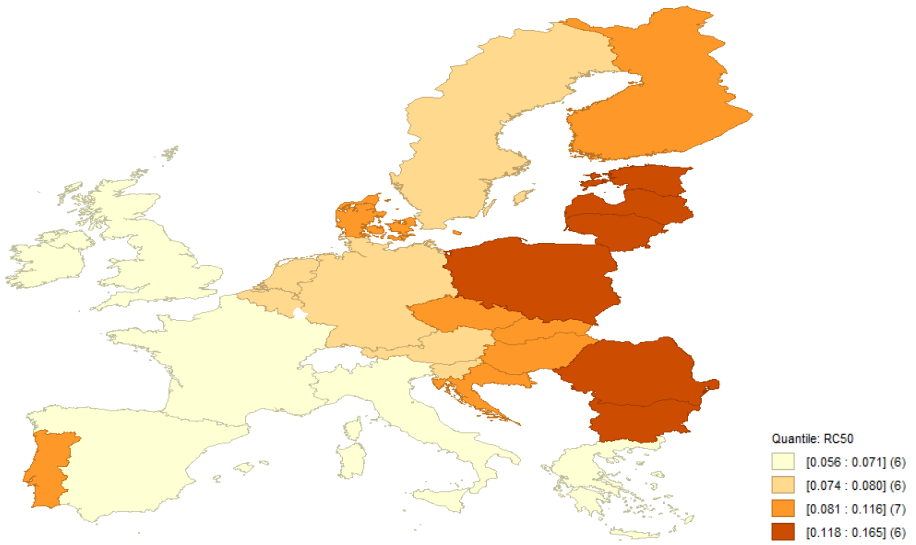

Fig. 1. Growth rate of the 50+ group consumption expenditure in 2005-2019-quartile map
Source: own construction in GeoDa 1.14

The analysis of the growth rate of the consumption expenditure of the group age (50+) emphasizes the standard spatial distribution which characterizes the European Union - a clear clusterization process on the East-West direction. Old members of the EU have low growth rates for this variable, while the new, former communist countries have high values. This is indicative of a possible convergence process occurring for the consumption expenditure of the (50+) group age. In order to assess this aspect, we have also constructed the quartile map for the initial value, in 2005 (see Fig. 2). Our assumption holds when comparing the two maps in Fig. 1 and Fig. 2. It is clearly emphasized that the old EU members have high values for the expenditure consumption of the (50+) age group, while the eastern ones had initial low values. This is in accordance with the convergence theory that states that spatial units with high initial values will be characterized by low growth rates, while the reverse is valid for the initial low value spatial units (Barro & Sala-i-Martin, 1992). The reason for this is because convergence implies movements towards a common equilibrium.

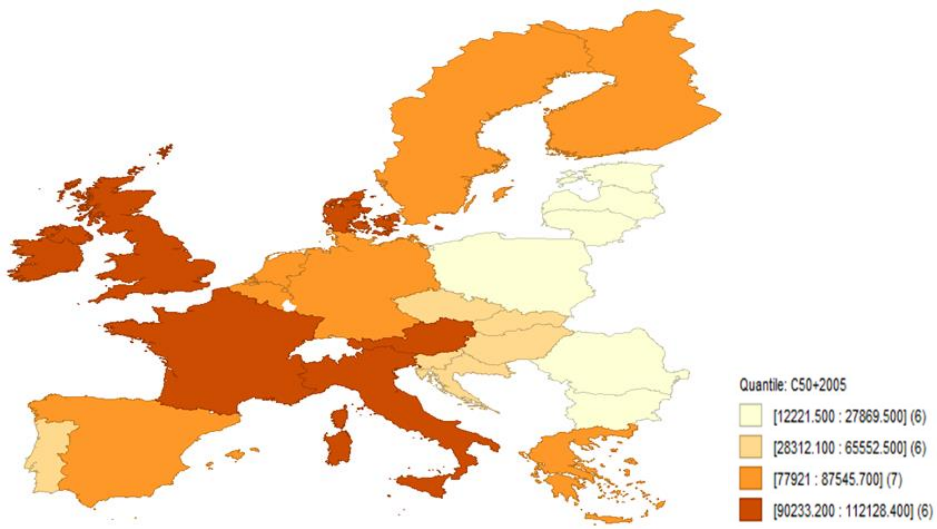

Fig. 2. Consumption expenditure of the 50+ age group in 2005 - quartile map
Source: own construction in GeoDa 1.14

3.2. Analysis on the growth rate of the GDP

The aim of the present research is to analyse the relationship between the 50+ age group consumption and the GDP, in order to evaluate the economic impact of this age group. In this respect we have further constructed the quartile maps for the GDP in 2005 (Fig. 3) and its growth rate (Fig. 4) in the analyzed period. The maps emphasize the same type of behaviour, with clear clusterization processes on longitude. This is expected, as several studies on the European Union have pointed out that, in respect to the GDP and not only, there are significant clusterization schemes and a valid convergence process (Mare, 2014a & b).

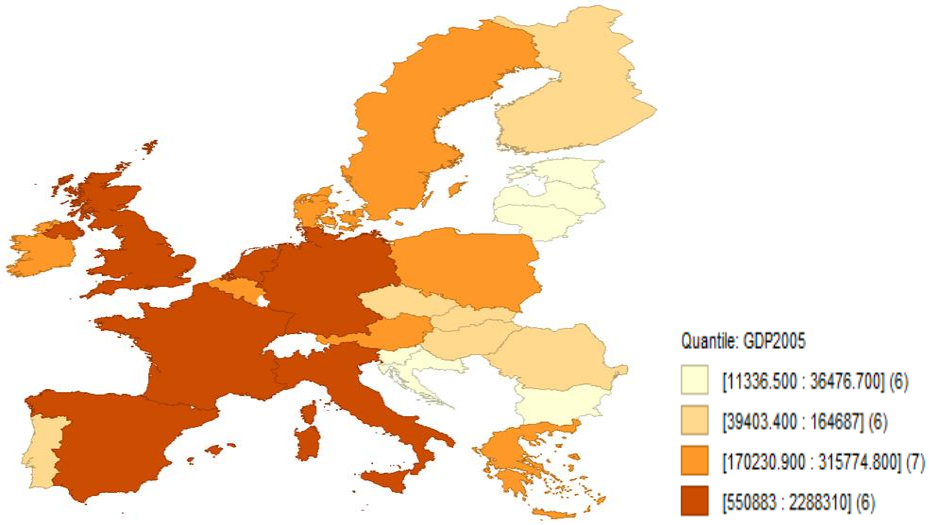

Fig. 3. GDP in 2005 - quartile map
Source: own construction in GeoDa 1.14

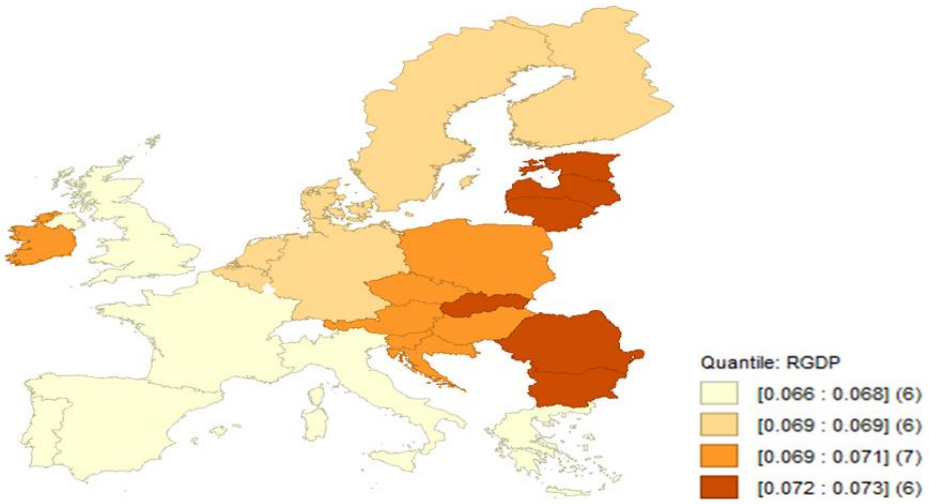

Fig. 4. Growth rate of the GDP in 2005 - 2019 - quartile map
Source: own construction in GeoDa 1.14

The descriptive analysis conducted based on the quartile maps point out a direct relationship between the GDP and the consumption expenditure of the (+50) age group. For this reason, in the following part of our research we tested the significance and stability using spatial regression.

3.3. Regression analysis

The first aspect depicted from the previous analysis on the quartile maps is the existence of the convergence process in EU. Consequently, the first spatial regression procedures were applied in order to test its final validity. Table 1 presents the results of the convergence

testing procedures. As stated in the methodological part, the first step is to test the absolute beta-convergence, namely, to specify the simple equations between each growth rate and the initial level. In both cases (GDP and C50+), significant convergence process was validated by the analysis. The coefficient of the 2005 value is both negative and highly significant (0.000). Moreover, the convergence process is also stable, as coefficients range in the [-1; 0] interval (-0.0009 for the GDP and -0.038 for C50+). The analysis of the absolute beta-convergence process also allows for the computation of the convergence speed, which is lower for C50+, at 5.7%, as compared to 9.44% for the GDP. This indicates a certain reluctance of the first variables in terms of a general equilibrium state. One possible explanation is the fact that the behaviour of the 50+ group is also conditioned by the internal specificities of a country, namely level of income, traditions, culture, etc.
Considering the relationship between GDP and C50+ is bidirectional, we have therefore applied the conditional beta-convergence method in both ways. The introduction of the C50+ growth rate in the GDP convergence model lowers the coefficient of the GDP in 2005, but all coefficients are highly significant. Additionally, GDP in 2005 preserves both the sign and the sub-unit value. As expected, the impact of C50+ upon GDP is a direct one - an increase of 1 pp in the growth rate of C50+ leads to an increase of 0.043 pp in the GDP growth rate. The reverse is also valid, the convergence process of C50+ is significantly and positively conditioned by the GDP growth rate. Additionally, the impact of GDP upon C50+ is higher than in the reverse case.

Table 1: Beta-convergence analysis for GDP and C50+

Variables	Equation 1: GDP	Equation 2: GDP vs C50+	Equation 3: C50+	Equation 4: C50+ vs GDP
	Coefficient (p-value)	Coefficient (p-value)	Coefficient (p-value)	Coefficient (p-value)
LN GDP2005	-0.0009328 (0.00001)	-0.000414674 (0.00746)	-	
RC50+	-	0.0430952 (0.00001)	-	
LN C50+2005	-	-	-0.0383827 (0.00000)	-0.024153 (0.00079)
RGDP	-	-	-	6.05846 (0.01204)
Constant	0.0809432 (0.00000)	0.07073 (0.00000)	0.0418155 (0.00000)	-0.0675841 (0.75519)
Adjusted R^2	0.564448 -	0.815425 -	0.804442 -	0.847482 -
Akaike	-260.744 -	-281.32	-144.764	-150.09
Spatial tests	- >0.1	- >0.1	- >0.1	- >0.1

Source: own calculations in GeoDa 1.14

In the last step of our analysis, we estimated the impact of C50+ on the GDP, but this time for each analyzed year, during 2005-2019. The intention was to see the evolution of the relationship significance and intensity. Moreover, we have also tested for the presence of spatial effects in the models. The last issue was rejected in all cases, all spatial dependence diagnostics tests returning probabilities much higher even than the 10% level. Regarding the relationship between C50+ and GDP, the regression coefficients are highly significant and positive in all years, conforming the direct relationship between the two variables. This implies that more developed countries, with a higher GDP, have a higher consumption expenditure of the 50+ group. This is an expected result, as more developed countries have

a higher share of the 50+ group in the population (they have old populations). An interesting effect is the fact that the coefficients increase in value, meaning that a rise by 1% in the consumption expenditure of the 50+ age group had higher and higher impact on the GDP (see table 2).

Table 2. GDP vs. C50+ regression results

Year	LNC50+		Constant		Adjusted R^2	Spatial tests
	Coefficient	p-value	Coefficient	p-value		p-value
2005	1.71526	0.00002	-6.62658	0.06795	0.53932	>0,1
2006	1.75305	0.00003	-7.08318	0.06942	0.51674	>0,1
2007	1.82003	0.00007	-8.01240	0.06653	0.48564	>0,1
2008	1.85836	0.00013	-8.59732	0.07191	0.45414	>0,1
2009	1.82642	0.00009	-8.09680	0.07195	0.47069	>0,1
2010	1.87513	0.00006	-8.56487	0.05673	0.48630	>0,1
2011	1.91193	0.00008	-9.08822	0.05267	0.47872	>0,1
2012	1.94009	0.00008	-9.26670	0.05156	0.47591	>0,1
2013	1.91456	0.00011	-9.04559	0.06124	0.46124	>0,1
2014	1.92771	0.00012	-9.18904	0.06012	0.45964	>0,1
2015	1.97144	0.00009	-9.32703	0.05300	0.47270	>0,1
2016	1.99225	0.00012	-9.54371	0.05596	0.45869	>0,1
2017	2.06227	0.00014	-10.42090	0.04850	0.45333	>0,1
2018	2.10645	0.00017	-11.04580	0.04699	0.44197	>0,1
2019	2.16755	0.00019	-11.63910	0.04335	0.43833	>0,1

Source: own calculations in GeoDa 1.14

4. Conclusions

During 2005-2019, a clear convergence process can be observed for both the consumption expenditure of the people aged 50 and over, and the GDP, at the level of the European Union. As ageing population raises over the studied period, our research indicates an increased influence of the consumption expenditure of the 50+ age group on the GDP, especially in the European developed countries, where the phenomenon of population ageing is more accentuated.
The results emphasize the need to further investigate the particularities of this age group, from the perspective of the economic impact it may have, as forecasts indicate the continuation of the process of ageing in all European countries over the next decades.

5. Limitations and further research

This study is part of a broader analysis of the author who is in the process of developing the doctoral thesis, aiming to identify the economic opportunities that the phenomenon of population ageing can bring, from the perspective of the 50+ age group consumption. The pandemic of Covid in 2020 has definitely impacted the economy and people's lives and there

seems to be a disruption in the consumer pattern and demand respectively, especially among the elderly. As such, further research on the topics analyzed in this paper, regarding forecast on the economic growth, will have to consider the economic decline and all other negative effects on social level this pandemic caused.

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