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PhD thesis summary

Silver Economy and effects on economic growth in the context of an aging population in the European Union

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The content of the thesis

Introduction

The complex situation facing the world today has proved to be a field of study and analysis for various domains of science. Economics and history, law and political science, philosophy, sociology, geography are just some of the traditional fields of analysis of the evolution of the world economy. The last decades have raised a series of challenges that the phenomena and processes of economic growth and development at global, regional or local level must face, of which population growth and especially the change of its age structure have a significant impact both socially, economic and political. The trend of population growth, along with the phenomenon of aging is manifested differently from one region to another, from one country to another, from one continent to another, and the effects are also different.

Analyzing the evolution of the number of inhabitants since 1950, it is found a constant increase from about 2.6 billion in 1950, so that in 1987 it doubled, and in 1999 to reach 6 billion. Significant growth is forecast for the coming decades, with an estimated 9.7 billion by 2050 and about 11 billion by 2100. (United Nations, 2020). Currently the population is about 7.8 billion, of which over 3.9 billion men and over 3.8 billion women (Global World Statistics, 2022).

The existence of significant differences in the growth rate of the population on continents, according to forecasts, shows the potential changes in its structure by 2100. According to data provided by United Nations statistics, a significant increase (the highest growth rate) will have place in Africa, where between 2020 and 2100 population growth will be about 300%, the share of the African continent in the total world population changing from 9% in 1950 to 17.2% in 2021 and forecast at 39.4% in 2100 (Statistic Times, 2021).

Asia is currently the continent with the largest population, of about 4.70 billion in 2021 (Statistic Times, 2021). According to forecasts, the population of Asia will continue to grow until 2055, when it will have about 5.3 billion, after which it will register a decreasing growth rate (Statistic Times, 2021).

In 2021, Europe's population was about 748 million, ranking third in terms of population, after Asia and Africa. The numerical decline of the population is evident in Europe, which in 1950 accounted for 21.66% of the total population, in 2021 accounted for 9.59% and for 2100 the forecast is 5.79% (Statistic Times, 2021). The population of North America registers a

much less significant increase compared to Asia and Africa, ranking fourth in the total population.

South America ranks fifth in 2021, after Asia, Africa, Europe and North America, with the continent's population accounting for 5.53% of the world's total population. As in Asia, forecasts indicate population growth by 2055, followed by a decline.

Regarding the number of the population over the age of 65, it registers important increases, with significant evolutionary perspectives. According to a study published by the United Nations Department of Economic and Social Affairs, Population division of 2020 (United Nations, 2020), World Population Aging 2020 Highlights, in 2020 lived globally about 727 million people in the group, and forecasts for the next 30 years indicate a doubling of this number, reaching, according to forecasts, 1.5 billion inhabitants by 2050, which will represent about 16% of the total population. This means that every sixth citizen will fall into this age group, compared to 2019 when only one in 11 people was in this situation. The forecast situation is different for the United States and Europe, where one in four people will be over 65 in 2050 (United Nations, 2020). According to the same study, for the first time in history, in 2020, the number of people over 65 was higher, globally, compared to children under 5.

Starting from this situation, I considered that a research that can take the form of a doctoral thesis on the topic of population aging is an important one, without knowing, when I chose this topic, several years ago, that a series of events on a global scale, of an economic, political, military and security nature, or coming from the medical sphere, such as the Covid 19 pandemic, will have a strong impact on the population, both globally and individually, deepening the existing differences, including related to the aging process of the population.

In this paper, I intend to approach this aspect from an economic point of view, correlating it, from my point of view, to a rather small extent with the other components. Of course, in the literature included in the paper, are summarized a number of factors that determine the profound changes caused by population aging, as they appear in studies and papers published on this topic by researchers in the field or in documents and studies of international or regional institutions.

I started from the premise that, from the market perspective, the number and structure of the population is one of the important and categorical determinants of economic growth. From

the supply perspective, population means human capital, with all its known components. From the perspective of demand, it represents consumers of the goods offered. For this reason, any change in the number and structure of the population generates important economic, social and demographic effects.

From this perspective, I considered that an analysis of the impact of the changes in consumption behavior of the population on GDP, in the conditions of the aging process can lead to the enunciation of valuable judgments that, in turn, generate specific public policy proposals.

The interest in the study of this process manifested itself internationally a few decades ago, when a UN General Assembly was held in Vienna whose theme was the aging of the population, and a year later the Proclamation on the process of population aging and a UN action plan were developed in this regard. (United Nations, 2020).

A summary of the concerns related to the aging of the population in terms of global and European institutions is presented in the following figure:

From the above, we consider that the phenomenon of population aging is globally the reality of today and of the decades to come.

Objectives

From this perspective, we formulated the main objective of the thesis, related to the analysis of how the consumption of the aging population can contribute to changing the rate of economic growth in the European Union.

The main objective is subsumed by a series of sub-objectives related to:

a) identification and analysis of some determining factors of the aging population from a demographic perspective;

b) identification and analysis of the consumption patterns of the elderly;

c) the analysis of the way in which the knowledge on the needs and consumption preferences of the elderly can constitute a potential for the development of innovative technologies, products and services for them;

d) identification of economic sectors with development potential, which respond to the needs of elderly consumers;

e) identification of possible proposals for measures at governmental, business or organizational level that contribute to using the consumption potential of the elderly and to counteract the negative economic and social effects of the aging population.

To achieve these objectives, starting from the general context of the implications of the aging population, we began by identifying the challenges and opportunities generated globally by this phenomenon, from the perspective of research and studies published in the literature, as well as some policy elements developed in this regard. The search for information involved identifying articles, publications and reports available in physical and online format, in English and Romanian, on topics related to "population aging", "elderly consumption", "Silver economy", "economic impact of population aging", etc. .

The information gathered in the first stage allowed me to formulate the research hypotheses and the objectives of the thesis. The results of the analysis of the literature as well as the reports of the European Commission in the field of population aging reveal an important role of the consumption of the demographic group of people over 50 years in economic growth

and its contribution to job creation. For these reasons, I set out in this paper to identify the economic opportunities generated by the consumption particularities of this demographic group.

Continuing the paper, we analyzed in detail the phenomenon of population aging, by identifying elements and concepts closely related to it. We structured the paper on six chapters, starting from the presentation of some demographic factors that contributed over time to the accentuation of the aging population, by analyzing some relevant indicators: human development index, fertility rate, life expectancy.

We then conducted a demographic analysis at the level of the European Union and Romania, in which we used a series of significant indicators for the evolution of the aging phenomenon for the analyzed period 2005-2019, such as: total population, its structure by age groups as it appears reflected in the population pyramid from the historical point of view but also of the forecasts; indicator of healthy life years at birth; the index for sustainable demographic development. In the continuation of this part I used the active aging index, which allowed me to identify the main groups of problems faced by the aging population and the potential solutions to solve them by analyzing policies developed for good management of the aging process, at European Union level and globally.

I then briefly analyzed the phenomenon of migration from the perspective of its impact on the phenomenon of population aging at European level as well as the evolution and forecasts regarding the old age dependency ratio, at the level of the European Union and in Romania.

I introduced the Silver Economy concept, which emphasizes the consumption patterns of the elderly population, highlighting the economic potential of this demographic segment over 50 years old, at EU level, from the perspective of identifying economic sectors that could have a significant impact on economic growth, measured by the GDP growth rate. According to the European Commission, Silver Economy represents “economic opportunities generated by public and consumer spending related to the aging population and the specific needs of the population over 50 years” (European Commission, 2015).

By applying some indicators presented in the theory part, we developed a case study, using spatial econometrics, with the aim of analyzing the impact of the age group over 50 on economic growth. The study, called "The Impact of Consumption of the Population Over the Age of 50 on Economic Growth", uses spatial econometric methods to analyze the evolution

of the growth rate of consumption expenditure of the population over the age of 50 and GDP in 2005-2019, at the level of 25 EU Member States (representing the EU28 without three countries: Cyprus, Malta and Luxembourg, for which data on the consumption of the 50+ demographic group were not available), as follows:

a) the convergence analysis of the consumption of the population over 50 years of age;

b) GDP / capita convergence analysis;

c) analyzing the impact of the consumption of the population over the age of 50 on the GDP;

d) spatial panel analysis of the impact of the consumption of the population over the age of 50 on the GDP, in order to identify the spatial, chronological variations and the existing interdependencies;

e) the analysis in spatial panel of the impact of the consumption of the population over 50 years on the GDP by consumption types, with a role in identifying the consumption categories that have the greatest impact on economic growth, based on data containing the value of indicators in the period 2005-2019.

Following the analysis of the literature but also the results of the case study, we identified possible future actions of decision makers that would contribute to the use of the economic potential of the demographic group of people over 50 years of age. To this end, along with the presentation of examples of good practice projects that contribute to meeting the needs and desires of the elderly, we have included a number of policy recommendations. In the vision of the doctoral thesis, they will be able to contribute to the improvement of the living standard of the elderly, but also to the growth of some economic sectors through the development of innovative technologies, products and services.

The paper concludes with the conclusions section, which includes a summary of the results obtained from the research undertaken and presented in this paper, the author's contributions to improving the information available on the phenomenon of population aging, and details on future research limits and directions.

Personal contributions

Among the personal contributions and novelties brought by the research related to the impact of the consumption of the aged population on the economic growth in the European Union in the period 2005-2019, I mention:

a. the convergence analyzes carried out in studies and research so far, have led to the identification of indicators for measuring and evaluating economic convergence, most studies using GDP in absolute or relative value, respectively GDP / capita, without the use of other indicators relevant for measuring economic growth. The personal contribution is given, from this perspective, by a convergence analysis of the consumption expenditures of the demographic group over 50 years old, at EU level in the period 2005-2019, which highlights a clear phenomenon of convergence for the expenditures with consumption of persons over 50 years of age using other relevant indicators mentioned above. As the phenomenon of population aging intensifies over the period analyzed, our research indicates an increased influence of consumption of the 50+ age group on GDP, especially in developed European countries, which are experiencing a more aging population. These results are also the starting point for further analysis in order to explore possible spatial interdependencies.

b. Numerous studies analyze the impact that various economic or social factors have on economic growth, without taking into account possible spatial effects. By using spatial econometric methods, the paper proposes to analyze the existence of spatial dependencies present in the analyzed economic indicators (consumption expenditures of the population over 50 years, respectively GDP / capita, suggested by their spatial distribution on maps. The results confirm the existence of strong spatial interdependencies, revealing processes of contagion, diffusion and clustering of EU member states in terms of economic performance measured by GDP / capita, conditioned by the consumption of the population over 50 years and control variables uses.

c. through the content of the research on the consumption patterns of the elderly, as well as their impact on GDP, the paper promotes the concept of Silver Economy in addressing the phenomenon of population aging, which emphasizes the economic opportunities of population aging, from the perspective of consumption of the demographic group of people over the age of 50, which can generate the development of innovative technologies, products and services that lead to economic growth and the creation of new jobs.

Analyzing the results obtained from the research, the paper proposes a series of policy recommendations / measures that could be implemented at governmental, business or

organizational level, which could contribute to the use of the consumption potential of the elderly, and thus lead to economical growth.

Research methodology

We developed the paper considering the following stages from a methodological point of view: 1. Defining the research problem; 2. Review of concepts and theory; 3. Formulation of research hypotheses; 4. Data collection; 5. Data analysis; 6. Interpretation of data and presentation of results.

The paper proposes the development of a case study, using spatial econometrics, with the aim of analyzing the impact of the age group over 50 on economic growth. Details of the methodology used in the case study are provided in the dedicated section entitled "Analysis tools and techniques used in the case study". The data used in the analysis are extracted from Eurostat and Euromonitor International, at the level of the EU 28 member states, in the period 2015-2019. Due to the lack of available data, the states of Cyprus, Luxembourg and Malta were omitted from the analysis of the impact of consumption of people over 50 years of age (C50 +) on economic growth. The analyzes were performed in GeoDa 1.14 and STATA 16.

Chapter 1. Determinants of population aging in the European Union

European countries are currently facing an aging population as a result of declining fertility rates and an increase in the life expectancy of their inhabitants. Estimates of the evolution of the population of the European Union based on data provided by Eurostat Population Projection in the period 2014-2050 show that the population in the age group 0-15 years will decrease (from 15.6% to 14.8% of the total population) while the population over 65 will increase (from 18.9% to 28.5%). During this period, there will be a doubling of the population over the age of 80 (from 5.1% to 11%) (Kluge, Goldstein, & Vogt, 2019).

Eurostat forecasts indicate a continuous increase in the dependency rate of the elderly, which will reach 59.2% in 2070. If at present the dependency ratio between those over 65 years of age and the working age (20-64 years) is 1: 3, this ratio will reach 1: 1 (European Commission, 2020). This **poses** question**s related to** the economic sustainability of European countries, with implications for health, employment and pension policies.

1.1.Fertility rate

One of the factors that contributes to the population aging phenomenon is the decrease in the fertility rate. The decline in the fertility rate was mainly due to women's emancipation, as well as technological progress and legislative or economic changes.

If the generation of baby boomers, born between 1946 and 1960 in a period of economic growth after the end of World War II, was characterized by an increase in fertility (Jan Van Bavel, 2018), the generations that followed were marked by global declines in fertility. Research in this direction has sought to identify the factors that have contributed to this phenomenon. One of these is related to women's level of education: the higher a woman's level of education, the less likely she is to have children, thus having a negative correlation between a woman's level of education and the total fertility rate (Jain, 1981).

Another influencing factor is social and economic development, studies revealing the existence of a negative correlation between fertility rate and economic and social development (Myrskylä, 2009). In this research, the economic and social development of a state is measured by the Human Development Index (HDI), an instrument implemented by the United Nations.

In the period 1960-2009, at the level of the European Union, the total fertility rate decreased from about 2.5 live births to a woman in the early 1960s to an average of almost 1.6 in the period 2007-2009 (Eurostat).
Much of the decline in the fertility rate among women aged 20 to 29 took place between 1970 and 1995 (OECD Family Database).
By the year 2000, fertility rates were steadily declining in almost all European countries, with minimum values in countries such as the Czech Republic and Spain. A dramatic decrease is registered in the same period in Romania, which reaches in 2000 an average number of only 1.31 children born, from 2.74 children in 1960. Between 2000 and 2018 the fertility rate registered slight increases in 17 European countries, including Romania (Eurostat).

With the changes in fertility rates which have decreased in all EU countries up to 2000 and slightly increased after this year, there is also a change in the age at which women become mothers. At the level of the European Union, in the last 20 years the average age of women giving birth to a child has increased from 29 to 30.8 years.

1.2.Life expectancy at birth

Globally, this indicator has shown an upward trend in the last 60 years, both among women and men. According to Christensen et al., 2009, cited in (Kluge, Goldstein, & Vogt, 2019), of the females born between 2015-2060, half have a life expectancy of 100 years.

Since 1960, life expectancy has seen an upward trend in all European countries, both life expectancy at birth and life expectancy at age 65, women and men alike. The average growth in the EU is over 10 years in the period 1960-2018. However, Eurostat forecasts indicate that the 2020 COVID-19 pandemic has led to a decline in life expectancy at birth in most EU Member States, with the EU average falling from 81.3 to 80.4 years.

Studies conducted in the direction of identifying the factors that led to increased life expectancy reveal, in addition to the importance of a well-developed health system, dimensions of demographic, economic and social.

There is thus a positive influence on the life expectancy of health expenditures (a 10% increase in health expenditures leads to a 3.5 month increase in life expectancy), respectively a healthy lifestyle (improving it by 10 months). % leads to a 2.5 month increase in life expectancy) (OECD, 2017).

A healthy lifestyle would be one in which risk factors such as smoking, alcohol and unhealthy eating are reduced / eliminated and which include activities that contribute to maintaining health, such as physical activity.

Regarding the role of education in increasing life expectancy, the existence of an association between the two has been indicated in numerous studies and research. Education contributes to positive health behaviors (Cutler & Lleras-Muney, 2010). Thus, each year of additional education is associated with a lower probability of increasing risk factors that influence health.

Another factor influencing life expectancy is income, the relationship being a positive one (Chetty, et al., 2016). Higher incomes are associated with longer longevity. Similarly, other studies show that countries with higher GDP per capita also have high values of life expectancy (Niu & Melenberg, 2014), (He & Li, 2020) and that the causal relationship is valid and vice versa (Cervellati & Sunde, 2011).

1.3. Migration

Labor migration can be one of the phenomena that counteracts to some extent the negative effects of the aging population, respectively those of labor decline. Studies and analyzes conducted in this direction indicate a positive impact of immigrants, by contributing to

economic growth, but conditioned by integration into the labor market and improving their skills through educational programs (Muysken, Cörvers, & Ziesemer, 2008), (Segendorf & Theobald, 2019).

Eurostat statistics show that at the level of the European Union as a whole, the foreign population is younger than the national population. On 1 January 2021, the average age of the EU's national population was 45, while the average age of foreigners living in the EU was 36 (Eurostat). This situation comes to support the labor shortage that mainly "older" European countries such as Germany and Italy face.

In the absence of migration, the economic impact at European level is negative: by 2060, the EU could lose about $ 7 billion in GDP, and the population would be 14% smaller, the effect of population decline being more felt in the working age population, where there would be a decrease of 20% (European Commission, 2018).

Chapter 2. Ageing population: Demographic trends in the European Union and in Romania

2.1.Demographic decline

At the level of the European Union, the demographic forecasts until the year 2100 clearly reveal the continuation of the phenomenon of population aging, through the increases in the age segments over 60 years, and the phenomenon is registered among both women and men.

According to Eurostat forecasts, the number of people over the age of 80 is estimated to increase to 60.8 million in the EU-27 by 2100, and the median age of the population will increase by 5.1 years.

Regarding the total population of Europe, Eurostat estimates indicate an increase from 446.8 million in 2019 to 449.3 million in 2026 (+ 0.6%), followed by a decrease of up to 416.1 million in 2100, thus representing a decrease of 6.9% in 2100 compared to 2019.

At the level of European countries, the forecasts indicate different developments by 2100. Thus, of the 27 Member States, only 11 of them will register population increases.

2.2. Sustainable demographic development

If life expectancy is a quantitative element in defining life expectancy and taking into account its increase as illustrated above, it becomes important to identify how many years of life are lived healthy or not. The phenomenon of population aging thus depends on the health of individuals as well as on the factors that contribute to its maintenance.

Analyzing the indicator "life expectancy in good health", which according to Eurostat is the number of years a person is expected to live in good health, it is found that in 2018 in the EU, the number of years of life with good health at birth was estimated at 64.2 years for women and 63.7 years for men, representing approximately 76.7% and 81.4% of total life expectancy for women and men (Eurostat).

2.3. Changes in the old dependency ratio

The 2019 United Nations report containing population forecasts regarding the four global demographic phenomena, namely population growth, population aging, migration and urbanization, highlights the accentuation of the aging phenomenon both in recent years and in the coming decades. Thus, in 2018, for the first time in history, people over the age of 65 around the world outnumbered children under five. And forecasts indicate that by 2050 the number of people over the age of 65 globally will exceed the number of adolescents and young people aged between 15 and 24 (United Nations, 2019).

Eurostat forecasts indicate an increase in the Dependency rate of older people over three decades in all EU Member States.

2.5. Active Ageing Index

The Active Aging Index (AAI) is a tool developed in a project jointly managed by the European Commission's Directorate-General for Employment, Social Affairs and Inclusion and the Population Department of the United Nations Economic Commission for Europe (UNECE). As it was built, the Active Aging Index allows decision makers to propose policies based on concrete, quantitative information on the indicators that define active aging, being applied to EU member states as well. It is calculated at country level, which allows comparisons on the lives of older people in terms of their activities in the labor market, participation in social activities, in an independent, healthy and safe life. A fourth dimension of this index examines the capacity and environment for active aging at EU Member State level.

The Active Aging Index (AAI) includes 22 indicators grouped into four categories. They are expressed in relative form, and as positive indicators, which means that the higher the value, the better the result of active aging. The four areas of AAI are: 1. Employment (AAIEmp), 2. Participation in society (AAISoc); 3. Independent, healthy and secure living (AAILiv); 4. Capacity and enabling environment for active aging (AAICap).

Chapter 3. 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" (European Commission, 2015).

The need to clearly identify a growing sector from a budgetary perspective stems from the need to pay more attention to public spending for the 50-year-old age group, which is growing in the context of an aging population. In 2015, Silver Economy supported a multitude of economic sectors across the European Union, contributing EUR 4.2 trillion to GDP and over 78 million jobs. These figures illustrate that the Silver Economy in the EU is of considerable importance even in a global macroeconomic context. For example, if considered as a nation, the Silver Economy would be the third largest economy in the world, after the USA and China (European Commission, 2015).

The literature has classified people over 50 years of age, from the perspective of their participation in the Silver Economy in two important categories, depending on the role they play in economic, social and political life. A first group includes people active on the labor market, generating income, including to supply the state budget or health budgets, and a second group, which includes inactive, retired people.

Chapter 4. Consumption patterns of the demographic group over the age of 50

In order to identify the economic benefits generated by the consumption of the demographic group over 50 years old, it becomes opportune to analyze its possible consumption patterns.

At European level in 2013, people over the age of 50 accounted for almost 70% of hospitalized people, despite representing only about 40% of the population. At the opposite pole are the expenditures on education services, underrepresented at only 28% of total

consumption. For the other subcategories of expenditure, the ratio is approximately directly proportional to its share as a segment of the total population.

On average, 54% of the expenditures made by the demographic group of people over 50 in the EU28 countries, ie the majority of costs, are those with housing, food and transport (European Commission, 2018).

In 2015, the consumption potential of the population over the age of 50 is estimated at 4.2 trillion euros, supporting over 78 million jobs, representing a contribution of 29% of the European Union's GDP and 35% of the EU's workforce. Estimates show an upward trend of these indicators, with projected values for 2025 of 6.4 trillion euros and a contribution to the labor market of 88 million, ie a contribution to GDP of 32% and 38% of total jobs, respectively. (European Commission, 2018).

Going further in detail, we analyzed the situation in 2019 of private consumption patterns of consumers over the age of 50 in European countries, by main subcategories of expenditure. The analysis carried out on the particularities of private consumption of the demographic group of people over 50 in 2019, at European level reveals that a common feature of the countries analyzed from the perspective of major consumer spending 50+ is the identification of the following categories: housing, food and transport.

Also, spatial groups with common characteristics were identified, finding the east-west delimitations that differentiate on certain cost categories the eastern European countries from the western ones, suggesting a process of convergence of the 50+ consumption expenditures, as well as that at the level of western European countries where the share of the population over 50 is the highest, the economic impact of consumption of this age group is stronger. In this context, we will continue to analyse the economic impact of the consumer expenditures of the demographic group over 50 years old, by analyzing the effect on the GDP growth rate / capita, at the level of the European Union countries.

Chapter 5. Study case: The impact of the consumption of the population over the age of 50 on economic growth

5.1. Analysis tools and techniques used in the case study

The first step in this research was the descriptive analysis of the variables of interest. However, given that the data used are at the level of European Union countries and that we have used spatial econometric methods to assess relationships of interest, the descriptive analysis is mainly based on maps. The most used map in this paper is the quartile map. The analysis of the maps allows us to observe if there are spatial processes and of what nature (convergence, divergence, clustering, polarization, diffusion, etc.).

To achieve the objectives of this research in assessing the relationship between GDP and the level of consumption of the age group over 50, we performed three types of analysis. However, given that these are European Union countries, where, as we will present below, there are strong spatial effects, in all cases we used methods of spatial econometric analysis and modeling. An important aspect of this type of method is that it works on populations and not on samples.

In addition to analyzing how the link between GDP and the consumption of the demographic group over the age of 50 (C50 +) over time has evolved, spatial econometrics also allows us to assess the existence of space processes. Thus, we applied the spatial diagnostic tests. Their significant values highlight the fact that there are complex spatial processes that must be treated by spatial methods related to them. The neighborhood scheme is introduced into the analysis by the spatial weighted matrix W. This matrix attaches different weighting coefficients, depending on whether or not there is a neighborhood relationship between any two of the spatial units analyzed. The distance-based matrix was built. In the last part of the analysis we used spatio-temporal estimates of the relationship between the consumption of the population over 50 years and GDP by introducing the spatial panel methodology. Spatial panel analyzes allow the evaluation of the relationships between variables taking into account both spatial and chronological variations, and the interdependencies between them. Like the simpler spatial estimates used in the first two stages of the analysis, the space panel allows the assessment of the existence of space processes of various types.

For the spatial panel analyzes performed, we introduced control variables. Their purpose is twofold: on the one hand, they help to assess the robustness / stability of the main relationship; on the other hand, they control for other significant effects that may occur in research.

The analysis includes 9 variables: Dependent variable: GDP / capita, Independent variable: Private consumption of people over 50 years of age, Control variables: Old Dependency ratio, Active aging index (AAI), and its four sub domains (Employment, Participation in society, Independent, healthy and secure living, Capacity and enabling environment for active aging), Higher education (ISCED 5-8).

5.2. The impact of the consumption of the population over the age of 50 on economic growth

5.2.1. Analysis of the growth rate of consumption expenditures of the population over the age of 50

We first built the quartile map by using data on the consumption expenditures of the population over the age of 50 (hereinafter abbreviated to C50 +), in the period 2005-2019, at the level of the European Union. The analysis of the growth rate of consumer spending for the population over the age of 50 highlights the standard spatial distribution that characterizes the European Union, which highlights a clear East-West clustering process. Old EU Member States have low rates for this variable, while newcomer states, former communist countries, have high values. This indicates the possibility of a convergence of consumer spending over the age of 50. To assess this, we built the quartile map for the initial consumption value of the population over 50 (C50 +) in 2005. In 2005 it is clear that the old EU member states have high values for the consumption of the population over 50 years (C50 +), while the eastern states, new EU members, have low initial values. This is in line with convergence theory which states that space units with high initial values will be characterized by low growth rates, while the inverse is true for low space initial units of value (Barro & Sala-i-Martin, 1992). , the convergence process involving movements towards a common balance.

5.2.2. Analysis of GDP growth rate

Following the analysis of the economic impact of the consumer group over 50 years old, we built the quartile map of GDP in 2005, respectively its growth rate in the analyzed period. The maps highlight the same type of behavior, as in the case of consumption of the population over 50 years (C50 +), with clear longitudinal clustering processes. Spatial units divided into four groups highlight longitudinal clustering processes, Western European states have the highest values, in contrast to Eastern European countries whose GDP is in the quartile group with the lowest values.

5.2.3. GDP regression analysis vs. Consumption of the population over 50 (C50 +)

The first aspect that emerges from the analysis of previous quarters maps is the existence of the convergence process in the EU. Consequently, the first spatial regression procedures were applied to test its validity. The first step is to test the absolute beta convergence, namely by specifying the simple equations between each growth rate and the initial level. In both situations (GDP and consumption of the population over 50 years C50 +) the process of significant convergence was validated by the analysis. The value coefficient from 2005 is negative and strongly significant (0.000). Moreover, the convergence process is also stable, as the coefficients are in the range [-1; 0] (-0,0009 for GDP and -0,038 for the consumption of the population over 50 years old C50 +).

Given that the relationship between GDP and consumption of the population over 50 (C50 +) is bidirectional, we applied the method of conditional beta-convergence in both directions. The introduction of the growth rate of consumption of the population over the age of 50 (C50 +) in the GDP convergence model decreases the GDP coefficient in 2005, but all coefficients are significant. In addition, GDP in 2005 keeps both its sign and its sub-unit value. As expected, the impact of consumption of the population over the age of 50 (C50 +) on GDP is a direct one: a 1 pp increase in the growth rate of consumption of the population over the age of 50 (C50 +) leads to an increase by 0.043 pp in the GDP growth rate. And vice versa, the process of convergence of consumption of the population over 50 years (C50 +) is significantly and positively conditioned by the GDP growth rate. In addition, the impact of GDP on the consumption of the population over the age of 50 (C50 +) is higher than in the opposite case.

In the next step of the analysis we estimated the impact of consumption of the population over 50 years (C50 +) on GDP, this time for each year of the analyzed period, between 2005 and 2019. The aim was to observe the evolution of the significance and intensity of the relationship. The regression coefficients are significant and positive in all years of analysis, confirming the direct relationship between the two variables. This implies that in developed countries with a higher GDP, the consumer expenditures of the group over 50 years of age are also correspondingly higher. This is an expected result, as developed countries have a larger share of the population over the age of 50. An interesting effect is that the coefficients increase in value from year to year, which means that a 1% increase in consumer spending in the age group over 50 has had an increasing impact on GDP.

In conclusion, in the period 2005-2019, at the level of the European Union, a clear phenomenon of convergence can be observed, both for the consumption expenditures of the population over 50 years of age, and for the GDP. As the phenomenon of population aging intensifies over the period under review, our research indicates an increased influence of consumption of the population over the age of 50 on GDP, especially in developed European countries, which are experiencing a more aged population.

5.2.4. Spatial panel analysis of the impact of consumption of the population over 50 (C50 +) on GDP

In order to identify spatial, chronological variations and existing interdependencies, in this part of the analysis we used spatio-temporal estimates of the relationship between the consumption of the population over 50 years and GDP / capita by introducing the spatial panel methodology. The obtained results confirm the direct impact of the consumption of the population over 50 years old on the economic growth at the level of the states from the European Union. The relationship between the two variables studied remains stable (high significance, at the threshold of 1%, with values of coefficients between 0.500 and 0.539) even after the introduction of control variables. Regarding the latter, it is observed that the old dependency ratio, higher education, the Active Aging Index, the AAI subcomponents for Independent, healthy and secure living component (IIALiv) , Participation in Society component (IIASoc) and Capacity and enabling environment (IIACap) have a significant positive impact on GDP / capita - the higher their value, the higher the GDP / capita. The increase in the old dependency ratio leads to the increase of GDP / inhabitant - this result confirms the economic-demographic studies which show that the richer and more developed countries have an aging population.

The active aging index (AAI) has a positive overall impact (coefficient = 0.008), showing that an increase in it leads to an increase in GDP / capita. The only non-significant control factor is the Active Aging Index, the Employment component (AAIEmp). But the countries analyzed are members of the European Union, with a high degree of economic convergence and high interdependencies. Spatial effects are confirmed by the significance of the spatial weighted matrix of GDP (WGDP), ie spatially weighted GDP / capita, represented by the average of the values of the neighbors, weighted with the neighborhood coefficients from the spatial weighting matrix. The coefficients of the spatial weighting matrix of GDP (WGDP) are always positive, a result that shows spatial clustering (significant spillover effects) - neighbors have similar behaviors (countries with low GDP / capita are neighboring countries

with similar levels of GDP / capita). At the same time, there is contagion and diffusion of behavior in the EU. The spatial component of GDP / capita is not significant in the presence of the Active Aging Index, the subcomponent Capacity and enabling environment for Active Aging (AAICap) - this control variable alters the spatial effects.

But spatial interdependencies are complex, they exist not only in the dependent variable, but also in the factors considered. The spatial weighted matrix of the consumption of the population over 50 years of age (WC50 +) is significant regardless of the estimated model (control factors do not alter the effects of the neighborhood). But its coefficient is negative, showing local polarization processes. The change in the sign from the consumption of the population over 50 years of age (C50 +) to its spatial weighted matrix (WC50 +) is due to the complex effects that exist in space. Thus, the consumption of the population over 50 years of age (C50 +) quantifies the direct impact of the consumption of the group over 50 years of age on the economic performance of countries, while its spatial weighted matrix (WC50 +) estimates the impact of neighbors. Given that the spatial weighted matrix of GDP (WPIB) is also significant and most of the spatial lags of control factors, it denotes that there are complex, multidirectional processes, and that, in fact, spatial autoregressive components include not only individual influence of each factor, but the interdependencies and conjugate effects that exist in space. The indicator of the spatial weighted matrix of the old dependency ration (WODR) is significant (even if only at 10%) and positive, confirming, once again, the clustering of countries in terms of demographic aging, in line with economic performance - countries with a higher old dependency ratio have neighbors with a higher GDP / capita. The existence of strong spatial interdependencies is confirmed, on the one hand, by the significance of the autoregressive spatial components (Wvariable-spatial weighted matrix) and on the other hand by the strongly significant and positive coefficients of the spatial error correction term (λ). They confirm, once again, the contagion, dissemination and clustering of EU members in terms of economic performance measured by GDP / capita, conditioned by the consumption of the population over 50 years and the control factors used.

5.2.5 Impact of consumption of the population over 50 (C50 +) on GDP, by types of consumption

After analyzing the consumption of the population over 50 years of age globally (C50 +), we continued with assessing the impact of consumption types. Thus, we replaced the C50 + with its components, highlighting 11 subcategories-types of consumption, as follows:

1.Expenditures on medical care and health; 2. Expenditures on food products; 3. Expenses with alcoholic beverages, tobacco; 4. Expenditure on clothing and footwear; 5. Expenses with home maintenance; 6. Expenditures on housing; 7. Transportation expenses; 8. Expenses with communications; 9. Expenses with leisure; 10. Expenditure on education; 11. Expenditure on hotels, restaurants, cafes.

The results show that the significant positive impact is maintained regardless of the type of consumption analyzed. But each age group has behavioral specificities, consuming more or less of certain types of goods and services.

Comparing the obtained coefficients we can see that the greatest economic impact is the consumption of the population over 50 years (C50 +) related to transport (0.461), followed by food (0.451) and housing maintenance (0.440). On the 4th place are the expenses related to medical care and health. The lowest coefficient was obtained for education expenditures (0.157), an expected result, given that up to this age, individuals complete their studies, as well as in correlation with studies indicating an age-related decrease in adult participation in programs. (European Association for the Education of Adults, 2012).

Spatial interdependencies are significant in this case as well. Thus, the error correction term is significant and positive, as in the case of the analysis of the consumption of the population over 50 years of age globally (C50 +), confirming the effects of spillover - contagion, diffusion and clustering. Spatially autoregressive components lose their significance in certain specifications, but the signs of the coefficients are preserved. Thus, there are no autoregressive spatial effects for GDP / capita when analyzing the consumption of the population over the age of 50 with medical and health care, alcohol and tobacco and education. Regarding the spatial effects generated by the consumption of the population over the age of 50, the indicator of the spatial weighted matrix indicates the same categories of consumption as those listed above, for which there are no spatial effects, to which are added the clothing and footwear expenses and leisure services. For all other types of consumption, spatial interdependencies are complex. The consumption category with hotels, restaurants and cafes of the population over 50 years is the only one in which the analysis reveals significant and positive spatial effects, in other words the consumption of the elderly in this category of expenditure has cross-border impact, denoting the tourism potential of the elderly European level, identified as one of the areas of interest in the European Commission (European Commission, 2015).

Chapter 6. Examples of good practices and policy recommendations for managing the aging process

Through the policy recommendations included in this section, we set out to make arguments for initiating policies that will help improve the use of the potential of the Silver Economy to support growth and job creation. To illustrate the significance of the proposed interventions, respectively the need they cover, we have included in this section of the paper a series of examples of good practice in areas that address the needs of the elderly and have the potential for replication.

The needs and desires of the demographic segment of people over the age of 50 can lead to the development of new markets, or the transition from niche sectors to mainstream markets. The main areas with the potential for growth of the Silver Economy identified at European level are those that contribute to a more active, healthier and independent life. These are closely linked to the Sustainable Development Goals (SDGs) adopted by the United Nations in 2015. The period of the last ten years of the Sustainable Development Goals, 2021-2030, has been designated by the United Nations as the "Decade for Healthy Aging", which emphasizes in this way the importance given to the phenomenon of aging population and aiming to improve the lives of the elderly, their families and the communities in which they live (World Health Organization, no year). Within the actions proposed in the Decade for Healthy Aging 2021-2030, two major areas have been identified, to which we have paid increased attention, in terms of the economic and social impact that they could have with the development of interventions that to support them. These refer to: 1. "Age friendly" environments, by promoting products, services and technologies that contribute to a healthy aging and that allow those with reduced physical or mental capacity to enjoy life; 2. Combating discrimination against the elderly: stereotypes, prejudices and discrimination against the elderly have consequences for their health and well-being, suggesting that actions in this area should focus on changing perceptions about age and aging (World Health Organization, n.d.).

6.1. Age friendly cities and communities

A 2006 study by the WHO (World Health Organisation) looked at the benefits and chalenges of older people living in cities, looking at transport, information and communication technology, housing, outdoor spaces and buildings, community support and health services, social participation, jobs work and civic participation, social inclusion (World Health

Organization, 2018). The results of the study led to the development of the concept of "age friendly" city, as well as the creation of a Guide that includes a set of checklists for determining the age friendly cities. Requests from city communities regarding this concept led to the establishment in 2010 of the Global Network for Age-Friendly Cities and Communities. The network supports cities and communities with solutions that contribute to the development of services and products for the elderly, promoting an active and healthy life.

6.2. Entrepreneurship among the elderly

An important role in the context of the aging population can be entrepreneurship among the elderly. It could help to harness the potential of older people, with a positive economic impact by maintaining them in the labor market, supporting the prolongation of the working life of older people, as well as reducing unemployment among older workers.

Entrepreneurship among the elderly is analyzed in studies and research, on a global or European scale, referring to older people who are starting a business for the first time.

Older entrepreneurs have the advantage of high levels of experience, either from a managerial or technical point of view, as well as personal connections and available financial resources to support them in starting a business (Weber & Schaper, 2004). At the same time, older entrepreneurs face the stereotypes characteristic of older workers, being considered a group with poor performance, resistant to change, with low ability to learn or adapt to new technologies (Posthuma & Campion, 2009), (Anca, 2017 b). And compared to young people, older people are much less likely to initiate entrepreneurial activities (Kautonen, 2013).

The project “Entrepreneurship of seniors-experience never ages”, http://www.seniorenterprise.ie/:

The success of the project consisted in creating a training content dedicated to the elderly, in including in the activities meetings with entrepreneurs over 50 years old, as well as in carrying out mentoring activities with the elderly. The Senior Enterprise project was highlighted as an example of good practice in the OECD document “Policy Brief on Senior Entrepreneurship” (OECD, 2012), as well as in the document published by the European Commission, “Senior Entrepreneurship Good Practices Manual” (European Commission, 2016).

6.3.Transport

Older people use a variety of transport options, which include driving their own car, walking, public transport as well as private and specialized transport services. The main means of transport for people over 55 is the car, followed by public transport, the main reason for using the car to the detriment of public transport is that the latter is not as convenient (European Commission, 2011). While at European level the use of the car is preferred by 52.9% of the population, at the age of over 55, it represents only 47%, being still the preferred means of transport of this demographic group. Regarding the use of public transport, it is preferred in daily activities by 21.8% of the population, remaining at about the same value for the elderly (21.5%).

6.4. ICT- Information and communication technology

Analyzing at European level the degree of internet use among the elderly, variations are observed from one country to another. Thus, in the demographic group of people aged between 55 and 64, still considered active in the labor market, the largest share of people who used the internet in the last three months in 2020 comes from Denmark (99%), Luxembourg (99 and Finland (97%). At the opposite end of the ranking are Bulgaria (56%), Romania (64%) and Greece (64%).

Regarding the segment of inactive elderly people, aged between 65-74 years, the ranking of internet users remains unchanged compared to that of the segment 55-64 years, placing Denmark (94%), Luxembourg (91%) and Finland (91%) in the first places, while Bulgaria (25%), Croatia (28%) and Greece (33%) are in the last places.

Research and reports on the use of ICT show that older adults are embracing technology more than ever, and that manufacturers in this economic field are contributing a wide range of innovative products designed to meet the needs and desires of consumers. We refer to high-tech monitoring devices and applications, from blood pressure to daily steps, to smartphones with magnification options for increased visibility, as well as to technological solutions that support independent living in homes, such as the Internet. IoT-Internet of Things, support / company intelligent robots (AAL-Active and Assisted Living) and other artificial intelligence (AI-Artificial intelligence). The latter have been shown to have a positive impact on improving mental and physical health, as well as the independence of the elderly, through technologies that allow them to live in their own homes, the so-called "aging in place", to the detriment of their placement in assisted living units such as care centers for the elderly (Mihailidis, Carmichael, & Boger, 2004).

However, it is noteworthy that older people have difficulty using ICT devices, even when performing simple tasks such as sending telephone messages. The main causes that determine the lack of trust and frustration in the use of technology among the elderly would be the lack of technological knowledge, and familiarity with terminology, as well as physical challenges.

The European Commission supports AAL activities for active and assisted living through the "Active and Assisted Living program" (AAL JP), http://www.aal-europe.eu/, operational since 2008, which finances research and development of technologies and services to increase the quality of life of the elderly. The project "4Mvideo E-sport cycling at home for rehabilitation and daily exercise 4ME", https://4mvideo.dk/ is a relevant example in this sense. Starting from the knowledge of the importance of the fact that daily physical exercises of 30 minutes reduce the risk of hypertension, diabetes, obesity, etc., and that it is often difficult for the elderly to fulfill them, the project proposes cycling at home assisted by a video system. The system requires little space and is set up using a stationary bike or a pedal system with a wireless cadence sensor and a tablet. The sensor wirelessly sends pedal activity information to the 4Mvideo app on the tablet which plays a video selected by the user. The user thus has the feeling of cycling in the selected environment (e.g. cycling on the shore of a lake). The system can work without an internet connection and is easy to use. It allows the user to keep track of their own exercise records and works on a subscription basis.

Conclusions

1.Results

Through the research carried out in this paper, we aimed to investigate the impact of consumption on economic growth in the context of the phenomenon of population aging in the European Union. The demographic group represented by the population over the age of 50 has a positive and significant impact on economic growth, through its private consumption expenditures.

Regarding the objectives proposed in this paper, we consider that the results obtained have contributed to their achievement.

1. Thus, regarding the first established objective, to identify the factors that contribute to the aging population, the research undertaken highlights the impact of demographic changes that reveal an increase in life expectancy over time, respectively a decrease in fertility rate, the phenomenon being present globally. However, it is observed that there are differences from

one country to another in terms of the degree of population aging. At European level, the oldest countries are mainly Western European countries (Germany, Italy) which have a higher standard of living.

2. The second proposed research objective refers to the identification of consumption patterns characteristic of the elderly. From this point of view, the analysis carried out reveals common characteristics of the 50+ age group in all the countries analyzed, namely that the main categories with the highest consumption are common and refer to: 1. Home maintenance (housing rent expenditure, maintenance and repairs, utilities), 2.Food (foodstuffs purchased for home consumption) and 3.Transportation (expenses for the purchase of cars and other vehicles, operation of personal means of transport and transport services). The category of consumption with the lowest share of the total is the expenditures on education services. With regard to expenditure on health services, a clustering on two east-west longitudinal axes is identified, which suggests the existence of health insurance systems that better cover the needs of health services in Western countries compared to Eastern European countries.

The analysis of consumption patterns suggests a process of convergence of consumption expenditure 50+, and the fact that in Western European countries where the share of the population over 50 is the highest, the economic impact of consumption of this age group is stronger.

3. Regarding the third research objective through which we aimed to analyze the impact of consumption of the elderly on economic growth, the research results highlight a direct relationship between GDP and consumption expenditures of the age group +50. In the period 2005-2019, at the level of the European Union, a clear phenomenon of convergence can be observed, both for the consumption expenditures of people over 50 years of age, and for the GDP. As the phenomenon of population aging intensifies over the period analyzed, our research indicates an increased influence of consumption of the 50+ age group on GDP, especially in developed European countries, which are experiencing a more aging population. The analysis of the existence of spatial interdependencies confirms the contagion, diffusion and clustering of EU member states in terms of economic performance measured by GDP / capita, conditioned by the consumption of the 50+ age group and the control variables used.

4. The fourth objective of the research was to identify economic sectors with development potential, which meet the needs of older consumers. Starting from the analysis of consumption patterns characteristic of the age group 50+ at the level of the analyzed

European states, we identified on the one hand three categories of consumption whose total share is predominant in this demographic group: housing, food and transport. At the same time, from the research studies and the reports of the European Commission that refer to the challenges and opportunities created by the phenomenon of population ageing, it emerged that an important role is played by: 1. the health sector, from the perspective of its importance in creating conditions for an active and healthy life of the elderly; 2. the ICT sector (information and communication technology), for the great potential it can have in contributing to the creation of innovative technologies, products and services for the benefit of the elderly.

5. Regarding the fifth objective of the research, for the identification of proposals for measures at governmental, business or organizational level that would contribute to the use of the consumption potential of the elderly, in the last section of the paper we analyzed several economic areas. which contributes to meeting the needs and desires of the elderly. The studies and research undertaken in this direction that we analyzed, as well as the examination of a set of projects considered examples of good practice, led us to identify the following recommendations: -Increase awareness of the concept of age friendly environments , as well as the benefits on the demographic group of the elderly; -Expansion of the Global Network for Age-Friendly Cities and Communities; -Development of programs that allow the exchange of good practices regarding the concept of age friendly environments; -Subsidies for entrepreneurial training among the elderly; -Fiscal incentives for senior start-ups; -Stimulating innovation and business incubators for senior entrepreneurs; -Supporting research in the direction of identifying the needs of senior entrepreneurs; -Measures that contribute to the improvement of the conditions of use of public means of transport for the elderly, and which refer to: 1. Increasing the availability of public means of transport in rural areas; 2. Introduction of public transport services on request, with means of transport of small or medium capacity, adequately equipped for the needs of the elderly, including wheelchairs; -Supporting research to conduct studies in order to improve information on the needs and motivational factors of the elderly in connection with the use of ICT devices and mobile social services.

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