The Impact of Population Ageing on Economic Growth: An In-depth Bibliometric Analysis

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Abstract

The phenomenon of population ageing and its influence on the economic growth of countries has long been the focus of major concern for both governments and the scientific community. Considering the scientific contributions that have been published on the matter in recent years, it seems timely to take a comprehensive and objective account of this stream of the literature.

Using bibliometric techniques and based on 144 articles centred on ageing and economic growth gathered from Scopus, we found some interesting evidence: 1) ageing has increasingly attracted more researchers within economics-related literature; 2) more recently, studies have revealed the willingness of researchers to evaluate less immediate mechanisms relating ageing and economic growth, most notably consumption and saving patterns, and human capital; 3) there is a growing need in ageing research to test economic phenomena with real–world data against the theory, as reflected by the noticeable increase in the use of empirical methods; 4) Multivariate analyses have become more prominent since 2006, contrasting with a continuous fall in empirical analyses based on ‘Mathematical modelling’; 5) the effect of an ageing population on economic growth does not essentially vary according to the main mechanism through which ageing impacts on growth (being predominantly negative), but it does vary with the empirical methodologies used; 6) there are very few or a complete lack of studies on developing and less developed countries.

The absence of empirical studies on ageing and economic growth for less developed countries combined with the fact that the ratio of an older population in such countries is expected to significantly increase over the next thirty years, makes this topic an imperative for future research.

Keywords: Ageing population, Economic Growth, Bibliometrics, Less developed countries.

JEL Codes: J10, H50, O30, C89
1. Introduction

The process of demographic transition, mostly associated with increasing longevity and decreasing fertility, has led the world to the era of the ‘ageing population’. Hodgson (1988) and Bloom and Williamson (1998) argue that the ex post effect of the demographic dividend was the main reason behind the ageing problem. According to Hodgson (1988), in the early 20th century, orthodox demographers considered themselves as ‘population pessimists’ and assumed that population growth would negatively influence capital accumulation and technological change. Due to this pessimistic perspective, the problem of a decreasing fertility rate became relevant for many countries, and policies were designed to invert this trend.

The world population began to decline in the mid-1970s when, in many developed countries, the working-age populations (aged between 25–59 years) started to increase faster than the child population (Lee et al., 2011). This imbalance in the population structure has created the so-called ‘demographic dividend’, translated in terms of positive productivity growth in developed countries for some years (Bloom et al., 2001). However, over time, this unequal age structure has become a demographic burden and has created the current ageing problem.

The advances in technology and science were crucial to instigating the demographic dividend and enhancing the field of medical science, greatly increasing the possibilities of individuals to live longer and healthier lives. This evolution materialised, for instance, in a rising trend in life expectancy for European countries, from 2002 to 2009 (Eurostat, 2013). Indeed, since 2007, the average life expectancy for countries such as Luxembourg, Spain, Germany, Portugal, Austria, France and Italy is over 80 years of age (Eurostat, 2013). Given the current fall in the fertility rate, it is predicted that the prime working age group will be lower than the old age group in the near future, which means a demographic change with significant influence the national economies (Mason, 2005). Inequality in age structures, especially in the case of a growing old age group, is expected to have multiple effects on the overall economic performance of countries.

The influence of the ageing problem on economic development is manifest. Several studies (e.g., Bloom et al. 2001; Creedy and Scobie, 2002; Alders and Broer, 2004; Weil, 2006; Sobotka et al., 2010) not only confirm the existence of an ageing population in developed countries, but also identify and analyse the main mechanisms underlying the influence of ageing on economic growth: consumption and saving patterns, public expenditure, and human capital.
Regarding the mechanism associated to consumption and savings, Bakshi and Chen (1994) and Walder and Döring (2012) argue that the degree of inequality regarding the population age structure of a country impacts on the consumption pattern of its households. Due to the ageing problem, the overall demand for certain goods will be affected, since they will not provide any utility for the older household (Walder and Döring, 2012). For instance, in a country with a high old age population, the overall demand for education will decline as the consumption preferences of the old age group fall more on medical care.

The rise in the ageing population is also expected to affect public expenditure and, thus, economic growth. According to Eiras and Niepelt (2012) and Lisenkova et al. (2012), when a country faces an increase in the old age population, public spending on social security expenses and the medical system will be higher than the corresponding spending on education and other forms of development. Additionally, an increase in the old age group will also affect a country’s sources of income. A decline in the working age group and an increase in the old age group will provide less tax revenue. This demographic evolution may also affect Foreign Direct Investment (FDI). Indeed, Davies and Robert (2006) show that foreign firms will not invest in a country with an ageing population since the working age population is scarce, therefore negatively affecting the country’s capability to produce wealth. Finally, the potential imbalance in the government budget, meaning increasing deficits due to the ageing problem, may also impact on the economy (Tosun, 2003; Lisenkova et al., 2012).

In most developed countries, government policies and the non-altruistic behaviour of couples have reduced the fertility rate (Alders and Broer, 2004). As a result, their populations are composed of many working age individuals and fewer children to succeed them in the future (Lee et al., 2011). This disproportional age structure leads to scarcity in labour supply and a decline in labour productivity, because the individuals’ capacities seem to change along with their age. According to Mincer (1974), the productive capacity of a society composed of an older labour force will be remarkably different (lower) from one with a younger labour force.

Considering the consequences of population ageing on economic growth, and the contributions that have been published on the matter in recent years, it seems timely to take a comprehensive and objective account of this stream of the literature. Thus, based on bibliometric methods, this study intends to: i) analyse the emergent topics associated with this literature; ii) identify the
relative scientific importance of the main mechanisms involved in the relationship between ageing and economic growth; iii) analyse and categorise the main methodological approaches that have been used in the literature; and, iv) identify the main regions and/or countries to which research has paid greater attention.

The paper is structured as follows. After the Introduction, Section 2 describes the methodology employed in the bibliometric analysis. Section 3 details the results of the analysis, providing an evaluation of the evolution of the literature in terms of main mechanisms analysed (Section 3.1), main types of research and the relative frequency of types associated to each mechanism (Section 3.2), main empirical methodologies used to analyse the available data (Section 3.3), and the countries and group of countries (developed, developing and least developed countries) to which the studies have dedicated the most attention (Section 3.4). Finally, Section 4 concludes and offers some considerations regarding future research on this topic.

2. Methodology

In order to achieve the four goals identified above, data on published articles were collected from Sciverse Scopus (from Elsevier).  

The search keywords (in the fields ‘keywords’, ‘article title’ and ‘abstract’) used were ‘ageing population’, ‘aging population’ and ‘demographic transition’, limiting the search to articles written in English in the subject areas of ‘Economics, econometric and finance’ and ‘Business management and accounting’.

This search yielded 605 articles published between 1975 and 2013. We downloaded the articles and analysed each abstract (in some cases, the full paper). Following a preliminary assessment, 461 articles were removed from the analysis because, although highly relevant scientifically, they did not focus on topics related to ageing and economic growth/development, exploring rather topics such as: fertility and mortality trends; the altruistic behaviour of couples and women labour force participation; demographic transition and its effects on the agricultural sector; the

1 Scopus is the world’s largest search engine for abstract and citation databases of peer-reviewed articles. It has tools to track, analyse and visualise research. The search engine covers a wide range of published articles, journals and documents. It is easy to use and to obtain research information quickly, also helping to maximize library resources more efficiently. Considered as a tool to sort, refine and quickly identify results, it helps to focus on the outcome of the research conducted, requiring less time to master the databases. Data was accessed on February 4, 2013.
health care system and ways to overcome increasing medical expenditures; female education and fertility growth rates; and demographic transition processes.

After this preliminary assessment, a total of 144 articles had been selected, which seemed to serve the purposes of this study. They were then categorized according to their ageing-growth nexus mechanisms, type of methodology, unit of analysis, countries of analysis, and estimation methods.

With regard to the ageing-growth nexus mechanism, and following the literature briefly reviewed in Section 1, and further detailed in Nagarajan et al. (2013), the articles can be classified into one of the following categories: 1) Consumption and saving patterns of households; 2) Public expenditure; and 3) Human capital.

Based on the proposal by Silva and Teixeira (2009), the articles were categorized in terms of main type and grouped as: 1) survey; 2) appreciative; 3) appreciative and empirical; 4) formal and empirical; and 5) formal. Articles involving meta-analysis or literature reviews were classified as ‘Survey’, critical or open articles as ‘appreciative’, and when the articles’ testing basis was empirical, they were considered as ‘appreciative and empirical’ (Appreciative + empirical). Articles focused only on modelling issues involving algebraic derivations and simulation/ calibration were included in the ‘Formal’ category. Moreover, if the models were empirically tested, they were classified as ‘formal and empirical’ (Formal + empirical).

Empirically-based articles were further examined in terms of the unit of analysis, which encompasses the individual (individual or household samples), regional and country levels.

To assess the specific trend associated to the methods used to analyse data, Malhotra et al.’s (2013) contribution was adapted by grouping methods into 3 categories: 1) univariate and bivariate analyses; 2) multivariate analyses; and 3) mathematical modelling (mainly involving simulation).

As the influence of ageing on growth may vary across countries, we identified the country(ies) that was(were) the target of empirical articles. More specifically, information was gathered on each country analysed and then, following the World Bank’s ranking, they were grouped into the categories ‘developed’, ‘developing’, and ‘least developed’ countries.
3. Empirical results

3.1. General evolution of articles on ageing and economic growth

The phenomenon of population ageing and its influence on the economic growth of countries has long been the focus of major concern for both governments and the scientific community. Economists have been actively involved in investigating the impact of ageing on economic growth. Although displaying some irregular patterns, research articles published in journals on this topic became more prominent particularly from 2000 onwards (cf. Figure 1). The growing ratio of papers published on ageing and economic growth in total papers published on economic growth reflects that ageing is increasingly attracting more researchers within economics-related literature.

![Figure 1: The evolution of the weight (in %) of articles related to population ageing in the economic growth literature](image)

*Figure 1: The evolution of the weight (in %) of articles related to population ageing in the economic growth literature*

*Note: Given that Scopus covers the literature after 1995, we opted to calculate the ratio of articles published on ageing and economic growth to all articles published on economic growth for each year after 1995. For the entire period, we considered 126 articles on ageing and economic growth and 10254 on economic growth.*

*Source: Authors’ computation based on articles gathered from the Scopus database (accessed on February 4, 2013)*

The highest percentage of articles on ageing related to economic growth was reached in 2001, accounting for 2.5% of the total papers on economic growth that explore ageing issues.
3.2. Variations in the scientific importance of ageing-growth mechanisms

Ageing influences economic growth primarily through three main mechanisms: consumption and saving patterns, public expenditure, and human capital. A country with a growing ageing population will lead to households with more individuals belonging to the old age group. The households’ overall consumption and saving patterns change according to the individuals’ age (Walder and Döring, 2012). Moreover, an ageing population is likely to influence a country’s public expenditure (Lisenkova et al., 2012). A rise in public expenditure, especially on public welfare, and a decline in tax revenue (higher number of pensioners and lower number of working age individuals) are assumed to increase the budget deficit of ageing countries. Finally, the impacts of ageing on labour productivity and human capital investment are also believed to influence economic growth as highlighted by Lisenkova et al. (2012). According to these authors, a gradual decline in the labour force and a decline in public expenditure on capital investment will affect labour productivity.

Some of the papers analysed focus on more than one mechanism (e.g., Hondroyiannis and Papapetrou, 2001; Cameron and Cobb-Clark 2002; Guest and Mcdonald, 2003). Thus, the number depicted in Figure 2 represents the number of times each mechanism is referred to in the 144 articles analysed in the given period, and not the number of articles.²

For the entire period, the mechanism mentioned most often was ‘public expenditure’, accounting for 56% of the total occurrences, followed at a distance by ‘human capital’ (24%) and ‘consumption and saving patterns’ (20%). According to Phillipson (2011), policy makers in OECD countries have confirmed that demographic changes influence public expenditure. The OECD and the European Commission’s Working Group on Ageing Population have expressed their concerns over the long-term sustainability of current trends due to the ageing problem (Krugman, 2007). According to Maebayashi (2013), government budget deficits will rise due to increasing expenditures on social security benefits compared to public capital investment. The imbalances in the provision between capital investment and social security investment will affect economic growth. Tosun (2003) and Maebayashi (2013) further state that increases in spending on social security will reduce economic growth. Hence, an analysis of public policy centred on

² From 1975 to 2013, 4 articles from the 144 are focused on ‘other’ mechanisms (Technology; Agriculture; Agglomeration economies). Since the figure is residual, we decided to not include this group in Figure 2.
spending on social security benefits seems relevant for researchers (Maebayashi, 2013). Accordingly, research related to public expenditure was more prominent in the first years of the period under study, representing 64.5% of the total articles published in the period 2001–2005.

The dynamics of the relative scientific importance of the three mechanisms is clear from 2005 onwards, when the relative importance of ‘public expenditure’ decreased significantly (from 69% to 36%) in favour of a remarkable rise in the ‘consumption and saving patterns’ mechanism, which increased 25 percentage points. From 2010 onwards, research published on ageing and economic growth seems to favour consumption and saving patterns, reaching 38.5% of the total articles in 2011–2013. This seems a ‘natural’ trend as increases in tax revenue affect household incomes and decrease their average consumption (Alders and Broer, 2004). In fact, Pham (2009) argues that old people are less efficient in producing utility than young people and, therefore, they demand relatively more consumption. For example, Guest and McDonald (2003) estimate that the average person aged 75 years and above consumes 19% more than the average individual aged 25–39 years. Preferences and needs of households change with age, when the consumption preferences of the old age group become mainly related with health care services (Pham 2009).

Thus, following the large amount of literature dedicated to the analysis of the public expenditure mechanism, studies in more recent years reveal the willingness of researchers to evaluate less
immediate mechanisms relating ageing and economic growth, most notably consumption and saving patterns and human capital mechanisms.

3.3. The evolution of research in terms of type of methodology

For the period analysed, about one third of the research was of the ‘formal + empirical’ type. There is a striking balance between formalisation and appreciative theorising with the formal-type of papers representing half of the total articles published on this topic, whereas 44% are of the appreciative type (the remaining 6% ‘literature reviews’) – cf. Figure 3.

It is also apparent that over time there is a significant decrease in exclusively ‘appreciative’ papers (dropping from 25% before 2000 to 4% in the most recent period, 2011-2013). In the early stage, many journal articles applied ‘Appreciative’ and ‘Formal’ methods. However, there is a
substantial drop in the use of the ‘Appreciative’ method between 2011 and 2013. Of the 25 articles published in this latter period, only one applied this method. This trend, also observed in other research areas (e.g., regional studies - Cruz and Teixeira, 2010; ecological economics – Castro Silva and Teixeira, 2011), clearly explains the difficulties researchers encounter in proving scientifically the real impact of the ageing problem exclusively through qualitative methods. Although the use of ‘formal’ methods in economics (linked to formal modelling and mathematical methods) is identified as the quest to increase ‘rigor’ (Cruz and Teixeira, 2010; Teixeira, 2013), a noticeable drop was detected in the use of the ‘Formal’ method between 2011 and 2013.

Figure 3 highlights a perceptible rise in the use of ‘Appreciative + empirical’ and ‘Formal + empirical’ methods (increasing 21 percentage points and 11 percentage points, respectively, from the earlier period to the most recent one). Hence, these two combined types became central in the studies published from 2000 to 2013. This trend reveals a growing need in research to test economic phenomena with real–world data against the theory (Cruz and Teixeira, 2010). Furthermore, since the impact of population ageing on economic performance varies across countries (Lee et al. 2011), empirical analysis is considered as vital in studying the impact of ageing on their economic growth. For example, according to Lee et al. (2011), and unlike most Western countries, an ageing population positively influences economic performance in Asian countries. Therefore, in general, the total number of journal articles employing ‘Formal + Empirical’ and ‘Appreciative + Empirical’ methods more frequently has been on the rise. This result is in accordance with Kaldor’s (1961) view on the relevance of empirics, as was previously highlighted. According to this author, any constructed model should be able to explain the typical features of economics that we find in reality.

Figure 4 represents the relative weight of the three main methodological types used to analyse data in empirical studies. It is shown that before 2000 the dominant type of empirical analysis was ‘Mathematical modelling’. Between 2001 and 2010, ‘mathematic modelling’ and ‘univariate’ methods were the most prevalent. In particular, over this time frame, simulation methods, time series analysis and descriptive studies were used as primary tools to perform prediction on the ageing problem.
Multivariate analyses have become more prominent since 2006. At least in part, this increase may be explained as the result of the increasing availability of data. In fact, from 2000 onwards, countries like Italy, Japan, Germany, France, the UK, Australia and Canada already had a larger proportion of people over the age of 65 and rich databases became available for empirical analysis (Eurostat, 2013). Therefore, sufficient data were available to carry out ‘Multivariate’ types of empirical analysis. Figure 4 also shows a continuous rise in this type of empirical analysis since 2001. In contrast, there was a continuous fall in empirical analysis based on ‘Mathematical modelling’.

As discussed in the introduction, distinct mechanisms have been identified underlying the ageing-economic growth nexus. Hence, it is interesting to quantify the weight of each analytical method used to specifically address each mechanism. Cross tabulation analysis was applied to study the interrelation between the mechanisms and the methods. The results (cf. Figure 5) show that, in fact, the articles published have concentrated on specific methods to analyse each mechanism. More specifically, Figure 5 illustrates that the ‘Formal + Empirical’ types were more frequently
used in the articles related to the ‘Consumption and saving patterns’ mechanism (46.9%). From our knowledge of the related literature, it is possible to state that an important stream of this literature has been using a framework of analysis based on Overlapping Generations (OLG) models to address the behaviour of households in terms of consumption and savings, since such behaviour may differ significantly between individuals’ working and retirement periods. OLG models take into consideration the time preferences (Samuelson, 1958), thus, the majority of the studies has applied these models to project the impact of an ageing population on ‘Consumption and saving patterns’. For the ‘Public expenditure’ mechanism, the ‘Formal + Empirical’ type is also dominant although less expressively (with 29.7% of the total occurrences) whereas the ‘Appreciative + Empirical’ type accounts for 22% of the total occurrences.

![Figure 5: The interrelation between mechanisms and methodology](source: Authors’ computation based on 144 articles gathered from the Scopus database (accessed on February 4, 2013))

In the early period of our analysis (1975 – 2000), the ‘Formal + empirical’ method was more frequently used to analyse the impact of ageing on ‘Public expenditure’. To a certain extent, this analytical choice may be understood if we bear in mind that, until 2000, the impact of population
Our bibliometric results also show that, for the ‘Human capital’ mechanism, the most common type of articles has been the ‘Appreciative + empirical’ (with 35.9% of the total occurrences), higher than the ‘Formal + Empirical’ (accounting for 25.6%). Generally, most of the literature on the influence of population ageing through ‘Human capital’ is mostly focused on the labour force and analyses its effects on the basis of econometric methods (Ilmakunnas and Ilmakunnas, 2010; Göbel and Zwick, 2012; Ludwig et al., 2011).

3.4. Main empirical methodologies to analyse the data

The empirical analysis accomplished in the published articles reveals that the impact of population ageing on economic growth does not essentially vary according to the main mechanism through which ageing impacts on growth (c.f. Figure 6). In general, regardless of the mechanism (consumption and saving patterns, public expenditure, and human capital), the predominance of the negative effects of ageing on growth is apparent (covering over 70% of the total occurrences).

According to Braun et al. (2009), a decline in the households’ savings rate due to the ageing problem is associated to a concurrent decline in the after-tax real return on capital or after-tax real interest rate, which is believed to negatively affect economic growth. Although in a considerably lower proportion (11% of the corresponding total), some empirical studies centred on the impact of ageing on economic growth through consumption and savings have found a positive relation between these variables. An anecdotal example can be found in the Chinese case. Chinese economic growth has been occurring along with a rise in the old age dependency ratio. Li et al. (2012) report that China’s increasing old age group is required to take measures to ensure their own welfare, which means this group will continue to be pressured to engage in a savings behaviour. Such behaviour in turn positively contributes to China’s economic growth.

With regard to the articles in which ageing failed to impact on economic growth through the consumption and savings mechanism (a finding for 16% of the total occurrences), Hock and Weil (2012) argue that a rise in the ageing population will increase the burden on the working age group, i.e., working age individuals will have to expend a larger share of their income on the
elderly. Thus, in order to maximize consumption at the steady state, the working age population may opt to have fewer children. Consequently, the ageing population will have a greater influence on the fertility rate than consumption and saving patterns.

Moreover, an ageing population is assumed to influence growth negatively by means of government revenue and positively by means of government expenditure (Tosun, 2003). According to Tosun (2003), a rise in the ageing population tends to decrease government revenue through labour income tax and increase government spending through pension and health care expenditures. Notwithstanding, Pammolli et al. (2011) report that, over the past 30 years, the health care expenditure of OECD countries has increased more rapidly than their GDP. Such an ambiguity is also found in our bibliometric analysis, although the general findings of the existing empirical research point to the prevalence of the negative impacts of ageing on economic growth (see Figure 6).

The lack of impact (‘No impact’) of ageing on economic growth is slightly more evident in studies that address the public expenditure mechanism (18% of the total empirical papers published focusing on this mechanism). According to Blake and Mayhew (2006), the rise in

![Figure 6: The impact of ageing on economic growth by main mechanisms](image)

*Source: Authors' computation based on 144 articles (161 occurrences) gathered from the Scopus database (accessed on February 4, 2013)*
government spending due to an ageing population bares no effect on economic growth as long as there is a continuous rise in immigration.

With regard to the human capital mechanism, the vast majority of the empirical studies surveyed (75% of all occurrences) shows that ageing impacts negatively on economic growth as labour supply and labour productivity decline due to ageing. More specifically, Ilmakunnas and Ilmakunnas (2010) contend that ageing negatively affects the economic growth of a country when more senior workers are less productive compared to their younger counterparts. Thus, productivity differentials among the distinct age cohorts may explain the disparate impacts that the existing empirical literature has encountered.

It is important to note that the empirical studies on the impact of ageing on growth through the distinct mechanisms have employed different estimation methods and, consequently, part of the divergent effects encountered (negative, positive or no effect) may derive from the use of different methodological approaches. Indeed, as shown in Figure 7, it seems that empirical studies based on simulation and pooled OLS convey relatively more negative impacts than those using more complex methods such as the GMM, dynamic least squares, multinominal, and panel data.

![Figure 7: The impact of ageing on economic growth by main method of analysis](image)

*Source: Authors’ computation based on 144 articles (108 occurrences) gathered from the Scopus database (accessed on February 4, 2013)*
If we cross the empirical methodologies used with mechanisms and impact (Figure 8), we conclude that the impact obtained (positive, negative or no effect) is likely to depend more on the particular empirical method than on the mechanism analysed. For instance, it is clear from Figure 8 that GMM or dynamic least square methods are associated with a high proportion of positive impacts of ageing on growth regardless of the associated mechanisms.

The analysis further reveals that the results of projection or forecasting through simulation show a higher percentage of negative results for all three mechanisms. Using France as a case study, Thiébaut et al.’s (2013) simulations highlight that a rise in the elderly population will increase health consumption and that a healthy ageing scenario for this country will not be ‘cost-saving’. Hence the authors project that a rise in the number of elderly will not be able to support the country’s economic growth.

![Figure 8: The impact of ageing on economic growth by main methodologies of analysis](image)

Source: Authors’ computation based on 144 articles (161 occurrences) gathered from the Scopus database (accessed on February 4, 2013)

### 3.5. Countries and groups of countries analysed

Countries have been experiencing the demographic transition at different paces since 1970 (Mérette and Georges, 2009). According to Mason and Lee (2011), countries cannot rely entirely...
on their past experience as changes in population age structure in any given country may be occurring for the first time.

Most of the existing empirical studies have focused on developed countries regarding ageing and its impact on economic growth (cf. Figure 9). However, from 2006 to 2010, there was a significant rise in the share of studies on developing countries (from less than 2% to over 20%). No published studies were found regarding the least developed countries on ageing and economic growth. Such an absence, although unfortunate, may be explained by the fact that the pace and timing of ageing are different between industrialized and developing countries (Brooks, 2003). Ageing was first experienced by developed countries (Mérette and Georges, 2009), thus it is to be expected that in the earlier periods (1975 – 2000), empirical analyses were performed based on data mostly from developed countries.

![Figure 9: The evolution of the distribution of occurrences by the countries’ level of development](image)

*Source: Authors’ computation based on 144 articles (161 occurrences) gathered from the Scopus database (accessed on February 4, 2013)*

Among the developed countries, the US, Germany, Japan and the Netherlands were the most frequent analysed in the empirical studies in the area. During the period 1975 – 2013, the share of these four countries has been more or less stable (around 31% of the total occurrences for developed countries), albeit Germany’s share observed a marked increase (cf. Figure 10). As an industrialised country, Germany faces the impact of ageing on economic growth. According to Bloom et al. (2011), although Germany has managed to solve the pension problem related to the
ageing population, its scientific committees are currently more concerned with the impact of ageing on social policy (Börsch-Supan et al. 2002). Börsch-Supan et al. (2002) state that Germany’s ageing population will have a huge impact on production by 2035 as a 15% decline in the labour force is predicted. In the case of Germany, empirical studies have tended to pay more attention to labour supply and labour productivity, that is, the human capital mechanism (Börsch-Supan et al., 2002; Göbel and Zwick, 2012).

Ageing has also been considered a severe problem in countries such as the US, the Netherlands, and Japan. According to Ludwig et al. (2011), the US working-age population ratio is predicted to decrease from 84% in 2005 to 75% in 2050, whereas the old-age dependency ratio will increase from 19% in 2005 to 34% in 2050. In the case of the Netherlands, Ewijk and Volkerink (2012) state that the ageing population will tend to raise the consumption of non-tradable goods and diminish that of tradable goods. According to these authors, such changes in consumption patterns is likely to generate a decrease in the current account surplus from 7% of the GDP to 4% in 2025, eventually turning it into a deficit of 3% of the GDP by 2040 when ageing reaches its peak. In the case of Japan, Braun et al. (2009) project that the average value of Japanese savings rates will not exceed 5% for the rest of the 21st century.

Figure 10: The evolution of the distribution of occurrences for given developed countries

Source: Authors’ computation based on 166 occurrences for developed countries gathered from the Scopus database (accessed on February 4, 2013)
Although showing a growing tendency, the number of studies on developing countries is still scarce, with Asia as the most frequently analysed region (cf. Figure 11) (13 articles from a total of 25 on developing countries focus on Asian countries, corresponding to 52% of the occurrences). Within these regions, the most analysed sub-regions are East Asia and the Pacific, especially in the period 2006-2010 (accounting for 38% of the total occurrences). The working age population has already started to decline in some East Asian countries (Lee et al., 2011). Moreover, the proportion of the older population is increasing very rapidly in Asia as a whole, although there are distinct patterns within the region. For instance, South Asian countries still have relatively young populations while East Asian countries have seen their share of elderly increase substantially in the last few years (Lee et al. 2011).

This increase largely justifies the fact that empirical studies have paid more attention to developing countries from East Asia and the Pacific. Interestingly, although China’s population is ageing at a rapid pace, according to Fehr et al. (2005), given that this country is likely to become the world’s largest saver over the next few decades, ageing will not negatively affect its economic growth.

Currently, the processes of demographic transition towards an ageing population take place in most of the developed and developing countries (Bloom et al., 2011). Even though, at present,
the demographic transition process in least developed countries may not yet be visible, given the lack of published empirical studies on these realities, this does not mean that ageing is not a relevant issue for these countries. According to the United Nation (2009), the growth rate of the older population in least developed countries is projected to continuously increase until 2040. The report further reveals that by 2045 – 2050, the population aged 60 years and over in the least developed countries is expected to grow at a rate of 3.5% per year, nine times higher compared to that of developed countries (0.4% annually).

The majority of the empirical studies (54% of the occurrences) focusing on the consumption and saving patterns mechanism in developed countries found that ageing does not have an impact on economic growth (Cf. Figure 12). A fall in labour supply due to ageing tends to raise the wage rates of all generations and, consequently, increase the cost of having children. This tends to generate a shift from children to consumption of goods (Alders and Broer, 2004), which, according to Alders and Broer (2004) and Hock and Weil (2012), means that an ageing population will not affect the consumption and saving patterns of households. The remaining 42% occurrences report that ageing has a negative impact on the economic growth of developed countries. This may be explained by the fact that population ageing will ultimately increase the dependency ratio and affect national savings, the price of consumption, and investment in tradable and non-tradable goods (Kenc and Sayan, 2001).

Figure 12: The impact of ageing on economic growth by main country blocks analysed

Source: Authors’ computation based on 144 articles (191 occurrences) gathered from the Scopus database (accessed on February 4, 2013)
The vast majority (70% occurrences) of the empirical studies on developed countries and on the public expenditure mechanism found a negative relation between ageing and growth. According to Febrero and Cadarso (2006), the rise in the ageing population will influence overall government spending leading to accumulated public deficits. Exemplifying with the Spanish case, the author further states that Spain’s pension spending is projected to increase from 8.2% in 2001 to 13.6% of its GDP by 2050.

The empirical studies focusing on the public expenditure mechanism and developing countries reveal a positive relation between ageing and economic growth (c.f. Figure 12). Lee et al. (2011) stress that most developing countries in Asia are better off and thus able to both support the elderly and sustain economic growth, mainly due to the systems of mandatory savings during working life that these countries have implemented. This choice significantly improves the wealth of individuals and raises capital investment after retirement.

In 57% of the studies centred on the human capital mechanism, ageing was found to have no impact on the economic growth of developed countries, whereas in developing countries, the results are very different, with 75% revealing that ageing has a negative impact on economic growth. Elgin and Tumen (2010) state that developed countries increasingly rely on machines rather than a human labour force. Therefore, a decline in the human labour force as a result of ageing tends to have no effect on productivity and, thus, economic growth. Furthermore, Blake and Mayhew (2006) stress that the continuous rise in immigration to the UK has been able to sustain productivity growth and, therefore, the ageing population has no impact on its economic growth. In contrast, Tyers and Shi (2007) project that for developing countries such as Indonesia, India, China and Sub-Saharan Africa, the fall in their labour force due to ageing will lead to a fall in the corresponding average GDP.

4. Conclusion

Over the next four decades, global life expectancy at age 60 is expected to increase from 19.7 years in 2005-2010 to 22.4 years in 2045-2050 (United Nation, 2009). Besides the importance of ageing for scientific research, this issue is also the focus of major concern for policy makers (Tosun, 2003; Mason and Lee, 2011).

Given the relatively large amount of scientific literature on this topic, namely related to economic growth, it seemed timely to review this literature from a quantitative perspective.
Bibliometric analyses are considered useful tools in uncovering potential gaps in the literature (Silva and Teixeira, 2009). Indeed, bibliometric methods are able to map a given scientific area and provide an assessment of the dynamics of its key topics and research methods (Cruz and Teixeira, 2010).

In this paper, based on bibliometric techniques, we were able to identify several dimensions of the main scientific contributions in the literature on ageing and economic growth. Some of our findings are worth highlighting, as they provide valuable insights into the extent to which ageing has affected the economic growth of countries.

First, our results show that papers on ageing and economic growth have been on the rise in absolute and relative terms (vis-à-vis papers related with economic growth) revealing that this particular field of research has come to attracted more researchers within economic growth literature.

Second, in terms of the main mechanisms, studies related to the public expenditure mechanism were more prominent in the first years of the period analysed, representing 64.5% of the total articles published in the period 2001 – 2005. This is in line with the observation by Pammolli et al. (2011) that, in the past 30 years, the health care expenditures of countries increased more rapidly than their gross domestic product. From 2005 onwards, variations in the relative scientific importance of the three mechanisms (consumption and saving patterns, human capital, and public expenditure) is more clear-cut, with the relative importance of ‘public expenditure’ decreasing significantly (dropping from 69% to 36%) in favour of a noticeable rise in the ‘consumption and saving patterns’ mechanism, which increased 25 percentage points.

Third, the results reveal a growing need to test economic phenomena with real–world data against the theory, as testified by the significant increase in the ‘Appreciative + empirical’ and ‘Formal + empirical’ type of papers.

Fourth, it was found that the impact of ageing on economic growth does not depend on the mechanism analysed but rather varies according to the empirical methodology used. In general, the vast majority of the empirical studies found a negative effect of ageing on economic growth (Kenc and Sayan 2001; Braun et al., 2009; Ilmakunnas and Ilmakunnas, 2010; Bloom et al., 2011; Lee et al., 2011; Ewijk and Volkerink, 2012; Li et al., 2012; Thiébaut et al., 2013), although some occasional evidence points to the positive or neutral effects of ageing on economic
performance (e.g., Blake and Mayhew, 2006; Cai, 2010; Li et al., 2012). Such idiosyncrasies are to some extent related to the countries’ institutional and social arrangements.

Fifth, there are few empirical studies on ageing and economic growth in developing countries and none on the least developed countries. This raises some concern as ageing is also a critical issue for less developed countries.

The United Nations (2009) reported that for less developed countries, the proportion of the population aged 60 years and over is projected to increase significantly over the next thirty years, with the working age population in these countries projected to decline to 49% by 2050. Therefore, there is an urgent need for empirical studies on ageing and economic growth in developing and least developed countries, which require more attention from researchers.

References


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