The Impact of an Ageing Population on Economic Growth: An Exploratory Review of the Main Mechanisms

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Abstract

Although a myriad of important theoretical and empirical contributions on ageing populations exist, these contributions are diffuse and lack an integrated vision of the distinct mechanisms through which ageing populations impact on economic growth. As such, in this paper we survey the literature that provides insights on the ageing population and its effect on economic growth. In particular, we sought to uncover the main mechanisms through which ageing impacts on economic growth.

The literature review shows that the impact of ageing on the performance of countries is intimately related to the mechanism elected. About 70% of the empirical studies that focused on the ‘public social expenditure’ mechanism convey a negative impact of ageing on economic performance, whereas the majority (60%) of empirical studies that focus on ‘human capital’ fail to uncover any significant statistical relation between ageing and the economic growth proxy and the positive impact is more closely related to the ‘consumption and saving patterns’ mechanism. Estimation methodologies also seem to be associated with distinct impacts of ageing on economic growth, with less sophisticated econometric methods (i.e. OLS and panel) being most often associated with negative (cor)relations. The bulk of the empirical evidence concerns developed countries (and the ‘public social expenditure’ mechanism), with most of the analysis indicating a negative and significant relation between ageing and growth. Given that developed, developing and even the least developed countries are/will be affected by the phenomenon of an ageing population, knowing the degree to which the influence of ageing varies among countries (including developing and the least developed), and through which mechanisms, is essential to specifying sound public policies.

Keywords: Ageing; economic growth; consumption and saving patterns; public expenditure; human capital
1. Introduction

Even though longevity and lower mortality rates are considered major successes for medical science (Dalgaard, 2012), the demographic change they convey is commonly taken as having a negative influence on national economies (Mason and Lee, 2011).

Many developed countries are approaching an era of ageing populations due to an increase in longevity, a decrease in mortality rates and a decrease in fertility rates (Harper and Leeson, 2009). The decline in population growth has been visible since the mid-1970s when the adult working-age population in several countries outpaced child population (Mason and Lee, 2011).

According to the World Health Organization (WHO, 2012), the proportion of people aged 65 and above in Europe is predicted to increase from 14% in 2010 to 25% in 2050. Hence, it is expected that, in the near future, the prime working age group will be smaller than the older age group.

The involvement of women in the labour force is also considered to be negatively related to the fertility rate (Becker et al., 1990). In developed countries more women have entered the labour market. For instance, the growth rate of female employment in the Euro area (17 countries) increased from 1.3% in 1996 to 2.3% in 2007 (Eurostat 2012) and here having a child became a choice for female employees (Alders and Broer, 2004). Since human capital and the fertility rate are negatively correlated (Alders and Broer, 2004), the increasing trend of women to be better educated generally leads to a decrease in the fertility rate. Productivity shocks and the retirement of the baby boom generation reinforces the increase in the ageing population (Alders and Broer, 2004). Underlying the issue of fertility, Alders and Broer (2004) further argue that the current demographic transfer faced by developed countries is no longer an exogenous shock since it is due to the increase of women capital in the labour market, which has led to a decrease in the fertility rate. Given this critical situation, Alders and Broer (2004) further state that the altruistic behaviour of married couples will be a key factor in building the future human capital. Nonetheless, it is argued that the current financial crisis is not helping to promote the necessary altruistic behaviour of couples.

Declining fertility leads to populations with many working age individuals and fewer children to succeed them (Weil, 2006; Lee et al., 2011). For a highly developed country the ‘ideal’ fertility rate is considered to be associated with a 2.1 replacement level (Nimwegen and Erf, 2010). In 2011, for almost all European countries, the fertility rate was below this replacement
level (cf. Figure 1). In particular, the figures for Portugal, Spain, Italy, Austria and Greece are far below that replacement rate. The average fertility rate for these five countries is below 1.5.

![Figure 1: Fertility rates in European countries, 2000 – 2011](image)


It is important to note that a decrease in the fertility rate alone will not turn a country into an ageing country; along with this, a lower mortality rate and increasing life expectancy have played an important joint role as well (Dalgaard, 2005).

This structural ageing of the population has profound consequences on the economic growth of countries. Most economists argue that a country with a higher proportion of the older age group tends to be associated with lower productivity levels and savings and higher government spending (Bloom et al., 2010; Mèrette and Georges 2009; Sharpe, 2011; Walder and Döring, 2012). This demographic tendency also makes room for an increase in the age dependency ratio, meaning that the smaller working age group will be obliged to care for the older age group (Lindh, 2004).

Although there is a myriad of important theoretical and empirical contributions on the ageing population, these contributions are diffuse and lack an integrated vision of the various mechanisms through which an ageing population impacts on economic growth. Thus, the main goal of this paper is to provide an in-depth survey of the literature on the interaction mechanisms between population ageing and economic growth.

Our paper is structured as follows. In Section 2, we provide a general overview of the literature on population ageing and economic growth, giving an account of the main mechanisms through which this influence occurs. Section 3 details the empirical studies in the area and Section 4 offers some concluding remarks.
2. The impact of an ageing population on economic growth: main mechanisms

2.1. An overview of the interaction between ageing and growth

The inequality in age structure leads to demographic transition and can have a positive effect on growth if the proportion of the active working age group is higher than the non-working group (Lee et al., 2011). However, as the European Commission (EC) (2006) highlights, a contrary situation is being delineated, featuring a relatively higher proportion of the non-working group, especially retirees, in many developed countries. This phenomenon means that most industrial countries are classified as ageing population countries (Weil, 2006). According to Bloom et al. (2010), the current global life expectancy is 65 years and this is projected to increase to 75 years by 2050. For example, the life expectancy of Japan has been the highest in the world since 2000 (Weil, 2006; Lee et al., 2011). Moreover, since the growth of current working group is higher than the future population growth, the future working population group will be smaller than the retirees, and this is one of the causes of the ageing population in Japan.

Most of the literature argues that there is a negative relationship between population ageing and economic growth (Narciso, 2010; Bloom et al., 2010; Lisenkova et al., 2012; Walder and Döring, 2012). Even so, some authors, such as Prettnner (2012) and Lee et al. (2011), claim the existence of a positive effect. According to Prettnner (2012), older individuals tend to save more and so there tend to be more resources available for investment, impacting positively on growth. A longer life span will further enable investment in Research and Development (R&D). Therefore, the rise in longevity will increase savings and the savings time span, which will positively influence investment, particularly in R&D, which is consensually recognized as the engine of economic growth (Aghion and Howitt, 1992).

As Figure 2 highlights, the increase in the ageing population via medical advances and the less altruistic behaviour of couples affects economic growth mainly through three mechanisms: consumption and saving patterns, public social expenditure, and human capital (Bakshi and Chen, 1994; Tosun, 2003; Alders and Broer, 2004; Elmeskov, 2004; Lee et al., 2007).
The next section looks at these mechanisms in more detail. It is important though to acknowledge the existence of a reverse causality between these two phenomena - in other words economic growth may also influence the determinants of an ageing population.¹

![Figure 2: Main mechanisms through which an ageing population impacts on economic growth](source)

2.2. Consumption and saving patterns

Some authors (e.g., Hock and Weil 2012; Walder and Döring, 2012) contend that the increase in the ageing population will lead to a fall in consumption, which ultimately deprives growth. The argument runs as follows: an increase in the elderly population tends to reduce the *per capita* income of the three generations, child, working group and retiree, and this will mean a net decrease in the total consumption of the family (Lee *et al*., 2007).

To Hock and Weil (2012) consumption patterns are affected by ageing through disposable income. Indeed, the increase in the old age dependency ratio will reduce the disposable income. A few studies on the causes of an ageing population (e.g. Bloom and Williamson, 1998; Hodgson, 1988; Alders and Broer, 2004; Elgin and Tumen, 2010; Dalggaard *et al*., 2012). Alders and Broer (2004) and Elgin and Tumen (2010) argue that a country’s economic growth negatively affects its population growth and its fertility rate. Specifically, Alders and Broer (2004) show that the fertility rate tends to decline when there is a positive productivity shock - this shock increases the cost of having children and creates a substitution effect between children and the consumption of goods. Moreover, increasing returns on human capital will increase investment and raise labour force participation, inducing a decline in fertility rates since couples now choose to allocate their time resource between child bearing, investment in human capital and work; this means fewer children. The international financial and economic crisis also has an important impact on demographic variables. The significant increase in unemployment rates and the income reduction observed during the crisis is contributing to a reduction in the fertility rate, especially for developed countries, since families have a greater role in supporting children than the elderly (Weil, 2006; Sobotka *et al*., 2010).

¹ Given that this paper focuses on the impact of ageing on growth, the important issue of reverse causality will not be developed. A few studies on the causes of an ageing population (e.g. Bloom and Williamson, 1998; Hodgson, 1988; Alders and Broer, 2004; Elgin and Tumen, 2010; Dalggaard *et al*., 2012). Alders and Broer (2004) and Elgin and Tumen (2010) argue that a country’s economic growth negatively affects its population growth and its fertility rate. Specifically, Alders and Broer (2004) show that the fertility rate tends to decline when there is a positive productivity shock - this shock increases the cost of having children and creates a substitution effect between children and the consumption of goods. Moreover, increasing returns on human capital will increase investment and raise labour force participation, inducing a decline in fertility rates since couples now choose to allocate their time resource between child bearing, investment in human capital and work; this means fewer children. The international financial and economic crisis also has an important impact on demographic variables. The significant increase in unemployment rates and the income reduction observed during the crisis is contributing to a reduction in the fertility rate, especially for developed countries, since families have a greater role in supporting children than the elderly (Weil, 2006; Sobotka *et al*., 2010).
income of the working population, resulting in a decrease in the fertility rate and further reinforcing population ageing.

Private consumption has a considerable influence on demand (Walder and Döring, 2012). Therefore, the demand for goods and services is crucial for defining both the production structure and the labour market, which are directly influenced by the age composition of a country’s population.

The saving rate decreases for retirees as saving becomes the source of their spending (Davies and Robert III, 2006). Hence, the ageing population will increase the dependency ratio in a family. An increase in the child dependency in a family will lead to a significant decline in the per capita income of the child generation alone (Lee et al., 2007). Moreover, an increase in the old age dependency will lead to a significant decline in both child and worker generations (Lee et al., 2007). This means that, as already noted, the increase in the ageing population will decrease the overall consumption of the family.

Focusing on changes of the composition of aggregate basket of consumption derived from ageing, Mèrette and Georges (2009) claim that ageing population will prompt changes in consumption patterns such as a higher demand for health services and a lower demand for housing. Such changes in the demand for goods and services will definitely influence the economic growth of a country.

2.3. Public social expenditure

Taxation is relied on as the major source of income for a government agency. Rise in the ageing population will affect government revenue from taxes and increase government spending, especially on health care, the pension system and other old age related benefits (Tosun, 2003; Elmeskov, 2004).

On the one hand, taxes directly provoke an increasing deficit in the government budget. In fact, strategies whereby government agencies raise taxes to accommodate pension and medical expenses affect the disposable income of the working group, which tends to result in a decline in the fertility rate (Hock and Weil, 2012). Consequently, this type of response will further enhance the ageing problem. For instance, the ageing population in New Zealand means that social expenditure as a percentage of gross domestic product (GDP) is predicted to increase from 22.7% in 2001 to 31.0% in 2051 (Creedy and Scobie, 2002). As such, population ageing tends to cause significant changes in government budget allocation. According to Eiras and Niepelt (2012) and Lisenkova et al. (2012), population ageing will
increase government spending on social security against the allocation for education and infrastructure investment, which ultimately impact (negatively) on economic growth.

2.4. Human capital

According to some authors, such as Bloom et al. (2010), the increase in the retirement age and immigration will in fact help to overcome the decrease in the labour force. Other authors claim that countries can sustain economic growth despite the ageing population problem. For instance, Elgin and Tumen (2010) states that faced with a decline in human capital, the economy will switch from traditional production (that uses young workers) to new human capital oriented production (that uses old age workers). Therefore, in this line of argumentation, an ageing population will affect neither the production nor the growth dynamics. Furthermore, Elgin and Tumen (2012) also argue that modern economies rely more on machines than labour force. Therefore, a fall in the labour force will have no effect on productivity. According to the authors, labour can be replaced by machines. They believe that this means that a decrease in the young working group has no effect on economic growth.

Lisenkova et al. (2012) have a contrasting view of this phenomenon, though. They find that even though increasing the retirement age will help to overcome a decreasing labour market, workers of different ages are not perfect substitutes and so there will definitely be a decline in productivity per worker. Other authors also stress the negative impact of population ageing and the associated decrease in a country’s stock of human capital (Narciso, 2010), with a subsequent negative influence on economic growth. Accordingly, an ageing population will decrease the labour force, which will then affect economic growth due to lower productivity levels. Even though the higher participation of women in the labour force increases labour productivity, this participation will further lower the fertility rates, which will eventually lead back to the initial problem (Alders and Broer, 2004).

There is also the argument that, apart from the increase in the retirement age, higher immigration is unable to help much with overcoming public spending due to this ageing problem, as immigrants will also have rights under the pension and health care system (Elmeskov, 2004). Despite the negative effect on human capital accumulation identified by Lindh (2004), Ludwig et al. (2011) and other authors argue that, for the US economy, increasing human capital investment will reduce the impact of an ageing population. The endogenous human capital through formal schooling and on-the-job training programmes will positively influence human capital technology (Ludwig et al. 2011). Hence in the case of the US, Ludwig et al. (2011) report that when we allow for endogenous human capital
accumulation the welfare losses in terms of lifetime consumption increase only about 8.7%, whereas when human capital is assumed as exogenous, these losses rise to 12.5% (assuming that replacement rates to the pension system are constant).

3. Surveying the empirical studies assessing the impact of ageing on economic growth

Although high quality empirical research on the impact of an ageing population on countries’ economic growth does exist, (this latter often proxied by GDP growth rates) this literature is still relatively scarce. Table 1 summarizes some of the most relevant studies in this area, highlighting the main mechanisms through which ageing impacts on growth: consumption and saving patterns, public social expenditure and human capital. Attention is paid to assessing the possible distinct impact of ageing on economic growth depending on the mechanism focused on, econometric estimation techniques used and countries analysed.

3.1. The effect of an ageing population through consumption and saving patterns

Few empirical studies have addressed the impact of ageing on growth through consumption and saving patterns. The two studies summarised in Table 1 focused on the influence of an ageing population on the economic performance of China and Taiwan. Even though Taiwan and China had a common history in the past, the empirical analysis undertaken on these two countries shows contrasting results. Li et al. (2012) showed that there is an increase in savings and investment in China by an ageing population and this is expected to boost the economic growth of the country. Whereas, in the case of Taiwan, Lee et al. (2007) found that the increase in the ageing population will negatively affect the income per capita of families.

Analysing the impact of the old age dependency ratio on Chinese savings and investment (controlled for other variables such as the working age population and population growth rate), for the period 1985 to 2005, Li et al. (2012) demonstrate that ageing has a positive effect on both savings and investment. The authors note that China’s imperfect social security system (policies including family planning, child bearing, pension and marriage) is the reason for the increase in savings among older people. The government’s one-child policy system and Pay-As-You-Go (PAYG) pension plan make the current working group start saving for their future expenses.

The statement that economic growth increases with the old age dependency ratio is further borne out by estimation results. However, the authors failed to show a significant relationship between the working age population and savings or investment rates. Finally, their results show a negative impact of the population growth rate on either the savings rate or investment
rate. The authors stress that the increase in the number of children in China will result in additional consumption needs and this will reduce people’s savings and investment capacity. On the other hand, Lee et al. (2007) state that when a country faces demographic burdens due to having a smaller working group and larger non-working group, the dependency ratio will increase and this will reduce families’ per capita income. They analysed the impact of old age dependency ratio on the per capita income of family members (child generations, worker generations and old-age generations). In fact, when using the population dependency method to compute the dependency ratio for Taiwan, Lee et al. (2007) introduced a new method called ‘the family dependency ratio’. Using this, the authors computed the dependency ratio as the number of pensioners per family to the number of workers per family. The main reasons for using the family dependency ratio instead of the population dependency ratio were: i) the population dependency ratio is less accurate in capturing the impact of the relative number of working family members over the lifecycles of families; ii) the family dependency structure is different among cohorts, whereas the population dependency structure has the same cohorts. The model assumes that no saving or per capita consumption of each generation is determined by an altruistic family utility function (Lee et al., 2007). Thus, the consumption of each dependent generation is equal to that generation's labour income plus net family transfers. The estimated results for the period 1951 – 2101 show that an increase in the old-age dependency ratio will significantly reduce the per capita income of all three generations (children, workers and elderly). The possible reason for the contrasting results is that the two authors (Lee et al., 2007; Li et al., 2012) analysed the influence of ageing based on different mechanisms: savings and income per capita and the variables were measured by Li et al. (2012) through the total amount of savings and investment, whereas Lee et al. (2007) measured the variables in per capita terms. If the authors had used the same method to measure the variables they would have obtained similar results.

3.2. The effect of ageing on economic growth through public social expenditure

Ageing populations do affect public social expenditure in many ways. Empirical analysis has been carried out to identify the influence of ageing populations through foreign direct investment (FDI) (Davies and Robert III, 2006; Narciso, 2010), foreign portfolio investment (FPI) (Narciso, 2010) and GDP per worker growth rate (Lindh et al. 2009).

Davies and Robert III (2006) and Narciso (2010) analysed the influence of an ageing population on a country’s FDI and FPI (Davies and Robert III, 2006; Narciso, 2010). Overall,
Davies and Robert III, (2006) and Narciso (2010) show a significant negative correlation between the old dependency ratio and FDI for the countries studied.

Davies and Robert III (2006) use the OLS method to test the determinants of US inbound and outbound FDI for 55 countries for the period 1983-1998, whereas Narciso (2010) tested the relation between both old-age dependency ratio and youth-age dependency ratio and FDI and FPI in 8 home OECD countries, for the period 2001-2007. As is usual in the literature, Davies and Robert III (2006) compute the dependency of the home country and host country by dividing the old-age individuals and the population of young individuals. According to Davies and Robert III (2006), FDI is negatively correlated with both the home-country dependency ratio and the host-country dependency ratio. This means that an increase in the old-age dependency ratio of either the home or host country will significantly reduce US FDI in general. However, when the authors test this relationship separately for poor countries and rich countries, different results emerge. Even though changes in the dependency ratio of rich host countries still have a negative correlation with US FDI (outbound), the related changes of rich home countries have no significant impact on inbound flows (Davies and Robert III 2006). For the estimation of poor countries alone, changes in the home countries’ dependency ratio have a negative correlation with US FDI (inbound) and no significant estimated impact on US FDI (outbound) exists relative to the changes in host countries. Narciso (2010) tests two relationships: between old age dependency ratio and FDI, and between old age dependency ratio and FPI, with a negative correlation emerging for both. Moreover, for the youth dependency ratio, there is a positive correlation with FDI and FPI. Hence, both Davies and Robert III (2006) and Narciso (2010) provide generally similar results. The impacts of FDI and FPI due to an ageing population will consecutively affect the GDP growth of the countries.
<table>
<thead>
<tr>
<th>Author</th>
<th>Method</th>
<th>Dependent (in case of econometric model)</th>
<th>Exogenous (in case of econometric model)</th>
<th>Sample</th>
<th>Time Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lai et al. (2009)</td>
<td>Negative</td>
<td>Growth rate of real GDP per worker</td>
<td>Age 65 and above</td>
<td>China</td>
<td>1988 - 2005</td>
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<tr>
<td>Ni et al. (2010)</td>
<td>Negative</td>
<td>Growth rate of real GDP per worker</td>
<td>Age 65 and above</td>
<td>EU-14 (except Luxembourg)</td>
<td>1990 - 2004</td>
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<tr>
<td>Liu et al. (2009)</td>
<td>Negative</td>
<td>Growth rate of real GDP per worker</td>
<td>Age 65 and above</td>
<td>EU-15 (except Luxembourg)</td>
<td>1990 - 2004</td>
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<tr>
<td>Peters et al. (2007)</td>
<td>Negative</td>
<td>Growth rate of real GDP per worker</td>
<td>Age 65 and above</td>
<td>Taiwan</td>
<td>1940 - 2001</td>
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</table>

Table 1: Studies on the impact of an ageing population on economic performance.
<table>
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<tbody>
<tr>
<td></td>
<td>dummy variables for age [20,25) (-) , [25,30) (0), [30,35) (+), [40 45) (0), [45,50) (0 ),[50,55) (-),[55,60)(-);women (-); Germans (0); Apprenticeships (+); unskilled (-); high skilled ( 0); white-collar (+); part time (0); good equipment (+); Age-dispersion (0); Export (+); number of workers (+); East Germany (-);dummy variables for cohort [1900,1930) (0), [1930,1940) (0), [1940,1950) (+), [1960,1970) (0), [1970,1980) (-), [1980,1900) (-); dummy variables for tenure [10,20) (0), [20,30) (0), [30,40)(0), [40, 50) (0).</td>
</tr>
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<td>(6)</td>
<td>The inverse of the convergence term (0); Population share of age group (15-29) (0); Population share of age group (30 – 49) (0); Population share of age group (50 – 64) (+); Population share of age group (65 and above) (-); average log capital (+);dummy variables for age [20,25) (-) , [25,30) (0), [30,35) (0), [40 45) (0), [45,50) (0 ),[50,55) (-),[55,60)(-);women (-); Germans (0); Apprenticeships (+); unskilled (-); high skilled ( 0); white-collar (+); part time (0); good equipment (+); Age-dispersion (0); Export (+); number of workers (+); East Germany (-);dummy variables for cohort [1900,1930) (0), [1930,1940) (0), [1940,1950) (+), [1960,1970) (0), [1970,1980) (-), [1980,1900) (-); dummy variables for tenure [10,20)  (0),  [20,30) (0), [30,40)(0),  [40, 50) (0).</td>
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<td>(15)</td>
<td>log capital (+);dummy variables for age [20,25) (0) , [25,30) (0), [30,35) (0), [40 45) (0), [45,50) (0 ),[50,55) (-),[55,60)(-);women (-); Germans (0); Apprenticeships (+); unskilled (-); high skilled ( 0); white-collar (+); part time (0); good equipment (+); Age-dispersion (0); Export (+); number of workers (+); East Germany (-);dummy variables for cohort [1900,1930) (0), [1930,1940) (0), [1940,1950) (+), [1960,1970) (0), [1970,1980) (-), [1980,1900) (-); dummy variables for tenure [10,20)  (0),  [20,30) (0), [30,40)(0),  [40, 50) (0).</td>
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<td>(16)</td>
<td>log capital (+);dummy variables for age [20,25) (0) , [25,30) (0), [30,35) (0), [40 45) (0), [45,50) (0 ),[50,55) (-),[55,60)(-);women (-); Germans (0); Apprenticeships (+); unskilled (-); high skilled ( 0); white-collar (+); part time (0); good equipment (+); Age-dispersion (0); Export (+); number of workers (+); East Germany (-);dummy variables for cohort [1900,1930) (0), [1930,1940) (0), [1940,1950) (+), [1960,1970) (0), [1970,1980) (-), [1980,1900) (-); dummy variables for tenure [10,20)  (0),  [20,30) (0), [30,40)(0),  [40, 50) (0).</td>
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</table>
Lindh et al. (2009) studied the trend between OECD and EU countries. The authors analyse the influence of an ageing population on real GDP per worker growth rate in the OECD and EU 15 countries (except Luxembourg). In order to minimize the endogeneity issues, instead of GDP per capita, the authors considered GDP per worker has a dependent variable. They conclude that for these countries changes in the population for the age 65 and above have a significant negative impact on real GDP per worker growth rate. According to the authors, when there is an escalation in the old age group (age 65 and above), the growth rate of GDP per worker will decline. Therefore, the result confirmed that the demographic transition does affect GDP growth.

3.3. The effect of an ageing population on human capital

If workers of different ages are not perfect substitutes, the productivity level of the particular worker will be lower with an ageing population, considering their physical ability to actively participate in the labour market (Lisenkova et al. 2012). Even though both Göbel and Zwick (2012) and Lisenkova et al. (2012) agree that, in general, the impact of an ageing population on labour productivity is negative, Göbel and Zwick (2012), based on an empirical study, state that the level of this effect will differ according to the sectors analysed.

Göbel and Zwick (2012) looked at the differences in the age productivity profiles between the metal manufacturing sector and the service sector in Germany, for the period 1997–2005. Using the generalised method of moments (GMM) as an estimation tool, the authors obtained results showing that for the labour age group at the age 55–60 there is no significant effect on productivity in the metal manufacturing and service sectors. Hence, the study concludes that an increase in the old-age group in Germany has no effect on the productivity in the two analysed sectors. However, Lisenkova et al. (2012) explain that, in general, regardless of the sector in focus, the age-specific effect will influence productivity in Scotland.

Lisenkova et al. (2012), setting out to see if the age specific features significantly influence output productivity in Scotland, predict its output level for the period 2006 – 2106, based on a simulation exercise. The results show that when age-specific features are not taken into account changes in the output level are lower, whereas when age-specific effects are considered, these changes will be higher. According to the authors, since the physical strength of human beings declines as they get older so increasing the retirement age and having more old-age labour will definitely negatively affect output productivity.
4. Some final remarks on the relation between ageing and economic growth

The demographic dividend through industrialization has improved the economic growth of developed countries (Bloom and Williamson, 1998). Although government policy on fertility control has benefited developed countries, the demographic dividend achievement did not last forever. The unbalanced population structure has led to many developed countries being christened ‘ageing countries’ (Bloom and Williamson, 1998). An ageing population and economic growth are related, as extensively discussed above. The current ageing problem faced by many developed countries is occurring, however, without any past history. Hence, these ageing impacts might be considered a new experience for the world.

Our review of the literature has led us to conclude that an ageing population has affected economic growth through three main mechanisms: consumption and saving patterns, public expenditure, and human capital. This literature review shows that the impact of ageing on countries’ performance is intimately related to the mechanism chosen. Indeed, about 70% of the empirical studies that focused on ‘public social expenditure’ convey a negative impact of ageing on economic performance, whereas the majority (60%) of empirical studies that focus on human capital do not find any significant statistical relation between ageing and the economic growth proxy, and the positive impact is much more related to the ‘consumption and saving patterns’ mechanism (cf. Figure 2). In short, the mechanism seems to have a non-trivial impact on the estimated relation between ageing and economic growth.

Figure 3: Estimated impact of ageing on economic growth by main mechanism

*Note:* The analysis was based on 26 econometric estimations reported in the studies surveyed and listed in Table 1.

*Source:* Authors’ computations.
Estimation methodologies also seem to be associated with distinct impacts of ageing on economic growth. Indeed, as Figure 4 shows, less sophisticated econometric methods (i.e., OLS and panel) are most often associated with negative (cor)relations, whereas overlapping generation methods and the generalized method of moments (GMM) are more likely to generate positive or no significant effects.

![Figure 4: Estimated impact of ageing on economic growth by main methodologies of analysis](image)

Note: The analysis was based on 26 econometric estimations reported in the studies surveyed and listed in Table 1.

Source: Authors’ computations.

The evidence gathered helps little in assessing to what extent the impact of ageing on growth varies according to the mechanisms and countries analysed. The bulk of the empirical evidence concerns developed countries and the ‘public social expenditure’ mechanism, with most of the analysis indicating a negative and significant relation between ageing and growth.

It is important, however, to acknowledge that developed, developing and even the least developed countries are affected by the ageing population phenomenon. As Börsch et al. (2002) state, ageing population patterns are similar in most countries; the only observable difference concerns the timing of the situation. Furthermore, an ageing population’s influence on economic growth has been labelled as ‘remarkable’, especially during the current financial and economic crisis (Lee et al., 2011). Several economic studies (e.g. Creedy and Scobie, 2002; Alders and Broer, 2004; Weil, 2006; Sobotka et al., 2010) not only confirm the existence of ageing populations all over the world, but also document and analyse the mechanisms that influence economic growth, as well as proposing possible remedies to solve the problem.
The movement both developed and developing countries are going through, featuring a convergence to the era of ageing populations, has its own consequences for economic growth dynamics through the distinct mechanisms detailed above: consumption and saving patterns (Fougère et al., 2009; Li et al., 2012; Walder and Döring, 2012), human capital (Elgin and Tumen, 2010; Sharpe, 2011; Göbel and Zwick., 2012), and public social spending (Creedy and Scobie, 2002; Tosun, 2003; Elmeskov, 2004; Hock and Weil, 2012).

Realizing the seriousness of the issues raised by ageing populations, policy makers are desperate to find ways to tackle the issues. Policy implications such as the ‘Blue card’ system introduced by European countries to encourage foreign immigration to overcome labour shortages, increasing the retirement age to lower government expenditure, increasing the working group’s income tax and social planning whereby couples are encouraged to have more children are considered the major ones. However, for some reason, general policy plans are not yet regarded as an effective way to solve the problem. Knowing the degree to which the influence of ageing varies from country to country, and through which mechanisms, is essential to specifying adequate policies.

References


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