Institute for Research in Economic and Fiscal issues

IREF Working Paper Series

Aging populations and the size of government

Ryan H. Murphy
Meg Tuszynski

IREF Working Paper No. 201802

April 2018

Institute for Research in Economic and Fiscal issues

Aging Populations and the Size of Government[1]

Ryan H. Murphy[2]
Southern Methodist University
Fellow, Institut de Recherches Économiques et Fiscales

Meg Tuszynski[3]
Southern Methodist University
Fellow, Institut de Recherches Économiques et Fiscales

ABSTRACT:
Aging populations continue to put strain on government finances, as such demographic shifts cause fewer tax dollars and more citizens on pension programs. What effect does this have on the size of government across countries worldwide? We study this using the *Economic Freedom of the World* (EFW) index published by the Fraser Institute. One fifth of the index is comprised of measures of the size of government. We investigate whether the share of the population over 65 has a negative impact on this measure of the size of government, as well as whether it has a negative impact on the narrower measure of subsidies and transfers published in EFW. Doing so allows us to understand the effects of demographic variables on the size of government as an *economic institution*, as opposed to particular spending flows, which has been studied in literature elsewhere. Using standard panel methods we find support for this hypothesis. These results are supported by the use of the aged dependency ratio as a robustness check.

Keywords: Economic Freedom; Size of Government; Public Finance; Demographics; Demographic Burden

JEL Codes: H50; H55; J11

[1] The authors would like to thank the Institut de Recherches Économiques et Fiscales for their generous support for this project.
[2] Corresponding Author and Research Assistant Professor, O'Neil Center for Global Markets and Freedom, SMU Cox School of Business.
[3] Assistant Director and Research Assistant Professor, O'Neil Center for Global Markets and Freedom, SMU Cox School of Business.

I. Introduction

Since the Industrial Revolution, more people have been living longer lives, thanks to the benefits of modernity. Though high-income countries tend to have a larger percentage of their population that is over the age of 65, middle- and low-income countries have nonetheless seen a marked upward trajectory in longevity, as Figure 1 shows. Simultaneously, individuals in high income countries have seen birth rates fall, not due to infant mortality, but rather a conscious choice among individuals to have fewer children (but invest more in the children they do have), pushing the age of the average citizen upward. This naturally has led scholars to question what the effects of this demographic shift will be. In this paper, we examine the impact that a larger percentage of the population in the 65+ age group has on both the size of government, and on the magnitude of transfers and subsides as a percentage of GDP. We find that countries with larger elderly populations tend to have larger governments, driven mostly by larger transfers and subsidies as a share of GDP.[4] We also find that countries with larger aged populations have larger levels of government consumption as a percentage of total consumption.

Theoretically, the impact of aging populations on the overall size of government is ambiguous. Certainly, aging populations will impose larger expenses on existing government-financed old-age and medical programs, which will result in a larger size of government, all else being equal. Because there are fewer workers supporting each elderly person, some have termed this phenomenon the "demographic burden" of aging populations (Matytsin et al. 2015; Van Der Gaag and de Beer 2015). Additionally, as the distribution of the population skews older, the median voter likewise becomes older. This, too, may militate towards a larger size of government, since the elderly tend to prefer higher levels of spending on pensions and healthcare (Mello et al. 2017). However, there is cross-country evidence suggesting that older people prefer lower levels of spending on education, which makes the relationship between aging and overall government size ambiguous (Sørensen 2013). Still, some have found that the elderly favor spending on *both* the programs which directly benefit them, pensions and healthcare, as well as those

[4] Here, we use the term "elderly" to mean populations consisting of individuals who are over the age of 65.

programs whose mechanism is indirect, such as education and defense (Sanz and Velazquez 2007). If this is the case, we would expect the overall size of government to rise as the percentage of elderly in the population rises. Yet as taxes rise to support these additional government expenditures, those who are responsible for paying the bulk of these taxes may become less supportive of a large government, possibly creating a countervailing force (Razin et al. 2002). Even though most empirical studies have found a positive relationship between aging populations and the size of government, Boldrin and Rustichini (2000) have created a model showing that expenditures will fall in the future as young people become less supportive of a large welfare state.[5] Alternatively, political inertia and path dependency might make the size of the state grow somewhat mechanically, since politicians who provide benefits tend to be more popular than those who scale back. Theoretically, whatever mechanisms hold true to whatever extent, the overall effect is ambiguous and in need of empirical testing.

This paper is a contribution to the literature on the determinants of government size generally, and the particular literature on the relationship between population aging and government size.[6] Much of this literature uses spending and other commonly-available metrics to approximate the size of government across countries. However, little of the literature, with the exception of Shelton (2007), takes a holistic view of the determinants of government size and growth. Numerous theoretical mechanisms, some of which we will review, may allow aging populations to impact the size of government in multiple, contradictory directions. From the narrow standpoint of the deadweight loss associated with the need for higher marginal tax rates in order to pay for larger public sectors, an increase in pensions, public health care, and other associated costs may be economically unimportant if population aging also leads to decreases in spending elsewhere.

While we acknowledge Shelton (2007) as a predecessor, we are the first to focus our efforts on examining this relationship using a comprehensive institutional measure, the "size of government"

[5] See also Elmendorf and Sheiner (2016)
[6] Galasso and Profeta (2014) present a recent overview of the literature on the relationship between population aging and the size of the welfare state, specifically.

component of the *Economic Freedom of the World* index (see Gwartney et al. 2016), to interpret the effect of population aging in terms of its effect of the size of government as an economic institution. We also focus on the narrower "transfers and subsidies" subcomponent, since the effect of population on this subcomponent is most direct. Ultimately, we will also consider the three other subcomponents that make up the size of government metric. The existent literature largely considers the effect of population aging on particular spending flows. While we do investigate the mechanisms which underlie our primary results, the effect on particular spending flows, like the effect on the size of the welfare state, is not our research question.

The major benefit of our measure of size of government is that it captures multiple dimensions of government size. Whereas those who use spending measures as their proxy for the size of government are able to see the impact of elderly populations on this single measure, we are able to more comprehensively understand the impact of aging populations on governments around the world. As such, we also contribute to the growing literature on the causes and origins of economic freedom, insofar as the size of government is interpreted as a key component of economic freedom. Heinemann (2004), for example, uses elderly populations as an independent variable in his analysis of what causes economic freedom to change over time. He finds that the elderly have a negative and statistically significant impact on the total value of economic freedom; while the point estimate on the size of government subcomponent is negative, he does not find it to be statistically significant. His paper, however, is not primarily interested in understanding the impact of age on the various aspects of economic freedom. Our empirical design allows us to better understand the threat that elderly populations pose to this particular aspect of global economic freedom. In doing so, it also underscores the necessity for reform in those areas which are dramatically affected by aging populations.

We explore the data using standard panel methodology. In addition to employing the usual year and country fixed effects, we also include controls for education, levels of economic output, and democratic political institutions. We also challenge our baseline results by placing the level of our size of

government variables on the right-hand side, and using a ten year forward difference of the variable as the left hand side variable. These steps form the basis for our claim of imperfect but plausible identification. Upon the application of our methodology, our findings suggest that most countries in the OECD will find their size of government index scores around 0.25-0.50 standard deviations worse than they would have been by 2050 due to the effects of aging populations. This quantitative assessment can be interpreted as the summary result of the paper. We also operationalize our hypothesis using the dependency ratio in place of the percentage of the population 65 years or older and find similar results.

In the next section, we provide an overview of the literature in which this contribution is situated. Because it is a large literature, we can at best give a thematic overview of key papers. In Section III, we provide a description of the data and methods. Section IV contains our results, and Section V draws implications and concludes.

II. Literature Review/Theoretical Background

On a general level, this paper contributes to the large literature that seeks to explain what causes the size of government to vary across countries (see Shelton 2007 for a recent review of this literature). Many explanations have been offered, encompassing both supply- and demand-side explanations. Supply-side explanations look at the process of policy formation, and explain variations in the size of government in terms of different types of political organization. Demand-driven explanations rely on variables thought to shift the demand for government services, and include a variety of demographic variables. Popular demand-side explanations of government size include the openness of an economic system (Cameron 1978, Rodrik 1998), country size (Alesina and Wacziarg 1998), ethnic fragmentation (Easterly and Levine 1997; Alesina, Glaser, and Sacerdote 2001), income (Henrekson 1993, Easterly and Rebelo 1993, Stein, Talvi, and Grisanti 1998), and income and/or wealth distribution (Meltzer and Richard 1981, Krusell and Rios-Rull 1999). Popular supply-side explanations include the distribution of political rights

(Lijphart 1997, Lott, and Kenny 1999), type of government (Mulligan, Gil, and Sala-i-Martin 2002), decentralization of authority (Buchanan and Wagner 1977), and institutional and/or legislative structure of government (Milesi-Ferretti, Peroti, and Rostagno 2002; Persson, Roland, and Tabellini 1998; Persson and Tabellini 1999).

Our paper falls clearly into the demand-side camp. More specifically, it falls under the broad umbrella of papers which use age demographics to explain variations in the size of government. Within these papers, there is some variation in the way the size of government is measured. Some use the share of earned income that is redistributed (Meltzer and Richard 1981, Alesina et al. 2003), some prefer various tax-related measures (Razin et al. 2002), others prefer government consumption spending (Rodrik 1998, Alesina and Wacziarg 1998), and still others prefer to employ multiple measures of government size (Tridmas and Winer 2005). Many have examined the relationship between varying demographics and particular categories of expenditure – with pensions, healthcare, education, and defense representing the preferred categories to examine (Sanz and Velázquez 2007). We prefer to use a more comprehensive measure of the size of government: Area 1 of the *Economic Freedom of the World* index. This includes the consumption and transfer spending variables popular in previous literature, and adds information on government investment and top marginal tax rate. (The index will be discussed at greater length in the following section.) This allows us to examine the relationship between aging and the size of government in a more comprehensive way than has been done in the past. It also allows us to understand the relationship between aging populations and *government as an institution,* rather than the simple relationship between aging populations and some type of spending flows. The empirical literature also employs a few different measures of aging populations. Among the more popular are the aged dependency ratio, which is a measure of the elderly population expressed as a percent of the working-age population (Disney 2007; Shelton 2008), and the percent of the population made up by individuals in the 65+ age category (Poterba 1996). In order to ensure our results are robust to different ways of measurement, we employ both measures.

The specific literature on the relationship between aging populations and the size of government can be divided up in a few different ways. Probably the most parsimonious division is to separate these studies by whether they look at the relationship between aging populations and *attitudes* toward various government programs, or at aging populations and *actual measures* of the size of government. We will discuss the former first, then turn to the latter. With respect to literature using attitudes towards government, many authors rely on survey data detailing support for government programs and/or spending among various demographic groups. Busemeyer et al. (2009), for example, look across 14 OECD countries, and find that age is a more important predictor of policy preferences than income, particularly with respect to education spending. Mello et al. (2017) build on Busemeyer et al., and find that not only do older people prefer spending on pensions and healthcare to spending on education, but also that they vote more, so their preferences are more fully expressed through the political process. There is evidence to suggest that elderly voters tend to focus their political interests on a few key issues – mainly pensions and healthcare (Mulligan and Sala-i-Martin 2003) – so the result of Mello et al. is unsurprising in this regard. Mulligan and Sala-i-Martin further find that "the elderly are much more elastic to a candidate's stance on old age subsidies than are the votes of any other group to any other issue" (1999: 12), suggesting once again that the preferences of the elderly are more fully reflected in actual policy decisions than those of younger generations.

There is also evidence that *both* the young and the elderly support spending on policies to benefit the elderly. Since the young expect to be old one day, they are supportive of spending on healthcare and pensions; yet since the elderly cannot become young again, they gain little by supporting things like education (Svallfors 2008). Because the median age in nearly all populations is rising, there is some concern that this shift will result in a "greying welfare state" or a "greying budget", where the government addresses the needs of the elderly at the expense of younger generations (Gorres 2008, 2009). Theoretically, the aging of the population will create an income effect militating toward lower spending on education as a category; however, it will also have a price effect, which will favor higher spending per

pupil. Fletcher and Kenny (2008) empirically tested the relative magnitude of these effects, and found that an increasing share of the elderly in the population has at worst a very small negative impact on education spending. Sørensen (2013) examines 22 countries using repeated cross sections, taking period and cohort effects into account. He finds robust evidence that the elderly prefer less education spending and more spending on pensions and healthcare. Whether an increasing elderly population harms education spending is still an open question. However, some argue that elderly populations might prefer higher spending across the board, not just higher spending on those programs which benefit them most. Spending programs geared toward younger populations might create positive externalities that benefit the elderly as well; for example, educated children may be less likely to commit crimes, and higher school spending may lead to more attractive neighborhoods, which the will be capitalized into the value of elderly persons' homes (Poterba 1998; Brunner and Balsdon 2004). Our comprehensive measure of government size, along with our specifications that break this measure into its component parts, allows us to see more clearly than previous authors whether the elderly prefer spending on only those programs that directly benefit themselves, or whether they support a more expansive government more generally. Since the elderly have a shorter time horizon than younger people, supporting expensive programs is relatively less costly in net present value terms than it would be for the young, which we expect our measure to capture.

Among those who have looked at the relationship between aging populations and actual government size measures, most find that there is a positive relationship between aging and their preferred metric of government size. Razin et al. (2002) are a notable exception. They found that a higher dependency ratio paradoxically results in a less generous tax and transfer environment, since current workers are unwilling to support an ever-expanding welfare state. The paper was subsequently criticized on methodological grounds by Bryant (2003), Disney (2007), Simonovits (2007), and Shelton (2008), all of whom found a positive relationship between aging populations and government size. Using public investment as their metric representing the size of government, Jäger and Schmidt (2016) find that there is a robust negative relationship between the elderly and public investment. Sanz and Velázquez (2007)

found evidence to suggest that the elderly positively impact spending not only on pensions and healthcare, but also on education and defense. That is to say, more elderly people in a population means more spending in all of these areas. Tepe and Vanhuysse (2009) find that, while the overall magnitude of spending has been growing across countries as the populations in these countries age, the generosity of individual benefits has been falling. The authors suggest that concerns over "grey power" are overblown (Galasso and Profeta 2002).

Some literature has also focused on the relative magnitude of the economic and political effects of population aging on spending decisions. With respect to the former, as populations age, the projected long-run return from the government pension system falls, meaning per capita returns fall, and support for the system falls. However, an aging population also means that the political influence of elderly voters will rise. A self-interested elderly voter will be interested in protecting – or even expanding – pension and healthcare benefits. This is known as the political effect of population aging. Whether the economic or political effect will dominate is an empirical question, which has been explored extensively. Razin et al. (2002) were some of the first to explore this question. Using data for the U.S. and 12 Western European countries over the 1955-1992 time period, they found a negative correlation between the dependency ratio and two different measures of the size of government: the tax rate on labor income and the generosity of transfer payments. Thus, they concluded that the economic effect was likely to predominate in this case. Several subsequent authors challenged this finding on methodological grounds, and have used different sets of countries and time periods. In these studies, the expected positive relationship between aged dependency and size of government prevails, suggesting that the political effect is the dominant force at work (Bryant 2003, Disney 2007).

It is important to underscore how our paper differs from all the papers just mentioned. It is not merely the case that we are using a different metric to address the same question, but more importantly we are making inroads into understanding the extent to which the elderly prefer goods and services to be allocated through the political versus market processes. We are also able to better explain whether the

elderly are purely self-interested in their political preferences, or whether they favor government growth beyond simply those programs that benefit themselves directly. Our metric of government size is made up of four equally-weighted subcomponents: government consumption, transfers and subsidies, government enterprises and investment, and top marginal tax rate (and the threshold at which it applies). Not only do we run tests to determine the effect that aging populations have on the overall size of government, but we also run independent tests to see what affects aging populations have on each of these four areas. While it seems noncontroversial to expect that we will find a positive relationship between the transfers and subsidies subcomponent of our size of government variable, finding positive (or negative) relationships between aging populations and any of the other three subcomponents would expand our understanding of the mechanisms behind why aging populations have empirically tended to favor larger governments.

III. Data and Model

Our primary dependent variable is the Size of Government measure from the *Economic Freedom of the World* (EFW) report. The *Economic Freedom of the World* index measures the degree to which countries allow resources to be allocated via market processes, as opposed to government mandates, and maintain an institutional environment that protects persons and property. This index is made up of five areas: Size of Government, the Legal System and Property Rights, Sound Money, Freedom to Trade Internationally, and Regulation. The Size of Government component consists of five variables divided into four key areas, which measure the extent to which a country has a limited government: (1) government consumption, (2) transfers and subsidies, (3) government enterprises and investment, and (4) the top marginal tax rate, and the threshold at which it applies. For both the Size of Government component and the four subcomponents, countries are rated on a zero to ten scale, with smaller values representing more expansive governments and larger values representing more limited governments. That is to say, the closer a country is to a score of "10", the freer that country is in this area. The first component, government consumption, is measured as government consumption as a share of total

consumption, as reported by either the World Bank, the IMF, or the United Nations. If this figure is six percent or lower, a country receives a "10;" if the figure is 40 percent or higher, a country receives a "0." Values between the min and max are scaled linearly.

The next component, transfers and subsidies, is measured as transfers and subsidies as a share of GDP, with 0.5 percent now corresponding to "10" and 37.2 percent now corresponding to "0."[7] Data sources and methodology are otherwise the same. The third component, government enterprises and investment, is measured similarly but different troughs are used in place of the linear scale. Countries will score a "10" if enterprises and investment as a share of total investment is 15% or less and a "0" if it is 50% or more, with countries between these cutoffs scoring between 2 and 8. Finally, two measures of the top marginal tax rate and the level at which they apply (first the top income tax rate alone, then that rate plus the payroll tax rate) are combined into one to create the fourth component. This data originates from PricewaterhouseCoopers. For countries with all five pieces of data, the average is computed by assigning the three measures of spending a full weight, and each of the two measures of a taxation a half weight.

This overall measure of the size of government, as well as the narrower measure of transfers and subsidies, will be used to assess the hypothesis that there is a negative relationship between aged populations and the size of government as an institution. We also employ the other three subcomponents to help determine the mechanism behind the relationship between elderly populations and the size of government, and to examine whether the elderly tend to prefer larger governments for purely self-interested purposes, or if their preferences are more nuanced. *Economic Freedom of the World* data dates back to 1970 for some countries, in five year increments up to 2000, then in one year increments every year after. The index has grown from including only 54 countries in 1970, to more than 159 in the most recent version. We use the maximum number of available countries for any given year in constructing our unbalanced panel.

[7] Among the nations included in the EFW report, 0.5 is the smallest observed measure of transfers and subsidies as a share of GDP, and 37.2 is the largest observed measure.

Our primary variable of interest, the percent of the population 65 or older, is found in *World Development Indicators*. Typically, EFW, and not these independent variables, is our binding constraint on years and countries available. We include three frequently-used control variables while testing our hypothesis. The log of real GDP per capita is also found in *World Development Indicators*.[8] The *Polity IV* index (Marshall et al. 2016) is an alternative measure of institutional quality which focuses on political institutions and the quality of democracy, as opposed to the economic institutions on which EFW focuses. Finally, we control for education using the standard Barro-Lee (2013) data set's measure of average years of education of the population 25 years of age or older. Though we use only three control variables, the relatively high level of explanatory value of our models, particularly in the full specifications, is convincing evidence that these fit the data well. The inclusion of additional variables would be unlikely to substantially improve our models. Descriptive statistics of all variables is found in Table 1, while a correlation matrix is found in Table 2.

As an empirical strategy, we produce six sets of regressions. Each of the first five regressions contain four regressions apiece. In the first four sets, the first regression runs controls in a straightforward pooled OLS application. The second includes year fixed effects, the third employs country fixed effects, and the fourth employs both. The first two sets regress levels on levels, while the third and fourth sets employ differences (with both levels and differences as control variables on the RHS). The first and third regressions employ the overall measure of size of government, while the second and fourth focus on transfers and subsidies. The fifth set of regressions changes the percent of the population that is 65 or older to the Aged Dependency Ratio, a similar metric also from *World Development Indicators*, as a robustness check. This robustness check employs both types of fixed effects in all regressions, while scanning through specifications analogous to those found in the first four sets of regressions. The final set of regressions examine the impact of the 65+ population on the other three components of government size: government consumption, government investment, and the top marginal tax rate. This table includes

[8] We do not adjust for purchasing power parity due to our preference for using the same *World Development Indicators* variable across the period.

examinations of both levels and differences, and all specifications include both country and year fixed effects.

IV. Results and Discussion

Table 3 provides our first set of results, regressing levels on levels. In all four specifications, the point estimate of the coefficient on population 65 or older is negative. In Regression 4, it is statistically significant at the 5% level with a coefficient of -0.118. A one standard deviation increase in the variable corresponds to a decline in the size of government score (i.e., an increase in the size of government) by 0.41 standard deviations. In this specification, only the population variable maintains its statistical significance. In Table 4, the effects on the narrower measure of transfers and subsidies are, statistically speaking, even stronger. Our population 65 or older variable is negative and more clearly distinguished from zero in each of the specifications. In Regression 8, it is statistically significant at the 1% level. The point estimate is -0.181, which corresponds to a 0.43 decline in the transfers and subsidies score. Here, too, an increasing share of the elderly population is correlated with a larger size of government.

Tables 5 and 6 supplement our level measures with 10 year differences, which offer superior identification at the cost of a smaller sample and less statistical power. The *level* of the population 65 or older is negative across the four specifications in Table 5, which use overall size of government on the LHS. However, the point estimate on the *difference* of the population 65 or older across the ten year period alternates between positive and negative values, depending on the specification, and in no specification is it statistically significant. The borderline significant estimate of the level in Regression 12, which includes both year and country fixed effects, is -0.111, which corresponds to 0.38 standard deviations. In Table 6, in which we use transfers and subsidies instead of size of government as our dependent variable, the results are once again sharpened. The level is now statistically significant and negative across the four specifications, while the difference is negative across the four specifications and

borderline significant in the final two. The point estimate of the effect of the level in Regression 16 is almost identical to the point estimate in Regression 8, while the difference coefficient corresponds to another 0.39 standard deviations. However, this is matter of interpretation. In these regressions, the level may be interpreted narrowly as a control variable, with solely the difference speaking to how large the effect is.

We can place these estimates in a more concrete context. In particular, we can project the future size of government in each OECD economy by examining the impact of the differenced value of the 65+ population on the size of government. We will interpret the coefficient on the level of the 65+ population as a control variable,[9] focusing only on the difference. To do so we take the value[10] of the size of government score from 2010 and adjust using the difference coefficient and the cumulative difference from 2010 to *n* years in the future. This is written out in Equation 1.

Eq. 1:

$$\widehat{Size\ of\ Government}_{2010+t} = Size\ of\ Government_{2010} + \beta_{Diff}(\%Pop65+_{2010+t} - \%Pop65+_{2010})$$

Applying this model to future demographic data in the OECD, we project that the average size of government score for these countries will decline from 5.59 in 2010 to 5.45 in 2020, 5.28 in 2030, 5.14 in 2040, and 5.04 in 2050. A fall from 5.59 to 5.04 corresponds to a fall in 0.37 standard deviations, a non-negligible figure. Rapidly aging countries which expect to see the greatest declines within the OECD include South Korea (an expected decline from 6.54 to 5.68), Spain (5.99 to 5.15), Poland (5.38 to 4.57), Chile (7.67 to 6.93), Portugal (4.86 to 4.12), Slovakia (6.39 to 5.66), Greece (6.25 to 5.53), Slovenia (4.60 to 3.89), and the Czech Republic (4.83 to 4.16). That is to say, these countries will see expansions in their size of government scores over time, driven in large part by elderly support for larger transfers and

[9] If the coefficient of the level is included in this analysis, the estimate of the effect becomes implausibly large. It is also not uncommon in the literature to interpret the level as a control variable in a regression which also contains differenced values.

[10] The size of government score was adversely affected by the Great Recession. To ensure the numbers quoted here closely reflect each countries underlying "true" institutions, the "2010" number is actually the average of the score in 2010 and 2005.

subsidies, as well as (as we will see in Table 9) support for government consumption spending more generally. We should note that all of these estimates assume that the average historical sociopolitical reaction to aging populations occurs in any country listed, and that reform measures to buffer these adverse economic effects are not undertaken. These projections may not apply where reforms have already been undertaken, or will be undertaken to combat these effects, as in the case of Chile.[11] Overall, when using this particular regression estimate as a guide, countries should expect to lose 0.25-0.50 standard deviations in size of government. Greater detail for OECD countries, including the losses in terms of standard deviations, is provided in Table 7.

Moving on, in Table 8 we test for robustness by using the aged dependency ratio in place of the raw population data. Regression 17 corresponds to Regression 4, as do Regression 18 to Regression 8, Regression 19 to Regression 12, and Regression 20 to Regression 16. The results qualitatively correspond to the previous analysis, which is unsurprising since the two methods of measuring are very similar. However, this alternative way of measuring elderly in the population makes it clear that our results are not contingent on the choice of independent variable.

Finally, in Table 9 we examine the impact – using both levels and differences – that aging populations will have on the other three discrete components that make up our size of government measure. While the results are not as strong as they were with the transfers and subsidies variable, there is evidence to suggest a negative relationship between aging populations and the government consumption score. That is to say, aging populations are associated with larger levels of government consumption spending across countries. In Regression 24, for example, if we increase population 65 and over by 1 standard deviation, our differenced government consumption score falls by about one-third of a standard deviation. We do not find any relationship between aging populations and either our government investment or our top marginal tax rate variable. It seems, then, that the observed negative relationship

[11] See Diamond (1993).

between aging populations and size of government is largely driven by a desire for larger levels of transfers and subsidies, and larger levels of government consumption among the aged.

This final set of regressions is equally important for what it *does not* find as for what it does find. That is to say, there is no significant relationship in the data between aging populations and either government investment or the top marginal tax rate. Though teasing out the full implications of this finding is beyond the scope of this paper, it does suggest that aging populations are primarily interested in the aspects of government size that benefit them directly in the short run, and not as interested in long-term government investment, or in reducing (or increasing) top marginal tax rates. Government consumption includes spending on all sorts of goods and services in the economy, including health and educational services. Since the elderly are beneficiaries of this type of spending, it seems natural that we should find that an increase in aging populations leads to a deterioration in the government consumption score (which manifests itself as an increase in government consumption spending). However, government consumption includes goods and services for both the elderly and the non-elderly. The fact that we observe a negative point estimate here suggests that the elderly are at least willing to tolerate other types of spending as long as they also get their preferred types of consumption spending. Because the elderly likely won't be around to realize the long-term effects of government investment, however, it is rational for them to care little about this facet of government size. Additionally, because the elderly are largely released from the responsibilities of payroll and income tax, it is rational for them to care little about this facet of the size of government.

V. Conclusion

Our paper does not conclusively settle the question of the mechanism behind the association between increased numbers of elderly people in a population and the growth of government in that society. However, it finds evidence to support the conjecture that a growth in the elderly population

encourages government growth. The data may indicate this because the elderly know they won't be responsible for bearing the full costs of their spending decisions, so are more likely to vote for additional spending, as Sanz and Velazquez (2007) argue. Here, we find that they support particular types of government spending, not spending across the board; that is, spending on government consumption, transfers, and subsidies is preferred by the elderly, while spending on government investment is apparently not robustly supported.

Empirical studies elsewhere also suggest that public opinion has a positive relationship with actual spending policies (Burstein, 2003; Brooks and Manza, 2007). Some studies find that age is positively and significantly related to expressed policy preferences, and that the elderly are more inclined than others to support welfare policies (Svallfors 2003, 2004; Mehrtens 2004; Fraile and Ferrer 2005), though there is some disagreement on this point (Arts and Gelissen 2001; Lipsmeyer and Nordstrom 2003; Jaeger 2006). It may be that as the population ages, they consume a larger portion of healthcare and pensions (Gonzalez-Eiras and Niepelt 2008); without concomitant decreases in other areas of spending, the elderly mechanically lead to a larger government sector. Indeed, about half of national spending on healthcare occurs during the final two years of a person's life (Hagist and Kotlikoff 2005). Further, as fewer and fewer workers support a rising number of retirees, the total amount of pension payouts will naturally rise.

Our results are consistent with the literature that finds a positive relationship between the percentage of elderly in the population and various measures of the size of government. Not only do we find that the percentage of those aged 65 and up has a positive relationship with the overall size of government, reinforcing Sanz and Velazquez (2007) and Heinemann (2004), but we also find a positive relationship between aging populations and the narrower measure of transfers and subsidies, consistent with Disney (1996, 2007) and Bryant (2003). We also find a positive relationship between aging populations and government consumption spending, a relationship that has not been systematically explored in the literature.

Of course, just because a rising share of elderly in the population is currently associated with a larger size of government, this does not imply that this situation will continue indefinitely into the future. Currently, among OECD countries there are about four individuals of working age for every one individual of retirement age. The OECD predicts that this will fall by half by 2050 (OECD 2014). Continuing current policies indefinitely into the future will place considerable fiscal strain on federal budgets. Boldrin and Rustichini (2000) suggest that aging may, over time, lead to a reduction in total pension spending, as countries wrestle with how to cut programs to meet other spending demands. Indeed, one possible future they envision includes a complete shift to a private, fully funded pension system. While the political economy issues make this possible future a somewhat unlikely idea, many countries have already begun to cut spending per pensioner in order to curb the growth of total spending on pension programs. Indeed, some studies have found that spending per elderly person tends to fall across countries as the share of elderly persons in the population rises (Lindert 1996; Breyer and Craig 1997; Galasso and Profeta 2004).

As explored in Table 7, the size of government across G7 countries will continue to rise absent substantial reform to current policies. While some have questioned the importance of the "Size of Government" index subcomponent in *Economic Freedom of the World* (Ott forthcoming), or have found a limited size of government to have a negative effect on inequality (Bergh and Nilsson 2010), a good deal of scholarship has used this variable to explain the positive effects of a limited size of government on labor market outcomes (Feldmann 2006), entrepreneurship (Bjornskov and Foss 2008), economic growth (Bergh and Karlsson 2010), and reductions in crowding out of investment (Atukeran 2005). While the value of the variable necessitates inherent social tradeoffs, evaluations of which many may disagree, the variable itself has been found repeatedly to be instrumentally important in relation to other social outcomes. As such, demographics impacting the variable in the magnitude of 0.25-0.50 standard deviations in OECD countries, as found in Table 7, is an economically important finding far apart from the general finding that aging populations lead to increases in particular spending flows. This finding

should encourage members of OECD countries in particular to seriously confront their fiscal problems in light of inevitable population aging. Indeed, aging populations should be considered a blessing; it means friends, family, and loved ones are contributing valuably to our lives for longer than has ever been possible. Governments across the world should not allow this blessing to turn into a curse.

Importantly, our paper understands the relationship between population aging and the size of government as an economic institution, as it is conceptualized and measured in the *Economic Freedom of the World* index. The only previous work that touched on this has been Heinemann (2004). As such, this paper also contributes to the growing literature on the sources and origins of economic freedom, in addition to the concerns in public policy and public finance regarding the sustainability and workability of entitlement and welfare programs as populations in developed nations continue to age.

Works Cited

Alesina, Alberto, and Romain Wacziarg. "Openness, country size and government." *Journal of Public Economics* 69, no. 3 (1998): 305-321.

Alesina, Alberto, Edward Glaeser, and Bruce Sacerdote. *Why doesn't the US have a European-style welfare system?*. No. w8524. National bureau of economic research, (2001).

Alesina, Alberto, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat, and Romain Wacziarg. "Fractionalization." *Journal of Economic growth* 8, no. 2 (2003): 155-194.

Arts, Wil, and John Gelissen. "Welfare states, solidarity and justice principles: does the type really matter?." *Acta Sociologica* 44, no. 4 (2001): 283-299.

Atukeren, Erdal. "Interactions between Public and Private Investment: Evidence from Developing Countries." *Kyklos* 58, no. 3 (2005): 307-330.

Barro, Robert, and Jong-Wha Lee. "A New Data Set of Educational Attainment in the World, 1950-2010." *Journal of Development Economics* 104 (2013): 184-198.

Bergh, Andreas and Martin Karlsson. "Government Size and Growth: Accounting for Economic Freedom and Globalization." *Public Choice* 142, no. 1-2 (2010): 195-213.

Bergh, Andreas and Therese Nilsson. "Do Liberalization and Globalization Increase Income Inequality?" *European Journal of Political Economy* 26, no. 4 (2010): 488-505.

Bjornskov, Christian and Nicolai J. Foss. "Economic Freedom and Entrepreneurial Activity: Some Cross-Country Evidence." *Public Choice* 134, no. 3-4: 307-328.

Boldrin, Michele, and Aldo Rustichini. "Political equilibria with social security." *Review of Economic Dynamics* 3, no. 1 (2000): 41-78.

Breyer, Friedrich, and Ben Craig. "Voting on social security: evidence from OECD countries." *European Journal of Political Economy* 13, no. 4 (1997): 705-724.

Brooks, Clem, and Jeff Manza. *Why welfare states persist: Public opinion and the future of social provision.* Chicago: University of Chicago Press (2007).

Brunner, Eric, and Ed Balsdon. "Intergenerational conflict and the political economy of school spending." *Journal of Urban Economics* 56, no. 2 (2004): 369-388.

Bryant, John. *Modelling the effect of population ageing on government social expenditures*. No. 03/15. New Zealand Treasury, (2003).

Buchanan, James M., and Richard E. Wagner. *Democracy in Deficit*. Acad. Press, (1977).

Burstein, Paul. "The impact of public opinion on public policy: A review and an agenda." *Political research quarterly* 56, no. 1 (2003): 29-40.

Busemeyer, Marius R., Achim Goerres, and Simon Weschle. "Attitudes towards redistributive spending in an era of demographic ageing: the rival pressures from age and income in 14 OECD countries." *Journal of European Social Policy* 19, no. 3 (2009): 195-212.

Cameron, David R. "The expansion of the public economy: A comparative analysis." *American political science review* 72, no. 4 (1978): 1243-1261.

De Haan, Jakob, Susanna Lundstrom, and Jan-Egbert Sturm. 2006. "Market-Oriented Institutions and Economic Growth: A Critical Survey." *Journal of Economic Surveys* 20, no. 2: 157-191.

Diamond, Peter. "Privatization of Social Security: Lessons from Chile." *NBER Working Paper* no. 4510 (1993).

Disney, Richard. *Can we afford to grow older?: a perspective on the economics of aging*. MIT Press, 1996.

Disney, Richard. "Population ageing and the size of the welfare state: Is there a puzzle to explain?." *European Journal of Political Economy* 23, no. 2 (2007): 542-553.

Easterly, William, and Sergio Rebelo. "Fiscal policy and economic growth: an empirical investigation." *Journal of Monetary Economics* 32 (1993): 417–458.

Easterly, William, and Ross Levine. "Africa's growth tragedy: policies and ethnic divisions." *The Quarterly Journal of Economics*112, no. 4 (1997): 1203-1250.

Elmendorf, Douglas W., and Louise Sheiner. "Persistently low interest rates argue for delayed budget belt-tightening even in an aging America." *Hutchins Center Working Papers* (2016).

Feldmann, Horst. "Government Size and Unemployment: Evidence from Industrial Countries." *Public Choice* 127, no. 3-4: 451-467.

Fletcher, Deborah, and Lawrence W. Kenny. "The influence of the elderly on school spending in a median voter framework." *Education* 3, no. 3 (2008): 283-315.

Fraile, Marta, and Mariona Ferrer. "Explaining the determinants of public support for cuts in unemployment benefits spending across OECD countries." *International Sociology* 20, no. 4 (2005): 459-481.

Galasso, Vincenzo, and Paola Profeta. "The political economy of social security: a survey." *European Journal of Political Economy*18, no. 1 (2002): 1-29.

Galasso, Vincenzo, and Paola Profeta. "Lessons for an ageing society: the political sustainability of social security systems." *Economic Policy* 19, no. 38 (2004): 64-115.

Galasso, Vincenzo, and Paola Profeta. "Population ageing and the size of the welfare state." *Harper S and Hamblin K (eds) International Handbook on Ageing and Public Policy. Cheltenham: Edward Elgar* (2014): 74-83.

Goerres, Achim. "Reforming the Welfare State in Times of Grey Electoral Majorities. The Myth of the "Grey Vote" in Germany." *German Policy Studies* 4, no. 2 (2008): 131-55.

Goerres, Achim. *The Political Participation of Older People in Europe: the Greying of Our Democracies*. Basingstoke: Palgrave Macmillan (2009).

Gonzalez-Eiras, Martin, and Dirk Niepelt. "The future of social security." *Journal of Monetary Economics* 55, no. 2 (2008): 197-218.

Gwartney, James, Robert Lawson, and Joshua Hall. 2016. *Economic Freedom of the World*. Vancouver, BC: Fraser Institute.

Hagist, Christian, and Laurence Kotlikoff. *Who's going broke? comparing growth in healthcare costs in ten OECD countries*. No. w11833. National Bureau of Economic Research, 2005.

Hall, Joshua and Robert Lawson. 2014. "Economic Freedom of the World: An Accounting of the Literature." *Contemporary Economic Policy* 32, no. 1: 1-19.

Heinemann, Friedrich. 2004. "Explaining Reform Deadlocks." *Center for European Research Discssion Paper*, no. 04-39.

Henrekson, Magnus. "Wagner's Law – a Spurious Relationship." *Public Finance* 48, no. 2 (1993): 406-415.

Jæger, Mads Meier. "Welfare regimes and attitudes towards redistribution: The regime hypothesis revisited." *European Sociological Review* 22, no. 2 (2006): 157-170.

Jäger, Philipp, and Torsten Schmidt. "The political economy of public investment when population is aging: A panel cointegration analysis." *European Journal of Political Economy* 43 (2016): 145-158.

Krusell, Per, and Jose-Victor Rios-Rull. "On the size of US government: political economy in the neoclassical growth model." *American Economic Review* (1999): 1156-1181.

Lijphart, Arend. "Unequal participation: Democracy's unresolved dilemma presidential address, American Political Science Association, 1996." *American political science review* 91, no. 1 (1997): 1-14.

Lindert, Peter H. "What limits social spending?." *Explorations in Economic History* 33, no. 1 (1996): 1-34.

Lipsmeyer, Christine, and Timothy Nordstrom. "East versus West: comparing political attitudes and welfare preferences across European societies." *Journal of European Public Policy* 10, no. 3 (2003): 339-364.

Lott, Jr, John R., and Lawrence W. Kenny. "Did women's suffrage change the size and scope of government?." *Journal of political Economy* 107, no. 6 (1999): 1163-1198.

Marshall, Monty G., Ted Robert Gurr, and Keith Jaggers. *Polity IV Project: Political Regime Characteristics and Transitions 1800-2015*. Center for Systemic Peace, 2016.

Matytsin, Mikhail, Lalita Moorty, and Kaspar Richter. "From Demographic Dividend to Demographic Burden: Regional Trends of Population Aging in Russia." *World Bank, Policy Research Working Paper No. 7501*, (2015).

Mehrtens III, F. John. "Three worlds of public opinion? Values, variation, and the effect on social policy." *International journal of public opinion research* 16, no. 2 (2004): 115-143.

Mello, Luiz, Simone Schotte, Erwin R. Tiongson, and Hernan Winkler. "Greying the budget: ageing and preferences over public policies." *Kyklos* 70, no. 1 (2017): 70-96.

Meltzer, Allan H., and Scott F. Richard. "A rational theory of the size of government." *Journal of political Economy* 89, no. 5 (1981): 914-927.

Milesi-Ferretti, Gian Maria, Roberto Perotti, and Massimo Rostagno. "Electoral systems and public spending." *The Quarterly Journal of Economics* 117, no. 2 (2002): 609-657.

Mulligan, Casey B., and Xavier Sala-i-Martin. *Gerontocracy, retirement, and social security*. No. w7117. National bureau of economic research, (1999).

Mulligan, Casey B., Ricard Gil, and Xavier Sala-i-Martin. *Social security and democracy*. No. w8958. National Bureau of Economic Research, (2002).

Mulligan, Casey B., and Xavier Sala-i-Martin. *Social security, retirement, and the single-mindedness of the electorate*. No. w9691. National Bureau of Economic Research, (2003).

Mulligan, Casey B., Ricard Gil, and Xavier Sala-i-Martin. "Do democracies have different public policies than nondemocracies?." *The Journal of Economic Perspectives* 18, no. 1 (2004): 51-74.

OECD, "Old age support rate", in *Society at a Glance 2014: OECD Social Indicators*, OECD Publishing, Paris, (2014).

Persson, Torsten, Gerard Roland, and Guido Tabellini. "Towards micropolitical foundations of public finance." *European Economic Review* 42, no. 3 (1998): 685-694.

Persson, Torsten, and Guido Tabellini. "The size and scope of government:: Comparative politics with rational politicians." *European Economic Review* 43, no. 4 (1999): 699-735.

Poterba, James M. *Demographic structure and the political economy of public education*. No. w5677. National bureau of economic research, (1996).

Poterba, James M. "Demographic change, intergenerational linkages, and public education." *The American Economic Review*88, no. 2 (1998): 315-320.

Razin, Assaf, Efraim Sadka, and Phillip Swagel. "The aging population and the size of the welfare state." *Journal of Political Economy* 110, no. 4 (2002): 900-918.

Rodrik, Dani. "Why do more open economies have bigger governments?." *Journal of political Economy* 106, no. 5 (1998): 997-1032.

Sanz, Ismael, and Francisco J. Velázquez. "The role of ageing in the growth of government and social welfare spending in the OECD." *European Journal of Political Economy* 23, no. 4 (2007): 917-931.

Shelton, Cameron A. "The size and composition of government expenditure." *Journal of Public Economics* 91, no. 11 (2007): 2230-2260.

Shelton, Cameron A. "The aging population and the size of the welfare state: Is there a puzzle?." *Journal of Public Economics* 92, no. 3 (2008): 647-651.

Simonovits, András. "Can population ageing imply a smaller welfare state?." *European Journal of Political Economy* 23, no. 2 (2007): 534-541.

Sørensen, Rune J. "Does aging affect preferences for welfare spending? A study of peoples' spending preferences in 22 countries, 1985–2006." *European Journal of Political Economy* 29 (2013): 259-271.

Stein, Ernesto, Talvi, Ernesto, Grisanti, Alejandro. "Institutional Arrangements and Fiscal Performance: The Latin American Experience." Working Paper 367, Office of the Chief Economist. Inter-American Development Bank. (1998).

Svallfors, Stefan. "Welfare regimes and welfare opinions: A comparison of eight western countries." In *European Welfare Production*, pp. 171-196. Springer Netherlands, 2003.

Svallfors, Stefan. "Class, attitudes and the welfare state: Sweden in comparative perspective." *Social policy & administration* 38, no. 2 (2004): 119-138.

Svallfors, Stefan. "The generational contract in Sweden: Age-specific attitudes to age-related policies." *Policy & Politics* 36, no. 3 (2008): 381-396.

Tepe, Markus, and Pieter Vanhuysse. "Are aging OECD welfare states on the path to gerontocracy?." *Journal of Public Policy* 29, no. 1 (2009): 1-28.

Tridimas, George, and Stanley L. Winer. "The political economy of government size." *European Journal of Political Economy* 21, no. 3 (2005): 643-666.

Van Der Gaag, Nicole, and Joop Beer. "From demographic dividend to demographic burden: the impact of population ageing on economic growth in Europe." *Tijdschrift voor economische en sociale geografie* 106, no. 1 (2015): 94-109.

TABLE 1. Descriptive Statistics

Variable	n	Mean	Std. Dev.	Min	Max
Area 1 EFW, Size of Govt	2753	6.175	1.493	0.654	9.934
Subsidies & Transfers	2467	7.666	2.167	0	10
% Population, Age 65+	2894	7.408	5.165	1.058	25.705
Dependency Ratio	3314	11.393	7.151	0.811	41.896
LN RGDP Per Capita	2707	8.348	1.586	4.749	11.608
Polity IV	2995	3.104	6.795	-10	10
Education	2346	6.792	3.262	0	13.42
Government Consumption	2789	5.886	2.241	0	10
Government Investment	2716	5.677	3.236	0	10
Top Marginal Tax Rate	2358	5.722	2.691	0	10

TABLE 2. Correlation Matrix, Primary Variables

	Area 1 EFW, Size of Govt	Subsidies & Transfers	% Population, Age 65+	LN RGDP Per Capita	Polity IV	Education
Area 1 EFW, Size of Govt	1.000					
Subsidies & Transfers	0.6461	1.000				
% Population, Age 65+	-0.4644	-0.8446	1.000			
LN RGDP Per Capita	-0.3669	-0.7182	0.7910	1.000		
Polity IV	-0.2434	-0.5380	0.5984	0.5494	1.000	
Education	-0.3050	-0.6730	0.7423	0.7672	0.6390	1.000

TABLE 3. Effects of Population Over 65 on Size of Government, Levels

Variable	(1)	(2)	(3)	(4)
Population, 65+	-0.133***	-0.127***	-0.064	-0.118**
	(0.010)	(0.010)	(0.056)	(0.050)
LN RGDP Per Capita	-0.263***	-0.112***	-0.033	-0.213
	(0.346)	(0.034)	(0.303)	(0.299)
Polity IV	0.030***	0.021***	0.013	-0.011
	(0.007)	(0.007)	(0.016)	(0.016)
Education	0.176***	0.066***	0.357***	0.130
	(0.018)	(0.020)	(0.076)	(0.090)
Constant	8.033***	7.272***	4.345*	7.740***
	(0.231)	(0.302)	(2.216)	(2.249)
Country FE?	N	N	Y	Y
Year FE?	N	Y	N	Y
n	1590	1590	1590	1590
R^2	0.1712	0.2336	0.6473	0.6931

* denotes confidence at 10% level. ** denotes confidence at 5% level. *** denotes confidence at 1% level. Robust standard errors were employed.

TABLE 4. Effects of Population Over 65 on Transfers and Subsidies, Levels

Variable	(5)	(6)	(7)	(8)
Population, 65+	-0.290***	-0.289***	-0.150**	-0.181***
	(0.010)	(0.010)	(0.062)	(0.057)
LN RGDP Per Capita	-0.354***	-0.296***	0.117	0.088
	(0.039)	(0.044)	(0.214)	(0.202)
Polity IV	-0.004	-0.006	0.006	-0.001
	(0.006)	(0.006)	(0.010)	(0.011)
Education	0.050***	0.011	-0.026	-0.098
	(0.017)	(0.019)	(0.043)	(0.075)
Constant	12.664***	12.466****	7.938***	9.189***
	(0.230)	(0.327)	(1.596)	(1.565)
Country FE?	N	N	Y	Y
Year FE?	N	Y	N	Y
n	1440	1440	1440	1440
R^2	0.734	0.744	0.907	0.9133

* denotes confidence at 10% level. ** denotes confidence at 5% level. *** denotes confidence at 1% level. Robust standard errors were employed.

TABLE 5. Effects of Population Over 65 on Size of Government, Differences

Variable	(9)	(10)	(11)	(12)
Lagged Size of Government	-0.541*** (0.039)	-0.545*** (0.039)	-1.025*** (0.046)	-1.010*** (0.053)
Population, 65+	-0.122*** (0.021)	-0.117*** (0.019)	-0.076 (0.060)	-0.111* (0.064)
Population, 65+, Differenced	0.083 (0.053)	0.065 (0.049)	-0.044 (0.090)	-0.045 (0.085)
LN RGDP Per Capita	-0.288*** (0.062)	-0.112* (0.060)	-0.127 (0.397)	-0.188 (0.385)
LN RGDPpc, Differenced	-0.140 (0.275)	0.081 (0.265)	0.908** (0.435)	0.774* (0.422)
Polity IV	0.021* (0.012)	0.012 (0.011)	0.039* (0.020)	0.012 (0.24)
Polity IV, Differenced	0.015 (0.014)	0.001 (0.013)	0.024 (0.017)	0.003 (0.019)
Education	0.199*** (0.029)	0.075** (0.033)	0.492*** (0.098)	0.232* (0.125)
Education, Differenced	0.190** (0.079)	0.106 (0.076)	0.304*** (0.108)	0.203* (0.108)
Constant	5.134*** (0.485)	3.533*** (0.490)	4.252 (2.794)	6.028** (2.735)
Country FE?	N	N	Y	Y
Year FE?	N	Y	N	Y
n	567	567	567	567
R^2	0.3507	0.4491	0.6681	0.6908

* denotes confidence at 10% level. ** denotes confidence at 5% level. *** denotes confidence at 1% level. Robust standard errors were employed.

TABLE 6. Effects of Population Over 65 on Transfers and Subsidies, Differences

Variable	(13)	(14)	(15)	(16)
Lagged Transfers and Subsidies	-0.435*** (0.046)	-0.429*** (0.044)	-1.060*** (0.052)	-1.058*** (0.056)
Population, 65+	-0.162*** (0.025)	-0.157*** (0.025)	-0.149** (0.073)	-0.183** (0.072)
Population, 65+, Differenced	-0.060 (0.054)	-0.075 (0.052)	-0.166* (0.088)	-0.165* (0.088)
LN RGDP Per Capita	-0.261*** (0.051)	-0.195*** (0.053)	0.291 (0.277)	0.171 (0.276)
LN RGDPpc, Differenced	-0.162 (0.196)	0.259 (0.207)	1.082*** (0.288)	0.874*** (0.277)
Polity IV	-0.011 (0.009)	-0.014 (0.009)	-0.016 (0.015)	-0.027 (0.017)
Polity IV, Differenced	-0.000 (0.008)	-0.005 (0.009)	0.005 (0.011)	-0.002 (0.012)
Education	0.102*** (0.029)	0.050 (0.030)	0.005 (0.059)	-0.137 (0.111)
Education, Differenced	0.081 (0.068)	0.047 (0.070	0.080 (0.072)	0.053 (0.081)
Constant	5.955*** (0.615)	5.164*** (0.639)	6.352*** (2.015)	8.330*** 2.124***
Country FE?	N	N	Y	Y
Year FE?	N	Y	N	Y
n	464	464	464	464
R^2	0.295	0.343	0.653	0.670

* denotes confidence at 10% level. ** denotes confidence at 5% level. *** denotes confidence at 1% level. Robust standard errors were employed.

Table 7. Naïve Projections of Future Size of Government Scores in OECD

Country	2010	2020	2030	2040	2050	Decline, stdev
Australia	6.53	6.40	6.26	6.17	6.12	0.27
Austria	5.07	4.97	4.75	4.56	4.48	0.39
Belgium	4.17	4.07	3.90	3.78	3.74	0.29
Canada	6.15	5.97	5.73	5.65	5.60	0.37
Chile	7.67	7.53	7.31	7.09	6.93	0.50
Czech Republic	4.83	4.61	4.50	4.34	4.16	0.45
Denmark	3.77	3.62	3.50	3.41	3.43	0.23
Estonia	6.47	6.34	6.21	6.11	6.02	0.30
Finland	4.48	4.23	4.10	4.09	4.05	0.28
France	4.39	4.21	4.07	3.98	3.97	0.28
Germany	5.60	5.51	5.27	5.12	5.07	0.35
Greece	6.25	6.10	5.94	5.71	5.53	0.48
Hungary	4.79	4.65	4.58	4.48	4.30	0.33
Iceland	5.87	5.70	5.50	5.37	5.28	0.39
Ireland	5.78	5.60	5.44	5.27	5.12	0.44
Israel	6.01	5.91	5.84	5.77	5.69	0.21
Italy	5.58	5.41	5.21	4.97	4.91	0.44
Japan	5.51	5.26	5.17	5.00	4.91	0.40
Latvia	5.75	5.67	5.55	5.49	5.44	0.21
Luxembourg	4.19	4.15	4.00	3.84	3.77	0.28
Mexico	7.15	7.07	6.94	6.75	6.56	0.39
Netherlands	3.88	3.67	3.46	3.33	3.34	0.36
New Zealand	5.58	5.41	5.21	5.08	5.08	0.33
Norway	5.25	5.14	5.02	4.89	4.85	0.26
Poland	5.38	5.15	4.94	4.83	4.57	0.54
Portugal	4.86	4.68	4.47	4.25	4.12	0.49
Republic of Korea	6.76	6.54	6.19	5.87	5.68	0.72
Slovakia	6.39	6.20	6.02	5.89	5.66	0.49
Slovenia	4.60	4.42	4.20	4.03	3.89	0.48
Spain	5.99	5.85	5.60	5.32	5.15	0.56
Sweden	3.57	3.46	3.39	3.32	3.32	0.17
Switzerland	7.80	7.69	7.50	7.35	7.28	0.35
Turkey	7.30	7.22	7.07	6.89	6.69	0.41
United Kingdom	5.74	5.64	5.50	5.39	5.35	0.26
United States of America	6.76	6.59	6.41	6.36	6.35	0.28

TABLE 8. Effects of Aged Dependency Ratio on Variables of Interest

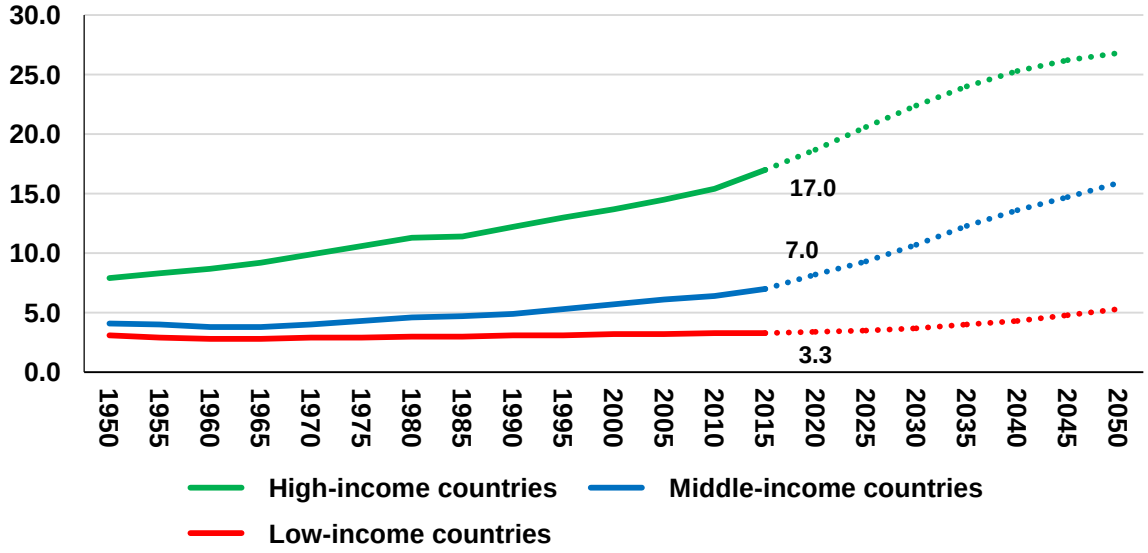
Variable	(17)	(18)	(19)	(20)
LHS	Size of Govt.	Transfers & Subsidies	Size of Govt, Diff	Transfers & Subsidies, Diff
Lagged LHS Variable			-1.013***	-1.053***
			(0.052)	(0.057)
Aged Dependency Ratio	-0.083***	-0.113***	-0.075*	-0.109**
	(0.029)	(0.035)	(0.040)	(0.048)
Aged Dependency Ratio, Differenced			-0.040	-0.092
			(0.046)	(0.056)
LN RGDP Per Capita	-0.253	0.003	-0.228	0.084
	(0.294)	(0.191)	(0.382)	(0.265)
LN RGDPpc, Differenced			0.739*	0.803***
			(0.423)	(0.272)
Polity IV	-0.011	-0.001	0.012	-0.027
	(0.016)	(0.011)	(0.023)	(0.017)
Polity IV, Differenced			0.004	-0.001
			(0.019)	(0.012)
Education	0.123	-0.107	0.225*	-0.148
	(0.089)	(0.074)	(0.124)	(0.112)
Education, Differenced			0.199*	0.046
			(0.107)	(0.082)
Constant	8.217***	9.986***	6.504**	9.061***
	(2.268)	(1.509)	(2.767)	(2.104)
Country FE?	Y	Y	Y	Y
Year FE?	Y	Y	Y	Y
n	1590	1440	567	464
R^2	0.694	0.676	0.691	0.678

TABLE 9. Effects on Other Components of Size of Government, Full Specifications

	(21)	(22)	(23)	(24)	(25)	(26)
LHS Variable	Govt Consumption	Govt Investment	Top Marginal Tax Rate	Diff, Govt Consumption	Diff, Govt Investment	Top Tax Rate, Diff
Lagged LHS Variable				-0.923***	-1.048***	1.051***
				(0.080)	(0.043)	(0.057)
Population, 65+	-0.143**	0.146	-0.116	-0.146*	0.048	-0.042
	(0.062)	(0.144)	(0.119)	(0.079)	(0.179)	(0.158)
Population, 65+, Differenced				-0.102	0.171	-0.065
				(0.090)	(0.216)	(0.168)
LN RGDP Per Capita	-1.177***	-0.075	1.206**	-1.792***	0.180	-0.184
	(0.373)	(0.601)	(0.594)	(0.579)	(0.909)	(0.790)
LN RGDPpc, Differenced				-0.330	1.055	0.887
				(0.539)	(1.076)	(0.820)
Polity IV	0.005	-0.025	0.019	-0.004	0.047	0.030
	(0.016)	(0.031)	(0.036)	(0.024)	(0.057)	(0.049)
Polity IV, Differenced				0.002	-0.011	0.067
				(0.017)	(0.035)	(0.050)
Education	0.141	0.042	0.533***	0.382**	-0.005	0.886***
	(0.124)	(0.231)	(0.192)	(0.157)	(0.338)	(0.270)
Education, Differenced				0.065	0.216	0.329
				(0.130)	(0.298)	(0.204)
Constant	16.512***	3.978	-10.177**	19.399***	1.842	-1.513
	(2.962)	(4.621)	(4.796)	(4.868)	(6.941)	(6.337)
Country FE?	Y	Y	Y	Y	Y	Y
Year FE?	Y	Y	Y	Y	Y	Y
n	1599	1572	1332	575	548	412
R^2	0.135	0.235	0.477	0.474	0.588	0.719

* denotes confidence at 10% level. ** denotes confidence at 5% level. *** denotes confidence at 1% level. Robust standard errors were employed.

Figure 1: Percentage of Total Population Over Age 65



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, custom data acquired via website.