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An Easily Understood and Intergenerationally Equitable Normal Pension Age

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Abstract

Pension arrangements are in the process of changing in most OECD countries. These changes often include changes in normal pension ages. Several rationales are commonly given for changes in normal pension ages, including financial exigency and increases in life expectancy, but the public remains largely unconvinced. Here we use the methodology of the characteristics approach to the measurement of population ageing to derive a simple and transparent procedure, based on principles of equity that produces analytically-based normal pension ages. Forecasts of our normal pension ages are generally quite close to country plans. Episodic changes in normal pension ages could get more difficult as populations age. We recommend that policy-makers consider setting normal pension ages automatically, based on changes in mortality rates, using the simple, transparent, and equitable procedure provided here.

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1 Introduction

In public policy, age matters. A myriad of policies stipulate rights, obligations, benefits, and taxes on the basis of chronological age. Chronological age is a simple, easily understood characteristic of people and this makes it particularly useful in the specification of public policies. Nevertheless, several different factors now converge suggesting that, at least with respect to some policies, the treatment of age needs to be rethought, particularly in view of changes in longevity. On a theoretical level, Sanderson and Scherbov (2013) argue that ageing is a multidimensional phenomenon and that it needs to be studied on the basis of the characteristics of people. Chronological age is one characteristic of people, but for specific public policies it might not necessarily be the most relevant one, especially because it does not vary with longevity. On a general policy level, Shoven (2007) and Shoven and Goda (2010) show that the US public policies concerning the normal pension age, the age at eligibility for Medicare (health insurance for the elderly), and ages in tax-advantaged savings plans, would be quite different if those ages were indexed for changes in longevity. On the level of policy implementation, public pension programs are in the process of change in most OECD countries (OECD 2013). Those changes frequently involve changes in normal pension ages.

In the provision of public pensions, fixed normal pension ages are already being replaced by variable ones. The conceptual basis for those variable normal pension ages, however, often remains unexplored and unarticulated. The purpose of this paper is to provide a clearly defined and analytically-based model of normal pension ages. Our approach produces hypothetical normal pension ages that are simple to understand, transparent, intergenerationally equitable, and vary with changing mortality conditions. Model-based normal pension ages are useful because they have known properties. A comparison of country policies with model-based normal pension ages can be useful in assessing those country policies.

Among wealthier countries in recent years one topic has been particularly contentious – changes in pension ages. Pension age changes have been challenged for a number of reasons. Important among these is the evident unfairness of the changes. Governments sometimes make the argument that changes in normal pension ages are needed because pensions are expensive and the government does not have the money to pay them. This argument is certainly unpersuasive. If the government does not have enough money, it can get it in any number of ways. It can reduce subsidies to various firms and sectors of the economy. It can produce its services more efficiently. It can stop performing services that have little or no value or are targeted to those in society who are already well-off. It can also raise the general level of taxes. The argument that pensions are expensive and therefore pension ages should be increased is a bit like making the argument that education is expensive and therefore there should be fewer schools. If governments need money, they should produce a balanced plan to raise some. Certainly, pension age changes can be part of those reforms, but, if the only problem is a shortage of money, it is unfair to argue that older people should have their benefits reduced, while farmers, among others, should not.

Changes in national pension ages are also problematic because of intercohort inequalities. Changes in national pension age policies are usually written so that people born in one year can get a full pension at, say, 65, while people born a year later can only get a pension when they are older. If the only problem is a shortage of money and the government was devising a fair plan to raise that money, why should a one day difference in birthdays translate into different levels of pension receipt?

Unanticipated changes in normal pension ages are inequitable. Changes in the normal pension age do not change the incomes of current pensioners. Young people have time to change their labor force and saving behavior to adjust to the changes. People near the previous normal pension age suffer because they have made plans based on that age. Episodic changes in normal pension ages during periods of economic duress are certainly a poor approach to the formulation of pension age policy. In order for people to understand, accept, and voluntarily adjust to changes in national pension ages, two criteria must be met. First, the rationale for pension age policy must be compelling, simple and transparent. Second, the resulting policies must be clearly intergenerationally equitable. Currently, in most high income countries, neither criteria is met. Under these circumstances, it is no surprise that pension age changes are so contentious.

The aims of this paper are: (1) to specify an analytically-based national pension age policy that meets both of those criteria, (2) to compute the resulting hypothetical normal pension ages for selected European countries, and (3) to assess the relationship between forecasts of the hypothetical normal pension ages that we compute and the plans that governments have for their normal pension ages.

The paper has 7 sections. In Section 2, we discuss the characteristics approach to the measurement of population ageing (Sanderson & Scherbov 2013). This methodology can be used to produce hypothetical ages based on the characteristics of people. The characteristics approach provides the basis for understanding how those characteristic-based ages could usefully be applied in public policies. In Section 3, we discuss the contributions of Shoven and Goda (2010). Shoven and Goda have provided the first detailed discussion of the effects of incorporating changes in mortality rates on the ages built into various US government policies, including the normal pension age. In Section 4, we discuss the three key features of a desirable normal pension age policy, simplicity, transparency, and intergenerational equity. In that Section, we also present a highly simplified model of a pension system that points to a new way of determining normal pension ages. Among other things, we show in that Section that increasing normal pension ages on the basis of increases in life expectancies at some fixed chronological age does not meet equity criteria. In Section 5, we provide examples of the new analytically-based normal pension ages. In Section 6, we compare our pension ages to those already planned for the future and discuss what could be done to improve welfare if planned pension ages rise too fast. We provide a concluding discussion in Section 7.

2 The Characteristics Approach to the Measurement of Population Ageing

The characteristics approach to the study of population ageing, developed by Sanderson and Scherbov (2013; 2005; 2010; 2008; 2007b), starts from the assumption that ageing is a multidimensional phenomenon. Chronological age is one characteristic of people, but, depending on exactly what is studied, it might not be the most interesting or informative one. Because ageing is multidimensional, a framework is needed that can consistently integrate a variety of characteristics. The fundamental building block of the characteristics approach is a characteristic schedule. A characteristic schedule relates chronological age to the average level of the characteristic in the population.

In mathematical notation, we express the characteristic schedule as $k = C_r(a)$, where k is the level of the characteristic observed at age a in population r. This relationship can be written in the reverse way, where for any level of the characteristic we can find the associated age. This can be expressed by the equation $a = C_r^{-1}(k)$.

We use the term "alpha age" to refer to a characteristic-based age. Alpha ages, in general, are derived from the equation $\alpha = C_s^{-1}(C_r(a))$, where r and s refer to two different characteristic schedules. For example, r and s can refer to the characteristic schedules of a country in different years. α is the age in characteristic schedule s where people have the same characteristic level as they have at age a in schedule r.

We illustrate how alpha ages are computed in Table 1. The table shows two characteristic schedules, one labeled r and the other labeled s. The two characteristic schedules can refer to, among other things, two countries, two years, two genders, two population subgroups, or some combination of these. In the characteristic schedule r, chronological age is shown in the left column and he corresponding characteristic level in the right column. In characteristic schedule s, the order is reversed and we have put the characteristic level on the left and the chronological age on the right. Which one of the two is put on the right or left is immaterial.

Let us begin with the term $C_r(a)$. In Table 1, $C_r(62) = 43$. In other words, people of age 62 in the characteristic schedule r, have the characteristic level 43. The second step in the computation of alpha age is to find the age in characteristic schedule s where people have the characteristic level 43. In mathematical notation this is just $C_s^{-1}(43)$. We can see from Table 1 that people in characteristic schedule s who have the characteristic level of 43 are 64 years old ($C_s^{-1}(43)$=64). So we say that the alpha age of people 62 years old in r is 64, when s is used as a standard of comparison.

One crucial question in the study of normal pension ages is what characteristic to use. This question was recently raised in Shoven and Goda (2010), so we turn to their work next.

Table 1. Hypothetical Example of the Computation of an Alpha-Age.

Characteristic Schedule *r*		**Characteristic Schedule *s***	
Chronological Age	Characteristic Level	Characteristic Level	Chronological Age
60	50	48	62
61	47	46	63
62	***43***	***43***	***64***
63	38	41	65
64	32	35	66

3 The Work of Shoven and Goda

Shoven and Goda (2010), building on the work of Shoven (2007), computed what we call alpha ages associated with three US government policies, Social Security (old age pension program), Medicare (health insurance for the elderly), and Individual Retirement Accounts (tax-advantaged saving plans for retirement). They calculated alpha ages corresponding to 7 different chronological ages used in those programs, including the normal pension age. They used 4 different characteristics, remaining life expectancy, equivalent mortality risk, the ratio of remaining life expectancy to life expectancy at birth, and the ratio of remaining life expectancy to life expectancy at age 20.

Table 2. Alpha Normal Pension Ages in 2004.

Characteristic	**Male**	**Female**	**Total**
Remaining Life Expectancy	73.0	71.0	73.0
Equivalent Mortality Risk	75.0	71.0	74.0
Ratio of Remaining Life Expectancy to Life Expectancy at Birth	83.0	81.9	81.8
Ratio of Remaining Life Expectancy to Life Expectancy at 20	76.1	74.8	76.0

Note: Alpha ages for the characteristics remaining life expectancy and equivalent mortality risk are rounded by Shoven and Goda. *Source*: Shoven and Goda (2010), Table 4.1, p. 152.

Table 2 reproduces the portion of their findings for alpha normal pension ages assuming that the characteristic remains fixed at the level for 65 year olds observed in 1935, the year in which the Social Security (national pension) system was introduced. 65 was the normal pension age in the US from 1935 to 2002.

The alpha normal pension age of 71.0 for women using the characteristic "remaining life expectancy" means that women in 2004 who had the same remaining life expectancy as 65 year old women in 1935 were around 71 years old. Another alpha normal pension age uses the characteristic of the ratio of remaining life expectancy to life expectancy at 20. To compute this alpha age, the ratio of the remaining life expectancy of women 65 years old in 1935 to the remaining life expectancy of 20 year old women in that year has to be calculated. The second step is to find the age in 2004 where the ratio of remaining life expectancy to life expectancy at age 20 was the same as in was for 65 year old women in 1935. That age was 74.8.

In mathematical notation, the alpha normal pension ages in Table 2 come from the expression

$$\alpha = C_{2004}^{-1}\left(C_{1935}\left(65\right)\right).$$

While it is natural for economic magnitudes to be adjusted for differences in price levels over time and from place to place, many public policies are based on chronological ages that are not adjusted for changes in longevity. Shoven and Goda show clearly that adjusting the chronological ages built into a number of US government policies for longevity changes would have a substantial impact. Their goal was not to decide which of the 4 characteristics that they studied would be best used for adjusting legislated ages in particular instances. Our goal, however, is to decide which characteristic is the best for calculating alpha normal pension ages. In order to do this, we must first be clear about exactly what we want our alpha normal pension ages to accomplish.

4 Ex-Ante Equitable Normal Pension Ages

Our goal in this Section is to determine simple, transparent, and equitable alpha normal pension ages. An alpha normal pension age is different from a normal pension age based on a fixed chronological age. Alpha normal pension ages vary with differing mortality conditions. Thus, we are not seeking a single alpha normal pension age. Rather our goal is to determine the procedure through which mortality conditions could be used in computing normal pension ages with known desirable features. Different mortality conditions will, in general, produce different alpha normal pension ages.

The features that we want in our alpha normal pension age are: (1) simplicity, (2) transparency, and (3) equity. Of the three, the last requires the most explanation. Here we are not talking about social equity, i.e. equity among population subgroups. For the population as a whole two types of equity can be distinguished, *ex-ante* equity and *ex-post* equity. This is similar to the distinction between *process equality* and *outcome equality*. For people to accept a method for determining normal pension ages, it must be clear that it is *ex-ante* equitable. Of course, like any insurance plan, the method will not result in *ex-post* equality. Some people will die before reaching any plausible normal pension age and therefore could have paid into the pension system and gotten nothing in return.

In order to find a mechanism determining alpha normal pension ages with desirable properties, we will consider a grossly simplified pension system. The enormous simplifications are designed to help us see the essence of the situation more clearly. Our simplified representation begins with a cohort starting at age 20. The adult lifecycle is divided into two phases, a pre-pension phase and a pension phase.

Ex ante equality requires that members of each cohort receive as much money in pension benefits as they contribute to the pension system. Systems in which cohorts receive much more or much less than they put in are not *ex ante* equitable. If the members of one cohort receive much more than they contribute to the system, then people in other cohorts have to pay for this. If the members of one cohort pay into the pension system more than they receive in benefits, people in other cohorts are the beneficiaries.

We express the idea that members of each cohort must receive as much money in pension benefits as they contribute to the pension system as:

$$\tau \cdot y \cdot u = p \cdot v, \qquad (1)$$

where u is the number of person-years lived by members of the cohort in the pre-pension phase, τ is the pension tax rate on income, y is average income during the pre-pension years, v is the number of person-years lived by members of the cohort in the pension phase, and p is the average annual pension receipt. The term p can be expressed as $\frac{P}{v}$, where P is the total amount paid out to pensioners in the cohort. Therefore, p is just the average pension receipt per pensioner. The term y can be expressed as $\frac{Y}{u}$, where Y is the total income of all people in the pre-pension ages. Therefore, y is just the average income of people in the pre-pension ages.

The equation is written without a discount rate. There are several reasons for doing this. First, payments into a pension fund are like investments in a risk-free insurance policy that pays off in perfectly inflation adjusted money. The real rate of interest on the safest government bonds has been close to zero for decades, so using zero discount rates is not out of line with what we observe. Second, with discounting, we would have to introduce details of the time profile of pension contributions and receipts that go far beyond what could be done in this paper and would distract from the central point here. Third, national pension systems have an important social component. They are designed, in part, to help those who have had bad luck or made bad economic decisions in their youth. When this social component is considered, the motivation for discounting becomes less clear.

The most important reason for not discounting has to do with simplicity. Equation (1) says that each cohort gets as much out of the pension system as they put into it. People can understand this and could support a pension system based on it.

There is a second dimension of equality that has to be taken into account here. People would not consider a pension system equitable if pensioners received more money every year than the incomes of those contributing, net of their pension contributions. Countries make a social choice of the level of pension income relative to the after-(pension)-tax income of pre-pensioners. We express this using the equation

$$p = \beta \cdot y \cdot (1-\tau), \quad (2)$$

where *p* is the average pension, *y* is the average income of people in the pre-pension period, τ is the pension tax rate, and β is the ratio of annual pension income to the income of people in the pre-pension period after adjustment for pension contributions. β is the relative generosity of pension benefits. If society makes a decision to reward one cohort by giving it a high β and penalizes another with a low β, this is clearly not equitable.

Equations (1) and (2) can be combined to yield an expression for the ratio of the number of person-years lived in the pre-pension phase to the number of person-years lived in the pension phase.

$$\frac{u}{v} = \beta \cdot \left(\frac{1}{\tau} - 1\right). \quad (3)$$

Equation (3) is simple, but very powerful. It combines two criteria for *ex ante* equity. The first is that each cohort must receive in pension benefits what it contributes to the pension system. The second is that the balance between pension receipts and the income people have in their pre-pension years net of their pension contributions should be the same across cohorts. In this way pensioners are not allowed to grow ever richer at the expense of those who support them or increasingly impoverished for the benefit of younger generations.

A useful feature of our hypothetical pension system is that the pension contribution rate, τ, is the same across cohorts. In practice, the pension contribution rate is usually fixed across cohorts as a matter of practicality. Having different pension contribution rates for different cohorts in the same year would mean that the pension contribution rates would have to differ by age. People would only agree to pay different pension contribution tax rates if governments could credibly commit to providing greater benefits to those who pay the higher rates, which is rarely the case.

In equation (3) if the generosity of the pension system, β, and the pension contribution rate, τ, are fixed, the ratio of *u* to *v* is fixed, independent of the level of income. A fixed ratio of *u* to *v* is easy to explain. If the ratio of *u* to *v* is fixed, then the ratio $\frac{v}{u+v}$ is also fixed. The latter ratio essentially says that for each cohort, the number of years people receive a pension is a fixed proportion of all the years they live from age 20 onward. A pension system based on this fixed ratio is equitable because the ratio is the same for all cohorts regardless of the mortality conditions that they face.

In the computation of alpha normal pension ages, we do not need to investigate using a variety of different characteristics. Equation (3) requires that we use a particular characteristic to set alpha normal pension ages, the ratio of the number of person-years lived in the pre-pension period to the number of person-years lived in the pension period.

The characteristic, $\frac{u}{v}$, is simple to compute using the T_x column of the life table. $u = T_{20} - T_\alpha$ and $v = T_\alpha$, where α is the alpha normal pension age. In terms of life table notation, then $\frac{u}{v} = \frac{T_{20}}{T_\alpha} - 1$, and this equation can easily be solved for the alpha normal pension age.

In addition to being simple to understand, this characteristic has the advantage of being transparent. Life tables are freely available to anyone. Also, because the characteristic on which alpha normal pension ages are based is public and not computed, manipulated, or contested by various factions, it is a strong foundation around which a consensus can be developed.

In Table 3, we show $\frac{T_{65}}{T_{20}}$ for men and women in selected countries in 2013. It is the inverse of the ratio in the equation for $\frac{u}{v}$. We show it in the table because it is easier to interpret. $\frac{T_{65}}{T_{20}}$ is the fraction of all person-years lived from age 20 onward that are also lived at ages 65+. The median proportion of adult person-years lived at age 65+ is 0.2635 for men and 0.3065 for women. All men in the Western European countries in the Table have values above the median and all men in Eastern European countries have values below the median. The same is true for women, except for Ireland, where the value for women is 0.306, just marginally below the median. If the normal pension age were 65, then $\frac{T_{65}}{T_{20}}$ is the fraction of all adult-person years spent in pension. The low $\frac{T_{65}}{T_{20}}$ ratios in Eastern Europeans countries indicate that if the normal pension age were 65, Eastern Europeans would spend a smaller fraction of their adult person-years with a pension than would Western Europeans. If people in the two groups of countries were to have the same ratio of adult person-years in pension, then the normal pension ages would have to be lower in Eastern Europe.

The data underlying Table 3 in this Section and Tables 4 and 5 in the next Section were created as part of the preparation of the European Demographic Datasheet (2014).

Equation (3) shows that alpha normal pension ages should be set so that $\frac{T_\alpha}{T_{20}}$ is fixed. This is close to Shoven and Goda's characteristic of a fixed proportion of life expectancy at age 20, but it is not the same. Shoven and Goda's characteristic $\frac{e_\alpha}{e_{20}} = \left(\frac{T_\alpha}{T_{20}}\right) \cdot \left(\frac{l_{20}}{l_\alpha}\right)$.

Because life expectancies are increasing and life expectancy is the most well-known and well-understood life table function, it is tempting to use life expectancy changes to change normal pension ages, as Shoven and Goda have done. Sweden, Italy, Poland, and Norway have adopted a notional defined contribution pension system where pension contributions are cumulated in a notional account (OECD 2011). At retirement age, the total is turned into an annuity based on life expectancy. This system fails the principle of equity that states that the total amount of money contributed by a cohort to the pension system should be returned to the cohort in terms of pension benefits. Because each person of pension age gets an actuarially fair return on his contributions, the system takes from each cohort the pension contributions of those who do not survive to the pension age. This money might be returned to each cohort or perhaps it is used to fund the pensions of other cohorts.

Another way of using life expectancy as a basis of changing normal pension age is to increase normal pension ages according to some fraction of the increase in life expectancy at a specific age. There is no guarantee that this procedure would be equitable either. Further, because it is not based on a clear definition of equity, questions would always arise as to what fraction of the increase in life expectancy to use and at what age to measure it.

Alpha normal pension age is a simple, transparent, and equitable normal pension age. It is based on clear assumptions about the features of an equitable pension age. In the next Section, we present those ages for a selected set of European countries.

Table 3. $\frac{T_{65}}{T_{20}}$ for men and women in selected countries in 2013.

	Males	**Females**
Bulgaria	0.194	0.257
France	0.276	0.333
Georgia	0.198	0.264
Germany	0.264	0.307
Greece	0.263	0.307
Ireland	0.267	0.306
Italy	0.277	0.325
Latvia	0.182	0.269
Russian Federation	0.156	0.247
Serbia	0.202	0.249
Slovakia	0.207	0.274
Spain	0.271	0.325
Sweden	0.275	0.309
United Kingdom	0.271	0.307

Note: $\frac{T_{65}}{T_{20}}$ is the ratio of all person-years lived from age 20 onwards that are also lived after age 65. *Source*: Authors calculations based on life tables prepared for the European Demographic Data Sheet (Vienna Institute of Demography 2014).

5 Temporal Paths of Equitable Normal Pension Ages

In Table 4, we show alpha normal pension ages based on the formula $\alpha = C_s^{-1}\left(C_r\left(65\right)\right)$, where $C\left(a\right) = \frac{T_{20}}{T_a} - 1$, r refers to a specific combination of country, gender, and the year 2013, and s refers characteristic schedule of various years of interest for that country and gender. Computed in this way, all alpha normal pension ages in 2013 are assumed to be 65.

Table 4 shows that if 65 is the appropriate normal pension age in 2013, then for most countries, in order to keep the proportion of adult person-years in pension constant, the normal pension age should increase to between 69 and 70 by 2050. The similarity in the normal pension ages across countries is more interesting than it first appears. The ratio of adult person years spent at age 65 and beyond to all adult person-years varies across countries in 2013. For men, it was lowest in the Russian Federation, where it was 0.156 and highest in Italy, where it was 0.277. The lowest level for women was also in the Russian Federation, where it was 0.247. The highest level for women was in France, where one-third of all adult person-years was spent at age 65 or beyond. Nearly constant alpha pension ages across countries over time indicates that the forecasts in the European Demographic Data Sheet (Vienna Institute of Demography 2014) envision that the countries with low ratios continue to have low ratios and those with high ratios continue to have high ratios. Convergence in the proportion of person-years spent at more advanced ages to all adult person-years is not envisaged.

Table 5 shows the alpha pension ages keeping constant the person-years ratio for Germany in 2013. An interesting policy question is what normal pension ages should be if European countries moved toward a common policy with respect to those pension ages. Table 5 presents a concrete example of that policy based on alpha normal pension ages. The result would be very similar if we took any Western European country in 2013 as the standard. For German women and men the alpha pension age increases to almost 70 by 2050. Alpha pension ages are almost identical for Greece as they are for Germany. France has marginally higher alpha pension ages than the Germans and Greeks. Russians and the people in Eastern European countries have considerably lower alpha normal pension ages. The alpha normal pension age for Russian men in 2013 is only 57.30. Russian women have an alpha pension age of 60.99 in 2013, over 3 years higher than that of men. By 2050, the gap between the alpha pension ages of Russian men and women is forecasted to shrink a bit, but the alpha pension age for Russian men is still only 62.41 in that year.

Table 4a. Alpha normal pension ages for women in selected European countries, 2013, 2020, 2030, 2040 and 2050.

Women,					
Country	**2013**	**2020**	**2030**	**2040**	**2050**
Bulgaria	65.00	65.42	66.63	67.83	69.13
France	65.00	65.65	66.88	68.03	69.28
Georgia	65.00	65.37	66.55	67.77	69.04
Germany	65.00	65.82	67.09	68.34	69.62
Greece	65.00	65.97	67.32	68.59	69.88
Ireland	65.00	65.68	66.86	68.07	69.31
Italy	65.00	65.65	66.89	68.13	69.37
Latvia	65.00	65.68	66.88	68.13	69.36
Russian Federation	65.00	65.37	66.46	67.50	68.58
Serbia	65.00	65.63	66.90	68.18	69.49
Slovakia	65.00	65.78	67.04	68.30	69.61
Spain	65.00	65.41	66.63	67.85	69.09
Sweden	65.00	65.70	66.90	68.14	69.40
United Kingdom	65.00	65.68	66.97	68.19	69.41

Note: Alpha normal pension ages are based on the ratio $\frac{T_{20}}{T_{65}}$ observed in the country in 2013. *Source*: Authors' Computations based on data compiled for the European Demographic Data Sheet (Vienna Institute of Demography 2014).

Table 4b. Alpha normal pension ages for men in selected European countries, 2013, 2020, 2030, 2040 and 2050.

Men,					
Country	**2013**	**2020**	**2030**	**2040**	**2050**
Bulgaria	65.00	65.60	66.96	68.31	69.69
France	65.00	66.09	67.52	68.74	70.02
Georgia	65.00	66.17	67.54	68.89	70.27
Germany	65.00	66.00	67.45	68.70	69.99
Greece	65.00	66.19	67.58	68.84	70.15
Ireland	65.00	65.56	66.71	67.89	69.10
Italy	65.00	65.57	66.84	68.14	69.40
Latvia	65.00	66.17	67.80	69.39	70.83
Russian Federation	65.00	65.69	67.33	68.81	70.22
Serbia	65.00	65.97	67.27	68.54	69.85
Slovakia	65.00	65.92	67.46	68.85	70.26
Spain	65.00	65.61	67.05	68.35	69.64
Sweden	65.00	65.66	66.87	68.07	69.34
United Kingdom	65.00	65.58	66.82	68.00	69.23

Note: Alpha normal pension ages are based on the ratio $\frac{T_{20}}{T_{65}}$ observed in the country in 2013. *Source:* Authors' Computations based on data compiled for the European Demographic Data Sheet (Vienna Institute of Demography 2014).

Table 5a. Alpha normal pension ages for women in selected European countries, 2013, 2020, 2030, 2040 and 2050.

Women,					
Country	**2013**	**2020**	**2030**	**2040**	**2050**
Bulgaria	61.70	62.09	63.26	64.43	65.67
France	66.90	67.57	68.82	70.01	71.29
Georgia	62.17	62.53	63.67	64.85	66.06
Germany	65.00	65.82	67.09	68.34	69.62
Greece	64.98	65.95	67.30	68.57	69.86
Ireland	64.94	65.62	66.80	68.00	69.24
Italy	66.28	66.93	68.20	69.47	70.73
Latvia	62.49	63.15	64.31	65.52	66.72
Russian Federation	60.99	61.34	62.41	63.41	64.46
Serbia	61.21	61.81	63.02	64.25	65.50
Slovakia	62.81	63.58	64.81	66.03	67.29
Spain	66.29	66.70	67.93	69.18	70.45
Sweden	65.13	65.83	67.03	68.27	69.54
United Kingdom	64.99	65.67	66.96	68.18	69.40

Note: Alpha normal pension ages are based on the ratio $\frac{T_{20}}{T_{65}}$ observed in Germany in 2013. *Source:* Authors' Computations based on data compiled for the European Demographic Data Sheet (Vienna Institute of Demography 2014).

Table 5b. Alpha normal pension ages for men in selected European countries, 2013, 2020, 2030, 2040 and 2050

Men,					
Country	**2013**	**2020**	**2030**	**2040**	**2050**
Bulgaria	60.25	60.82	62.14	63.44	64.78
France	65.83	66.92	68.36	69.59	70.87
Georgia	60.52	61.64	62.97	64.28	65.61
Germany	65.00	66.00	67.45	68.70	69.99
Greece	64.91	66.09	67.48	68.74	70.05
Ireland	65.18	65.73	66.88	68.07	69.29
Italy	65.89	66.46	67.74	69.05	70.33
Latvia	59.34	60.46	62.03	63.57	64.97
Russian Federation	57.30	57.96	59.56	61.00	62.41
Serbia	60.86	61.80	63.07	64.31	65.59
Slovakia	61.15	62.04	63.53	64.89	66.27
Spain	65.52	66.12	67.57	68.87	70.17
Sweden	65.75	66.41	67.63	68.85	70.11
United Kingdom	65.49	66.06	67.32	68.50	69.74

Note: Alpha normal pension ages are based on the ratio $\frac{T_{20}}{T_{65}}$ observed in Germany in 2013. *Source*: Authors' Computations based on data compiled for the European Demographic Data Sheet (Vienna Institute of Demography 2014).

6 Comparison of Increases in Alpha Normal Pension Ages to Planned Changes

In this section, we compare changes in alpha pension ages with current plans to change normal pension ages using Germany in 2013 as a standard (characteristic schedule *s*). An important policy question is whether countries should strive to have roughly the same normal pension ages in the future. Our approach suggests that they should not try to have similar normal pension ages based on chronological age, but rather that they could try to have similar alpha normal pension ages. Having similar alpha normal pension ages are preferable because they take mortality differences into account. We use Germany in 2013 as our standard to help us look at what converged alpha normal pension ages could look like in the future. Had we used any other Western European country in 2013 as a standard the results would be similar. In Table 5, the alpha pension ages for Germany are a bit over 67 years old for both men and women in 2030. Currently, the normal pension age in Germany is scheduled to increase to 67 by 2029. The alpha normal pension ages and the planned normal pension age match almost exactly. In Spain, the normal pension age is scheduled to rise to 67 in 2027. The alpha pension ages for women and men in 2030 are 67.93 and 67.57 respectively. Again the match between the alpha pension ages and the legislated ones is close. Italian pension reforms call for the normal pension ages of men and women to increase to 66 in 2018. The alpha pension ages for women and men in 2020 are 66.93 and 66.46 respectively. Again the match is close. After 2018, there will be an automatic linkage between the changes in the normal pension age and increases in life expectancy. This is not consistent with the equity criteria that we discussed above.

Some countries have legislated increases in normal pension ages that are faster than those suggested by the alpha normal pension ages. In the UK, normal pension ages are scheduled to rise to 67 by 2026. The alpha pension age for women in 2030 is 66.98 and it is 67.32 for men. The rise in the UK normal pension age is slightly faster than the rise in alpha pension ages. In Ireland, the legislated increase in normal pension age is much faster than the increase in alpha pension ages. The normal pension age is scheduled to increase to 68 in 2028 in Ireland. In 2030, the alpha normal pension ages are 66.88 for men and 66.80 for women. Greece has already increased its normal pension age to 67, while its alpha pension age is still around 65. France is an interesting example of a country with a normal pension age much below its alpha normal pension age. In 2050, France is the country in Table 5 with the highest alpha normal pension ages. If its normal pension age remains at 62, France at that time will be massively out of step with much of Western Europe.

Normal pension ages tend to be lower in Eastern European countries, as alpha normal pension ages suggest they should be. Typically, the pension ages for men are higher than for women, which is the opposite of what the alpha normal pension ages suggest they should be. In the Russian Federation, for example, the normal pension age is currently 60 for men and 55 for women. The alpha normal pension ages are 57.30 for men and 60.99 for women. Russian normal pension ages are now very roughly consistent with those in Western Europe, taking life expectancy differences into account.

Alpha normal pension ages are a simple analytic tool for discussing the evolution of normal pension ages. In this section, we showed that they are close enough to the legislated paths to make interesting comparisons. Alpha normal pension ages are easy to understand, easy to compute, and provide informative comparisons to legislated values.

7 Concluding Discussion

In Table 5, alpha normal pension ages rise to 70 for many countries by 2050. Alpha normal pension ages are designed to be fair, but it is sometimes argued that substantial increases in normal pension ages make the pension system more unfair. People in physically hazardous or especially arduous occupations might not be physically capable of working to age 70. It is certainly true that some people may not be able to work to age 70, but this does not automatically mean that normal pension ages should not be raised. Alpha pension ages are fair pension ages. Keeping pension ages fixed is unfair.

Alpha pension ages rise over time because of increases in the remaining life expectancy of older people and higher survivorship to older ages. In the past increased life expectancy has been associated with better health at older ages and better cognitive functioning (Vaupel 2010; Christensen et al. 2009; Baudisch & Vaupel 2012; Weber et al. 2014; Bordone et al. 2014). When people picture whether people can or cannot work up to age 70, they naturally picture today's 70 year olds. But tomorrow's 70 year olds will be different. They will be healthier, better educated, and it is likely that they would more attracted to market work than today's 70 year olds (Scherbov, Sanderson, KC, et al. 2014).

Nevertheless, it would be unwise to ignore the distributional effects of increasing normal pension ages. In Economics, there is a rule of thumb that states that policy-makers should have at least policy available to them for every target that they wish to attain. The single policy, changes in normal pension ages, should not be treated as being capable of simultaneously hitting the two policy targets. This is why in many countries, pension reforms that increased normal pension ages also provided additional support to people who had difficulties continuing to work at older ages (OECD 2014).

In some cases, such as that of Ireland, planned increases normal pension ages are considerably faster than those in alpha normal pension ages. Reducing the speed of the planned increases, in these cases, could make the pension system more intergenerationally equitable. It would, however, increase government expenditures. It could be possible for governments to add to their revenues by reducing labor market distortions which discourage people who would otherwise wish to work. In (Scherbov, Sanderson & Mamolo 2014) we showed that, in many European countries, a one to two percentage point increase in the average labor force participation rates resulting from a decrease in labor market distortions could compensate for a one year decrease in the normal pension age in terms of the burden of workers supporting those not in the labor force. A joint policy change, simultaneously reducing labor market distortions and reducing the speed of increase in the normal pension age, could result in a more equitable pension system without a loss of revenue to the government. It would be a win-win policy because labor markets would be less distorted and the pension system would be more equitable.

Two different approaches to changing normal pension ages has emerged in Europe. One is to set targets for normal pension ages, often a decade or more in the future. After a while a new set of political negotiations is necessary to produce new targets. This episodic policy making has an important problem. As countries age, it is likely to become ever more difficult politically to make the needed reforms of normal pension ages. In Sanderson and Scherbov (2007a), we showed that by 2050 around 39 percent of Germany's voting age population would be 65+ years old.

The alternative approach increases normal pension ages continuously as life expectancy increases. This approach is currently implemented in Sweden and will be implemented in Italy from 2018 onward. This form of demographic indexation is a step in the right direction, but indexation based on the T_x column of the life table rather than the e_x column would be preferable. Alpha pension ages provide a helpful guide to continuous modification of pension ages because those ages are based on an easily understood principle that is readily seen as fair. Policy-makers should consider replacing episodic changes in normal pension ages with continuous ones based on alpha normal pension ages.

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