Theoretical gender gaps in pensions

Content

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Executive summary

This paper uses a simplified earnings-related pension plans and statistics from the United Nations (UN), Organisation for Economic Co-operation and Development (OECD) and European Union (EU) for country specific gender pay gaps, longevity differences, and age differences between spouses to illustrate and quantify the economic, demographic and social sources of theoretical pension's gender gap for several countries. This report has been written on behalf of the ISSA Technical Commission on Old-age, Invalidity and Survivors' Insurance (TC Pensions).

The main reason behind the gender gap in pensions between men and women is that women have lower lifetime earnings than men. This is because women have a lower labour force participation rate, work fewer hours in the labour market and receive lower wages. Table A in the annex presents estimations of earning gaps for 155 countries. Since most pension plans award pensions proportionally to earnings or pension contributions, gender differences in lifetime earnings are translated into differences in pensions. Furthermore, women also live longer than men. A longer life span in addition to women being younger on average than the spouse results in women outliving on average their partners, and hence are more likely than men to live in a single-person household. The loss of a partner reduces the economic standard of living for the surviving spouse. The reason for this is that many fixed-costs related to a household can be shared, and hence living together enables economies of scale. In addition, since pension benefits often follow the development of consumer price index (CPI) they deteriorate relative to average earnings over time, if real wage development is positive. Since women live longer than men, the choice of indexation policy also contributes towards the gender gap in pensions.

The lifetime pension gap is calculated as the total pension payments over the expected remaining life expectancy for both men and women. When this indicator is analysed the gap between the women and men is significantly reduced or even reversed. This is explained by the fact that although women on average have lower annual benefits they have a longer duration of payments then men.

The gender gap in pensions can be reduced or even closed by:

- introducing or increasing existing, gender gap equalizing measures within existing earnings-related pension plans, or replacing such plans with a flat-rate pensions (i.e. the same pension to all retirees);

- a survivor pensions benefit that completely compensates for loss of economic standards of living (i.e. economies of scale) when a spouse/partner dies;

- indexing pension benefits to growth in average wages.

There are, of course, economically, ideologically and politically valid arguments for and against each of these policy measures. This paper neither

advocates nor opposes any policy measure. The aim of this report is to contribute to the debate on gender gap in pensions and on policy designs related to this issue.

1. Introduction

Policy makers and social partners should not be surprised by the fact that earnings-related pension plans reproduce earnings differences in the pension system. Since women – on average – have lower incomes than men, earnings-related pension plans will result in a pension gender gap. If pensions should reflect differences in income and pension contributions there is no reason to claim that the pension's gender gap is a problem any different from other income gaps, such as the pension gap between low-income earners and high-income earners irrespective of gender. With this line of reasoning the pension gender gap is a consequence of existing earnings gaps. Furthermore, if there is general support to have a close link between earnings, and thus between contributions to the pension plan and the pension, then there is only one acceptable way of reducing the pension gap and that is to reduce the gap in earnings between men and women.

Women earn less than men in virtually all countries. Figure 1 below shows the estimated earnings gap for 155 countries using the gross national income by gender in 2017 (2011 USD PPP) as a global proxy for the earnings gap. The average "gender gap in earnings" across 155 countries is roughly 40 percent.

Figure 1. "Income gaps" in 155 countries, proxied by 2017 gross national income (2011 USD PPP)
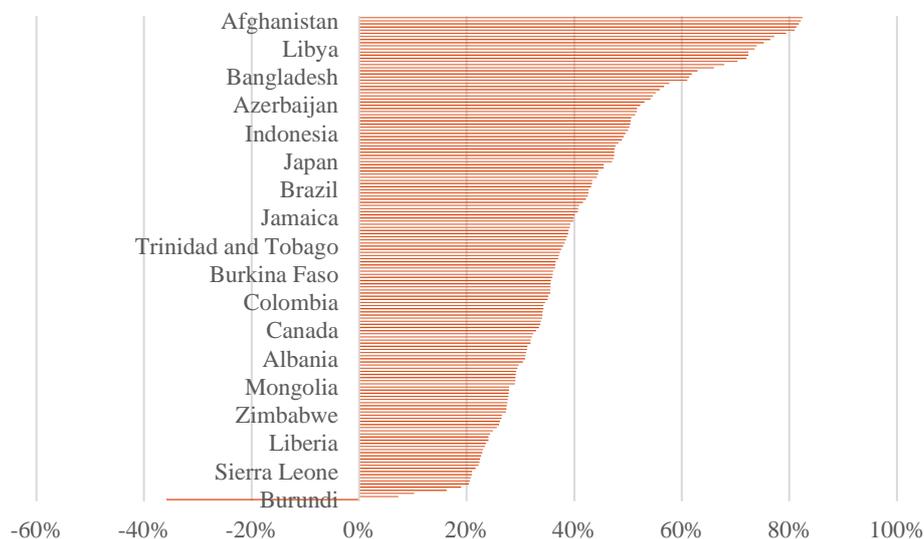
Source: United Nations.

Women work more than men (Figure 2). According to the OECD, women across 31 countries (28 OECD countries, China, India and South Africa)

work 479 minutes per day while men work 449 minutes of work per day.[1]
Time spent in work is divided into paid and unpaid work. Men have 318
minutes of paid work while women have more part-time and work 213
minutes of paid work per day. However, women have 266 minutes of
unpaid work, while men only have 131 minutes of unpaid work per day.

Figure 2. Time spent in unpaid and paid work by gender, minutes per day
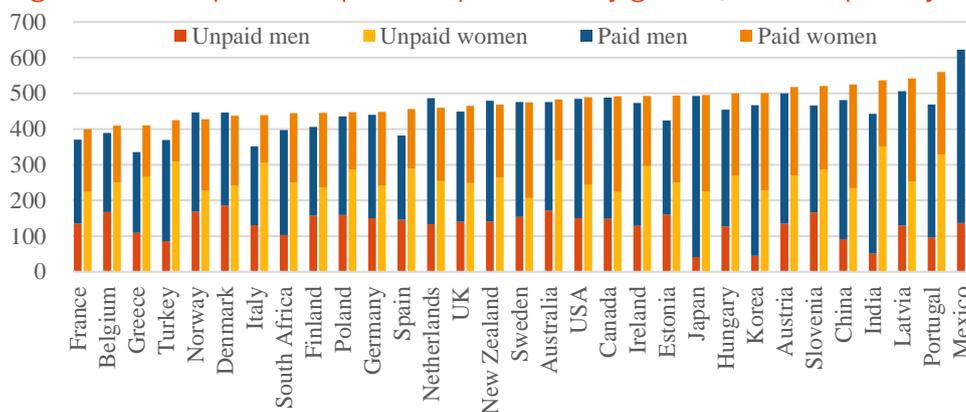
Source: OECD

Since women on average have less hours of paid work, these differences
result in lower lifetime income for women. The main reason for this
situation is that women often take a larger responsibility for unpaid informal
household work such as caring for children and elderly family members and
hence reduce, or are forced to reduce, their labour supply.[2] This is one area
where policy makers and/or social partners could reduce or eliminate the
pension gender gap that originates from the difference in how "society"
rewards market and unpaid household work.

A counter-argument against policy measures that aim to reduce the
difference in pensions caused by differences in average life-earnings
between men and women is that such measures risk conserving gender
inequality arising from how men and women organize their work and
household lives prior to retirement. This argument has not prevented policy
makers from providing policy measures that favour women over men within
earnings-related pension plans. Many countries with earnings-related state
pensions have measures that favour women.

Introducing measures within earnings-related pension schemes that partly or
even completely compensate for gender differences in lifetime income
erodes the earnings-related principle within such schemes. A more direct
way to avoid differences in pension benefits between men and women is by
completely abandoning the income-pension benefit relation. A flat rate

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[1] OECD Stats https://stats.oecd.org/index.aspx?queryid=54757.

[2] The negative effect that children tend to have, or at least have had for women that were retired in 2009,
is indicated in *The gender gap in pensions in the EU*. Figure 11.

pension to all does this and avoids transmitting the difference in average lifetime earnings between men and women to a corresponding difference in monthly pensions.

Pension systems basically have two related purposes, namely, the transfer of income across the life-cycle and poverty elevation. However, irrespective of the design of a public pension plan, and the rhetoric supporting that design, we, as do a majority of experts, claim that the most important objective of a public pension plan is to combat poverty among the elderly. Whether this objective is more effectively achieved by targeted benefits, or with flat-rate benefits to all irrespective of need, or by earnings-related pension schemes or by a mix of these principles is a seemingly never-ending normative policy discussion. This report will not go further into these large pension policy issues.

In this paper, various data sources are used to illustrate the sources of different gender gaps. In addition, a very simplified theoretical "pension model" is used to enable analysis on expected gender gaps in pensions. The theoretical "pension model" enables country approximations of the expected, theoretical gender gaps. The reason for doing this simplification or abstraction is to facilitate the comparison of the structural issues related to the pension gender gap. This said, it is important to note that the pension gaps presented in this paper are theoretical and a simplification of the situation in each of the modelled countries and cannot without elaboration be used to draw conclusions on the actual gender gaps.

The gender gap in pensions in the EU provides a good overview of estimated actual pension gender gap for the EU countries. In 2009 the population-weighted EU 27 average pension gap was 39 percent. This means that the average pension of a woman was 39 percent less than the average pension for a man. Furthermore, the pension gender gap was even larger for married women at 54 percent, 31 percent for widows, 26 percent for divorced and 17 percent for singles.

Definitions

There are three different types of gender gaps in pensions. The primary *gender gap* in pensions is defined as the difference in average monthly pension benefit received by men and women.[3] This is the same definition as used by the European Commission in the referred report. The second gap is the difference in average monthly individual *economic standard of living* between men and women. This measure takes the total income of the household and divides it by the number of persons in the household in a way that acknowledges economies of scale in living costs per household size. The latter gap reflects that persons living in the same household normally have the same economic standard, share fixed-costs and that there are economies of scale in larger than one-person households. Economies of

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[3] $\left(1 - \frac{woman's\ average\ female\ pension}{men's\ average\ male\ pension}\right) \times 100 = gender\ gap\ in\ pensions$

scale imply that living expenses increase less than proportionally to the size of a household. The third gap is the *gender gap in lifetime pensions*. It is calculated as the present value of all expected monthly payments given expected remaining life-expectancy and indexation of pensions in payment.

2. Gender-gap in income and in pensions

Figure 3 presents the distribution of pension-qualifying income for all men and women in Sweden 2016. Pension-qualifying income is defined as all the income used to calculate the pension credit in the national public pension. In principle, pension-qualifying income consists of all annual income from earnings, social insurance etc. after employees' pensions contribution. This income is a good proxy for all income from work or social insurance benefits replacing work income and also from self-employed declared income. The income average for men is roughly 1.1 times the unisex average and the average for women is roughly 0.9 times the unisex average. The average income of women represents 79 percent of the average income of men, which is a 21 percent gender gap in earnings. There is a ceiling on pensionable income in the Swedish public pension. Income above this ceiling does not increase the workers public pension.[4] In figure 3 the vertical line represents the ceiling and this value corresponds to 1.45 times the unisex average.[5] Meanwhile more of the incomes earned by men are above the ceiling than those of women, with the ceiling reducing the gender gap in pensionable income in the public pension plan. The ceiling reduces the gender gap in pensionable income to 15 percent.

The income gap is mainly explained by fewer hours of paid work for women relative to that of men. The hourly-pay gap is 11.3 percent in Sweden,[6] the EU-27 hourly-pay gap was 16 percent in 2009 according to The Gender Gap in Pensions in the EU. If further statistical considerations are taken with regards to profession, industry, education, age and time in profession, the gender gap in wages is reduced to 4.3 percent. This wage gap is unexplained by the statistical analysis[7].

Most countries limit the earnings used for pension contributions and pension benefits (OECD 2018). A ceiling implies a deviation from proportionality between income and size of pension benefit, but not necessarily between pensions and pension contributions. In addition, various rules compensate

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[4] Occupational pension plans normally insure incomes above the ceiling.

[5] The ceiling in the Swedish public pension plan is low. According to OECD calculations the Swedish ceiling is 105% of average worker earnings compared 224% across 20 OECD countries (OECD 2018). According to Swedish data the ceiling is 125 percent of the average wage of a fulltime worker.

[6] Swedish National Mediation Office (2017). "Rapporten om löneskillnader 2017".

[7] Ibid.

for life circumstances such as sickness, unemployment, taking care of dependent children in public pension schemes. Some of these rules often aim to compensate women for the loss of income due to child caring activities. In the Swedish pension scheme, such "solidarity" pension credits paid for by government reduced the gender gap by another four percentage units, from 15 percent to a net gap of 11 percent in 2016.

Figure 3. Distribution of Pension-qualifying income in Sweden 2016
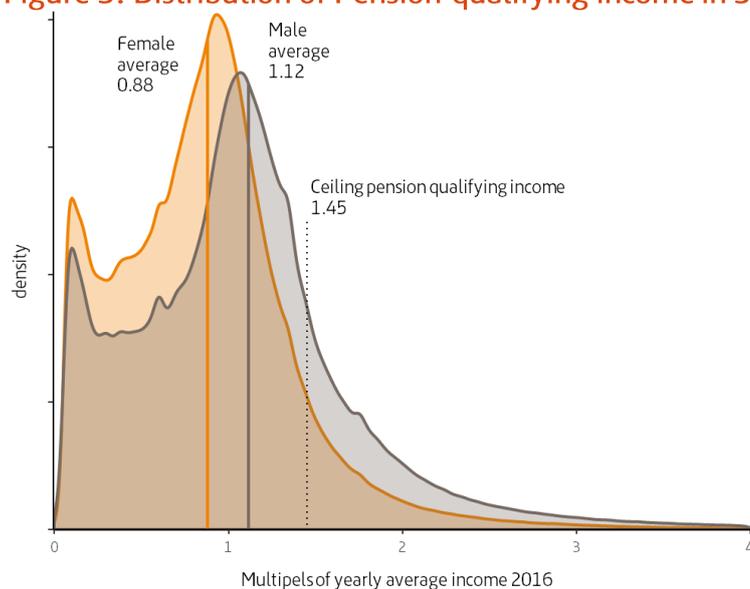
Source: Swedish Pensions Agency (Pedal)

Table 1. Gender gap in income and in pensions credits, Sweden 2016.

Income measure	Average women, EUR[8]	Average men, EUR	Av. women / av. men	Gender gap
All income	26 943	34 204	79%	21%
Income below ceiling	25 273	29 455	85%	15%
Income below ceiling + "solidarity" pension credits	26 179	29 388	89%	11%

Source: Swedish Pensions Agency (PEDAL)

In a proportional earnings-related pension system, the pension benefit is linear with lifetime income. In such a system, the income gender gap for a single year is only relevant if the gender gap in income is stable over time. If the income gender gap changes over time, the lifetime earnings will differ for each birth cohort. In many countries the annual gender gap in income

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[8] SEK 100 ≈ EUR 10

has been decreasing for several years. Figure 4 presents the development in Sweden.

Figure 4. Development of average female earnings over average male earnings, Sweden, 1992-2016
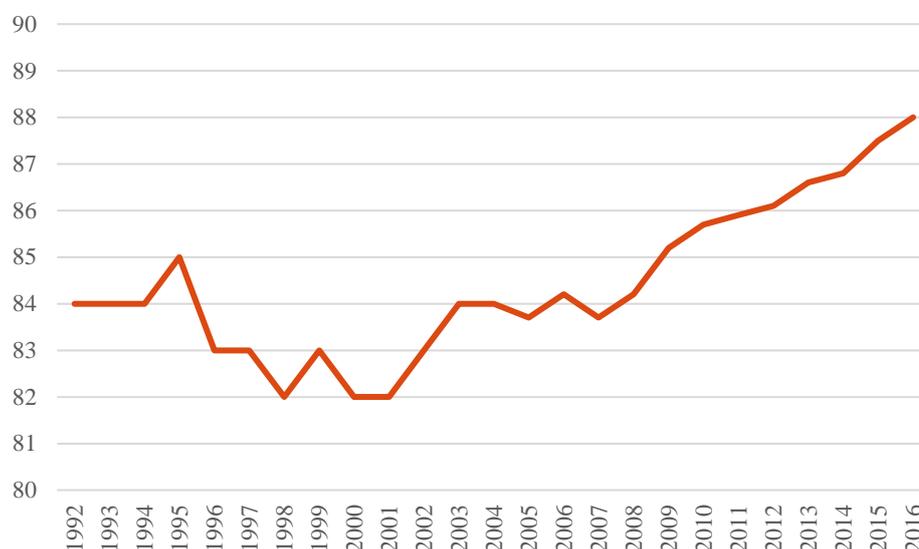
Source: Swedish Pensions Agency (PEDAL)

In a proportional pension plan with a changing, diminishing, income gender gap the income gender gap in a single year will be a bad estimate for the future pension gender gap. In this case, the pension gender gap will reflect the historical gender gap decades ago. In such a pension plan, the lifetime income gap of each cohort will be a source of the overall pension's gender gap.

The distribution of "notional pension capital" reflects the distribution of lifetime income below the ceiling in the public pension plan and the effect from "solidarity" payments such as contributions paid for unemployment, sickness, parental leave etc. Figure 5 presents the Swedish gender gap in notional pension capital at age 64 for the cohort born in 1953. Notional pension capital can be explained as the sum of each individual's yearly pensionable income, as a share of the yearly average wage, multiplied by the contribution rate.[9] As an example, a person earning the average income every year for 40 years gets 40 "points" in the public pension plan. Those points multiplied by the contribution rate (in the example assumed to be constant at 20 percent), results in an individual notional pension capital of

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[9] The pension wealth indicator can also be explained as the notional pension capital represents the value of all paid contributions indexed by the increase in average income. A third explanation is that the notional pension capital is equal to the net present value of expected pension payments assuming a unisex life expectancy and indexing and discounting benefits with the growth in average income. Theoretically, all definitions should give the same result.

eight times the average income. This can also be expressed nominally, in normal currency.

Figure 5. Distribution of notional pension capital at age 64 for birth cohort 1953 in Sweden
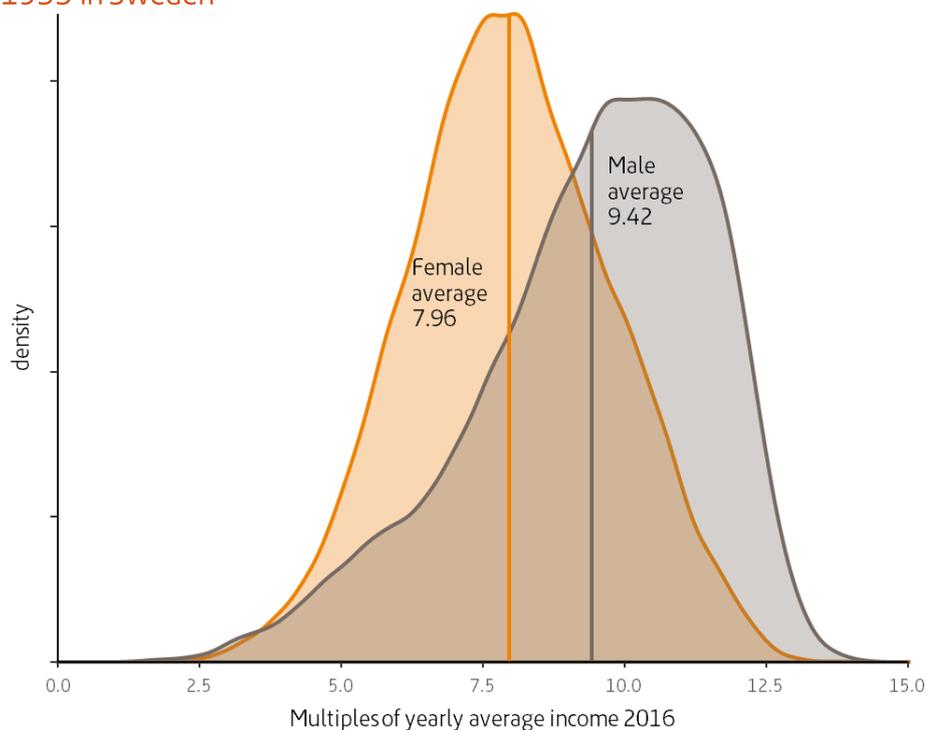
Source: Swedish Pensions Agency (PEDAL)

Women have a lower notional pension capital than men and the gender gap in notional pension capital is 15 percent. The average notional pension capital at age 64 is 7.96 times the average income for women and 9.42 for men. In Sweden, this 15 percent gap will be transferred into an equally large gender gap in monthly, earnings-related public pension.

The gender gap in public earnings-related pension is decreasing in Sweden as in many other countries across birth-cohorts. The reduction of the gender gap in pensions in Sweden (illustrated in Figure 4 as a decreasing gender gap in income) is shown for some generations in Figure 6.

In the modelled pension system used in the report, the calculations have been simplified in many respects. For example, "current" gender gap in yearly income is used. The income gaps used for the different countries in the model calculations are shown in table 2.

Figure 6. The public earnings-related monthly pension benefit gender gap for birth-cohorts 1920-1950 in Sweden
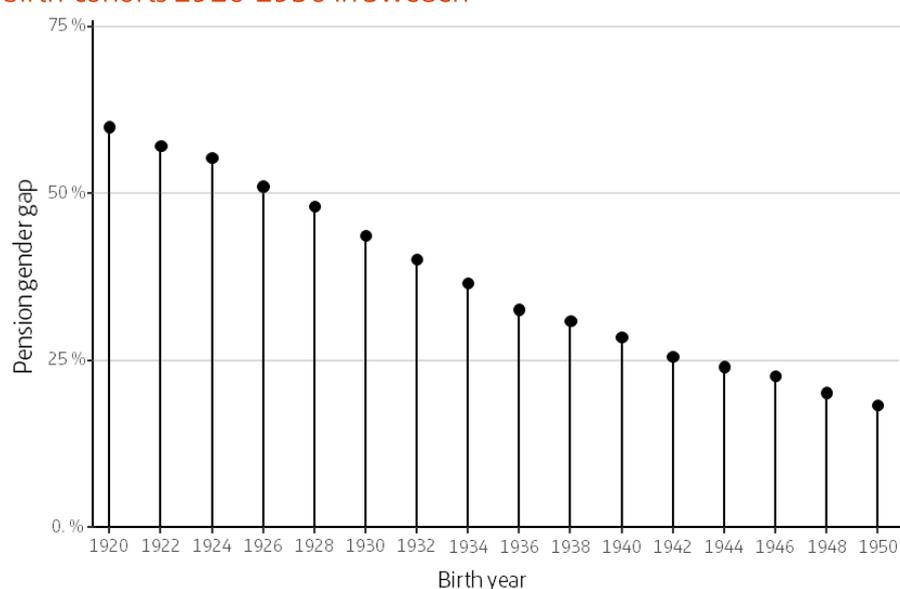
Source: Swedish Pensions Agency (PEDAL)

Table 2. Present income gender gaps estimated by using the gross national income per capita (2011 PPS USD) in 2017 and life expectancy in some countries

Country	Gross National Income women	Gross National Income men	Gender gap income percent	Life expectancy at age 65 females	Life expectancy at age 65 males	Females LE at 65 compared to males
France	32 518	46 218	30%	23.1	19.6	18%
Germany	37 689	54 843	31%	21.1	18.1	17%
Italy	25 767	45 326	43%	22.4	19.3	16%
Japan	27 209	51 326	47%	23.7	19.5	22%
New Zealand	25 872	42 339	39%	21.3	19.0	12%
Poland	20 367	32 343	37%	20.3	16.2	25%
Russian Federation	19 510	29 671	34%	17.9	13.6	32%
South Korea	22 572	49 297	54%	22.2	18.7	19%
Sweden	41 743	53 777	21%	21.6	19.4	12%
United Kingdom	28 043	50 485	44%	21.1	18.9	12%
United States	43 899	66 208	34%	20.9	18.6	13%

Source: UN and the Human Mortality Database.

3. Other sources of the pension gender gap, in addition to the income gap

3.1 Gender gap in monthly versus lifetime pensions

On average, women receive lower pensions per month than men. However, women receive their pensions for a longer duration because they live longer. Should this be taken into consideration when estimating the pension gender gap? The answer depends on the perspective you take on the issue. One argument against considering the differences in life expectancy between women and men is that all individuals live day by day and therefor need periodic income to buy goods and services to survive, hence what that periodic income adds up to is irrelevant. Another perhaps more "actuarial" or technical argument is that a public old-age pension insures the whole population and as such it does not distinguish between life expectancy (risks) of different groups. This same argument could be used against analysing income transfers in pension plans between socio-economic groups. Such analyses often show transfers from low-income earners to high income earners chiefly or entirely due to their longer life expectancy.[10] That EU legislation does not consider gender in calculating pension premiums or benefits could also be an argument against the relevance of the analysis.

One argument for considering the lifetime pensions gap is that the total value of the pension insurance is not only the monthly benefits but also the present value of the accumulated pensions. Information on how the pensions gender gap diminishes when studying the lifetime gender gap is one of the raison d'être of all pension plans. A fundamental principle of a pension insurance is to distribute income from persons with below average life expectancy to those with above average life expectancy.

The lifetime pension gender gap is straightforward if the indexation of the pension benefit in payments equals the discount rate used when calculating the present value of all future pension payments. The correct or suitable discount rate to use in this calculation is disputable, but a good candidate is the average wage growth. If pensions are indexed with average wage growth the lifetime pension is simply the initial benefit times the expected number of months that will be paid to women and men respectively. If the pension is

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[10] A study on Swedish data, *Livslängdsanalys för olika inkomstgrupper, riktålders rapport 3,* shows that there is no, or at no evident, income transfer from low-income to high income earners for the insured collective as a total, that is all men and women. The combination of lower income and longer life that women have relative to that of men counters, in this study, the longer life that high income earners have relative low income earners within sexes.

indexed to consumer prices, the benefit must be discounted by expected real price growth.

Table 3 presents both the lifetime pension gap and the effect of indexation according to growth of average wages or inflation (consumer price index, CPI). The pension gap is much reduced when taking the lifetime view, depending on the life-expectancy difference between men and women. In Russia, women have a 32 percent higher life expectancy than men (Table 2). This longer life expectancy implies that regardless of a theoretical pension gap in Russia of about 35 percent, women will over their lifetime receive 22 to 25 percent more pension than men. The other studied countries also have a very important, but less dramatic, reduction of the pension gap taking the lifetime perspective.

When using CPI the value of the pension benefit is diminishing over time, which in this case, is equal to the "remaining life expectancy". Discounting has a larger negative impact for women than for men since they live longer. The importance of the choice of indexation of pension benefit on the pension gap is discussed in the following section.

Table 3. Theoretical pension gap and life-time pension gap

Country	Pension gap		Life-time pension gap[11]	
	CPI	Income indexed	CPI	Income indexed
France	31,3%	30,0%	11.8 %	10.1 %
Germany	32,2%	31,0%	14.5 %	13.1 %
Italy	44,0%	43,0%	31.7 %	30.5 %
Japan	48,3%	47,0%	33.1 %	31.5 %
New Zealand	39,8%	39,0%	23.8 %	22.8 %
Poland	38,4%	37,0%	8.5 %	6.5 %
Russian Federation	35,5%	34,0%	-22.4 %	-25.3 %
South Korea	54,9%	54,0%	42.1 %	41.0 %
Sweden	22,1%	21,0%	9.4 %	8.2 %
United Kingdom	44,7%	44,0%	35.1 %	34.3 %
United States	34,9%	34,0%	19.6 %	18.5 %

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[11] Present value of expected life time pensions (i.e. pension wealth) in the theoretical model pension plan, discounted by income growth. The actual size of the pension is irrelevant, only the relation between average female and average male pension.

3.2 Another aspect of indexing pensions with consumer price or income development

In a fully proportional pension plan, which awards pension benefits as a function of lifetime income or pension contributions, the main source of a pension gender gap will be the difference in (lifetime) income between men and women. The income differences between men and women during working life will translate into corresponding differences in monthly pensions. However, even if there were no difference in (lifetime) income the pension plan could still produce a pension gender gap. This is the case if women live longer and benefits are indexed to CPI (or any other index with lower development than average income), and if there is real growth in income.

With positive real earnings growth, and if pensions are calculated as a function of earnings and indexed to CPI, the pension benefits of older birth cohorts of retirees will be lower than younger cohorts. Since the mortality of women is less than that of men, the share of women increases with age. Consequently, there is a higher share of women than men in the older age groups and the higher the age the lower the pension is, causing the average pension of women to be lower than the average pension, even if the average pension of men and women at every age is the same.

The pension gender gap produced by the higher life-expectancy of women and consumer price indexation in combination with real growth is not large but it roughly contributes between one to two percent of the pension gender gap, given the life expectancy difference between men and women and the economic assumptions made in this paper (Table 3). The calculations in Table 3 assumed a real income growth of 1.6 percent per year. With a higher assumed real income growth the CPI will cause a higher pensions gender gap; with lower growth, the gap decreases. The average age among females retirees is roughly one year higher than for males, thus the CPI gender gap effect is roughly one year in real income growth.[12]

The choice of indexation is neither arbitrary nor without important trade-offs. With a constant budget restriction (i.e. the same total cost) lower indexation such as consumer price indexation allows for higher initial pension benefits. On the other hand, with an income indexed pension benefit, initial pension benefits will have to be lower. Higher indexation distributes towards groups that live longer, and since women on average live longer than men, income indexation is more advantageous for women as a group. However, there are many other socio-economic parameters that explain life expectancy; moving towards something that benefits women could be regressive since it would be at the expense of low-skilled, less

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[12] That the average age of all female retirees exceeds the male average much less than the female life-expectancy exceeds the male is explained by the fact that there are many more women and men of lower age than at higher. Thus the weighting by number of persons explains the difference.

educated, low income individuals who all belong to groups with lower life expectancy.

The definition of the pension gender gap used in this paper and most other studies compares the average pension of all retired women with the average pension of all men of all ages. As explained here this definition implies that there could be a pension gender gap even if the average pension of men and women were identical at each age. It is a matter of perspective if this implies that the definition of the pension gender gap is flawed or not. By separating the different sources of the pension gender gap, the information on the "age composition effect" will become clear and makes it possible to make an informed and transparent decision if the combined effect from indexation and age structure were to be considered part of the gender gap or not.

3.3 Standard of living

Economic standards of living are calculated as the ratio of total household income divided by an equivalence scale. Income equivalence scales are used to enable comparisons across households of varying size and composition. Furthermore, as living expenses rise less than proportionally to household size, equivalence scales also consider economies of scale in larger households. In the previous section the theoretical gender gap was estimated by using monthly pension benefits and lifetime pension wealth. This analysis gives information on the pension gender gap between men and women at an individual level. However, as many individuals live in households with more than one person it is important to compare economic standards of living independent of household size. In a household the members often share income and costs, and furthermore they are often also required by legislation to support each other. Consequently, this affects the pension gender gap of men and women who live in two-person households.

Economies of scale imply that two persons living together has an economic standard of living higher than one person living on half the income of the couple. The reason for this is that collective goods such as housing can be shared. The effect of economies of scales is hard to estimate and there are several scales in use. The OECD uses a scale in which the total household income is divided by the square root of the size of the household. This means that the economic standard of individuals in a two-person household with an average income equal to that of the income of a single person household is 41 percent higher than the single-person household's economic standard of living.[13]

Assuming couples share their total income equally, the gap in the economic standard of living between genders goes down. The gender gap in pensions within couples is eliminated with this perspective. Couples thus decrease the

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[13] To calculate the standard of living the OECD scale implies that the total household income of two persons in the same income is divided by $2/\sqrt{2}=1.41$ or 41%.

standard of living gap between the sexes. There are however a significant gap in standard of living between couples and singles.

Table 4. Theoretical gaps

Country	Gap females/males		Gap couples/singles	
	CPI pension Gap	Standard of living Gap	Standard of living Gap	Share of females singles ≥65
France	31.3 %	20.0 %	38.4 %	69%
Germany	32.2 %	20.4 %	37.8 %	68%
Italy	44.0 %	25.5 %	39.9 %	68%
Japan	48.3 %	27.5 %	41.7 %	69%
New Zealand	39.8 %	22.5 %	38.7 %	67%
Poland	38.4 %	21.2 %	39.9 %	72%
Russian Federation	35.5 %	20.9 %	39.8 %	76%
South Korea	54.9 %	30.2 %	42.3 %	69%
Sweden	22.1 %	16.0 %	36.3 %	66%
United Kingdom	44.7 %	24.4 %	39.5 %	67%
United States	34.9 %	20.5 %	38.5 %	68%

Even if there were no gap in pensions paid, then there would be a gender gap in standard of living due to the fact that more woman then men are single.

For example, in New Zealand our theoretical calculation show that if a woman had an income of more than 90 percent of a man's income, the standard gap would be larger than the income gap. For women as a group to have a standard of living equal to that of men, their income would have to be at a level that is 140 percent of men's, with CPI indexed pensions.

Women spend more time living in single households than men. This has four sources: The first and single most important is that women have a higher longevity. The second source is that women in couples on average are younger than their men, with an average difference of two to three years. Thirdly, women are more often single already when they retire compared to men. In Sweden 31 percent of all women are singles at age 65 compared to 27 percent of all men. This difference adds to the expected duration as a single household. Finally, mortality is higher among singles than for persons living as part of a couple, and the effect is more pronounced for men than for woman. Therefore, there are fewer single males from the start, and expected lifetime for a single man (widower) is significantly shorter than for a single female (widow) of the same age. We have not studied the share of

men and women living in couples and as singles at time of retirement in other countries, but the higher share of female singles relative to that of men at retirement seems common. For example, Canada reports a similar pattern as in Sweden, with 36 percent of women and 23 percent of men in the age group 65-69 are single. We believe this structure can be generalized to many other countries as well. The theoretical calculation of the share of single persons that consists of women (Table 4) varies between 66 to 76 percent, and is probably more uncertain than many other estimates in this paper. The tendency that a large share of single households among retirees consists of women is however certain.

Figure 7. Gap in pensions and standard of living as a function of relative income
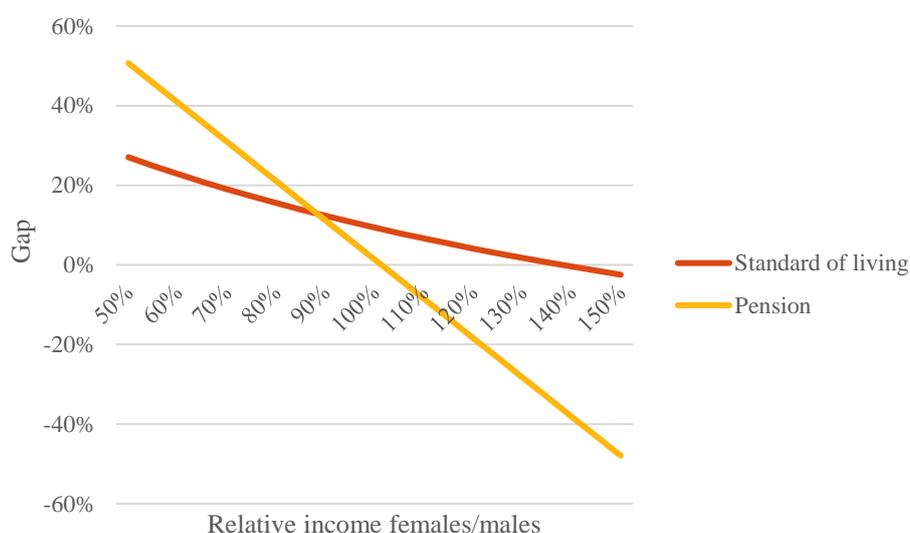
The age specific gap in standard of living increases with age as relatively, more women become single mainly due to the death of their partner. The standard of living is lower for singles, and at higher ages the probability for a man to be single is significantly lower than for a woman: in Sweden at age 85 it is 37 percent for men and 74 percent for woman. The effect is an increased gap in standard of living at higher ages, as shown in Figure 8 for New Zeeland.

Figure 8. Theoretical gap in standard of living as a function of age – CPI indexation
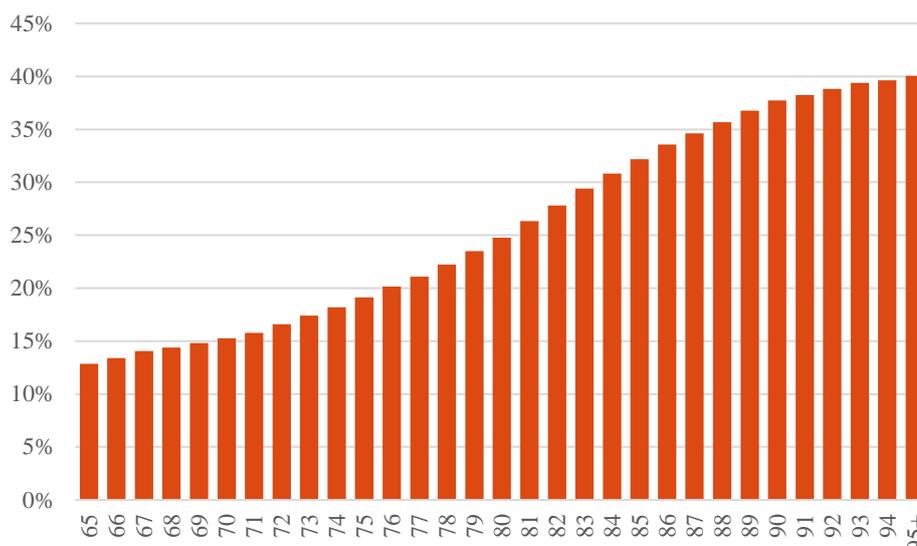
In many countries it is more common to live in extended families than it is for example in Sweden. Family compositions of larger households complicate the analysis of the standard of living gap further, and are not accounted for here. However, extended families do tend to make it possible for retirees to have a better standard of living than their pension would indicate since the economies of scale in extended families can be considerable.

4. Preserving the same standard of living through a reformed survivor's pension

From a theoretical point of view, it is possible to construct a survivor's pension that preserves the economic standard of living when a spouse dies. Such a survivor's pension can be designed with different levels of precision and different levels of income preservation. The first alternative is to assume that all individuals aim at having the same pension level, set at 1 for reasons of simplicity. The couple then has an income of 2 and standard of living $2/\sqrt{2} = \sqrt{2} = 1.41$. The loss of a spouse would leave the survivor with income and standard of living equal to 1. A survivor's pension of 0.41 would restore the standard of living and hence the level of the survivors' benefit should be 41 % of the deceased person's pension.

Since the average pension benefit within couples is not the same, a second and more accurate alternative would be to take the average pension level into account. If the man has a pension benefit of 1 and woman has a pension

benefit equal to 0.8, they have an economic standard of living $1.8/\sqrt{2} = 1.27$. If the husband dies the survivor needs 0.47 in addition to the initial 0.8 to enable the same economic standard of living. If, instead, the wife dies before the husband, the survivor needs 0.27 extra to have an unchanged standard of living. In this case the survivor's pension needs to be 47 % of a husband's pension and 27 % of a wife's pension.

A third option would be to look at each couple individually and to determine the level of the survivors' pension which enables an unchanged standard of living for the surviving spouse. Finally, in some cases such as within couples with large levels of income inequality and where the couple consist of one person with a much higher pension than the partner, the death of the person with the lower pension would increase the standard of living of the survivor, in which case no survivor's pension is needed. Indeed the pension of the surviving person would in some cases need to be reduced to keep the standard of living from increasing. To keep the standard of living for surviving spouses unaltered at the death of a spouse the survivor benefit not only needs to be calculated considering both persons pensions, but the equivalence scale must also correctly reflect the economies of scales of the couple. In practice this will really be the case in individual cases. At best the survivor benefit can be a good approximation that moderates the change in standard of living at the death of a spouse.

The calculations presented below are simplistic theoretical calculations that assume the second option above, with pension incomes reflecting the present average income for males and female respectively and pensions have been CPI- or income-indexed, i.e. all men of a certain age have the same pension, and the same holds for women. The cost for a survivor's pension can be split collectively or just on the risk population of married individuals. The costs relative to total payments are shown in Table 5. The latter limits the subsidy from single person households who have no benefit from a survivor insurance.

One argument against a compulsory survivor benefit is that it implies a subsidy, an income transfer towards couples from singles, unless the cost of the survivor benefit insurance is internalized and made actuarially fair. It may also be argued that survivor benefits reflect a traditional male breadwinner and female household work specialization of couples, which is one source of the pension gender gap. On the other hand absence of or low survivor benefits will increase the pension gender gap.

Table 5 Standard of living with theoretical survival pension and its cost, in percent of old-age CPI pension plan

Country	Standard of living gap with SP	Reduction in standard of living gap with SP	Cost SP/Total pension	Cost SP/ Married's total pension
France	14.7 %	-5.3 %	5.6 %	9.3 %
Germany	13.5 %	-6.8 %	7.0 %	11.3 %
Italy	18.1 %	-7.5 %	6.7 %	10.8 %
Japan	20.1 %	-7.4 %	6.7 %	10.8 %
New Zealand	16.2 %	-6.2 %	6.0 %	9.6 %
Poland	13.5 %	-7.7 %	9.5 %	15.2 %
Russian Federation	10.3 %	-10.6 %	13.8 %	22.1 %
South Korea	20.8 %	-9.5 %	8.2 %	13.0 %
Sweden	11.8 %	-4.2 %	5.0 %	8.2 %
United Kingdom	17.5 %	-6.8 %	6.3 %	10.0 %
United States	14.5 %	-6.0 %	6.5 %	10.6 %

5. Measures to reduce the pensions gender gap

If the difference in lifetime earnings between men and women is reduced the gender gap in pensions will, slowly, also be reduced. However, policy makers often have limited powers to achieve changes in earnings. A more realistic alternative might be to introduce measures within the existing pension system. As a consequence, the earnings-related pension system might become less earnings-related, and include more transfers. The extreme alternative is a flat-rate pension equal for all, irrespective of earnings.

Even if the pension plan is flat-rate and thus has a zero-gender gap there will still be a gap in *standard of living* between men and women. With the existence of a survivor's pension aiming to neutralise this gap, it can be reduced by benefits that neutralize the economic loss due to the death of a spouse. Even with all the measures above implemented there would be a standard of living gender gap for retirees. The source of this gap is that more women than men start their life as retirees as singles, thus more women than men will suffer from the absence of economies of scale than men, even if there is a "perfect" income equality and survivor benefit.

However, although gender is important, there are other socio-economic determinants when deciding on a how to construct a pension system. Since pension insurance is about insuring against longevity risk it inevitably transfers from all groups with below average life-expectancy to groups with above average life-expectancy. When increasing the transfers to women (who live longer) it also means increased transfers from other groups such as the low-skilled, low-educated, poor health, poor income to high-skilled, high-educated, excellent health and high income.

6. Appendix

6.1 The mathematical model used for calculating the gender gap in pensions.

All calculations in this paper are stylised calculations based on calculations in a spreadsheet. The parameters are country specific and uses country specific data for earnings and mortality. The calculations can be altered to yield different outputs. Furthermore, some general macro-economic assumptions are made. To enable comparisons across countries the same economic assumptions are used for all countries.

6.1.1 Data

The input data consist of mortality data from Human Mortality Database - www.mortality.org, and the United Nations. To keep things simple the survivor function l(x) is used without the population numbers. The mortality data sets used are those from France, Germany, Italy, Japan, New Zealand, Poland, Russia, South Korea, Sweden, the United Kingdom and the United States, more countries are easy to add. Furthermore, the mortality data is supplemented with household data for those countries for which this is available. In the Swedish case the proportion of women and men living in a single household or as married couple for ages 60-95+ and of relative mortality for single/married woman and menthe data comes from Statistics Sweden.

6.1.2 Parameters

Input parameters are:

- Country: a list of countries, choose the l(x) table to base the calculations on.

- Standard of living: the divisor for calculating the standard of living for a cohabiting couple, 1.41 as standard according to OECD.

- Expected lifetime earnings: percentage of male earnings.

- Earnings before retirement: absolute level (100 as standard for easy comparison).

- Consumer price index (CPI).

- Growth of average income, income index (II).

- Replacement ratio at age 65: the gross pension benefits as a ratio of final gross pre-retirement earnings. A value for both consumer price indexed (CPI) pension and income indexed (II) pension.

- Age difference between men and women in a couple.

- Mortality rates for married individuals and the total population: Standard parameters fitted from Swedish data.

6.1.3 Output

Given the data and parameters the following outputs are produced: For both men and women using CPI pension indexation/valorisation and II pension indexation/valorisation. The variables below are averages:

- Individual pension benefit

- Individual standard of living

- Survivors pension benefit

- Total of pension benefit and survivors pension benefit

- Individual standard of living with survivor pension benefit

- Cost of survival pension benefit related to total pension benefits in payment

- Cost of survival pension benefit related to married individuals pension benefits in payment.

6.1.4 Calculations

Using the above a large number of calculations can be produced. The list below contains the output from the modelling. All calculations are annual and based on gender and age. Some variables, where applicable, are calculated for both a CPI and an II pension schemes. The model used is a simplification: no divorces or new marriages are allowed and individuals live together until death.

The following is a list of selected variables:

- Replacement ratio.

- Annuity divisor assuming CPI indexation, actuarial value of a pension benefit from age x calculated with the difference of EI and CPI as a front loading rate.

- Qx, one year death probabilities at age x, computed from the l(x) table.

- Relative mortality for cohabitant's depending on age, calculated from input.

- Qx for cohabitants, Qx times the relative mortality.

- Remaining life expectancy at age x, calculated from l(x) table by gender.

- Number of cohabitants/single individuals from input data as a share of singles and l(x) table.

- Number of new widows at age x, calculated according to Qx cohabitants for the opposite sex adjusted by the age difference selected in the input stage.

- Remaining life-expectancy for a new widow at age x

- Pension benefit, by earnings level individual and total.

- Average economic standard of living.

- Average economic standard of living married couples.
- Survivors pension benefits, the cost of a survivor's pension benefit. It is calculated as the loss in standard of living times the number of widows at that age times the actuarial value of the annuity.
- The calculation of relevant total and averages is straight forward.

6.2 Table A

Table A: Earnings gaps, gaps in remaining life expectancy at age 65 and total pensions gap given CPI and income indexation of pension benefits.

	Gross National Income 2017 (2011 $ PPP)			Life expectancy at age 65			Pension Gap	
Country	Women	Men	Income gap	Women	Men	LE gap	CPI	II
Afghanistan	541	3 030	82,1%	13,4	12,2	-10,2%	82,8%	82,1%
Albania	9 702	14 028	30,8%	18,8	15,9	-17,8%	32,4%	30,8%
Algeria	4 232	23 181	81,7%	18,0	17,2	-4,7%	82,2%	81,7%
Angola	5 063	6 546	22,7%	14,2	12,9	-10,0%	23,4%	22,7%
Argentina	12 395	24 789	50,0%	19,8	15,1	-30,9%	52,6%	50,0%
Armenia	6 358	12 281	48,2%	16,7	14,1	-18,4%	49,7%	48,2%
Australia	35 323	51 857	31,9%	22,1	19,3	-14,5%	33,5%	31,9%
Austria	35 626	55 591	35,9%	21,2	18,0	-18,2%	37,8%	35,9%
Azerbaijan	10 089	21 152	52,3%	16,0	13,2	-20,9%	53,8%	52,3%
Bahamas	22 156	31 397	29,4%	19,8	16,9	-17,1%	31,1%	29,4%
Bahrain	18 774	55 130	65,9%	16,0	15,0	-6,5%	66,5%	65,9%
Bangladesh	2 041	5 285	61,4%	16,9	15,1	-12,2%	62,4%	61,4%
Barbados	13 509	18 384	26,5%	17	14,1	-20,4%	28,1%	26,5%
Belarus	13 479	19 592	31,2%	17,4	12,4	-40,3%	34,0%	31,2%
Belgium	33 260	51 302	35,2%	21,1	17,7	-19,2%	37,1%	35,2%
Belize	5 689	8 655	34,3%	14,6	12,5	-16,7%	35,4%	34,3%
Benin	1 795	2 329	22,9%	14	13,2	-6,6%	23,4%	22,9%
Bhutan	6 002	9 889	39,3%	16,9	16,7	-1,1%	39,4%	39,3%
Bosnia and Herzegovina	7 723	15 856	51,3%	17,7	14,9	-18,7%	52,9%	51,3%
Botswana	12 613	18 521	31,9%	14,6	12,8	-14,4%	32,9%	31,9%
Brazil	10 073	17 566	42,7%	19,5	16,3	-19,4%	44,4%	42,7%
Bulgaria	14 777	22 930	35,6%	17,3	14,0	-23,8%	37,4%	35,6%

	Gross National Income 2017 (2011 $ PPP)			Life expectancy at age 65			Pension Gap	
Burkina Faso	1 289	2 014	36,0%	12,2	11,6	-4,4%	36,3%	36,0%
Burundi	807	594	-35,9%	13,6	12,6	-8,2%	-35,3%	-35,9%
Cambodia	2 970	3 878	23,4%	14	13	-8,0%	24,0%	23,4%
Cameroon	2 751	3 878	29,1%	13,9	13	-7,2%	29,6%	29,1%
Canada	34 928	52 070	32,9%	21,8	19	-14,9%	34,5%	32,9%
Central African Republic	521	809	35,6%	13	11,9	-9,7%	36,2%	35,6%
Chad	1 412	2 088	32,4%	12,9	12,1	-6,7%	32,8%	32,4%
Chile	15 137	28 809	47,5%	20,6	17,2	-19,5%	49,3%	47,5%
China	12 053	18 295	34,1%	16,6	14,6	-13,9%	35,3%	34,1%
Colombia	10 271	15 692	34,5%	18,6	16,5	-12,9%	35,7%	34,5%
Comoros	1 265	1 643	23,0%	13,5	12,2	-11,0%	23,8%	23,0%
Congo	4 905	6 483	24,3%	14,9	13,9	-7,7%	24,9%	24,3%
Côte d'Ivoire	2 529	4 409	42,6%	11,4	11	-4,4%	42,9%	42,6%
Croatia	17 507	27 164	35,6%	18,5	14,6	-26,3%	37,7%	35,6%
Cuba	5 001	10 045	50,2%	20,5	18	-14,1%	51,6%	50,2%
Cyprus	26 580	36 543	27,3%	19,4	16,4	-18,2%	28,9%	27,3%
Democratic Republic of the Congo	703	889	20,9%	13,7	12,8	-6,7%	21,4%	20,9%
Denmark	40 293	55 624	27,6%	20,2	17,5	-15,4%	29,1%	27,6%
Dominican Republic	8 909	18 975	53,0%	19,4	17	-13,9%	54,4%	53,0%
Ecuador	7 388	13 307	44,5%	19,9	17,9	-10,9%	45,6%	44,5%
Egypt	4 081	16 489	75,3%	14,7	12,8	-15,1%	76,3%	75,3%
El Salvador	5 226	8 722	40,1%	18,7	16,7	-11,6%	41,2%	40,1%
Equatorial Guinea	14 869	23 258	36,1%	13,9	12,9	-7,4%	36,6%	36,1%
Eritrea	1 451	2 048	29,2%	13,8	12,3	-11,5%	29,9%	29,2%
Estonia	21 896	37 043	40,9%	19,8	14,9	-33,5%	43,7%	40,9%
Ethiopia	1 304	2 136	39,0%	14,9	13,8	-7,6%	39,5%	39,0%
Fiji	5 604	10 963	48,9%	15,2	12,3	-23,8%	50,5%	48,9%
Finland	34 504	47 691	27,7%	21,5	17,8	-20,8%	29,7%	27,7%
France	32 518	46 218	29,6%	22,9	19	-20,6%	31,8%	29,6%
Gabon	11 789	20 825	43,4%	15,2	14,2	-7,1%	43,9%	43,4%

	Gross National Income 2017 (2011 $ PPP)			Life expectancy at age 65			Pension Gap	
Gambia	1 168	1 870	37,5%	12,4	11,5	-7,6%	38,0%	37,5%
Georgia	6 177	12 481	50,5%	16,5	13,1	-26,1%	52,4%	50,5%
Germany	37 689	54 843	31,3%	20,8	17,6	-18,4%	33,1%	31,3%
Ghana	3 349	4 849	30,9%	12,6	11,9	-5,9%	31,3%	30,9%
Greece	19 658	29 796	34,0%	20,9	18,1	-15,6%	35,6%	34,0%
Guatemala	4 768	9 869	51,7%	18,7	17	-10,4%	52,7%	51,7%
Guinea	1 804	2 328	22,5%	12	11,5	-3,5%	22,7%	22,5%
Guyana	4 543	10 295	55,9%	13,2	12,3	-7,5%	56,4%	55,9%
Haiti	1 400	1 937	27,7%	15,1	13,6	-10,8%	28,5%	27,7%
Honduras	3 277	5 159	36,5%	19,4	17,1	-14,0%	37,8%	36,5%
Hungary	19 931	31 413	36,6%	18,2	14,3	-26,7%	38,7%	36,6%
Iceland	38 004	53 562	29,0%	21,1	19	-11,1%	30,2%	29,0%
India	2 722	9 729	72,0%	14,9	13,8	-8,5%	72,7%	72,0%
Indonesia	7 259	14 385	49,5%	14,1	12,1	-16,9%	50,7%	49,5%
Iran	6 094	32 017	81,0%	15,6	15,1	-3,3%	81,2%	81,0%
Iraq	6 039	29 250	79,4%	14,9	12,9	-15,2%	80,4%	79,4%
Ireland	42 771	64 916	34,1%	20,8	18	-15,4%	35,7%	34,1%
Israel	24 620	40 910	39,8%	21,2	19	-11,5%	41,0%	39,8%
Italy	25 767	45 326	43,2%	22	18,6	-18,7%	45,1%	43,2%
Jamaica	5 898	9 812	39,9%	19,3	17,1	-12,5%	41,1%	39,9%
Japan	27 209	51 326	47,0%	23,9	19	-26,0%	49,8%	47,0%
Jordan	2 459	13 971	82,4%	16,2	14,2	-13,9%	83,5%	82,4%
Kazakhstan	16 814	28 815	41,6%	15,4	11,5	-33,3%	43,8%	41,6%
Kenya	2 529	3 398	25,6%	15,3	14,2	-7,7%	26,2%	25,6%
Kuwait	39 570	93 476	57,7%	14,0	13,4	-4,3%	58,0%	57,7%
Kyrgyzstan	2 159	4 369	50,6%	15,7	12,4	-27,2%	52,5%	50,6%
Latvia	20 822	29 924	30,4%	18,3	13,6	-34,7%	33,1%	30,4%
Lebanon	5 523	21 182	73,9%	19,4	16,5	-17,6%	75,6%	73,9%
Lesotho	2 608	3 940	33,8%	13,3	11,6	-14,4%	34,7%	33,8%
Liberia	577	755	23,6%	12,4	11,8	-5,8%	24,0%	23,6%

	Gross National Income 2017 (2011 $ PPP)			Life expectancy at age 65			Pension Gap	
Libya	4 623	17 472	73,5%	15,7	13,4	-17,1%	74,8%	73,5%
Lithuania	24 366	32 934	26,0%	19	14,1	-34,3%	28,7%	26,0%
Luxembourg	51 154	78 737	35,0%	21,3	18	-18,2%	36,9%	35,0%
Madagascar	1 173	1 544	24,0%	13,9	13	-7,2%	24,5%	24,0%
Malawi	897	1 235	27,4%	15,1	13,4	-12,7%	28,3%	27,4%
Malaysia	20 004	31 826	37,1%	16,6	15	-10,9%	38,1%	37,1%
Maldives	7 064	18 501	61,8%	16,1	15,2	-6,3%	62,4%	61,8%
Mali	1 345	2 560	47,5%	11,9	11,9	-0,3%	47,5%	47,5%
Malta	24 255	44 446	45,4%	19,6	17,3	-13,2%	46,7%	45,4%
Mauritania	1 936	5 221	62,9%	13,3	12,4	-7,6%	63,4%	62,9%
Mauritius	12 558	27 986	55,1%	18,2	14,8	-23,3%	57,1%	55,1%
Mexico	11 065	22 873	51,6%	19,7	17,9	-9,8%	52,6%	51,6%
Mongolia	8 482	11 759	27,9%	15,2	12,2	-24,1%	29,5%	27,9%
Montenegro	12 967	20 692	37,3%	17,4	15	-16,7%	38,7%	37,3%
Morocco	3 197	11 561	72,3%	16,7	15,1	-10,8%	73,3%	72,3%
Mozambique	1 052	1 135	7,3%	14	12,9	-8,8%	7,9%	7,3%
Myanmar	3 860	7 355	47,5%	14	12,5	-12,4%	48,4%	47,5%
Namibia	8 895	9 907	10,2%	14,6	12,5	-16,2%	11,4%	10,2%
Nepal	2 219	2 738	19,0%	14,4	13	-10,7%	19,7%	19,0%
Netherlands	38 767	57 123	32,1%	21,1	17,9	-17,9%	33,9%	32,1%
New Zealand	25 872	42 339	38,9%	21,2	18,9	-12,6%	40,2%	38,9%
Nicaragua	3 434	6 930	50,4%	19,6	17,5	-12,2%	51,6%	50,4%
Niger	691	1 119	38,2%	12,9	12,2	-6,0%	38,7%	38,2%
Nigeria	4 433	6 008	26,2%	10,8	10,5	-2,7%	26,4%	26,2%
Norway	60 153	75 731	20,6%	21,2	18,3	-15,8%	22,2%	20,6%
Oman	11 246	49 282	77,2%	18,1	15,6	-16,3%	78,6%	77,2%
Pakistan	1 642	8 786	81,3%	14,3	14,1	-1,8%	81,4%	81,3%
Panama	13 229	25 102	47,3%	21,2	18,8	-12,5%	48,6%	47,3%
Papua New Guinea	3 002	3 789	20,8%	15,1	12,3	-23,2%	22,4%	20,8%
Paraguay	6 212	10 486	40,8%	18,3	16,4	-11,6%	41,8%	40,8%

	Gross National Income 2017 (2011 $ PPP)			Life expectancy at age 65			Pension Gap	
Peru	8 446	15 140	44,2%	18,7	16,2	-15,4%	45,6%	44,2%
Philippines	7 582	10 705	29,2%	15	12,6	-19,4%	30,5%	29,2%
Poland	20 367	32 343	37,0%	19,6	15,4	-27,3%	39,4%	37,0%
Portugal	23 095	32 013	27,9%	21,2	17,6	-20,5%	29,9%	27,9%
Romania	18 217	27 358	33,4%	17,8	14,6	-21,6%	35,2%	33,4%
Russian Federation	19 510	29 671	34,2%	17,1	12,9	-33,3%	36,7%	34,2%
Rwanda	1 568	2 064	24,0%	15,1	14	-7,9%	24,6%	24,0%
São Tomé and Príncipe	1 780	4 112	56,7%	15,1	14	-7,8%	57,3%	56,7%
Saudi Arabia	17 422	73 945	76,4%	15,9	13,9	-13,9%	77,5%	76,4%
Senegal	1 691	3 101	45,5%	13,7	12,4	-10,6%	46,2%	45,5%
Serbia	10 672	15 474	31,0%	16,8	13,9	-20,6%	32,6%	31,0%
Sierra Leone	1 096	1 387	21,0%	10,2	10,1	-0,7%	21,0%	21,0%
Singapore	69 508	95 809	27,5%	21,9	18,6	-17,6%	29,3%	27,5%
Slovakia	22 600	36 726	38,5%	18,4	14,6	-25,8%	40,6%	38,5%
Slovenia	26 898	34 341	21,7%	20,9	17,2	-21,9%	23,8%	21,7%
Solomon Islands	1 450	2 281	36,4%	14,6	13,2	-10,6%	37,2%	36,4%
South Africa	9 060	14 894	39,2%	15,3	11,1	-37,8%	41,5%	39,2%
South Korea	22 572	49 297	54,2%	21,8	17,4	-24,9%	56,7%	54,2%
South Sudan	843	1 083	22,2%	13,5	12,7	-6,5%	22,6%	22,2%
Spain	26 954	41 850	35,6%	22,6	18,7	-21,0%	37,8%	35,6%
Sri Lanka	6 462	16 581	61,0%	17,5	15,6	-12,1%	62,1%	61,0%
Sudan	1 785	6 455	72,3%	14,7	13,8	-6,3%	72,8%	72,3%
Suriname	9 132	17 449	47,7%	16,4	13,5	-21,3%	49,3%	47,7%
Swaziland	5 722	9 641	40,6%	13,7	11,8	-16,0%	41,7%	40,6%
Sweden	41 743	53 777	22,4%	21,2	18,6	-14,3%	23,9%	22,4%
Switzerland	47 938	67 490	29,0%	22,2	19,1	-15,9%	30,7%	29,0%
Tajikistan	2 233	4 392	49,2%	16,9	13,4	-26,4%	51,1%	49,2%
Tanzania	2 282	3 037	24,9%	15	14	-7,4%	25,4%	24,9%
Thailand	13 793	17 327	20,4%	19,1	16,4	-16,2%	21,9%	20,4%
Timor-Leste	3 301	10 282	67,9%	14,1	12,7	-10,7%	68,7%	67,9%

	Gross National Income 2017 (2011 $ PPP)			Life expectancy at age 65			Pension Gap	
Trinidad and Tobago	22 008	35 435	37,9%	16,6	12,9	-28,4%	39,9%	37,9%
Turkey	15 576	34 313	54,6%	18,4	14,8	-24,6%	56,6%	54,6%
Uganda	1 212	2 109	42,5%	14,3	13,2	-8,1%	43,1%	42,5%
Ukraine	6 082	10 513	42,1%	16,6	12,6	-31,2%	44,4%	42,1%
United Arab Emirates	24 973	84 130	70,3%	16,9	15,9	-6,0%	70,8%	70,3%
United Kingdom	28 043	50 485	44,5%	20,9	18,4	-13,5%	45,8%	44,5%
United States	43 899	66 208	33,7%	20,6	18	-14,1%	35,1%	33,7%
Uruguay	15 282	24 905	38,6%	20,5	15,5	-32,6%	41,5%	38,6%
Uzbekistan	4 687	8 264	43,3%	15,7	13,2	-19,0%	44,7%	43,3%
Vanuatu	2 340	3 635	35,6%	15,3	13,4	-14,5%	36,7%	35,6%
Vietnam	5 345	6 383	16,3%	20,6	15,9	-30,1%	19,0%	16,3%
Zambia	2 986	4 138	27,8%	14,6	13,5	-8,4%	28,5%	27,8%
Zimbabwe	1 431	1 948	26,5%	14,8	13,7	-8,2%	27,2%	26,5%

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