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Pension reform sustainability in  
the EU: A pension wealth-based  
framework

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## Abstract

Most assessments of pension sustainability focus on the projected fall in spending. However interest in the impact on adequacy, usually measured by replacement rates, is increasing. In this paper we show that replacement rates have significant defects, related to being point-in-time indicators and the use of unrepresentative assumptions. We argue for the use of pension wealth calculated using more realistic assumptions. Looking at ten EU countries, we find that while generosity decreased significantly, systems' effectiveness in alleviating poverty remain strong in countries where minimum pensions were improved. However, moves to link benefits to contributions have raised concerns for women and for those on low incomes. Though reforms have reduced the fiscal challenge of ageing, in many countries pressures will persist and further reforms are likely.

JEL Classification: H55, I38, J26.

## Keywords

Social Security and Public Pensions; Retirement; Poverty; Retirement Policies.

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## 1 Introduction

In recent decades many European governments have embarked on substantial pension reforms.<sup>1</sup> Most reviews show that these reforms' main consideration was long-term financial costs (and in some cases, especially in Eastern Europe, short-term fiscal problems and a desire to reduce the state's role).<sup>2</sup> However, policymakers are increasingly focusing on the broader impact of these changes. For instance, following a review of its involvement in reforms which found a neglect of the need that pension systems “reduce poverty and provide retirement income”,<sup>3</sup> the World Bank's current stance is that “pension systems need to provide adequate, affordable, sustainable, and robust benefits”.<sup>4</sup> Similarly after reaching an agreement among Member States in 2001 on common objectives on pension policy and on a voluntary process for political cooperation known as the open method of co-ordination (OMC), in 2012 the EU Commission prepared a white paper on pension reforms in which it argued that countries should “in the spirit of solidarity and fairness between and within generations, guarantee adequate retirement incomes for all and access to pensions which allow people to maintain, to a reasonable degree, their living standard after retirement”.<sup>5</sup>

While the standard measure of a reform's fiscal success – reduced spending – is well-known, despite many studies on the impact on generosity,<sup>6</sup> there is no similar consensus on how best to measure pension adequacy. This notwithstanding there is a growing use, particularly by international institutions, of theoretical replacement rates. Yet, as will be argued in this paper's first section, this measure has many defects. In section 2, an alternative approach is proposed, based on estimates of pension wealth for ten European countries which made considerable reforms since the 1990s.<sup>7</sup> These, namely Austria, Finland, France, Germany, Hungary, Italy, Poland, Slovakia, Sweden and UK, not only cover 70% of the EU's population, but also have very different pension systems and enacted varied reforms.<sup>8</sup> The proposed indicators address many of the defects of theoretical replacement rates – such as the latter's limited ability to reflect the influence of different benefit indexation

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1 For an overview of these reforms, see European Commission (2010) and OECD (2007).

2 See Zaidi/Grech (2007) and Schneider (2009).

3 World Bank Independent Evaluation Group (2006).

4 Holzmann/Hinz (2005).

5 European Commission (2012).

6 For instance, see Zaidi/Grech (2007) and European Commission (2010).

7 Note that these estimates are based on the pension system rules as at 2010. The deterioration of the sovereign debt crisis led to some subsequent reforms, particularly in Hungary.

8 For a brief description of pension reforms in these countries, see OECD (2007).

rules,<sup>9</sup> changes in pension age and life expectancy and the impact of systemic reforms<sup>10</sup> on generosity.

## 2 Theoretical replacement rates – a review

The theoretical replacement rate used by the EU in the OMC is defined as “the level of pension income the first year after retirement as a percentage of individual earnings at the moment of take-up of pensions for an assumed hypothetical worker, who in the so-called ‘base case’ has a given earnings and career profile (male, earnings of average wage constant over his fulltime 40 years career, retiring at 65)”.<sup>11</sup> The latest estimates for pensioners aged 65 and 75 are shown in Table 1, together with OECD estimates, restricted to just state pensions.<sup>12</sup> The World Bank suggests that “for a typical, full-career worker, an initial target of net-of-tax income replacement from mandatory systems is likely to be about 40% of real earnings to maintain subsistence levels of income in retirement”, while systems offering rates above 60% are unaffordable.<sup>13</sup> On this basis, Table 1 suggests that, on average,<sup>14</sup> in the ten countries studied in this paper, state pensions are adequate.

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9 Benefit indexation rules determine how the value of a benefit changes after it is awarded.

10 In a systemic reform, a scheme’s financing and benefit accrual is changed. In most cases, systems are changed from pay-as-you-go defined benefit (where benefits are determined in relation to an agreed pensionable income, financed out of current contributions) to defined contribution schemes (where benefits depend on contributions made, any accrued returns and the time to be spent receiving the benefit), either notional (i.e. benefits are still financed from current revenues) or funded (i.e. contributions are not immediately spent).

11 European Commission (2010).

12 See OECD (2011).

13 Holzmann/Hinz (2005). This is in line with International Labour Office (1952).

14 Throughout, the average across these ten countries is a weighted average by population.

Table 1: *Theoretical replacement rates (%) - OMC and OECD [in brackets]*

	<i>Gross replacement rate</i>		<i>Net replacement rate</i>	
	<i>At age 65</i>	<i>At age 75</i>	<i>At age 65</i>	<i>At age 75</i>
Austria	69 [77]	58	84 [90]	73
Finland	62 [58]	52	69 [65]	60
France	64 [49]	54	78 [60]	65
Germany	41 [42]	41	64 [56]	64
Hungary	65 [44]	64	105 [62]	106
Italy	80 [65]	68	88 [72]	76
Poland	59 [29]	48	68 [33]	56
Slovakia	58 [26]	53	75 [34]	71
Sweden	68 [31]	65	71 [31]	68
UK	61 [32]	54	73 [37]	66
Average	60 [45]	53	75 [54]	67

Note: Replacement rates are worked out on a gross and net (of income taxes and contributions) basis. The OECD estimates do not include income from private pensions.

Source: European Commission (2010), OECD (2011).

Table 2: *Net replacement rates and relative pension levels [in brackets] of state pensions (%) - OECD*

	<i>At 0.5 times average wages</i>	<i>At average wage</i>	<i>At 1.5 times average wage</i>
Austria	91 [54]	90 [90]	84 [119]
Finland	72 [42]	65 [65]	64 [88]
France	69 [37]	60 [60]	53 [75]
Germany	55 [33]	56 [56]	56 [78]
Hungary	56 [35]	62 [62]	60 [82]
Italy	72 [41]	72 [72]	72 [100]
Poland	33 [17]	33 [33]	33 [49]
Slovakia	31 [17]	34 [34]	35 [50]
Sweden	45 [24]	31 [31]	24 [32]
UK	62 [33]	37 [37]	27 [38]
Average	60 [34]	54 [54]	50 [70]

Note: Rates estimated assuming full career on different wages. Relative pension levels have the economy-wide average wages as the denominator, rather than the individual's own wage.

Source: OECD (2011).

However, as Blondell / Scarpetta (1999) points out, “there is no such thing as a single pension replacement rate in any national retirement scheme”. This because even with the simplest case - flat-rate universal pensions - the gross replacement rate will still differ for individuals as it is determined by their previous wage, while net



replacement rates will be affected by tax system progressivity. In fact, OECD estimates presented in

Table 2 show that in general, replacement rates for those on lower wages tend to be higher. The denominator of replacement rates can distort reality. While having a high replacement rate on a low level of previous income ensures a good degree of consumption smoothing; it would do little to alleviate the risk-of-poverty.

Table 2 also shows relative pension levels, where benefits are compared to the average economy-wide wage. These suggest that pension generosity for those on low incomes is significantly less pronounced when taking the average wage as the numeraire, well below the World Bank suggested 40% benchmark. Heterogeneity in replacement rates poses significant hurdles to use them as pension adequacy measures. To be able to do this, one would need to know to what extent the hypothetical individual, for whom the theoretical replacement ratio is estimated, is representative of the average pensioner. For instance, the EU's OMC indicator specifies a single male on average earnings, employed full-time for 40 years uninterruptedly and retiring at 65. Leaving aside the obvious issue of gender, the first consideration is that the average person does not retire at 65. Eurostat data suggest that the average exit age from the labour force of males in 2010 stood at 61.5 for the EU-27. Employment rates are well below 100%, particularly for women, tend to fall over the working age and differ greatly by country.<sup>15</sup> Close to a fifth of the workforce, most of them women, work part-time. Moreover an average wage does not provide any indication of wage inequality. Eurostat's Structure of Earnings Survey reports that across the EU in 2010, the wage of those in the bottom tenth percentile of the wage distribution was more than 8 times that of those in the top tenth<sup>16</sup> while earnings follow an evident age profile, accelerating rapidly at first before decelerating after age 50.<sup>17</sup>

The Commission is aware of these issues. European Commission (2009), for instance, notes that in Greece "a negligible portion of pensioners, below 3%, complete 40 contribution years before retirement". Since average career length in Greece is 25 years, while the OMC indicator suggests that pensions in Greece are the most generous in the EU, the poverty rate among Greek pensioners is the fifth highest, as people do not get that implied generous pension. Only in 9 EU countries, men

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15 The employment rate for men (women) in 2011 ranged from 67% (43%) to 83% (77%) across the EU. That for those aged 55-64 was nearly a third below the EU average.

16 It also differs greatly. In Sweden those in the bottom tenth percentile get a wage a quarter less than the median wage; whereas in neighbouring Estonia the ratio is more like a half.

17 In the EU, in 2010, the mean wage of men aged under 30 was just three-fifths the mean wage of those aged 40-49. Those aged over 60 have a wage only 3% higher than the latter.

contribute 40 years or more prior to retirement.<sup>18</sup> Given these issues, it is not surprising to find that there is only very weak correlation between net theoretical replacement rates and at-risk-of-poverty rates for the pensioner population.

Besides the base case, the Commission publishes replacement rates that depart from its base assumptions; such as a case where the individual's wage rises gradually from average to twice the average, a broken career variant where there are no contributions for 10 years, cases where the break is of 3 years either because of unemployment or childcare, and variants of early and late retirement. Unsurprisingly, as shown in Table 3, these cases confirm that replacement rates vary a lot. Rising wage profiles tend to result in lower rates, either as entitlements are based on career-average income rather than the final salary (e.g. Italy) or there are maximum pensionable rates (e.g. UK). Later retirement can yield very generous benefits (e.g. in Hungary the replacement rate is 17 percentage points higher), whereas early retirement is not as penalised (e.g. in Hungary the penalty of retiring early is 13 percentage points). In some counties, e.g. Slovakia, taking time off to take care of children results in a significant drop in replacement rates whereas in others, such as Sweden, there is no such fall.

**Table 3: Different OMC theoretical net replacement rates (%)**

	Base case	3 years unemployed	3 years childcare break	10 years career break	Retire at 63	Retire at 67	Wage rising to 2x average
Austria	84	83	82	70	77	88	76
Finland	69	66	65	54	62	76	65
France	78	73	75	58	62	89	55
Germany	64	62	65	48	57	74	46
Hungary	105	102	105	92	92	122	89
Italy	88	84	76	68	84	93	72
Poland	68	66	61	57	66	70	58
Slovakia	75	54	53	57	64	87	56
Sweden	65	60	65	NA	62	76	71
UK	73	71	74	58	71	77	52
Average	75	72	71	57	68	82	58

Note: Replacement rates are worked out on a net of income taxes and contributions basis. They include income from private pensions if coverage is significant.

Source: European Commission (2010).

<sup>18</sup> On average, across the EU, career length is 38 years for men and 30 years for women.

### 3 Pension wealth - a more effective framework to measure the impact of pension reforms

To summarise the previous section, theoretical replacement rates tend to be unrepresentative of actual outcomes due to unrealistic assumptions, coupled with a focus on individual wages as the numeraire. Interestingly there has been little discussion of another defect of replacement rates – namely their being point-in-time indicators. Isolating pension generosity at retirement fails to take into account differences in longevity and pension ages between generations and also ignores how payments change over retirement. A country with low life expectancy could afford to pay higher replacement rates to its citizens while imposing the same financial burden on workers as a country with higher life expectancy but with lower rates. Similarly a country where pensions lose their relative value over time can afford to pay a higher replacement rate at retirement than a country where the relative value is stable.

These issues matter. Rising longevity has made pensions become so topical. Changing the pension age has been a frequent reform.<sup>19</sup> Moreover, some countries (e.g. Italy, Sweden) have introduced systems penalising retiring at the same age if longevity rises, by linking more tightly projected benefits to contributions made. Another common reform has been the shift from uprating pensions in line with average wages (e.g. Austria, Germany). The impact of indexation on generosity is substantial. Table 1 shows that on average, across the ten countries being studied there is a drop of 11% in net replacement rates between age 65 and 75. Given that life expectancy for men and women is close to 20 years, this ten-year period constitutes just the half-life of a pension stream. If the relative value loss proceeds linearly, by the last year of life pensions would be a fifth less in earnings terms than at the beginning.

One way of addressing these concerns is using estimates of pension wealth. Brugiavini et al. (2005), while noting that “there is no simple and unique definition” notes that “pension wealth is, broadly speaking, the present discounted value of future pension rights, taking into account of mortality prospects.” In mathematical terms this can be expressed as:

$$PW_h = \sum_{s=h+1}^S \beta^{s-a} \pi_s B_s(h) \quad (1)$$

where  $PW_h$  is pension wealth at age of retirement ( $h$ ),  $S$  is the age of certain death,  $\beta$  is the pure time discount factor,  $a$  is the individual's age,  $\pi_s$  is the conditional survival probability at age ( $s$ ) for an individual alive at age ( $a$ ) and  $B_s(h)$  is the pension expected at age ( $s$ ).

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19 See OECD (2011).

OECD (2011) suggests that pension wealth “can be thought of as the lump sum needed to buy an annuity giving the same flow of pension payments as that promised by mandatory retirement-income schemes”. Take, for instance, a case where the pension benefit is equivalent to 50% of average earnings for 20 years. Assuming away time preference, you would be as better off if you forgo receiving pensions in lieu of a payment equivalent to ten times average earnings. If however benefits are expected to fall in relative terms by a tenth every ten years (broadly in line with the fall seen in Table 1), you would require a payment of just nine times. Equation (1) brings out the advantages of pension wealth estimates over replacement rates. Firstly, this is a measure that expressly takes into account the period for which benefits will be received. Increased longevity increases pension wealth, but does not impact replacement rates. Similarly a higher pension age decreases pension wealth, while it does not show up in replacement rates. Secondly, pension wealth measures the entire income stream, rather than just one payment. A reform changing indexation would not change the replacement rate at retirement, but it would clearly show up in pension wealth estimates.

There are two ways in which pension wealth is calculated. The empirical method uses income/wealth survey data and is retrospective.<sup>20</sup> By contrast, the institutional approach tries to calculate prospective pension entitlements by applying “the pension system’s parameters – such as accrual rates, minimum pensions, indexation rules, eligibility requirements etc. – to calculate pension benefits”<sup>21</sup> for a number of stylised cases and then grosses up results. This is the approach taken in this paper. Pension wealth estimates, covering only state pensions<sup>22</sup>, were computed for the ten countries under study using the OECD’s APEX<sup>23</sup>. Our estimates compare outcomes for those retiring under pre-reform systems with forecasts for those who will retire in 2050 under the reformed systems. The OECD publishes pension wealth estimates for the standard full-career case (see Table 4). By contrast, we try to approximate reality better by adopting a measure of career length based on Labour Force Survey data on activity rates by age and gender.<sup>24</sup> In all ten countries, elderly women are much more at-risk-of-poverty than elderly men. Yet, by assuming full careers for women, OECD estimates of pension wealth for women are higher than those for men, as women have longer life expectancy. Also, rather than focus on the

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20 For a discussion of this approach see European Central Bank (2009).

21 See Whitehouse (2003).

22 Like the OECD, we assume no income other than state pensions when computing entitlement to minimum pensions. This may boost pension generosity in some countries.

23 APEX (Analysis of Pension Entitlements across countries model) codes the rules of a nation’s pension system (vetted by officials from that country). It is used in the OECD’s publications and is also used by the EU Commission as part of the OMC.

24 More details on this are in the appendix. Like the OECD, we model individual benefits. This may weaken results for countries where benefits depend also on partner’s income.

average person, our focus is on individuals in the bottom half of the wage distribution who are more highly dependent on state pensions.

**Table 4: Net pension wealth estimates for current pension systems (multiple of average wage)**

	Male full-career on average wage	Male actual-career in bottom half of wage distribution	Female full-career on average wage	Female actual-career in bottom half of wage distribution
Austria	7.8	8.1	8.6	8.2
Finland	7.5	5.3	8.9	5.8
France	8.3	6.8	9.4	5.5
Germany	6.1	5.2	7.4	4.8
Hungary	9.2	6.2	11.4	8.5
Italy	8.8	8.4	9.6	8.4
Poland	7.0	4.6	7.4	6.2
Slovakia	9.2	8.3	11.3	8.7
Sweden	6.6	6.2	7.5	6.1
UK	4.4	3.8	5.1	4.5
Average	7.0	5.9	8.0	6.0

Note: Net pension wealth for actual-career case based on labour market participation by age and sex data. See appendix for details. The actual-career case reflects the pension entitlements for those earning a wage up to the 50<sup>th</sup> percentile of the wage distribution.

Source: OECD (2011) and own estimates using same model used in OECD (2011).

Across the ten countries, adjusting for actual-careers and the level of wages lowers net pension wealth. The reduction is largest for women, who get only 80% of the full-career average wage entitlement. The reduction for men is also strong, at 15%, particularly in countries with low employment rates (e.g. Slovakia). While the full-career estimates suggest women get the equivalent of one year's average wage more than men, adjusting for lower participation and wages, reveals that they get roughly the same amount as men. Links between the level of contributions and that of benefits offset most of the impact of having higher longevity. If pensions maintained their relative value over time, one would expect the difference in gender longevity to be reflected in an equivalent gap in pension wealth. By contrast, across these ten countries while post-retirement longevity is a third higher for women, even assuming the same wage and labour participation, net pension wealth of women is just 15% higher. The worst affected are those with long retirement periods where pensions are indexed to prices. For instance, in Poland while the gender longevity differential is 60%, that in pension wealth is just 6%. Unsurprisingly the risk-of-poverty among elderly women in Poland is 6.9 percentage points (70%) higher than for men.

Table 5: *Net pension wealth requirement to remain out of risk-of-poverty (multiple of average wage)*

	Men		Women	
	2005	2050	2005	2050
Austria	5.1	7.2	6.5	7.2
Finland	4.9	6.1	6.1	6.9
France	6.5	7.6	7.7	8.5
Germany	5.1	6.0	5.8	6.6
Hungary	5.3	7.5	6.6	7.2
Italy	5.3	7.4	6.3	7.2
Poland	4.2	6.7	5.9	7.7
Slovakia	5.3	7.1	6.2	7.0
Sweden	5.3	6.2	6.1	6.9
UK	5.0	7.0	5.3	5.7
Average	5.3	6.9	6.2	7.1

Note: Net pension wealth requirement is the pension wealth required so that the average annual pension keeps one above the risk-of-poverty (60% of the median equivalised income).

Source: Own estimates using discount rate of 2% and Eurostat life expectancy projections.

To link better the indicator to the risk-of-poverty,<sup>25</sup> we compute the pension flows that would enable an annual income equal to the poverty threshold throughout retirement. If pension wealth is higher than this ‘pension requirement’, on average, the system would be preventing poverty.<sup>26</sup> Pension requirements for 2005 and 2050, presented in Table 5, suggest for instance, that Austrian men require net pension wealth of at least 5.1 times mean wages if they are to stay out of poverty, on average, during retirement. Women have a higher requisite than men, as they live longer and in some countries, have lower pension ages. The benefit of having this benchmark is that it directly conveys information about pension adequacy. Thus, if in Austria to remain, on average, out of risk-of-poverty a man needs pension wealth equivalent to 5.1 times the average wage, this immediately suggests that current pension wealth of 8.1 is more than sufficient. By contrast knowing that the gross replacement rate for someone on the mean wage in Austria is 69% tells us very little, especially since replacement rates are in terms of one’s previous income and not the current poverty threshold.

At present, the lowest requirement is for Polish men, while the highest is for French women. However this need not remain the case. The other benefit of the pension

25 In this paper we focus on the poverty alleviation dimension of adequacy. Pension wealth can be used to look at income replacement (by defining measures in the person’s own wage) and the intergenerational dimension (by comparing successive cohorts’ pension wealth).

26 Note that since transfers are not constant for all years, even when pension wealth is equal to the ‘net pension requirement’ there may be years when one could be at-risk-of-poverty.

requirement benchmark is that it moves in line with longevity. If pension wealth stays the same, the benchmark helps us realise that pensioners have to spread it over a longer period. By contrast, a replacement rate is not usually affected by a change in longevity.<sup>27</sup> Similarly having a benchmark improves our understanding of pension age changes. The latter leave replacement rates unchanged while reducing pension wealth. Using replacement rates, one would conclude there was no change in generosity, and vice-versa if one uses pension wealth. However by reducing the period in retirement, pension age changes also limit the pension requirement. For instance, at present Polish men, due to low longevity, have a pension requirement considerably lower than UK men – who face their same pension age. By 2050, this will be reversed, even though Polish men will still have shorter life spans than UK men. However the latter will get their pensions at 68, rather than at 65 like Polish men. Table 5 shows that the pension requirement for men is going to rise more than that for women. This reflects the fact that pension age equalisation will offset part of the rise in female longevity.

**Table 6: Net pension wealth estimates for those in the bottom half of the wage distribution (modelled to reflect their projected actual career) retiring in 2050 (multiple of average wage)**

	Men		Women	
	Net pension wealth 2050	% Change on 2005	Net pension wealth 2050	% Change on 2005
Austria	8.1	-1	7.3	-11
Finland	8.5	+61	8.2	+43
France	5.7	-15	6.5	+18
Germany	6.0	+16	6.4	+35
Hungary	7.2	+17	7.0	-17
Italy	7.1	-16	6.1	-28
Poland	4.9	+6	4.4	-28
Slovakia	5.2	-37	4.8	-45
Sweden	6.7	+8	6.5	+6
UK	5.2	+36	5.3	+18
Average	6.0	+2	6.0	+1

Note: See Note to Table 4.

Source: OECD (2011) and own estimates using same model used in OECD (2011).

Table 6 presents net pension wealth estimates for 2050 for the bottom half of the wage distribution computed using Commission activity rate forecasts and Eurostat longevity projections. These estimates suggest that despite cuts in generosity and

<sup>27</sup> Unless in the system the annual benefit depends on the period over which the cumulative entitlements need to be spread. In this case, higher longevity lowers replacement rates.

higher pension ages,<sup>28</sup> net pension wealth should still rise slightly across the countries under review.<sup>29</sup> The increase in pension entitlements is lower than the expected rise in the period in retirement. Pension wealth will need to be spread more thinly across a longer retirement period. Table 7 illustrates this development. At present pension entitlements across these ten EU countries translate in an achievable poverty threshold of 67% for men and 52% for women in the bottom half of the wage distribution. By 2050, pension wealth, if spread evenly through retirement, would enable the average man, previously in the bottom half of the wage distribution, to have an income equivalent to 60% of the contemporary equivalised median income. For women, however, there should be a slight improvement, to 53%. The largest decline in achievable thresholds is for low-income men in Slovakia, followed closely by women in the same country. At present pension generosity in Slovakia is at par with neighbouring Austria. Reforms have, however, tightened the link between benefits and contributions, and reduced the progressiveness of the benefit formula. Moreover the state pension was partially replaced by a mandatory private defined contribution pension<sup>30</sup>.

Similar reforms were carried out in Poland, and the results are expected to be quite similar. The state pension, by itself, will no longer maintain low-income individuals, particularly women, out of relative poverty. By contrast in Germany, France and the UK pension reforms have tended to strengthen or maintain the poverty alleviation function, notably by improving the generosity of minimum pensions. Weak indexation and a long retirement period interact to push people into poverty in their old age, increasing the importance of having adequate minimum pensions in place. These estimates also show that the tightening of links between contributions made and benefits received makes it more crucial to have active labour market policies unless countries are ready to countenance an increase in pensioner poverty. Similarly countries need to have adequate crediting provisions, if they want to reduce gender income inequalities in old age.

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28 In the absence of reforms, pension wealth would have grown by 47% for men and 26% for women, which coupled with the larger cohort size would have caused large fiscal burdens.

29 Assuming full careers, men's pension wealth would rise by 3% and women's drop by 5%. Higher participation should offset part of the impact of reduced pension system generosity.

30 Since the financial crisis, this second pillar has increasingly been put under question.



**Table 7: Achievable poverty thresholds based on net pension wealth entitlements of those in the bottom half of the wage distribution (% of equivalised median income)**

	Men		Women	
	2005	2050	2005	2050
Austria	95	74	68	61
Finland	65	66	57	58
France	63	59	44	59
Germany	61	59	48	56
Hungary	70	65	68	59
Italy	95	68	68	51
Poland	66	50	55	35
Slovakia	93	51	74	41
Sweden	70	65	59	56
UK	46	59	39	56
Average	67	60	52	53

Source: Own estimates using same model used in OECD (2011). Net pension requirement based on discount rate of 2% and Eurostat life expectancy projections.

The EU Commission's pension adequacy indicator, i.e. the change in net replacement rates, similarly to the estimates of achievable poverty thresholds suggests lower generosity by 2050. However there are important differences, as can be seen in Table 8. Firstly, the proposed indicators suggest slightly improved outcomes for women, which is not apparent when looking at the OMC indicator as the latter is gender neutral and cannot take into account increased entitlements due to higher labour participation. Secondly, the full-careers assumption appears to hide the full impact of reforms that penalise not having a full career, for instance the changes effected in Italy, Austria and Slovakia.<sup>31</sup> Thirdly, by focusing on those on average wages, the OMC indicator fails to give due importance to reforms that have increased system progressiveness, such as better minimum pensions in Germany, France and the UK. Finally, and most importantly, while the OMC indicator suggests a decline in generosity, it does not readily convey whether this is of concern. By focusing on theoretical generosity, the OMC indicator boosts the level of pension entitlements, particularly for women. It also fails to register the increased influence that weak indexation will have on the efficacy of pensions and does not capture the impact of pension age changes.

31 For Sweden, the fact that actual careers are close to the full-career assumption results in similar developments in the achievable poverty threshold and in net replacement rates.

Table 8: *Change in achievable poverty thresholds compared with OMC indicator on net replacement rates (percentage points)*

	Change in poverty threshold by 2050 (men)	Change in poverty threshold by 2050 (women)	Change in replacement rates by 2050
Austria	-21	-8	+5
Finland	+2	+1	-8
France	-3	+16	-17
Germany	-2	+8	-3
Hungary	-4	-9	+5
Italy	-28	-17	+2
Poland	-16	-20	-17
Slovakia	-42	-32	-7
Sweden	-5	-3	-7
UK	+13	+17	+2
Average	-7	+2	-5

Source: OECD (2011) and own estimates using same model used in OECD (2011). Replacement rates from European Commission (2010), except Hungary from European Commission (2009) as our estimates do not cover the most recent reform in this country.

Another benefit of pension wealth is that it can be used to measure fiscal pressures. Table 9 presents estimates of the contribution rate required to pay the entitlements of the 2005 and 2050 pensioner cohorts.<sup>32</sup> Across the ten countries a contribution rate of 17% is required for the 2005 generation. This compares well with the 20% contribution rate currently charged by governments across these countries. Had no reforms taken place, the required contribution rate would have nearly tripled by 2050. The reforms partially addressed these pressures, such that the required increase is now of 10 percentage points. There are some notable outliers, such as France, Poland and Slovakia, where the increase is around double this rise, reflecting weaker labour participation combined with more rapid ageing. The trends in contribution rates are starker than those in pension spending projections. This is because they focus on the whole outlay for a cohort rather than give a snapshot for just a year.

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32 The intuition behind this is described in the appendix. For simplicity this approach assumes pensions are financed by the current workers, while in reality they can be debt-financed.

**Table 9: *The fiscal pressures faced by pension systems***

	Contribution rate required (%)		Pension spending (% of GDP)	
	2005	2050	2005	2050
Austria	19.3	26.8	13.2	16.4
Finland	8.7	20.9	10.4	14.9
France	21.0	41.4	12.8	15.1
Germany	11.8	20.9	11.1	13.0
Hungary	37.7	44.5	10.7	13.5
Italy	29.7	31.6	14.3	15.7
Poland	14.4	34.7	13.7	10.0
Slovakia	20.6	38.7	7.4	12.2
Sweden	11.5	21.5	10.4	9.9
UK	9.1	10.3	6.7	8.2
Average	17.5	27.2	11.4	12.7

Source: Pension spending from European Commission (2010). Own estimate of the contribution rate computed by multiplying mean pension wealth by system dependency ratio.

## 4 Conclusion

While useful, theoretical replacement rates estimated for full-career males on average wages are ill-suited for policy analysis especially of increasingly common reforms like pension age changes or moves to make state pensions more defined contribution. Replacement rates are hard to interpret as they do not have an underlying benchmark which allows their value to be deemed adequate or inadequate. Moreover they are a point-in-time measure which ignores the impact of benefit indexation rules. Moreover the emphasis on assumptions which are very unrepresentative of real-life labour market conditions also makes them deceptive, particularly in relation to current and future pension outcomes for women and those on low incomes.

This paper has suggested an alternative approach based on estimates of pension wealth calculated using more realistic labour market assumptions. These estimates are then compared to a benchmark reflecting the pension entitlement required to keep an individual out of relative poverty through retirement. By focusing on total pension flows, this approach is able to account for changes in the value of pensions over time. It also focuses analysis on the expected outcome, and lets the latter be affected by changes in longevity and pension ages. When applied to study reforms enacted since the 1990s in ten European countries, the resulting estimates suggest that these reforms have decreased generosity significantly, but that the poverty alleviation function remains strong in those countries where minimum pensions were improved. Theoretical replacement rates indicate a decline in generosity, but fail to give a precise picture of who will be worst affected and the extent, if any, of resulting

concerns. By contrast the pension wealth adequacy indicators show that moves to link benefits to contributions have raised concerns for women and those on low incomes which policymakers, particularly those in Eastern European countries, should consider and tackle. The pension wealth indicators also suggest that while reforms have reduced the fiscal challenge of ageing, in many countries pressures will persist and further reforms are likely.

## Appendix

This paper adopts a measure of career lengths based on Eurostat Labour Force Survey data. Essentially the probability of a person to be active at a given age is set at the activity rate at that age. These probabilities are summed to arrive at the total career length. The latter is then forecast to 2050 using EU Commission projections of activity rates by age. Table A1 shows that career length should rise in most countries. The increase among women reflects both a cohort effect – a catch-up in gender employment rates – and a policy effect – gender pension age equalisation. The change for men mostly reflects tightening of early retirement schemes.

**Table A1: Assumed career length**

	2005		2050	
	Male	Female	Male	Female
Austria	35	29	36	35
Finland	36	34	39	38
France	35	30	35	33
Germany	37	31	41	41
Hungary	31	23	32	29
Italy	35	23	37	28
Poland	33	27	35	28
Slovakia	36	30	35	31
Sweden	38	36	42	39
UK	38	30	41	37

Source: Own workings using Labour Force Survey data and Commission (2010) projections.

In a financially balanced pension system, the following identity holds:

$$\frac{\text{Average pension}}{\text{Average wage}} * \text{No of pensioniers} = \frac{\text{Average contribution}}{\text{Average wage}} * \text{No of pensioniers} \quad (1)$$

Rearranging identity (1) and redefining terms:

$$\text{Contribution rate} = \text{Gross pension level} * \text{System dependency ratio} \quad (2)$$

To turn (2) from a point-in-time indicator to a cohort indicator, we introduce pension wealth:

$$\text{Contribution required} = \text{Gross pension wealth} * \text{System dependency ratio} \quad (3)$$

Gross pension wealth multiplied by the ratio of beneficiaries to contributors gives the number of years of average wages required to finance total pension transfers to a generation. For example, if pensioners have an entitlement of 5 years average wages, and the dependency ratio is 2, then every worker needs to forgo 2.5 years of average wages to finance pension transfers. This amount is transformed into a contribution rate by dividing it by career length.

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