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Drivers of the Gender Gap in Pensions: Evidence from EU-SILC and the OECD Pension Model

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ABSTRACT

Drivers of the Gender Gap in Pensions: Evidence from EU-SILC and the OECD Pension Model*

This paper explores trends and drivers behind the gender gap in pensions (GGP) in Europe, focusing on countries with notionally defined contribution (NDC) schemes: Italy, Latvia, Norway, Poland, and Sweden. Based on current gender gaps on the labor market, the paper relates the progressivity of pension systems and the coverage of child care-related spells to the GGP. It shows that NDC countries do not stand out as a group compared to other European countries in terms of pension outcomes for women. Nevertheless, NDC countries differ significantly from one another. Choices of indexation of pensions in payment and survivors' pension options have a strong impact on gender inequalities. Still, labor market differences are the most important driver of the GGP.

KEYWORDS: Pensions, Gender Gaps, Notionally Defined Contribution

JEL CODES: H55, J16, J31

Abbreviations and Acronyms

DB	Defined Benefit
EU	European Union
EU-SILC	European Survey of Income and Living Conditions
GGP	Gender Gap in Pensions
NDC	Notionally Defined Contribution
OECD	Organisation for Economic Co-operation and Development

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1. Introduction

Women's pensions are significantly lower than those of men in the European Union (EU). On average, women's pensions were 27 percent lower across EU countries in 2013–2014 according to the European Survey of Income and Living Conditions (EU-SILC).¹ This gender gap in pensions (GGP) is observed in all EU countries, and while in some countries the GGP shows a decreasing trend, few signs indicate that it is closing across the board.

The GGP is an important indicator of pension systems for at least three reasons. First, gender equality is an integral part of social policy (OECD 2012, 2016), and the GGP is an important indicator of gender equality at old age. Second, the GGP reveals the impact of broader labor market inequalities on pensions, as women have lower employment rates, higher rates of part-time work, and lower wages in many countries. Finally, decomposing the GGP into its various drivers can indicate future policy avenues to reduce gender inequality.

This paper explores recent trends and the drivers behind the GGP in Europe, focusing on countries with a notionally defined contribution (NDC) scheme: Italy, Latvia, Norway, Poland, and Sweden. Based on current gender gaps on the labor market, it relates the progressivity of pension systems, the coverage of child care-related spells, and other elements of pension systems to the GGP.

With an ever-tighter link between labor income and pensions in many pension systems, it is likely that the GGP will remain persistently high if women's labor market position does not significantly improve. This should be especially evident in NDC schemes where – at least theoretically – risk sharing between individuals is limited compared to defined benefit (DB)

¹ This is an unweighted average. Similarly, all averages calculated for EU countries are unweighted.

schemes. Low or absent labor income should lead to low pensions especially in the absence of survivors' pensions. The unfunded nature of NDC systems is irrelevant in that respect.

However, the paper shows that countries with NDC schemes do not perform significantly worse as a group than other European countries in terms of pension outcomes for women. Nevertheless, countries with an NDC scheme differ significantly from one another. Even when NDC sustainability rules are followed strictly, the choices of indexation of pensions in payment and survivors' pension options have a strong impact on gender inequalities that are mainly driven by the labor market.

Current pensions are affected by NDC rules to varying degrees. Latvia was the first country to fully implement an NDC scheme in 1996, and all people who retired afterward have had their pensions determined based on the NDC formula. Poland introduced an NDC scheme in 1999 but only cohorts born after 1949 are affected. Sweden's NDC scheme was also introduced in 1999, affecting fully only cohorts born from 1954 onward. Italy introduced an NDC scheme in 1996 but all past entitlements were honored; its NDC scheme started to partially affect new pensions as of 2011 and will only be fully effective after 2040. Norway's NDC scheme was introduced in 2011 and started to gradually affect new pensions as of 2016.

In terms of links between lifetime earnings and pension calculation, NDC rules are similar to those of point systems: higher earnings means higher pensions and past earnings are valorized with the average wage (with some sustainability factors in some countries) but life expectancy does not directly affect the pension amount (unless indirectly affecting the sustainability factor). Such systems have been implemented since the 1990s in, among others, Germany, Croatia, Estonia, Lithuania, the Slovak Republic, and Romania.

The GGP captures the difference in monthly pension income, which is crucial for both poverty prevention and consumption smoothing. It misses, however, the cumulative lifecycle dimension that could be captured by pension wealth or the rate of return to individual pension contributions. This is important as women tend to live five years longer than men, on average, across Organisation for Economic Co-operation and Development

(OECD) countries (OECD 2017a). Longer life and therefore, potentially, a longer period of claiming a pension by women makes the GGP substantially higher than the gender gap in pension wealth. Although a full wealth analysis is beyond the scope of this paper, the impact of gender longevity differences is discussed in section 4.

Recent reports confirm the existence of a significant GGP in European countries (Grabka et al. 2017; Lodovici et al. 2016; Burkevica et al. 2015; Gardiner, Robinson, and Fakhfakh 2015; OECD 2012; Flory 2012; Hänisch and Klos 2014; Bettio, Tinios, and Betti 2013). Among them, three focus specifically on the pension gap in the EU. Bettio, Tinios, and Betti (2013) carried out a statistical analysis with the 2009 EU-SILC showing that the EU-27 (excluding Croatia) weighted-average GGP is 39 percent. They also pointed out that short careers, which many women have, were associated with lower pensions. However, that relationship was not linear. The gender structure of employment matters: the lowest gender gaps were in the public sector and the largest gaps were for the self-employed. Marital status also matters: the GGP was smaller for single women and widest for married women, with divorced women somewhere in the middle.

Burkevica et al. (2015) observed GGPs in 2012 similar to those found by Bettio, Tinios, and Betti (2013). Gaps in lifetime earnings were found to be among the main drivers behind the GGP. They also found that child care and other care activities could exacerbate the pension gap, particularly where child care was too expensive, of insufficient quality, not suitable, or not available.

Lodovici et al. 2016, found a weighted average EU-28 GGP of 40 percent in 2013 for the 65–74 age group. This gap is much higher than the average EU gender pay gap and the gender gap in annual earnings. The GGP has remained stable in the EU as a whole since the 2008–2009 financial crisis, as it was 40 percent in 2008. They also pointed out that the shift toward multipillar pension systems with a closer link between lifetime contributions and benefits means that pension entitlements are strongly related to career length. GGPs thus mirror gender gaps in employment, in working years, in part-time jobs, and in pay.

Chłoń-Domińczak (2017) proposed a forward-looking indicator for the GGP. It includes three dimensions – career length, work intensity, and pension system features– in mitigating the effect of labor market differences. When the future indicator of the GGP is calculated, these three dimensions are weighted according to “expert assessment of the risk posed by the selected indicators on the future gender pension gap.” For example, the gender gap in employment is given a weight twice higher than the gender pay gap or work intensity gap in all countries.

This paper provides evidence of how each dimension of the gender gap in the labor market (hourly earnings, number of hours worked, and career length) and elements of the pension system (progressivity and coverage of child care, survivors’ pensions, and indexation of pensions) affect the GGP separately and in interaction with each other. As the GGP is simulated using labor market outcomes for various years, the direction of future changes in the GGP is also shown. Section 2 describes the GGP across European countries, providing some insight into its distribution; section 3 explores the employment-related drivers behind the GGP and how they interact with pension systems, especially NDC designs. Section 4 shows how gender longevity differences affect the GGP, particularly given the existing indexation of pensions and survivors’ benefits, while section 5 concludes.

2. Gender gaps in pensions – current values and recent trends

In the EU-28 in 2013–2014, the GGP was 27 percent (see Box 2.1 for the definition of the GGP; this is an unweighted average, which will be the case from here on unless specified otherwise). When the size of the population aged 65 and over is taken into account, the weighted average increases to 34 percent. However, considerable heterogeneity arises at the country level. In 2014, the GGP stood at over 40 percent in Cyprus, Germany, and the Netherlands and below 10 percent in Denmark, Estonia, and the Slovak Republic (Figure 2.1).

The reported value of the average GGP across the EU is significantly lower than that reported by other recent studies, which show an EU average of around 40 percent (Lodovici et al. 2016; Burkevica et al. 2015). However, the country-level estimates in these reports are

very similar to the ones presented in this paper. Country-level estimates from Burkevica et al. (2015) enable calculation of an average for the EU-28 when giving all countries equal weights, which stands at 27 percent. The value of 40 percent for the EU-28 is obtained when the GGP is calculated from microdata the same way for the EU as a whole as for each country separately (Burkevica et al. 2015). Calculating it this way means that the richest and the most populous countries – such as Germany, the United Kingdom, and France, which incidentally also have the highest GGPs – boost the average. Moreover, the relative balance between men and women across countries matters for the final GGP. Such an average should not be compared with the average estimates of gender wage gaps and gender pay gaps when they are weighted differently.

Box 2.1: Measuring the GGP

The established definition of the gender gap in pensions (GGP) is used (Betti et al. 2013; Eurofound 2016):

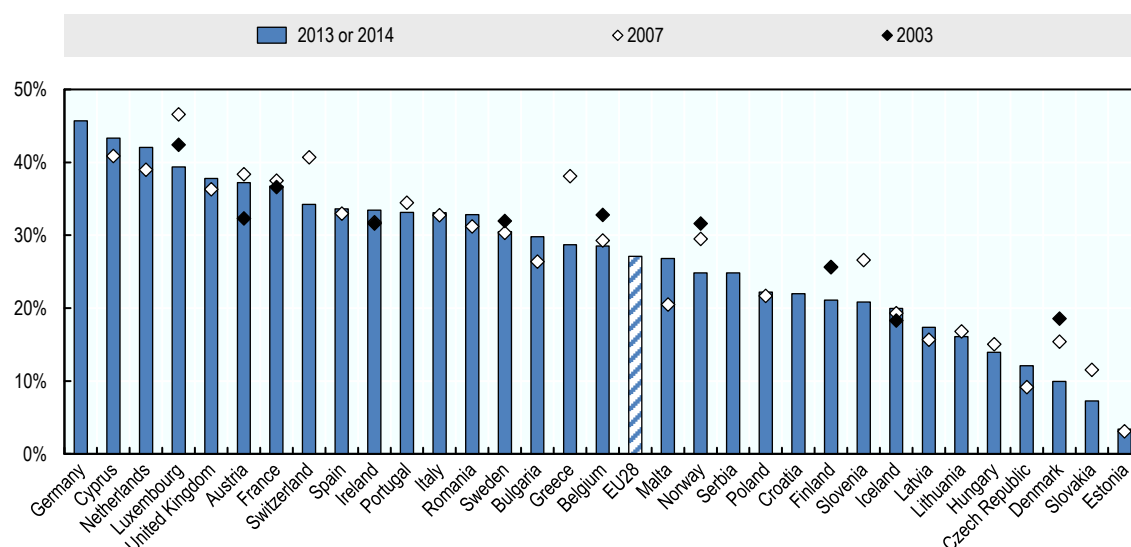
$$GGP = 1 - \frac{\text{women's average pension}}{\text{men's average pension}}$$

The GGP is calculated with EU-SILC data. Four variables are added to calculate total individual pensions: public pensions (PY100G), private pensions (PY080G), survivors' benefits (PY110G), and disability benefits (PY130G). The GGP is calculated only for people aged 65 and older who obtain at least one of the above-listed benefits. Excluding those without pensions follows the definition of the gender pay gap, which is calculated only among those working. Survivors' benefits are included in the pension gap since they are an integral part of the pension system. Excluding survivors' pensions would ignore an important (individual) source of income, especially for older women, while other intrahousehold transfers are outside the pension system.

The definition has two important features. First, only individual benefits are included, so first-tier pensions granted at the household level are not accounted for. In some countries basic pensions might also be excluded. Therefore, and given the lower employment rates among women, in some countries the computed GGP might be lower only due to the fact that people who have not met the eligibility conditions for contributory pensions and receive safety net benefits are excluded from the calculation. Second, in contrast to other studies, disability pensions are added to pension income herein. This is done to ensure better cross-country comparability. In some countries, disability benefits are directly transformed into old-age benefits when reaching retirement age, whereas in others they are not.

The GGP can be measured across various parts of the pension distribution using positional statistics such as, for example, the median or quantiles. Thus the GGP at quantile X is defined as:

$$GGP_{Dx} = 1 - \frac{X \text{ quantile of pension distribution among women}}{X \text{ quantile of pension distribution among men}}$$

Figure 2.1: Gender gap in pensions in 2013, 2007, and 2003 in European countries

Source: EU-SILC.

Note: The GGP is calculated for persons aged 65 and older. It includes persons who obtain an old-age benefit (public or private), a survivors' pension, or a disability benefit. Differences are expressed in percentage points (see Box 2.1).

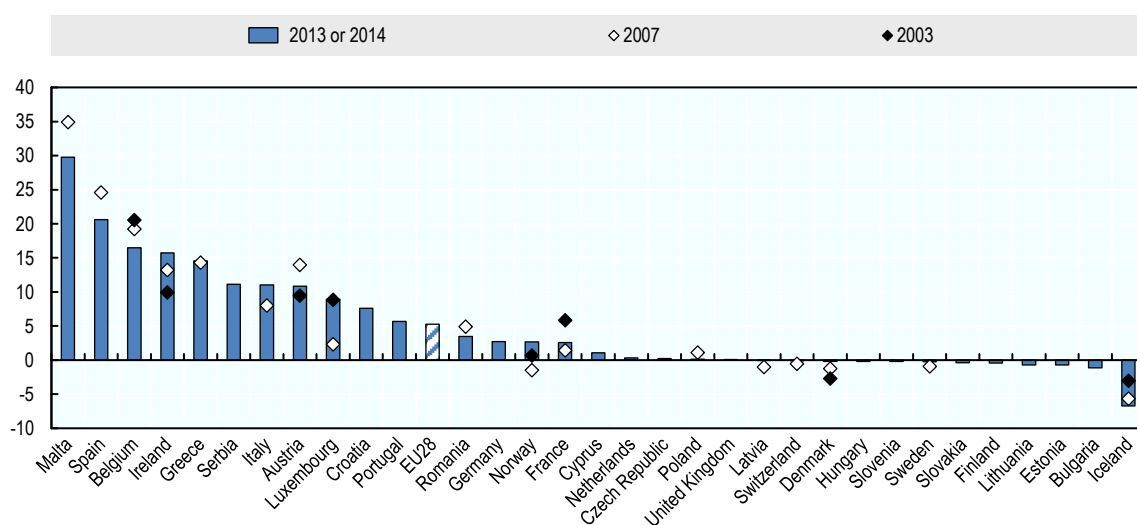
The GGP decreased only slightly in recent years across EU countries. On average for the 26 EU countries for which data were available in 2007 (this excludes Germany and Croatia), the GGP decreased from 27.2 percent in 2007 to 26.6 percent in 2014. Recent reports also show a relatively stable GGP in the EU (Lodovici et al. 2016; Burkevica et al. 2015). Moreover, on average for the eight EU countries for which data were available in 2003, the pension gap decreased from 30.2 percent in 2003 to 28.2 percent in 2014.²

The GGP does not account for people who do not obtain any individual pension (Box 2.1). In countries with noncontributory universal pension schemes the whole population would receive a pension at old age and no coverage gap would exist. By contrast, in countries where first-tier pensions include only means-tested social assistance granted at the household level, given their more limited attachment to the labor market, many women would not receive an individual pension, even though the safety net benefits might be

² Austria, Belgium, Denmark, Finland, France, Ireland, Luxembourg, and Sweden.

generous. Survivors' pensions – in combination with the aforementioned means-tested first-tier pensions – result in rising coverage with age, as only after the death of a spouse would some people, mainly women, receive individual pensions. In 10 out of 28 EU countries the gap in incidence of obtaining no individual pension was larger than 5 percentage points, with Malta and Spain standing out at 30 and 21 percentage points, respectively (Figure 2.2).

Figure 2.2: Gender gap in incidence of obtaining any individual old-age benefit in European countries



Source: EU-SILC.

Note: The gender gap in incidence of obtaining individual pensions is calculated as the difference in shares of women and men not obtaining individual pensions.

3. Labor market drivers of the GGP

Gender differences in the labor market have a profound effect on the GGP. Women are less likely to be employed than men and when they are employed, they earn less, work fewer hours, and have shorter careers on average. These differences are mirrored in the GGP (Lodovici et al. 2016). The reform trend toward pension systems with a stronger link between earnings and pensions has exacerbated the already weak pension position many women find themselves in (OECD 2015; Queisser, Whitehouse, and Whiteford 2007). However, rising women's participation rates, on the other hand, have improved the pension prospects for many women.

3.1. Employment (intensive and extensive margins)

The duration of working life is a crucial variable affecting the GGP. In Europe, women have a shorter working life compared to men, usually due to unpaid care activities (Lodovici et al. 2016). The method of calculating the duration of employment and nonemployment spells is presented in Box 3.1. It is based on cross-sectional monthly data on main economic status from EU-SILC. Following cross-sectional patterns from 2013, on average in EU countries, a woman at age 15 can expect to work 4.2 years less during her career compared to her male counterparts. In almost one-half of the countries, the gap is larger than three years. In Italy the career length gap is even around seven years (Figure 2.2). By contrast, Latvia managed to entirely eliminate the gender gap in career length.

Box 3.1: Duration of employment and nonemployment spells

To calculate the gender gap in duration of specific spells, Eurostat's concept of duration of working life is used. The duration of working life is a theoretical measure and is based on the activity rate by age and mortality rates by age. Eurostat uses Labor Force Survey (LFS) data to calculate duration of working life. Here the method is modified to utilize more detailed SILC variables on labor market status in each month of the year prior to the survey.

Similar to Eurostat, the average duration of a specific spell (DS) is based on the following concept:

$$DS = \sum_{i=15}^{70} ds_i * S_i$$

where ds_i is number of months spent in the specific state divided by 12 at age i and S_i is an age-specific survival function. All age profiles for ds_i were estimated with a nonparametric smoother. Based on the age- and gender-specific mortality (m_j), the survival function can be calculated:

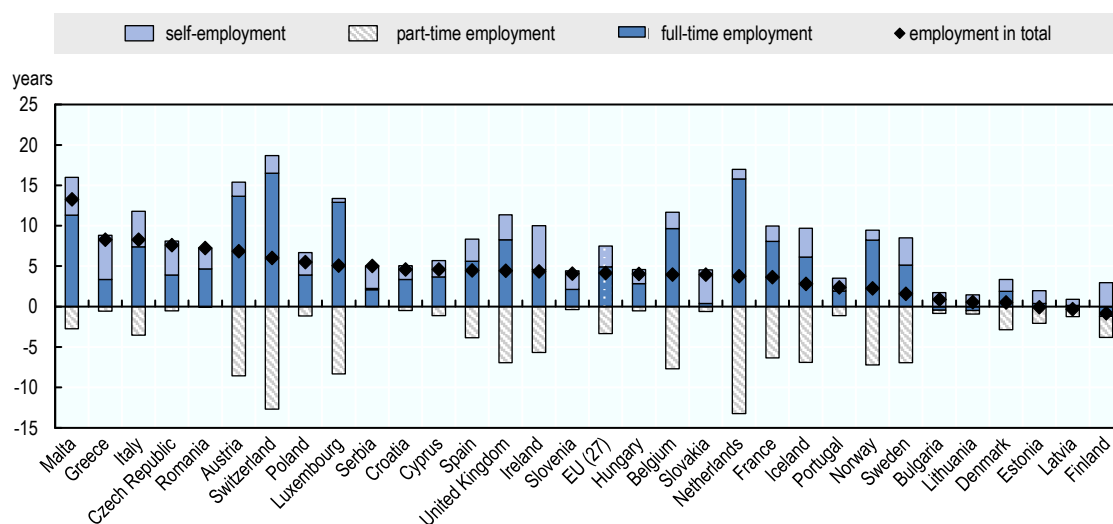
$$S_i = \prod_{j=15}^i (1 - m_j)$$

All the statistics can be calculated for each gender separately. The SILC data on main activity in each month allow more accurate duration calculation than the one based on LFS data. Only data on the main labor market status are available, so separate statuses are mutually exclusive.

Men not only work more often but also work full-time more frequently. The gap in career length in full-time employment is on average almost one year longer than in total employment, reaching 4.9 years on average in EU countries. It exceeds 15 years in the Netherlands and Switzerland (Figure 3.1). In many countries, increasing labor market

participation of women mainly leads to more part-time employment rather than full-time employment.³ The gender gap in part-time employment is negative in all EU countries. The more positive the gap in full-time employment, the more negative it is in part-time employment, with a linear correlation coefficient between the two of -0.85. The gap in the prevalence of self-employment also adds to the total employment gap. In all countries, men are more likely to be self-employed, with an average gap of almost three years. Self-employment has a lower impact on the GGP than full-time employment, as in many countries, the self-employed contribute less to the pension system.

Figure 3.1: Gender gap in average duration of employment spells for lifespan of 15–70, in years, in 2013 in European countries



Source: EU-SILC 2013.

Note: The gender gap in average duration of spells is calculated as the difference between men and women in the number of years expected to be spent in selected spells in the whole career (Box 3.1). Germany is excluded due to data availability.

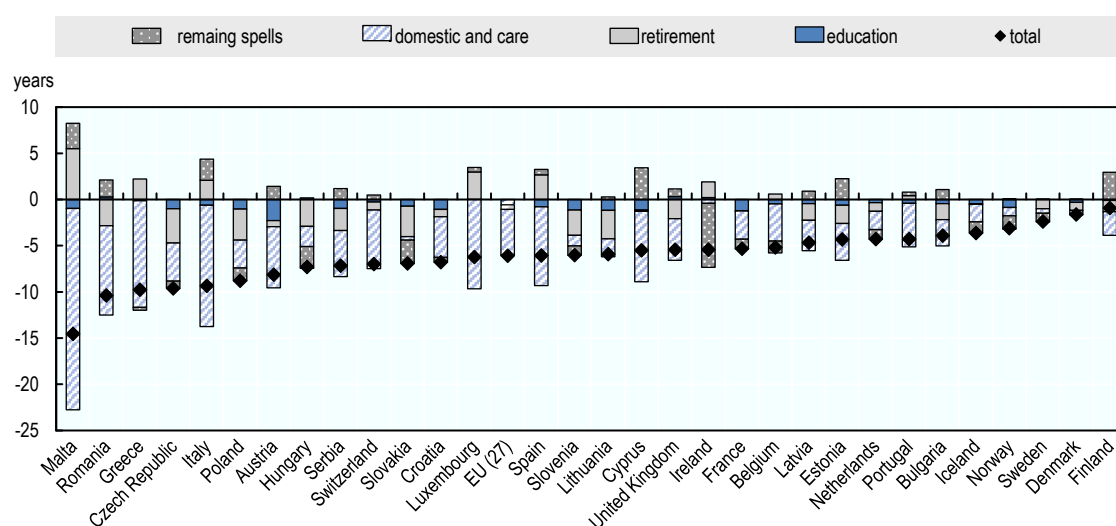
Periods of part-time employment in a person's career have a significant impact on the level of income in old age, as these periods strongly influence career advancement and, more

³ The overall significant gap in the share of part-time employment between women and men at 16 percentage points in 2017 on average across EU countries is one of the main drivers of gender gaps in lifetime earnings and thus also of the GGP.

generally, lifetime earnings. Part-time work is often a consequence of family duties and inadequate child care services (Lodovici et al. 2016). Women still perform the bulk of care activities, which leads to a much higher incidence of part-time work compared to men (OECD 2017c). In 2012, personal and family responsibilities were the reason for part-time employment of 44 percent of women across the EU-27, while only 11 percent of men stated these responsibilities as a reason (Burkevica et al. 2015).

Current data on main monthly economic activity imply that women at age 15 in EU countries can expect to spend, on average, 6.2 years more in nonemployment compared to men until they reach 70 (Figure 3.2).

Figure 3.2: Gender gap in average duration of nonemployment spells for ages 15–70, in years, in 2013 in European countries



Source: EU-SILC 2013.

Note: The gender gap in average duration of spells is calculated as the difference between men and women in the number of years expected to be spent in selected spells in the whole career (Box 3.1). Germany is excluded due to data availability.

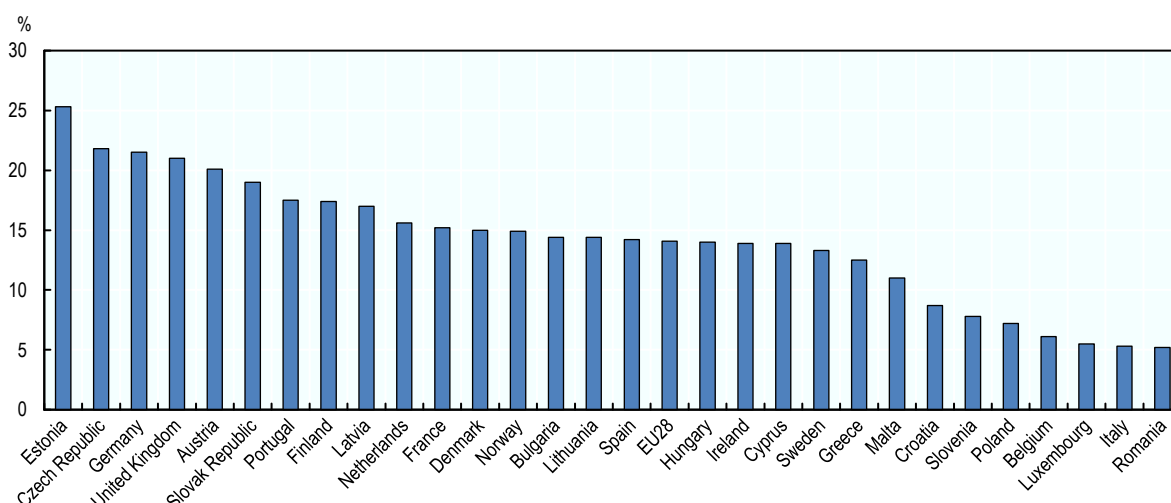
Almost the entire difference (5.1 years) comes from their engagement in domestic tasks and care activities. Retirement by age 70 is expected to last six months and education seven months longer among women than men. Remaining nonemployment spells (unemployment, disability, and other inactivity) have together almost no impact on the gender differences on average in the EU. This is because the average shorter duration of

unemployment among women equals the longer duration of other inactivity spells. In their total careers, women are expected to spend 11 months less unemployed on average in EU countries.

3.2. Earnings gaps

A second key determinant of the GGP is the gender pay gap; i.e., the difference in average hourly wages between men and women divided by the average hourly wage for men. The gender pay gap is 14 percent on average across EU countries; it varies from below 10 percent in Belgium, Croatia, Italy, Luxembourg, Poland, Slovenia, and Romania to above 20 percent in Austria, the Czech Republic, Estonia, Germany, and the United Kingdom (Figure 3.3).

Figure 3.3: Gender pay gap (unadjusted) for 2016 or latest in EU countries



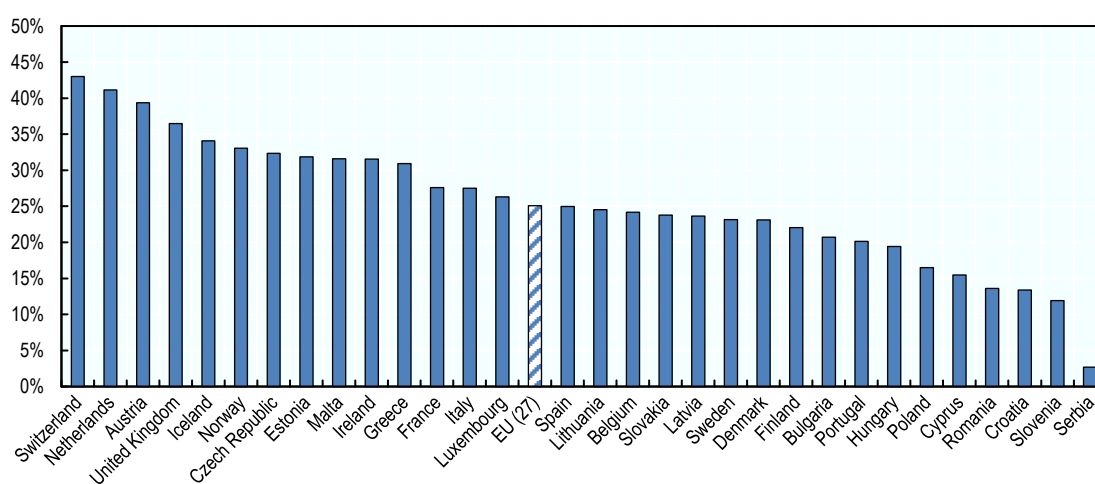
Source: Eurostat.

Note: Eurostat defines the unadjusted gender pay gap as the difference in men's and women's average hourly wages divided by men's average hourly wage. The adjusted gap is calculated with regressions that account for observable individual characteristics such as age, education, and occupation and firm characteristics such as company size and economic sector.

The gender pay gap is generally much lower for new labor market entrants and tends to widen with age (OECD 2012). However, these differences between age groups can have different patterns across countries. The gender pay gap might increase with age as a result of the career interruptions women experience. This is particularly the case for older women, who have benefited less from more recent policies promoting gender equality in the labor

market (OECD 2012). Wages in the public sector, which are more compressed, generally lower the gender pay gap in all EU countries. Women earn less due to being paid less for the same job, but also due to sorting mechanisms. The latter include educational choices and later on occupational and sectoral choices. Women tend to work more often in education, human health, and social work activities (OECD 2017c). The concentration of women in specific sectors increased over 2008–2014 (Eurofound 2016), resulting in almost 30 percent of women working in female-dominated sectors in 2014, compared with only 8 percent of men working in these sectors. Wages in sectors dominated by women are typically lower than in other sectors. This sectoral gender gap partially explains the GGP (Grabka et al. 2017). The gender gap in annual labor market earnings (which excludes people with no earnings) is wider than the gender pay gap. The pay gap measure only reflects differences in hourly wages, whereas annual earnings account for part-time employment, breaks in employment, and all types of labor contracts, including self-employment. The average gender gap in annual labor income in EU countries is 25 percent compared to a 27 percent GGP. The gender gap in annual labor income varies from more than 40 percent in Austria and the Netherlands to less than 15 percent in Croatia, Romania, and Slovenia (Figure 3.4).

Figure 3.4: Gender gap in annual labor earnings in 2014 or 2013 in European countries



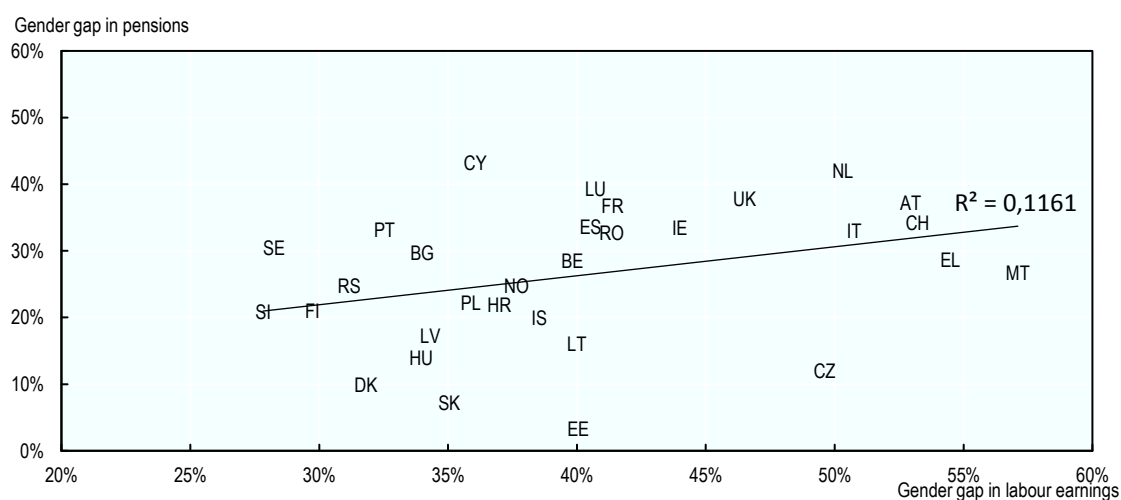
Source: EU-SILC 2014 and 2013.

Note: The gender in gross annual labor earnings is calculated for all labor income (dependent and self-employed). Persons with no labor income are excluded. Germany is excluded due to data availability.

The average gender gap in total labor earnings including individuals with zero earnings across EU countries is significantly higher, at 40 percent, than the average GGP of 27 percent in EU countries (excluding Germany, Figure 3.5). Sweden has a substantially higher GGP than the gap in total labor earnings, while in Norway the GGP corresponds closely to the labor market gap. Current GGPs remain relative low in Central and Eastern European countries partly due to labor market conditions that prevailed before the transition of these economies. In addition, redistributive elements in pension systems such as minimum, basic, and survivors' pensions, contribution ceilings, and recent increases in women's employment rates mitigate the labor market inequalities in later life.

The current gender gaps in total yearly labor earnings account for only 12 percent of the variation of the current GGP across countries (Figure 3.5) for many reasons. First, inequalities in yearly earnings can only partially proxy cumulative lifetime earnings inequalities. Second, the labor market situation has changed across cohorts and, currently, much higher employment rates of women are observed.

Figure 3.5: Gender gap in total labor earnings (including no earnings) and the GGP



Source: EU-SILC 2014 and 2013.

Note: The gender in gross annual labor earnings is calculated for all labor income (dependent and self-employed). Persons with no labor income are included with zero earnings. Germany is excluded due to data availability.

Moreover, pension systems have changed a lot; for instance, links between labor market income and pensions have been strengthened and retirement ages between men and

women have been equalized. Additionally, the differences between pension systems are very significant. Countries differ with respect to redistributive elements of pension systems and the coverage of nonemployment spells related to care activities, mitigating the gender difference in labor market earnings. In countries like the Netherlands, Austria, and Italy, high labor market inequalities coincide with high GGPs. Denmark, Estonia, the Slovak Republic, and the Czech Republic manage to achieve low levels of the GGP even though gender gaps in total labor earnings remain high (Figure 3.9).

3.3. Labor market differences in NDC countries

Judging purely from the overall GGP in countries, it is difficult to pinpoint the influence of the pension system on the outcome. Even though the Netherlands has a defined benefits (DB) system, it has one of the highest GGPs. Slovakia also has a DB scheme but a very low GGP. Like the Netherlands, Denmark has a funded system but a relatively low GGP. For the countries with NDC schemes, the GGP ranges from over 30 percent in Italy and Sweden to 20 percent and below in Poland and Latvia. Norway has a GGP somewhere in the middle at 25 percent. Since 2007 the GGP decreased in Norway; it stayed stable in Italy and Sweden; and it increased in Poland and Latvia.

Therefore, the difference in design of the pension system between defined contribution (DC) and DB systems might have less of an influence on the GGP than labor market differences in combination with the strength of the link between pensions and labor earnings.

Looking more closely at these labor market differences for NDC countries, it can be seen that countries with NDC schemes differ in terms of drivers of employment gaps. Sweden and Norway managed to eliminate gender gaps in employment, in particular those related to child care. Italy stands out as a country with very long breaks due to domestic and child care tasks. In Poland nonemployment is driven equally by domestic care and early retirement of women. In Latvia, the gap in average duration of nonemployment spells is five years lower than the one for employment spells, partly because the life expectancy difference between Latvian men and women is one of the highest (more than five years).

Norway, Poland, and Sweden show important gaps in full-time employment and in self-employment. In Sweden and Norway these gaps are almost fully offset by women working more often part-time. However, in Poland part-time employment among women can only slightly decrease the total employment gap. Latvia has hardly any gap in either full- or part-time employment duration. Therefore, NDC schemes are represented along the full spectrum of employment gaps.

The (unadjusted; see note at Figure 3.6) gender pay gaps in Latvia, Norway, and Sweden are around the EU average, at 17 percent, 15 percent, and 13 percent, respectively. Countries with NDC schemes still show various levels of gender gaps in annual labor earnings, however, from 33 percent in Norway, 27 percent in Italy, 24 in Latvia, and 23 percent in Sweden to 16 percent in Poland. This variety of labor market gaps among NDC countries leads to a variety of GGPs.

3.4. Decomposition of the labor market drivers of the GGP (the progressivity of replacement rates)

Labor market differences between men and women can be mitigated by a redistributive pension scheme. Although pure NDC schemes do not contain any redistributive elements, they interact with first-tier pensions (minimum and basic pensions or general safety nets). Additionally, NDC schemes often provide a contribution ceiling, resulting in lower replacement rates for high earners. On top of the progressivity of the pension system, earlier labor market exit of women, the coverage of nonemployment spells (for instance, child care), the indexation of pensions, and the generosity of survivors' pensions can all have a significant impact on the GGP.

Cumulative lifetime earnings inequalities are – to a different degree – mitigated by mandatory pension systems. All EU countries provide lower bounds of income for older people within the pension system (minimum and basic pensions) or outside the pension system (safety nets). Noncontributory old-age benefits (residency-based basic pensions and safety nets) vary from below 15 percent of average earnings in Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, and Lithuania to above 25 percent in Austria, Belgium,

Denmark, France, Greece, Ireland, Luxembourg, Malta, and the Netherlands. Minimum pensions or contribution-based basic pensions provide higher benefits. Countries with NDC schemes provide different solutions to first-tier pensions. Norway and Sweden provide basic pensions at 33 percent and 22 percent of average earnings, respectively. Poland and Latvia set (full) minimum pensions at 22 percent and 14 percent of average earnings, respectively, while Italy has a safety net benefit at 19 percent of average earnings.⁴ On the other side of the spectrum, some countries provide upper bounds of benefits through ceilings on pensions or contributions in mandatory schemes. Belgium and France place a ceiling (for public pensions) on pensionable earnings slightly above average earnings; the ceiling is low in Norway at 115 percent of average earnings, and substantially higher in Poland at 250 percent, while in Italy, Latvia, the Slovak Republic, and Hungary the ceiling exceeds three times average earnings (OECD 2017a). The ceiling is low in Sweden at 105 percent of average earnings but the increasing contributions to occupational DC plans make this ceiling less important for overall pension inequalities. Among NDC countries, the Norwegian system is therefore the most progressive, having high minimum benefits and a low effective ceiling on pensions from the public scheme; the Latvian system is the least progressive, with a very low level of first-tier benefits and a very high ceiling on mandatory contributions. Given the difference in labor market outcomes between men and women, these redistributive elements in the pension system also affect the GGP.

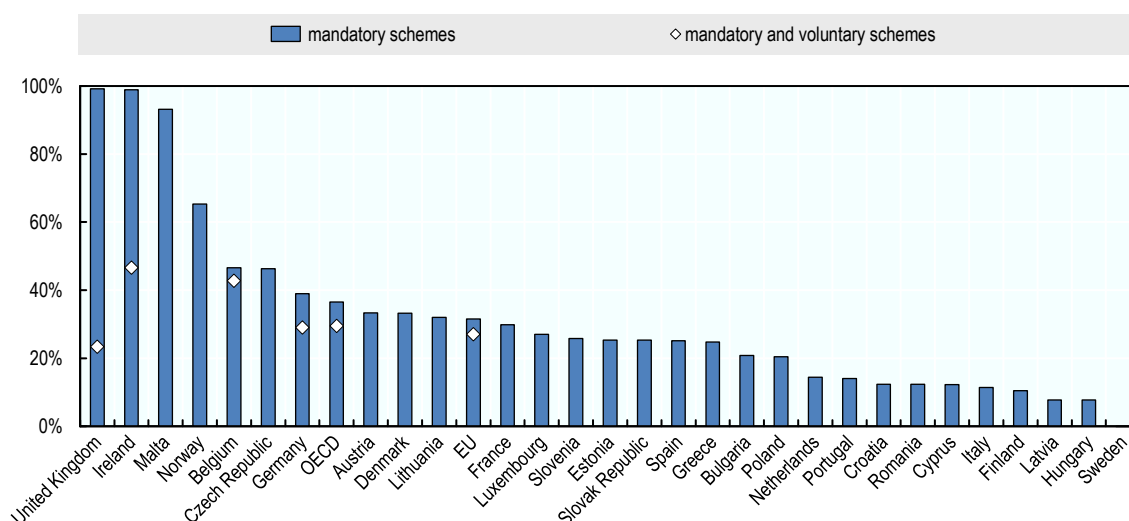
A progressivity index of pension schemes measures the transmission of the cumulative lifetime inequalities into pensions (OECD 2017b, 158). The index shows how a given level of inequalities of lifetime earnings affects pension inequalities, both measured by the Gini coefficient (see note under Figure 3.6). A value of 0 percent means that lifetime earnings are fully carried through to pensions on a one-to-one basis. Conversely, a value of 100 percent means that the pension scheme provides a flat benefit; therefore, earnings inequalities are not carried through to benefits at all. The progressivity index shows how lifetime earnings

⁴ Italy also has a minimum pension but it will not apply to pensions granted purely from the NDC scheme.

inequalities translate into pensions for earnings between zero (hence relying fully on safety nets and basic pensions) and 200 percent of average earnings. But it does not account for the impact of career breaks; e.g., those related to child care.

Figure 3.6 shows that, on average, mandatory pensions systems reduce lifetime earnings inequalities by 37 percent in the OECD and by 32 percent in the EU.

Figure 3.6: Progressivity of mandatory and voluntary pension schemes in EU countries



Source: OECD calculations.

Note: Calculations based on OECD 2017a, Figure 4.15. The progressivity index is calculated as 1 minus the Gini coefficient of projected pension entitlements divided by the Gini coefficient of wages. The wage distribution is assumed constant across countries. It is first assumed that the distribution comprises people with zero, low (50 percent of average wage), average (100 percent), and high (200 percent) earnings over the entire working lifetime. It is further assumed that 15 percent of people have zero earnings and that the total earnings distribution generates a score of 0.35 on the Gini index. It follows therefrom that the shares of low earners, average earners, and high earners are 16.5 percent, 45.3 percent, and 23.3 percent, respectively. The index was recalculated based on the model results from OECD (2017b). Voluntary schemes are included for the countries where they are widespread: Belgium, Germany, Ireland, and the United Kingdom (OECD 2017a).

Even though a generic NDC scheme would provide almost full transmission of labor income inequalities into pensions, the actually implemented ones appear at all parts of the distribution compared to the EU countries. Norway mitigates inequalities to a great extent, while Sweden not at all (but rather due to the quasi-mandatory occupational plans than its NDC scheme per se). Italy, Latvia, and Poland show rather low levels of progressivity: their pension systems reduce earnings inequalities by less than 20 percent, partly because only a small fraction of the population shows earnings twice higher than the average earnings and

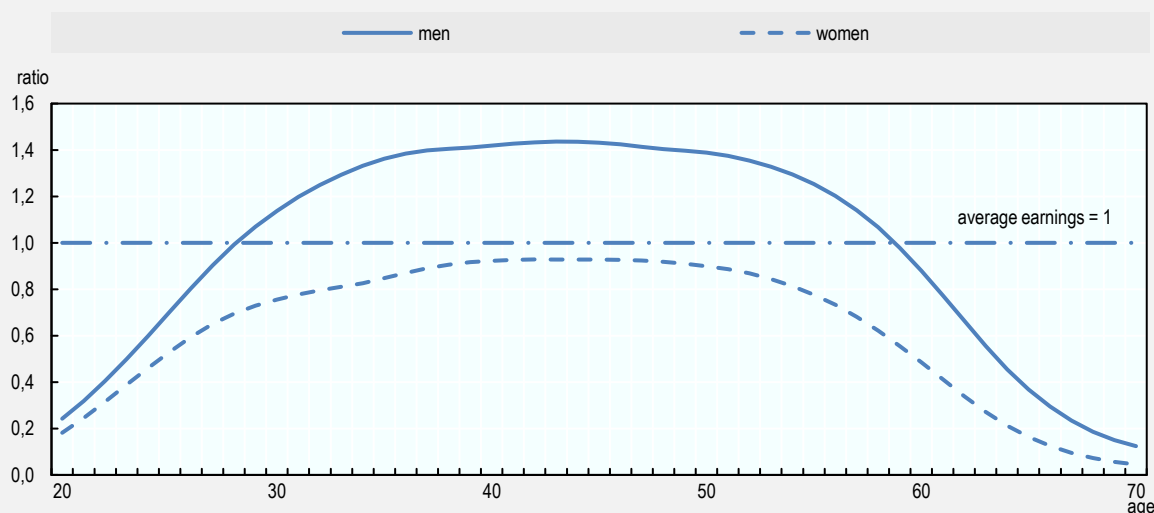
the progressivity index is not affected by ceilings on pensionable earnings being twice higher than the average earnings.

The progressivity of pension systems affects the transmission of lifelong cumulative gender earnings inequalities into pensions. Merging the (future) OECD pension model with actual cross-sectional data on average earnings by age and gender approximates the GGP stemming from current labor market gaps in combination with the pension rules for someone starting a career in 2016. In particular it allows simulating the NDC rules. Box 3.2 discusses technical details of the procedure, while Figure 3.9 presents the simulated GGP compared to the actually observed ones. If a country is below the 45 degree line it means that the simulated GGP is lower than the actual one and vice versa.

Box 3.2: Simulating and decomposing the GGP

Gender gaps in pensions (GGPs) are simulated for a person who starts her or his career in 2016 at age 20 and retires at the normal retirement age based on average earnings by age and gender at a given year using EU-SILC microdata. Average earnings account for earnings for dependent employment and self-employment as well as employment probabilities; i.e., people not working are included with zero earnings when the average is calculated.

The average age-earnings profiles from 2013 are shown in Figure 3.7. The profiles are calculated in a given year and, hence, should not be interpreted as a projection for any cohort but rather as an average for the cohorts. On top of age effects (earnings profiles), real earnings are projected to increase at 1.25 percent a year (OECD 2017a). Based on these earnings profiles, the first pension received at the normal retirement age is then calculated for each gender separately. This simplified approach does not account fully for the impact of shorter careers of women, the impact on eligibility conditions, child care credits, indexation of pensions, and survivors pensions but it provides important insights into the role of the labor market-related determinants of the GGP; it also makes it possible to check how current labor market developments would transmit to the GGP in the future. The voluntary schemes are used only in the countries where they are widespread (OECD 2017a) and it is assumed that both men and women participate in the schemes.

Figure 3.7: Average total annual earnings profile relative to average earnings for men and women

Source: EU-SILC 2014.

The decomposition of the simulated GGP shows how the gender gaps in hourly wages, numbers of hours worked, and employment probabilities affect the simulated GGP separately in each country. The average yearly earnings (E) at a given age (a) for each gender (g) are a product of hourly earnings (w), number of hours worked per worker (h), and employment probabilities (e) at year t :

$$E_{a,g}^t = w_{a,g}^t * h_{a,g}^t * e_{a,g}^t$$

The role of each contribution factor (hourly earnings, hours worked, and employment probability) to the simulated GGP is quantified in the following way. First, the pension of a woman is calculated using the gender-specific earnings, hours, and employment profiles. Then, one by one, each factor is substituted by the values for men. The reduction in the GGP indicates the contribution of that factor to the overall simulated gap. As only one factor is substituted at once, the interaction between them is not accounted for.

The simulated GGPs differ from the currently observed ones but the correlation between the two at 32 percent is substantially higher than the 12 percent correlation between lifetime earnings and pensions (Figure 3.8). This shows that despite the limitations of approximation (including lack of cohort effects), the simulated GGPs reasonably mirror the cross-country variation. Also the average level of the simulated GGPs at 30 percent across the EU-27 comes close to the observed 26 percent GGP.

The discrepancies between the two are meaningful as they show the impact of elements of the systems not included in the simulations, as well as the role of recent developments in the labor market (cohort effects) and in the pension system. First, many countries provide pension credits based on other factors than earnings (child care, unemployment, residency, derived pension rights) that lower the GGP. Second, in the Czech Republic, Estonia, Hungary, Latvia, Poland, and the Slovak Republic the simulated GGPs are higher than the actual ones. In the past, benefits were less tightly linked to lifetime earnings, while women's labor participation was higher in some Central and Eastern European countries. In particular, the NDC schemes introduced in Latvia in 1996 and in Poland in 1999 are examples of such policies. As a consequence, some countries with low current GGPs (below 20 percent) might expect strong increases in the future.

Figure 3.8: Simulated gender gaps in pensions and the actually observed ones



Source: OECD pension model.

The looser relationship between benefits and lifetime earnings in the past would also explain the higher simulated GGPs in Italy, Spain, and Austria even though women's labor market participation has been increasing in these countries. Italy is gradually moving from a pay-as-you-go DB pension system to an NDC system, while in Spain and Austria the benefit calculation takes into account a larger share of the career than in the past. On the contrary, the simulated GGP is lower, among others, in Ireland and the United Kingdom, where the public pension is mainly a flat benefit. Before 2016 in the United Kingdom, mandatory

pensions included an earnings-related component (SSA 2002–2016; Bozio, Crawford, and Tetlow 2010).

Leaving high redistributive elements in the Norwegian NDC means that moving to an NDC scheme is not expected to affect the GGP substantially. By contrast, introduction of an NDC scheme in Italy is expected to substantially increase its GGP.

The simulated GGP allows isolation of the impact of labor market developments on GGPs as the pension rules remain fixed for all simulations. Due to data availability, labor market developments can be tracked back to 2007 for most countries and to 2003 for a few of them.

The simulated GGP, which does not account for cohort differences but only for the changes in employment and earnings by age and gender, declined almost everywhere between 2007 and 2013, by 5 percentage points on average for 23 EU countries (Figure 3.9, panel A).

The decrease was substantial in Italy, Latvia, and Sweden but much less in countries in which labor markets were less affected by the financial crisis, namely Norway and Poland.

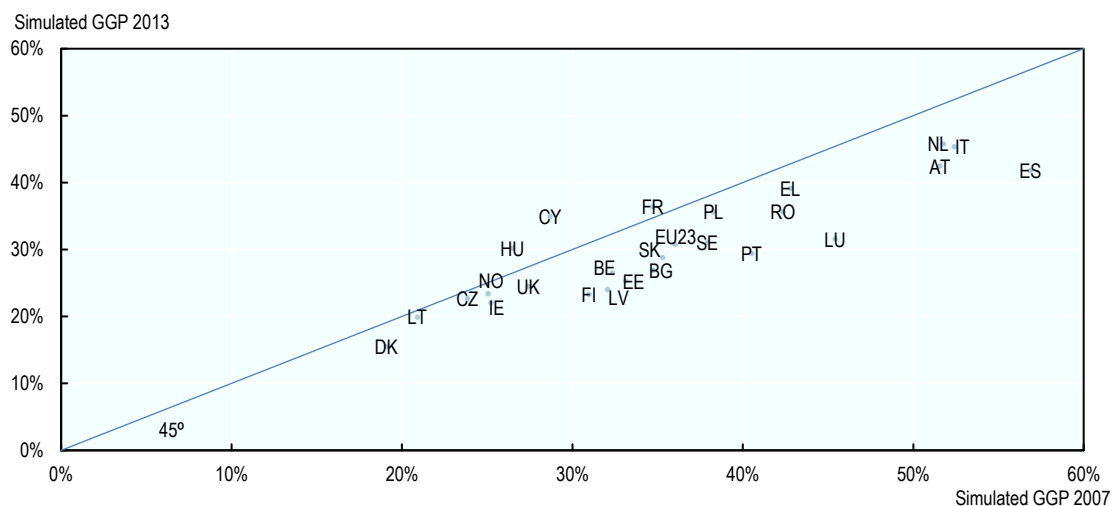
This decline is related not only to increasing employment among women, but also to a decrease of employment rates among men following the financial crisis. In Spain, the employment rate among men decreased from 77 percent in 2007 to 60 percent in 2013, while for women it only decreased from 55 percent to 52 percent, which led to a decrease in the simulated GGP by 15 percentage points.

These changes were strongly linked to the cyclical movement of the labor market; the long-run trends are expected to be slower. Before the global financial crisis between 2003–2007, employment rates were rising in many countries but the simulated GGP hardly changed (Figure 3.9, panel B).

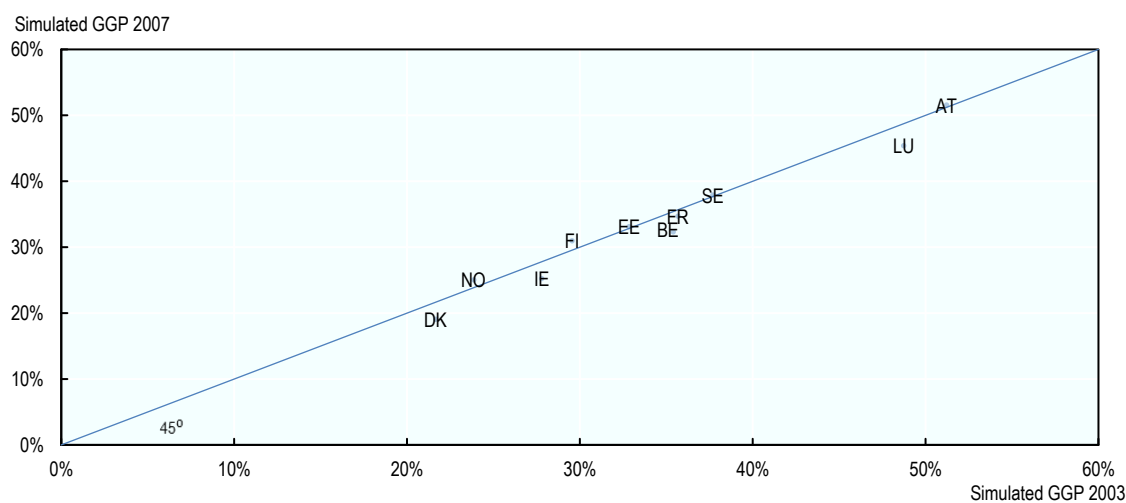
Therefore, the reduction in the GGP might not be as fast as implied by the labor market developments during the crisis.

Figure 3.9: Dynamics of simulated GGP in EU countries between 2003 and 2013

Panel A: Year 2013 against 2007



Panel B: Year 2007 against 2003

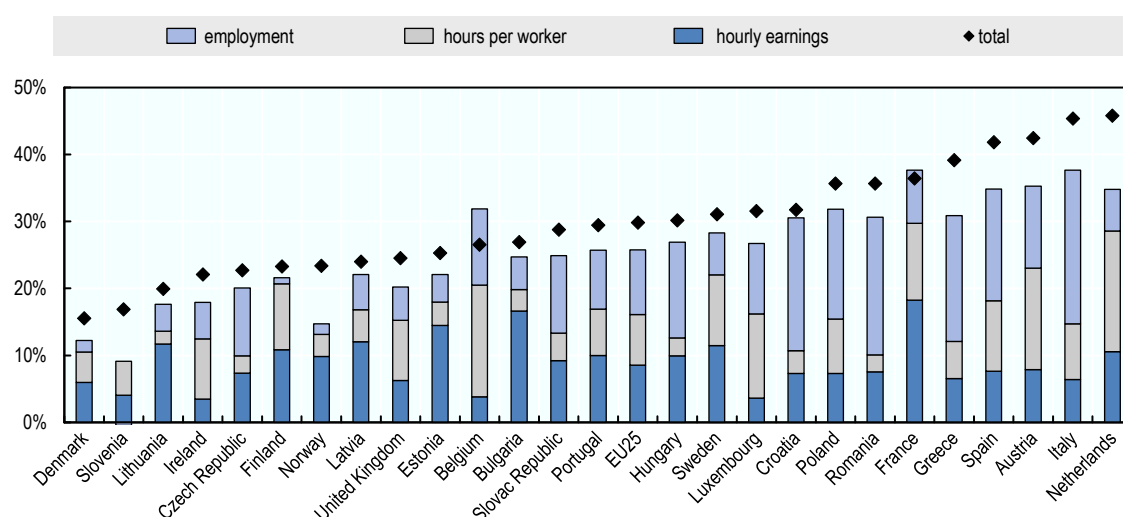


Source: OECD pension model and EU-SILC.

The separate effects of different drivers in lifetime earnings on the GGP – wage gaps, hours worked, and employment rates – can be quantified using the simulations (Box 3.2). First, eliminating the gender gap in hourly wages alone would reduce the GGP by 9 percentage points on average and by more than 10 percentage points in Bulgaria, Estonia, France, Latvia, Lithuania, and Sweden (Figure 3.10). Coudin, Mailard, and Tô (2018) found that the high gender gap in hourly wages in France stems from a strong segregation of women to

firms with low earnings. Second, in turn, eliminating the gap in working hours would lead to an average reduction of 7 percentage points and over 10 percentage points in Austria, Belgium, France, the Netherlands, Spain, and Sweden. Third, eliminating the gap in employment rates would decrease the GGP by 10 percentage points on average, and by more than that in Austria, Belgium, Croatia, the Czech Republic, Greece, Hungary, Italy, Luxembourg, Poland, Romania, the Slovak Republic, and Spain. The countries with NDC schemes differ significantly in terms of the drivers of earnings gender inequalities: it is mainly employment in Italy and Poland, mainly hourly wages in Norway and Latvia, and hourly earnings and number of hours worked in Sweden.

Figure 3.10: Decomposition of the simulated GGP in EU countries



Source: Pension model and EU-SILC 2014.

The three factors – hourly wages, hours worked, and employment rates – can be strongly related and, hence, closing the gender gap in one dimension might help closing it in other ones too. In many occupations, such as lawyers, longer working longer hours result in higher hourly wages, while working part-time is often linked with a penalty in terms of hourly wages. Work experience results in pay increases due to the accumulation of firm-specific human capital or tenure-based pay policies. As a result, groups with lower employment rates are also likely to face lower hourly wages. Finally, part-time workers are often the first to be dismissed and shorter working hours lower employment probabilities.

A substantial part of the simulated GGP is not explained by the three contributing factors because pension systems are not linear and the interaction between the factors is not accounted for. In countries with large basic pension components or with progressive replacement rates, such as Greece, Luxembourg, the Netherlands, Norway, and Slovenia, closing all labor market gaps brings stronger results than adding the effects of closing them separately. On the contrary, the contribution factors explain more than the full gap in Belgium and France, where low ceilings for pensionable income lower average pensions of men and make it possible to equalize the pensions without fully equalizing earnings.

3.5. Role of child care credits

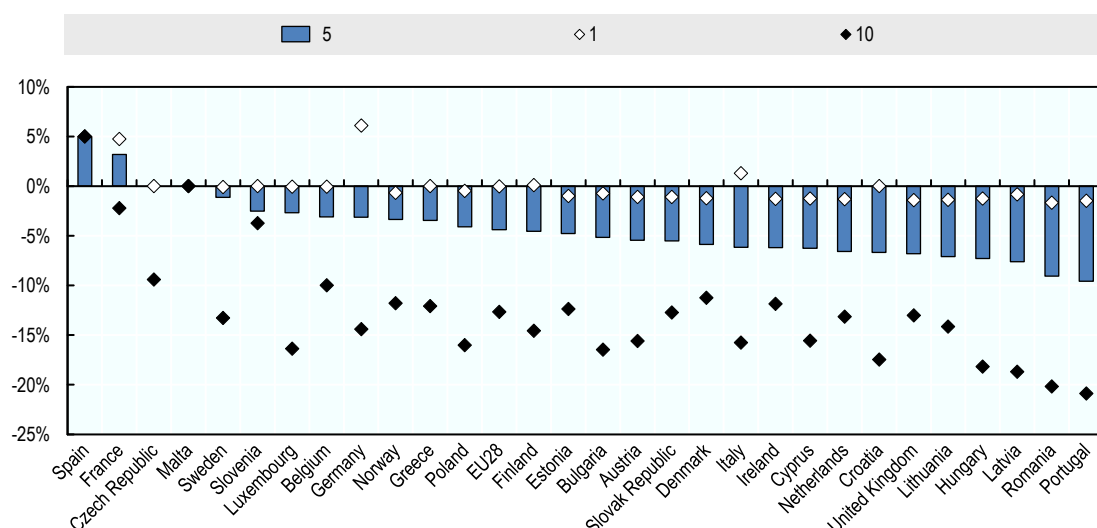
Child care and time spent fulfilling domestic tasks are the main reasons for lower employment rates among women in many EU countries (Figure 3.2). On average for the EU-27, women spend 5.2 years during their lifetime on child care and domestic tasks, which is 4.9 years more than men. The average duration of child care as the main activity varies among countries: it is less than 1 year in Denmark, Ireland, the Slovak Republic, and Sweden but more than 10 years in Greece, Italy, Luxembourg, and Malta. Countries with NDC schemes are therefore represented at both tails of the duration of child care-related career breaks.

All EU countries provide some pension entitlements for such periods. In France, Germany, Italy, and Spain, pension bonuses are granted due to having a child and are independent of the actual length of the child care break. In France and Germany, these bonuses are equivalent to two and three years of individual annual earnings for each child, respectively. Italy lowers the actuarial factor for mothers and increases the final pension by around 3 percent, while Spain grants a direct bonus that increases with the number of children: 5 percent, 10 percent, and 15 percent for having two, three, and four or more children, respectively. The bonuses in these countries outbalance the effect of lost earnings due to short career breaks. For a one-year break the pensions are even higher than in the case of having no break and not having children (Figure 3.11). What is more, in countries with DB schemes, in which shorter periods than the full career are used to calculate final pension,

short and early career breaks might not affect the pension entitlements at all if careers are long enough at the time of retirement. As a result, having two children and not working for five years increases pension amounts in France and Spain even compared to someone working full-time.

In countries with high residence-based basic pensions (for example, Ireland, Norway, the Netherlands, and the United Kingdom), career breaks have no impact on this component of benefits. Still, private pensions in these countries widen the GGP. A break of five years results in a decrease of around 6–7 percent in pensions in these countries.

Figure 3.11: Child care-related career breaks of 1, 5, and 10 years, and pension amounts



Source: OECD pension model.

Note: Pensions for full and incomplete careers are calculated for a woman earning 90 percent of average earnings, starting a career at age 20, and retiring at the future normal retirement age. In the incomplete career case, a woman gives birth at age 30 and 32, and the career break starts at age 30 and takes 1, 5, or 10 years.

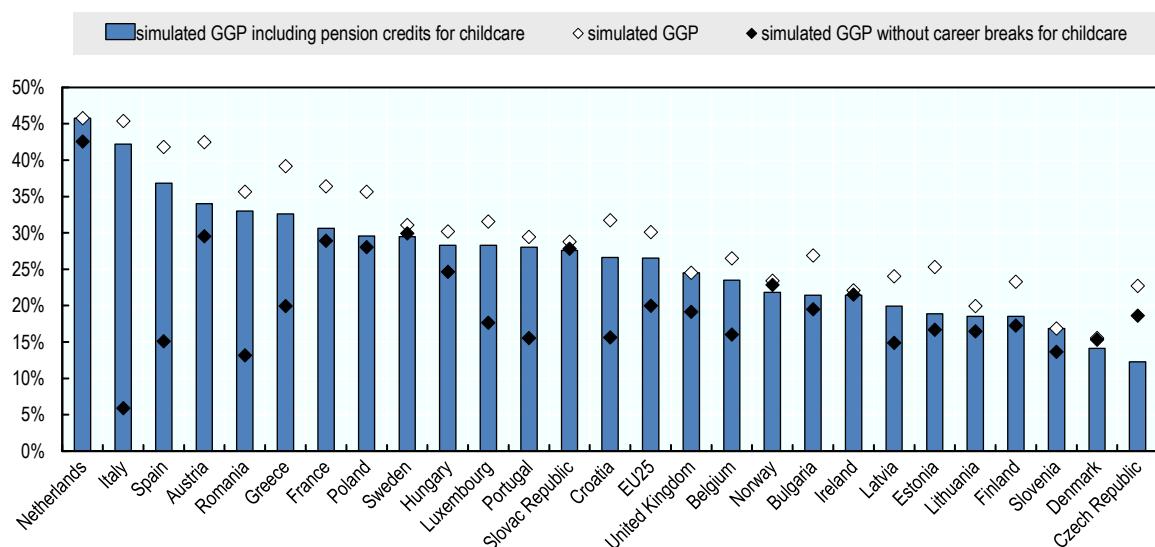
Some countries, including those with NDC schemes, grant pension credits in the form of paid pension contributions related to individual earnings, economy-wide minimum earnings, or economy-wide average earnings during maternity, paternity, and parental leave (Latvia, Norway, Poland, and Sweden). The duration of coverage varies among countries. For example, Norway and Sweden provide coverage until a child reaches the age of six and four, respectively. Poland also provides coverage until a child reaches the age of four but after one year the contribution declines to 60 percent of previous earnings with a ceiling below

the economy-wide average wage. In Latvia, only one-and-a-half years of child care are covered by pension credits. As a result, a five-year career break for child care results in a pension decrease of 1 percent in Sweden, 3 percent in Norway, 4 percent in Poland, and 8 percent in Latvia.

The actual impact of child care career breaks on the GGP depends on both the pension coverage of these spells and on their actual length. Figure 3.12 shows how the simulated GGP (Figure 3.8) changes when pension credits for child care are accounted for and what the simulated GGP would be if women did not experience career breaks related to child care or domestic tasks.

Child care credits lower the GGP substantially in a few countries (Figure 3.12). When these credits are included, the simulated GGP drops from 30 percent to 27 percent on average across 25 EU countries. It is almost exactly the actual GGP observed in the data at EU level (Figure 2.1). Pension credits reduce the simulated GGP by more than 4 percentage points in Austria, Bulgaria, the Czech Republic, Estonia, and France. By contrast, the credits do not change the simulated GGP in the Netherlands and the United Kingdom, where basic pensions are independent of child care periods. Average career breaks of less than two years in Denmark, Hungary, Ireland, Norway, the Slovak Republic, Slovenia, and Sweden result in the limited role of existing pension credits: they lower the simulated GGP by less than 2 percentage points.

Child care credits cover the employment gap only partially. If all career breaks resulted in the same pension entitlements as employment at average earnings for women, the simulated GGP would drop further from 27 percent to 20 percent. In particular, it would drop by more than 20 percentage points in Italy, Spain, and Romania. By contrast, the gap would increase in France due to the lost bonuses for having children. Short breaks of less than two years and wide coverage in countries like Denmark, Ireland, Norway, the Slovak Republic, and Sweden leave hardly any pension gap left due to child care, whereas in the Czech Republic the average actual career break for child care of five years is fully covered by pension credits.

Figure 3.12: Pension credits for child care and the simulated GGP

Source: OECD pension model and EU-SILC 2014.

Note: The simulated GGP without career breaks is calculated as if women worked and earned their average wage instead of child care spells. The impact of child care spells is modelled as a pension reduction to the full career case due to child care break of length equal to the average duration of child care spell. Germany, Cyprus, and Malta are excluded due to data availability.

After having children, women's employment and earnings diminish permanently and therefore child care-related breaks have long-lasting consequences for lifetime earnings that go way beyond the lost earnings/contributions from child care itself. Kleven, Landais, and Søgaaard (2018) show that earnings and employment rates are similar for men and women until a child is born, but start to diverge afterward and the gap increases with time. Indeed, employment and earnings of women without children are much higher than those of mothers. Therefore, while child care credits can compensate for even a few years of career break, they do not compensate for lower earnings and employment possibilities after the break.

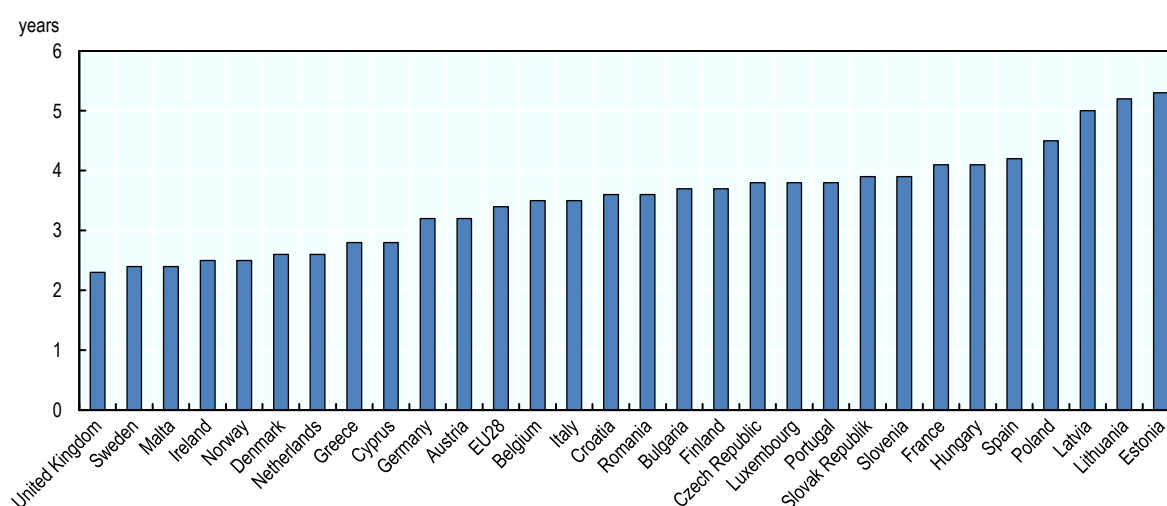
The coverage of other spells like unemployment would have a much smaller impact on the simulated GGP. On average among 27 EU countries, other spells than those related to child care and domestic tasks add only one year to the nonemployment difference between men and women (Figure 3.2). Moreover, due to lower labor market participation, the total duration of unemployment spells over the lifecycle is even lower for women than for men.

4. Longevity differences and the GGP

4.1. Longevity differences

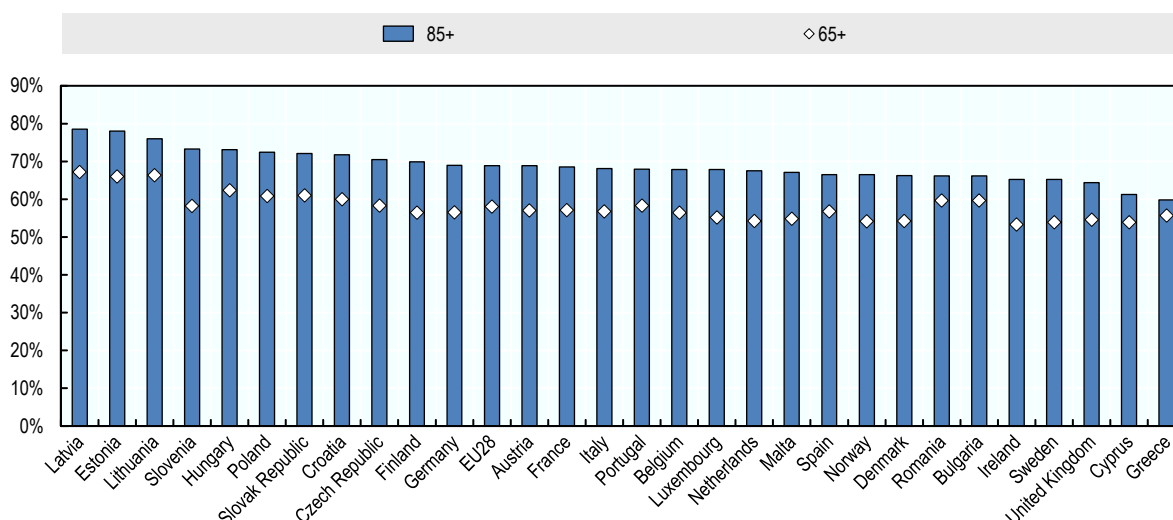
Life expectancy differences have a significant influence on the GGP. Women live 3.4 years longer than men after 65 on average among EU countries. In Italy the difference is close to the EU average, while it varies from more than 4.5 years in Estonia, Latvia, Lithuania, and Poland to less than 2.5 years in Ireland, Norway, Malta, Sweden, and the United Kingdom (Figure 4.1). The indexation of pensions, the use of unisex life expectancy for benefit calculations, and the prevalence of survivors' pensions have an effect on the GGP through differences in life expectancy.

Figure 4.1: Gender differences in life expectancy at age 65 in European countries in 2016



Source: Eurostat.

The differences in life expectancy result in higher shares of women at older age groups. In all EU countries the share of women among those younger than 65 is around 50 percent, while on average this share increases to 58 percent among those 65 and older and to 69 percent among those 85 and older. Women constitute more than 75 percent in the oldest age group in Estonia, Latvia, and Lithuania but less than 65 percent in Cyprus, Greece, and the United Kingdom (Figure 4.2). Poland has a ratio higher than the EU average, Italy's is around the average, and Sweden and Norway's ratios are substantially below the average.

Figure 4.2: Share of women in total population by age in EU countries in 2017

Source: Eurostat.

4.2. Indexation and survivors' pensions

In many countries pensions are indexed to prices (Italy among the NDC countries) or a combination of prices and wages, wage bill, or GDP growth (Poland and Latvia). In both Norway and Sweden pensions are indexed to wages but a fixed percentage is deducted in exchange for a more favorable initial pension amount. Since wages and GDP typically grow faster than prices, the older someone gets the lower his/her pension will be compared to the average wage, but also compared to the pensions of younger cohorts. A larger part of these older pensioners are women; as a result, more frontloaded indexation of pensions exacerbates the GGP.

Similar to private DC annuities, when an NDC annuity is calculated the initial level of pension depends on how the benefits are indexed when being paid. In the base case, the notional capital is divided by the unisex life expectancy and pensions in payment are indexed to the internal rate of return, which, according to the NDC design, should be changes in the wage bill. However, Italy, Norway, and Sweden choose to grant a higher pension in the beginning but index the pensions less favorably. Norway and Sweden decrease the indexation of pensions by 0.75 and 1.60 percentage points, respectively, and increase the initial pension

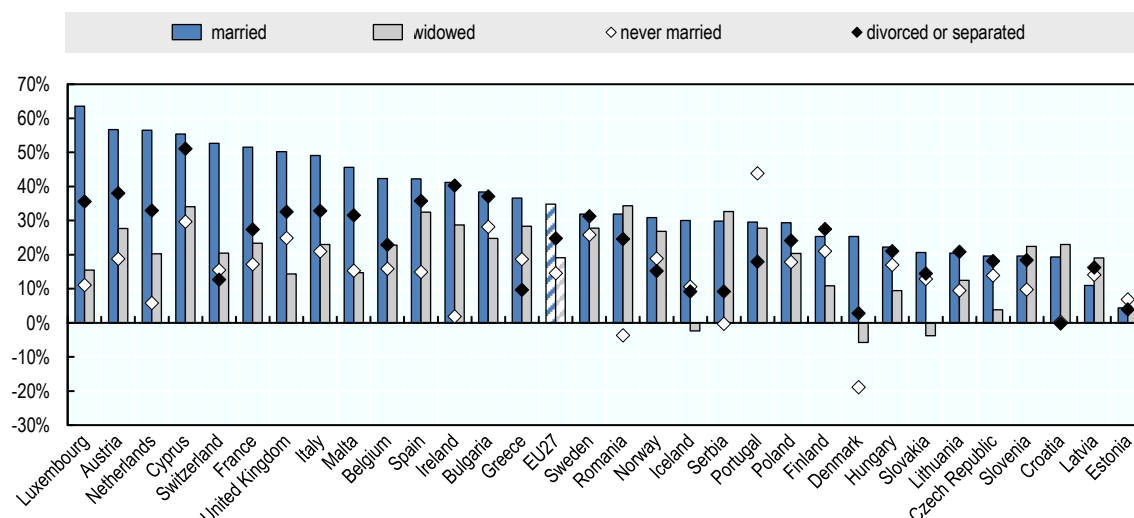
level accordingly. Italy, by contrast, indexes pensions only to prices, while increasing initial pensions by including a discount factor of 1.5 percent in the calculation. By contrast, Poland and Latvia calculate initial pensions as if they were indexed with the wage bill but then pensions are indexed less favorably. These countries therefore exacerbate the GGP.

On the other hand, in European countries unisex life expectancy is used to calculate the initial pensions or life expectancy does not affect the pension level at all (as in most DB schemes). Not accounting for gender-specific life expectancy lowers the GGP.

Marital status has a large impact on the GGP. The pensions of married women are lower, on average, than those who are divorced, separated, or widowed. Compared to the average pension of men of 65 and older, the GGP is highest for married women, at 36 percent, while it is lower for divorced and separated women at 26 percent (Figure 4.3). The GGP is even lower for widows at 20 percent and the lowest for never-married women at 15 percent.⁵ Among the countries with NDC schemes, Italy shows the highest gap for married women which is, however, reduced substantially for widows. In Norway, Poland, and Sweden widows' pensions are substantially higher than those of married women but are lower in Latvia, where no survivors' pensions are available.

Many opposing forces influence the link between marital status and the GGP. On the one hand, never-married women are typically more attached to the labor market. On the other hand, they are not granted any survivors' pensions. Marital status is also an important determinant for the probability of working full-time versus part-time, with not being married associated with a higher probability of working full-time (OECD 2016). Married women are less attached to the labor market, in part due to care activities, but in some countries they are granted pension credits for child care. Moreover, widows are granted survivors' pensions in most countries.

⁵ Bettio, Tinios, and Betti (2013) confirm the smaller gender gap for single women compared to married women, with divorced women somewhere in the middle. However, even for single women the gap remains wide.

Figure 4.3: Gender gap in pensions by marital status in EU countries in 2013

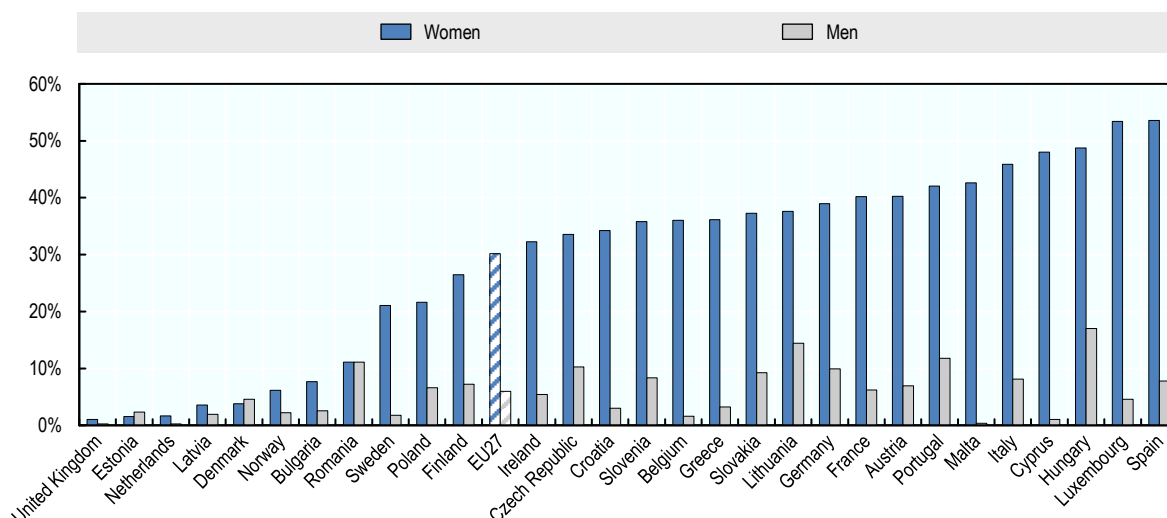
Source: SILC.

Note: Women's pension by marital status is compared to the average pension of all men. Germany is excluded due to data availability.

Married female pensioners may be entitled to a proportion of their partner's pension in the event of his death. Survivors' benefits play an important role in averting poverty among widows and widowers and are likely to lower the GGP.

Most beneficiaries of survivors' allowance are women, given their longer life expectancy and the fact that they are generally the younger partner in couples. Large differences arise in the prevalence of survivors' benefits in general. In the United Kingdom, for instance, only 1 percent of female pensioners receive survivors' benefits (Figure 4.4). In Estonia, the Netherlands, and Latvia less than 5 percent of women receive survivors' pensions.⁶ In Luxembourg and Spain, however, over one-half of female pensioners receive a survivors' benefit, while in Italy, Cyprus, and Luxembourg almost one-half of them do. On average, 30 percent of female pensioners receive survivors' benefits compared to only 6 percent of men.

⁶ The low share of survivors' benefits in Latvia stems from the absence of survivors' benefits for spouses (for children it exists). In Sweden, survivors' pensions in the public scheme are being abolished.

Figure 4.4: Share of European pensioners receiving survivors' benefits by gender in 2015

Source: Eurostat.

As with the other elements of pension systems in European countries, no consistent approach exists to the rules governing allowances for survivors. In most countries, they are built into DB pension systems which, be they funded or pay-as-you-go, comprise an element of transferal following a spouse's death. They thus supplement the individual pension that the surviving spouse already receives. In DB schemes survivors commonly receive a proportion of their deceased spouse's entitlement. In both Estonia and Finland, for example, that proportion is 50 percent of the earnings-related component, while in Belgium it is 80 percent.

However, benefits are often capped, with payment dependent on the survivor's own earnings-related pension or reduced over time (James 2009). Moreover, in many DB schemes, neither contributions nor benefits depend on whether a survivors' pension might have to be paid. Survivors' pensions often redistribute from singles to couples (especially single-earner couples), from working women to nonworking women, from couples with slight age differences to couples with wide age differences, from divorcees to nondivorcees, and from low- to high-income families (James 2009).

Some NDC countries also provide survivors' benefits. In Italy, survivors' pensions are built into the NDC framework and are accounted for when the annuity factors are calculated. In

Latvia, Norway, and Sweden survivors' pensions for spouses are excluded from the NDC scheme. In Sweden and Norway they are still granted as a previously acquired entitlement. In Poland, survivors' benefits function as in a DB scheme without affecting the actuarial factor in the pension formula.

Apart from the survivors' benefit option, many DC schemes offer the option to take out retirement savings as a lump sum. Orlova, Rutledge, and Wu (2015) found that taking out a cash lump sum heightens the risk of falling into poverty. Similarly, not opting for a joint-and-survivor annuity considerably increases the surviving spouse's risk of poverty. The recent switch toward DC pension systems with a greater choice of survivors' pension options has thus increased the potential risk of old-age poverty among widows and widowers in DC schemes.⁷

5. Conclusions

Pensions of women are substantially lower than those of men, by 27 percent on average across the EU but by more than 40 percent in a few European countries. This average gap is higher than the one for hourly earnings at 14 percent but substantially lower than the one for the total yearly labor earnings at 40 percent. In none of the countries with NDC schemes were all current pensions granted according to the NDC rules; in all, a transition is taking place. Latvia, Poland, and Sweden are more advanced, while only Italy and Norway are partially affected by the NDC. These countries show various levels of the GGP: from 33 percent in Italy, 31 percent in Sweden, and 25 percent in Norway to 20 percent in Poland and 17 percent in Latvia.

⁷ Whether women are more likely to take their pension as a lump sum is not entirely clear. On the one hand, women are typically more risk averse than men (Borghans et al. 2009), which would lead to a lower prevalence of lump-sum taking among women. On the other hand, retirement savings are often lower for women than for men and smaller amounts of retirement savings are more often taken as lump sum. Which effect dominates is not entirely clear.

The main driver of the GGP stems from gender differences in the labor market. Current gender labor statistics by age imply that women work 4.9 years less than men in full-time jobs, on average across EU countries, and 2.6 years less in self-employment. On the other hand, they work 3.3 years more in part-time employment. Women work less because they spend 5.1 years more on care activities between age 15 and 70, but also 0.6 of a year more in education and 0.5 of a year more in retirement. On top of that, women more often work in lower-paid jobs and even when working in similar positions as men, they face lower wages and fewer promotion opportunities. As a result, they earn on average 15 percent less per hour than men, across the EU. These three factors – employment, hours worked, and wages – contribute at a similar magnitude to the GGP at the EU level, but their relative role varies a lot among countries. In terms of labor markets characteristics, countries are more similar to regional peers than to other countries with NDC schemes: Poland and Latvia show features similar to those of other Central and Eastern European countries, Italy to the Southern European countries and to Spain in particular, and Sweden and Norway to other Northern European countries.

Gender gaps in (hourly) pay and part-time employment remained stable over the recent decade, while employment gaps decreased in many countries. These changes have been affecting pensions slowly. However, in some Central and Eastern European countries with very low GGPs, labor market gaps increased in the last 30 years and therefore the GGP might increase in the future. Moreover, the financial crisis affected the employment of men more than that of women. The subsequent economic recovery is expected to (at least partially) restore gender inequalities in labor earnings in many countries.

Pension systems manage to reduce cumulative labor earnings inequalities to a different extent in EU countries but the current labor market gaps are still expected to create substantial GGPs. First-tier pensions, progressivity of pension replacement rates, child care pension credits, and survivors' pensions mitigate labor market gender gaps but they are not enough to eliminate them. Pension systems cannot simply solve the gender gaps resulting from cumulative labor market inequalities. In particular, some countries manage to almost entirely eliminate the impact of employment breaks due to child care, but the long-lasting

effects of career breaks such as shorter working hours and wage gaps are not eliminated with compensation measures in the pension systems. Moreover, women live longer; therefore, their average pensions in payment are affected more heavily by less favorable indexation. There are two women for every man among those 85 and older in EU countries on average. Finally, survivors' pensions substantially improve the income of widows in some countries and therefore reduce the GGP.

NDC pension formulas by themselves do not reduce earnings inequalities, in particular gender gaps in employment or wages. However, minimum and basic pensions as well as contribution ceilings and child care credits can substantially reduce the GGP, even stronger than DB schemes can, as is the case for Norway. Some features in existing NDC schemes worsen gender gaps, however, because women live longer on average, namely: the lack of joint annuities as a mandatory, default, or even available option; and the higher initial amount of pensions instead of more favorable indexation of benefits. Survivors' pensions for spouses are included in the NDC scheme only in Italy; in other countries they are either being abolished (Latvia, Norway, and Sweden) or they exist outside the NDC design (Poland). This is unnecessary since survivors' benefits can be sustainably embedded within NDC schemes at the expense of making the system more complicated.

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