# LABOUR MARKET SEGMENTATION AND PENSIONS IN THE POLISH DEFINED-CONTRIBUTION SCHEME

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IBS Working Paper 09/2015

May **2015**

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# Labour market segmentation and pensions in the Polish defined-contribution scheme

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## Abstract

In this paper we apply the cohort model of the pension scheme to analyse the impact of labour market segmentation, in particular the use of contracts on mandate, on expected retirement benefits in Poland. Heterogeneity of labour force and impact of differences in years of employment, contributions paid and account indexation are taken into consideration. The effects of policy instruments aimed at increasing the stream of contributions paid by workers with contracts of mandate are evaluated. We find that the expected retirement benefit in the segment of contracts of mandate is lower by 17% than in the segment of employment contracts. The major cause of this gap between segments are lower contributions in the case of men and shorter life-cycle employment in the case of women. The obligation to pay contributions on all contracts of mandate from the minimum wage level will enable closing the pension gap by approx. 4.4 pp unless the obligation increases unemployment risk in the segment of contracts of mandate. Additional saving of 2% of the gross wage during spells of work on contract of mandate reduces the gap by less than 1 pp.

Keywords: labour market segmentation, pensions, defined-contribution pension scheme

JEL: J26, J32, J68

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# Introduction

Over the past 15 years, two complementary trends have been going on in the Polish labour market: a significant decrease in open-ended employment and the accompanying growth in the number of persons working for a fixed term, under civil law contracts, or self-employed. Prospective retirement benefits in the Polish pension scheme are based on a defined contribution,[1] yet the contribution payment obligation depends on the form of employment. The increasing role of work in forms which do not involve payment of full contributions raises a question about their impact on future retirement benefits in the Polish social security system. This issue is significant for several reasons. Firstly, the labour market phenomena that reduce (in comparison to the employment contract involving payment of full contributions) the number and amount of the contributions paid by scheme members might reduce the expected retirement benefits. Indeed, Boeri and Galasso (2012) demonstrate that – in the defined-contribution pension scheme – the effects of the so-called segmentation on the labour market on retirement benefits of persons affected thereby are greater than in the defined-benefit pension scheme.[2] Based on a sample of almost 4 thousand members of the Japanese pension scheme aged 30-49, Takayami et al. (2012) conclude that labour market segmentation might significantly increase poverty among old age pensioners in the future. Secondly, the pension-related consequences of labour market segmentation can affect various socio-demographic groups unevenly (depending on e.g. sex, age, education) and enhance inequality in retirement benefits arising from heterogeneity of wages and employment opportunities in the life cycle. Thirdly, they have a macroeconomic dimension as they lower contribution payments to the pension scheme and deteriorate current balance of the pension fund. A special role is played by the widespread use of civil law contracts in Poland, constituting the focus of this paper, the aim of which is a quantitative evaluation of the effects of using such contracts on expected retirement benefits.

In accordance with Polish regulations, (fixed-term and open-ended) employment contracts are burdened with the highest retirement contributions – the contribution accounts for 19.52% of the gross remuneration.[3] In the case of contracts of mandate, the employer is not obliged to collect contributions unless the contract is the sole title to social insurance (otherwise all contributions have to be paid). Contracts to perform a specified task, in turn, are characterised by no obligation to pay contributions.[4] Wages of persons working under civil law contracts or self-employed workers are burdened with lower social security contributions. This encourages employers to apply civil law contracts and self-employment in situations where an employment contract is appropriate, for the purpose of reducing the total labour costs and tax wedge (Arak, Lewandowski, Żakowiecki, 2014).[5]

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[1] This applies to people born after 1949, people born earlier were members of the defined-benefit scheme but reached the statutory retirement age in 2009 (women) or 2014 (men).

[2] A detailed discussion of the defined-contribution pension scheme can be found for example in Palmer (2006).

[3] The total tax wedge is 38.5-41% depending on gross wage.

[4] In the case of self-employment, social insurance contributions are tied to the forecast income of the entrepreneur.

[5] On the other hand, workers with civil law contracts have worse access to social security benefits than those working under employment contracts. Civil law contracts also involve a significantly lower employee protection

This is important from the viewpoint of retirement security. Decisions aimed at reducing the amount of contributions paid translate into reducing the total amount of funds collected on the pension account and, as a consequence, decrease prospective retirement benefits. Flexibility of employment involved in civil law contracts might result in irregular employment career, more frequent spells of frictional unemployment and no entitlement to unemployment benefit. As a consequence, the total number of contributory periods in the life cycle of persons working under civil law contracts can be lower than in the case of persons working under employment contracts. Moreover, due to indexation and accumulation of interest on the collected contributions,[6] the moments in the life cycle when spells of work on civil law contract occur, might play a significant role. The earlier in the life cycle they occur, the higher is the opportunity cost related to foregone indexation and accumulation of interest on contributions that would have been paid in the case of typical employment contract.

This paper provides a quantitative analysis of such processes using the cohort model of the Polish pension scheme. The focus of the paper is a selected cohort of persons born in 1980. This choice is determined by two major reasons. The start and development of professional careers by people born in 1980 was accompanied by rising incidence of fixed-term employment and civil law contracts. On the other hand, persons born in 1980 have the major part of their professional careers ahead of them. This allows assessment how the potential policies and changes to be introduced from 2016 would affect the pension prospects of this cohort. To allow for labour force heterogeneity, we distinguish 10 profiles (5 various education groups, separately for men and women) and for each profile we create two life cycle scenarios – (i) based exclusively on employment contracts and (ii) with spells of work on civil law contracts, in particular contracts of mandate. This enables us to calculate differences in expected retirement benefits arising from labour market segmentation and to analyse the effects of the already announced and other potential changes affecting the amount of contributions paid by workers with contracts of mandate.

This paper is composed of four sections. Section one presents the segmentation processes that have occurred on the Polish labour market in the recent years and their effects from the viewpoint of participation in the pension scheme. Section two explains the methodology of the cohort model and life cycle work scenarios. Section three presents estimates of the impact of working on civil law contracts on expected retirement benefits. Labour force heterogeneity and various channels of the impact of segmentation on the expected retirement benefits are taken into account. Section four evaluates the effects of policies aimed at reducing the pension gap which results from labour market use of civil law contracts. The paper is concluded with a summary.

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against dismissal, no requirements concerning OHS and appropriate work conditions, no right to a leave (Arak, Lewandowski and Żakowiecki, 2014).

[6] Polish pension scheme has both PAYG and funded pillars, with total contribution divided between the two.

# 1. Labour market segmentation in Poland

## 1.1. Labour market segmentation and employment structure

Between 1997 and 2013, the number of persons working under temporary contracts in Poland increased over five times, from 605 thousand in 1997 to 3.24 million in 2013 (LFS data). The growth of temporary workers was noticeable both among men and women (cf. Figures 1-2). At the same time, there was a significant drop in the share of persons working under open-ended employment contracts in total employment (from 67% in 1997 to 57% in 2013). However, despite the fact that the popularity of the traditional open-ended employment contract has been decreasing in Poland, it has remained the most common form of employment (in 2013, approx. 8.89 million persons worked under such a contract).

Figure 1. Number of women employed under open-ended contracts (the left axis) and temporary contracts (the right axis) (in millions).

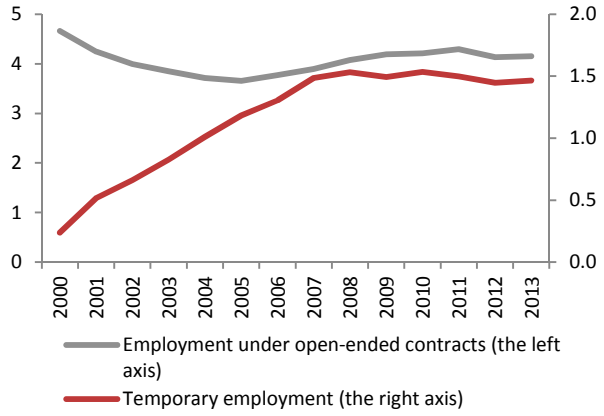
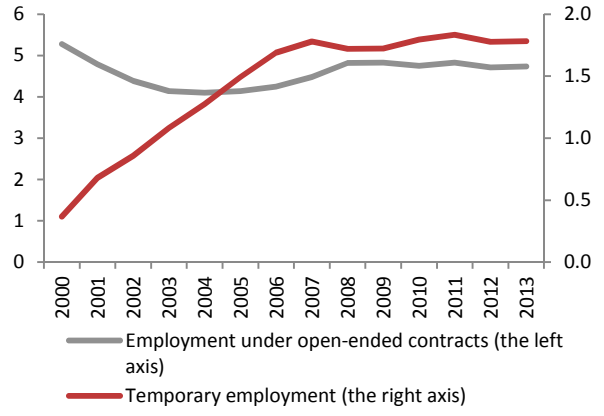



Figure 2. Number of men employed under open-ended contracts (the left axis) and temporary contracts (the right axis) (in millions).




Source: own elaboration based on LFS data

Temporary employment has become widespread among all age groups and all education levels, yet the most intensive growth in temporary employment indicators has been recorded among persons aged 20-29 (cf. Figures 3-4). In 2000, the number of persons aged 20-29 who worked under fixed-term contracts was approx. 224 thousand but it was gradually increasing until 2006, when it exceeded the level of 1.35 million persons. In absolute terms, the temporary employment level among persons aged 20-29 reached its peak in 2008 (nearly 1.4 million workers) and then slightly decreased (in 2013, it was 1.26 million). At the same time, while in the period 2003-2007 persons aged 20-29 accounted on average for 48% of women working under temporary contracts and 45% of men working under temporary contracts, these percentages dropped to 40% for both sexes in the period 2011-2013. On the other hand, the share of people aged 30-39 in total temporary employment increased (from 19% in 2000 to 27% in 2013). Workers aged 30-39 experienced the second strongest growth of temporary employment rate. Hence, the increasing incidence of temporary employment in Poland was not a phenomenon related exclusively to employing people in the initial years of their professional careers (aged 20-29) but also to older ones.

Figure 3. Temporary employment indicators by age group in the period 2000-2013, women (in %).

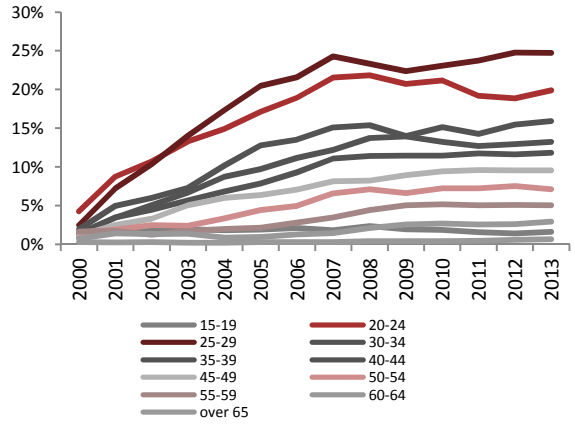
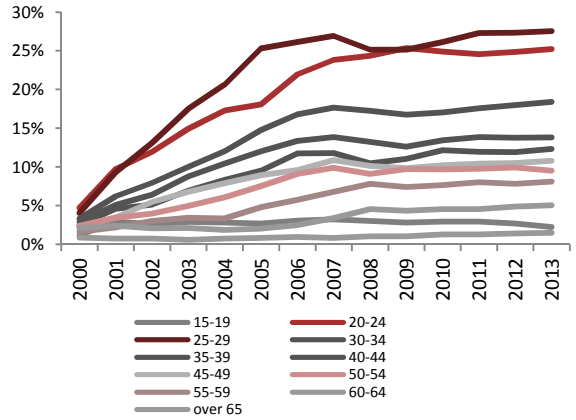



Figure 4. Temporary employment indicators by age group in the period 2000-2013, men (in %).




Source: own elaboration based on LFS data

Figures 5-6 present the open-ended and temporary employment structure by education. On average, persons working under temporary contracts were worse educated than persons working under open-ended contracts. According to LFS data for 2013, the percentage of persons with tertiary education among those who worked (outside farming) under open-ended contracts was approx. 38% and among those who worked under temporary contracts – approx. 23%. Moreover, the lower the education level, the higher the share of temporary workers. Among all workers (excluding the employment in the agriculture) with tertiary education, as many as 70% were employed under open-ended contracts. This percentage was significantly lower for other education groups, in particular for persons with primary or lower secondary education, among whom the share of persons employed under open-ended contracts was equal to the share of temporary workers (46%). Additionally, according to OECD (2014), 43% of persons employed under temporary contracts in Poland are workers performing simple jobs related to providing services (e.g. cleaning, preparing meals, security staff). It is persons with a lower level of human capital that most often work under temporary contracts in Poland.

Figure 5. Structure of permanent persons by education in 2013 (in %).

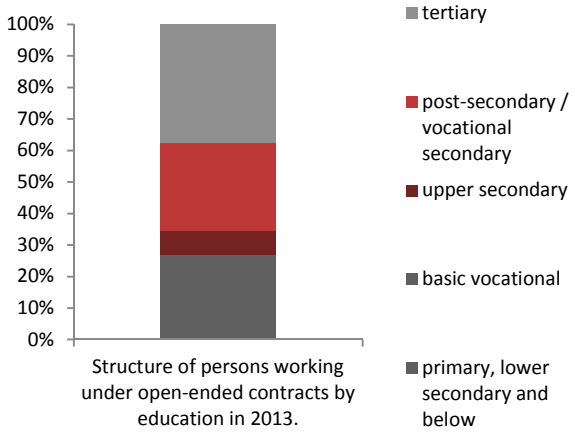
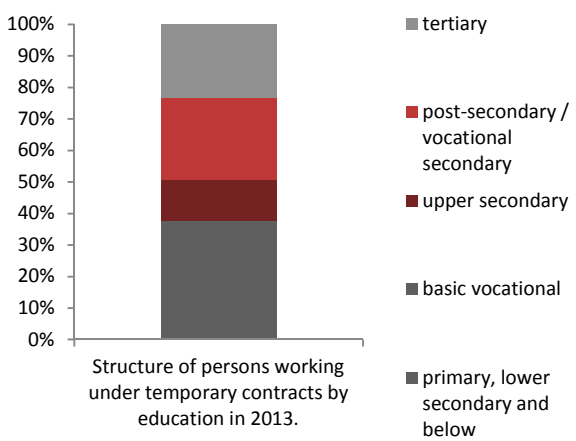



Figure 6. Structure of temporary workers by education in 2013 (in %).




Source: own elaboration based on LFS data

The increasing number of civil law contracts contributed to the growth in temporary employment. According to the data of Polish Ministry of Finance, 974 thousand persons settled their taxes only under civil law contracts in 2013, while in 2002 the number was approx. 600 thousand. On the basis

survey of firms employing at least 9 persons, the Central Statistical Office of Poland (GUS, 2014) reported that there were 547 thousand persons working exclusively under civil law contracts in 2010, 1.01 million in 2011, and 1.35 million in 2012. The data collected by GUS and the Ministry of Finance differ in estimated levels of number of persons working under civil law contracts, yet both point to a significant growth in the scale of the phenomenon. Unfortunately, due to unavailability of appropriate information in LFS,[7] it is impossible to estimate the contribution of civil law contracts to the growth in temporary employment by socio-demographic groups, or to identify the groups for which this form of employment became most widespread.

Lewandowski (2015) shows that the Social Insurance Institution (ZUS) data is a valuable source of information about the number of persons working under civil law contracts (more precisely – contracts of mandate). However, ZUS data does not include information on individuals' education level and excludes persons older than 55. Figures 7-8 present the number and percentage of men and women, respectively, who worked at least once under a contract of mandate in 2013, by age, estimated on ZUS data for 2013. The share of persons working under contracts of mandate was definitely highest among young people (according to ZUS data, among 890,500 persons who worked under contracts of mandate for at least one month in 2013, more than 40% were persons aged 20-29). On average, this percentage was higher among women than men (15.1% vs. 13.7%). Women accounted for 51% of the total number of persons working under contracts of mandate.

Figure 7. Number of men and women aged 15-55 who worked under contracts of mandate at least once in 2013 (in thousands).

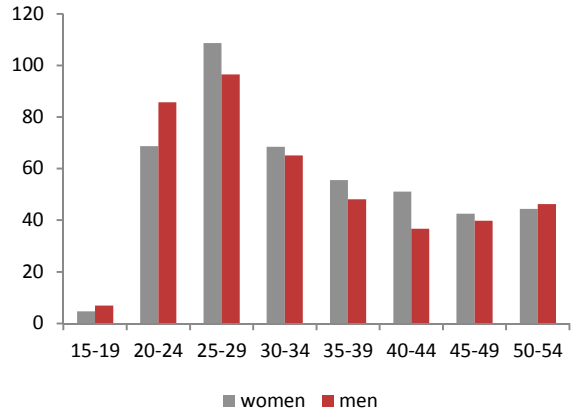
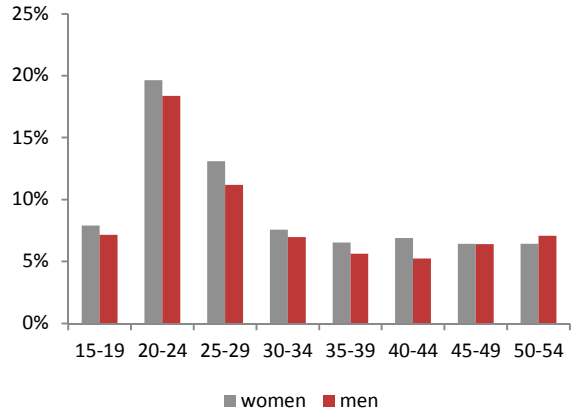



Figure 8. Percentage of women and men who worked under contracts of mandate at least once in 2013 among all persons insured in ZUS aged 15-55 (in %).



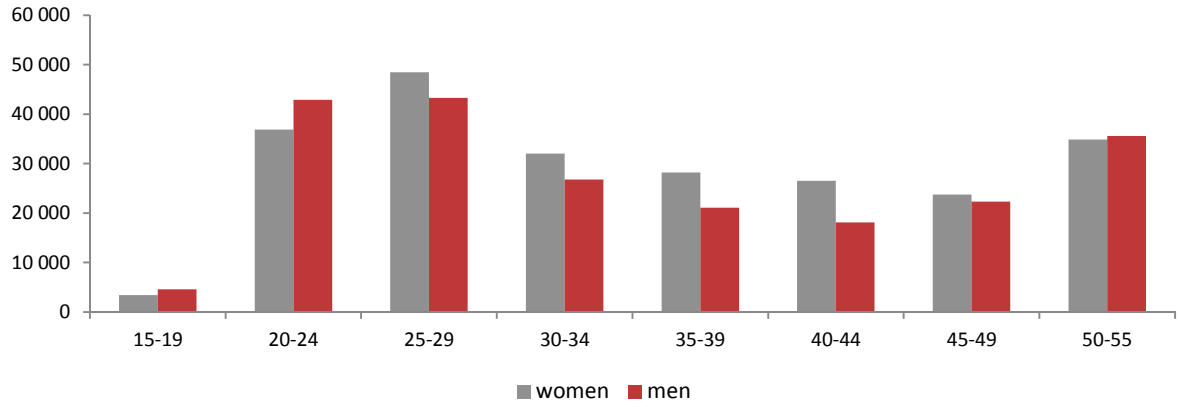

Source: Lewandowski (2015) based on ZUS data

Lewandowski (2015) also shows that contracts of mandate were the only basis for social insurance for approx. 450 thousand persons in 2013. Other people with spells of work under contract of mandate were subject to social insurance on different grounds, e.g. under an employment contract. In 2013 there were 228 thousand persons who worked simultaneously under an employment contract and a contract of mandate for at least one month (Lewandowski, 2015). ZUS data indicates that the annual average working time of persons who worked exclusively under a contract of

[7] In the Labour Force Survey, respondents are not asked about the type of temporary contract – whether it is a fixed-term contract or a civil law contract. On the other hand, the Structure of Earnings Survey data cover only persons employed under an employment contract (either fixed-term or open-ended).

mandate was approximately 8 months. Additionally, according to the same source, such persons did not pay social insurance contributions on average for 15% of the time worked, that is for approx. 1.2 months in a year. All this differences mean that in comparison to persons who worked under employment contracts, workers under contracts of mandate paid a lower number of pension scheme contributions annually.

Figure 9. Persons who worked exclusively under contracts of mandate in 2013, by sex and age group (in thousands).




Source: Lewandowski (2015) based on ZUS data.

## 1.2. Labour market segmentation versus wages and bases for pension scheme contributions

Empirical research for OECD countries proves that on average temporary contract workers are paid less than those employed under open-ended contracts, even considering the impact of individual characteristics, such as education level or work tenure (Boeri, 2011). This regularity is observable also in Poland (Magda, Potoczna, 2014). According to LFS data, in 2013, in the first decile of wage distribution 6 out of 10 persons worked on a temporary basis (compared to approx. 35% in 2001).

Figure 10. Employment structure by wage distribution deciles in 2001 (in %).

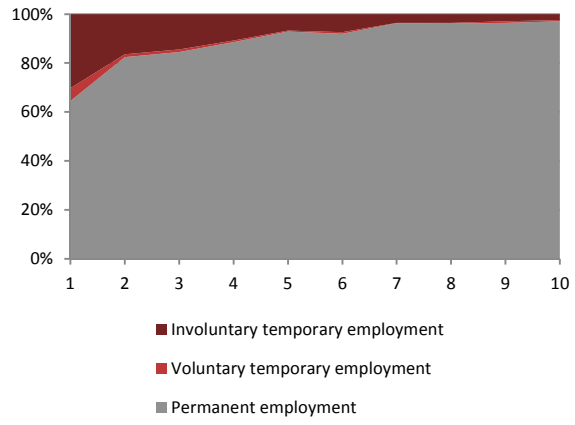



Figure 11. Employment structure by wage distribution deciles in 2013 (in %).


Source: own elaboration based on LFS data

Figures 12-15 present the hourly wage distribution density for women and men with higher and post-secondary/vocational secondary education, separately for workers under fixed-term and open-ended employment contracts in 2012 (Structure of Earnings Survey (SES) data covers only persons working

under employment contracts). In both cases, the hourly wage distribution for temporary contract workers is clearly shifted to the left, which means that the average wage of persons working under fixed-term contracts is lower than of those working under open-ended contracts. This phenomenon is noticeable for all the analysed education groups.[8] On average, men employed under open-ended employment contracts in 2012 earned 1.4 times more than those working under fixed-term employment contracts (SES data). In the case of women, this proportion was 1.3.

Figure 12. Hourly wage distribution (in PLN) for women with tertiary education, by contract type in 2012.

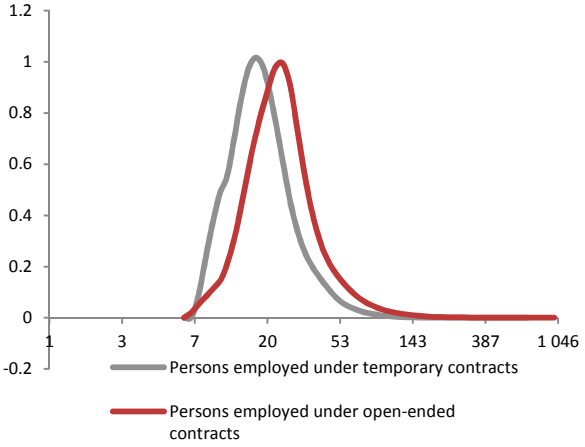



Figure 13. Hourly wage distribution (in PLN) for men with tertiary education, by contract type in 2012.

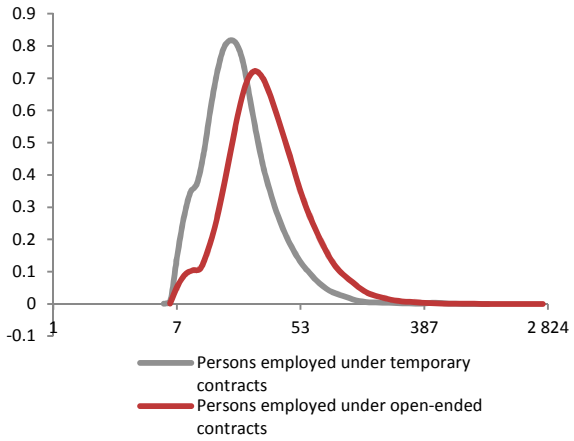



Figure 14. Hourly wage distribution (in PLN) for women with post-secondary / vocational secondary education, by contract type in 2012.

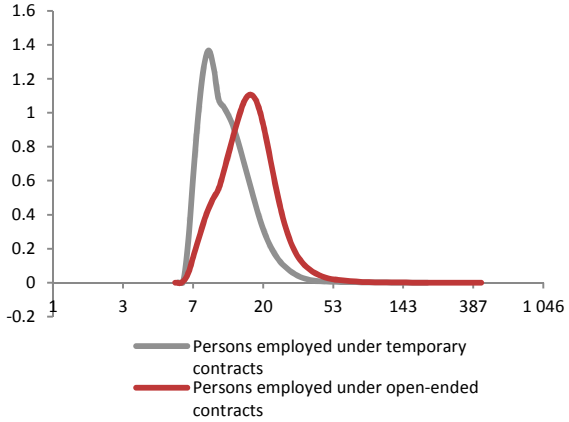
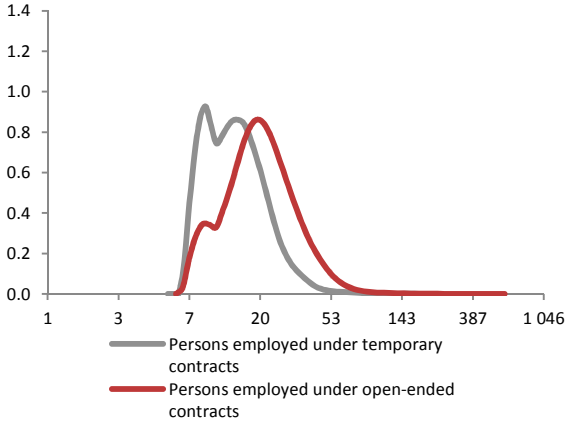



Figure 15. Hourly wage distribution (in PLN) for men with post-secondary / vocational secondary education, by contract type in 2012.




Source: own elaboration based on SES 2012 data.

The ZUS data quoted by Lewandowski (2015) indicates, in turn, that the average base of the contribution paid by persons working under contracts of mandate in 2013 constituted, for both women and men, 1/3 of the base of the contribution for persons working under employment contracts. An even greater discrepancy was demonstrated by medians of both distributions – the median base of the contribution paid by women (men) working under contracts of mandate was almost four times (five times) lower than for women (men) working under employment contracts.

[8] Distribution of hourly wage density for other groups by education are available at request.

Figure 16. Average base of assessment of pension security contributions for women in 2013 (PLN).

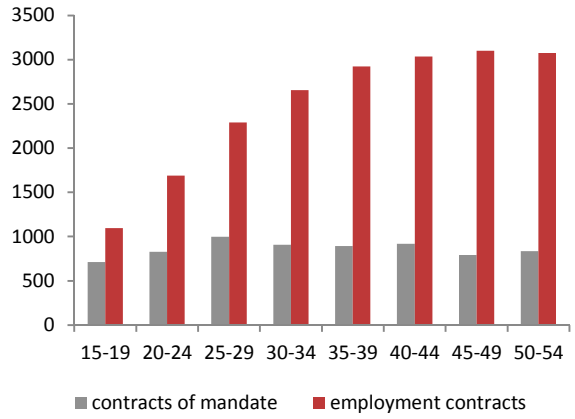
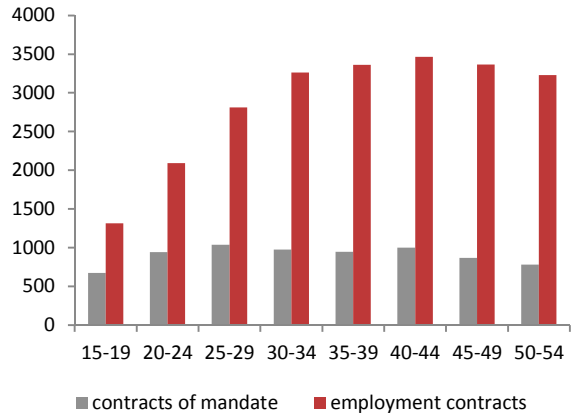



Figure 17. Average base of assessment of pension security contributions for men in 2013 (PLN).




Source: Lewandowski (2015) based on ZUS data

# 2. Methodology

## 2.1. Cohort pension model

The quantitative analysis is carried out with use of the cohort demographic and pension model with annual frequency, developed in the Institute for Structural Research (IBS). The demographic part of the model is composed of historical data and assumptions on fertility, mortality rates and international migration balance by sex and one-year age groups until 2050. These assumptions are based on *Employment in Poland 2008* (IBS / CRZL, 2010). In the pension part of the model, subgroups – called profiles – are distinguished for each birth cohort, based on sex and education level.[9] Generally, the expected probabilities of having a job and level of earnings in the years of life to come are calculated for each cohort born in the period 1948-1983 (men) and in the period 1950-1985 (women).[10] The next step is to calculate the expected number of years of employment and the accumulated pension capital, i.e. the value of account in both pillars, for each cohort in any projection moment. It is assumed that each member of the scheme retires when reaching the statutory retirement age and that the retirement benefit is calculated as annuity based on life expectancy in the overall population at a statutory retirement age. The result of the model is the expected retirement benefit for a person of a given sex, born in a given year and given education level attained. Expected retirement benefits for a given sex or given birth cohort are calculated as averages of expected retirement benefits of profiles, weighted by the shares of profiles in the population of insured individuals of given sex (cohort).

[9] Education groups distinguished: tertiary or higher; post-secondary or vocational secondary; upper secondary; basic vocational; primary, lower secondary and below.

[10] We use probabilities of work estimated on LFS data and average wages estimated based on SES data for the period 2000-2013 and construct a projection up to 2050 in accordance with the methodology presented in IBS / CRZL (2010).

The model adopts the macroeconomic scenario compliant with the *Guidelines for applying uniform macroeconomic indicators being the basis for estimating financial effects of bills* of November 2013 used by the Ministry of Finance. Table 1 summarises it by means of annual average growth rates of selected variables in the period 2015-2050. It is assumed that the annual average inflation in Poland will reach approx. 2.1%, yet it will systematically decrease from 2015 on and stabilise at the level of 2% in 2027. The forecast for the annual average real Gross Domestic Product growth rate is 2.8% and the real labour productivity change is at the level of 3.5%. It is also assumed that the real wage growth will be slightly lower than the labour productivity growth, reaching 3.2%. Capital asset profitability indicators are relatively high, reaching 2.7% for profitability of treasury bills, 4.9% for profitability of assets invested on the Warsaw Stock Exchange, and 3.8 for other assets of Open Pension Funds.

Table 1. Summary of the assumptions of the macroeconomic scenario until 2050

| | **Annual average change (in %)** |
|---|---|
| Inflation | 2.1 |
| GDP change (real) | 2.8 |
| Labour productivity change (real) | 3.5 |
| Real wage growth | 3.2 |
| Profitability of treasury bills | 2.7 |
| Profitability of the Warsaw Stock Exchange | 4.9 |
| Profitability of other assets in Open Pension Funds | 3.8 |

Source: own elaboration.

## 2.2. Life cycle employment scenarios

Two employment and wage scenarios in the life cycle are established for each profile within the cohort born in 1980: for the employment contract and contract of mandate segments of labour market. All employment scenarios in the life cycle were created based on the data derived from the 2013 and 2012 Labour Force Survey, 2012 Structure of Earnings Survey and the 2013 Social Insurance Institution (ZUS) data. It has been assumed that limit distributions are stationary over time, i.e. it is assumed that the distribution of probability of working under a given contract type is constant over time for the individual profiles distinguished by sex and education level. This is assumed due to the fact that there are no relevant panel data which could be used to estimate probabilities of transitions between employment and civil law contracts over the period [t,t+1]. The exact distribution of the probability of working under civil law contracts by age, education and sex is unknown, either (ZUS data provides only information about distribution by age and sex). Therefore, the probabilities of working under civil law contracts have been estimated for the individual education groups based on two datasets – 2012 Labour Force Survey and 2012 Structure of Earnings Survey. LFS contains data about all people working in the economy, while SES – only about persons working under (open-ended or fixed-term) employment contracts. Thus, we calculated the distribution of probability of working under civil law contracts (by sex, age and education level) as a difference between probabilities of working temporarily in the LFS and SES data.

Then, making use of the estimated probabilities of working under a given contract type in the life cycle, the individual profiles have been assigned the contract type for which the estimated probability was the highest. Since persons with civil law contract employment spells display a higher

risk of frictional unemployment (illustrated by gaps in employment and payment of the contributions, as discussed in subsection 1.2), it is assumed that they work for a shorter period in their life cycles, i.e. the accumulated number of years of employment for a given profile is lower than the accumulated number of years of employment for those working only under employment contracts (cf. Table 2).

The contributions bases (wages) expressed as a percentage of the average contribution base were estimated on ZUS 2013 data for a given gender and age group. As ZUS data lacks information on education level, we assumed that relative differences between wages in both segments for a given educational profile were identical as for a relevant gender and age group. Using SES (2102) data, for every profile we estimated wages relative to the average wage. These two distributions allowed us to express wages in both segments in relation to the average wage. As in case of probabilities of work, we assumed that limit distributions of wages (relative to average wage) in profiles and segments are stationary over time. Life cycle employment and wage scenarios for persons working exclusively under employment contracts (yet with unemployment spells) were created as reference scenarios.

The scenarios of employment paths in the life cycle for both segments and by distinguished profiles are presented in Tables 5-6, and the scenarios of contribution bases in Tables 7-8 in the Appendix.

**Table 2. Accumulated years of employment in the life cycle for the individual profiles in model employment scenarios in two segments of the labour market**

| Sex | Education | Accumulated years of employment | |
|---|---|---|---|
| | | Segment of contracts of mandate | Segment of employment contracts |
| Men | Tertiary | 40 | 43 |
| Men | Post-secondary / vocational secondary | 37 | 40 |
| Men | Upper secondary | 32 | 35 |
| Men | Basic vocational | 34 | 39 |
| Men | Primary and lower secondary | 28 | 36 |
| Women | Tertiary | 39 | 43 |
| Women | Post-secondary / vocational secondary | 35 | 38 |
| Women | Upper secondary | 32 | 36 |
| Women | Basic vocational | 34 | 38 |
| Women | Primary and lower secondary | 24 | 32 |

Source: own calculations.

Applying these two scenarios in the pension model presented above, we calculated the expected average retirement benefit in two labour market segments which for each profile exhibit: (i) professional career with a use of contracts of mandate, and (ii) professional career based solely on employment contracts. In each segment, the results for a given sex (and total cohort) have been calculated as weighted averages (weighted by the education profile shares) of results for profiles.

# 3. Labour market segmentation consequences for pensions

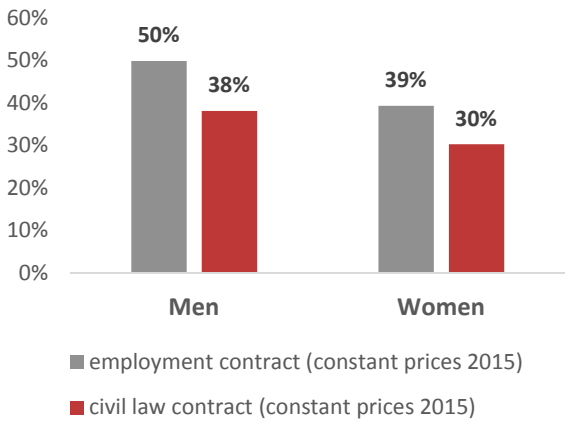
## 3.1. Expected pension gap between labour market segments

In principle, workers affected by labour market segmentation for fewer years under employment contracts and pay lower contributions, which results in lower retirement benefits compared to those with the same socio-demographic characteristics yet working under employment contracts. We express the difference in the expected retirement benefit related to labour market segmentation by two variables: (i) the expected retirement benefit in constant prices of 2015 and (ii) the relation of the expected retirement benefit to the last wage before reaching the statutory retirement age in the given profile (and segment).

According to our results for people born in 1980, presented in Figures 18-19, a career in the labour market segment that commonly applies civil law contracts involves expected retirement benefit lower by PLN 538 (in constant prices of 2015) for men (PLN 3083 in the segment of civil law contracts relative to PLN 3621 in the segment of employment contracts) and by PLN 428 for women (PLN 2553 relative to PLN 2981). Therefore, the expected pension gap in the civil law contract segment in comparison to the employment contract segment amounts to 17.7% in the case of men and to 17.2% in the case of women. In terms of retirement benefit as a percentage of the last wage before retiring, the difference is 12 pp for men and 9 pp for women, respectively.

Figure 18. Expected retirement benefit in constant prices of 2015 in the employment contract segment and the civil law contract segment by sex (in PLN).


Figure 19. Expected retirement benefit in relation to the expected last remuneration before reaching statutory retirement age in the employment contract segment and the civil law contract segment by sex (in %).




Source: own calculations

However, the differences in average expected pensions between segments do not tell the whole story. There are substantial disparities affecting various profiles by education level (cf. Table 3). The greatest expected pension gap between labour market segments affects workers with primary and lower secondary education, for whom it exceeds 45% (in 2015 prices this means the expected retirement benefit of PLN 1245 in the segment of civil law contracts vs. PLN 2275 in the employment contract segment for men, and PLN 763 vs. PLN 1424 for women). On the other hand, the smallest differences in expected retirement benefits between labour market segments occur among people with tertiary education – the expected pension gap among people with tertiary education amounts to approx. 10% (below PLN 500 in 2015 prices). In the case of other profiles, i.e. people with post-

secondary, upper secondary or basic vocational education, the difference in the expected pension ranges from 18% to 27% (with respect to the expected retirement benefit in the segment of employment contracts for a given profile). In terms of retirement benefits expressed in relation to the expected last wage before reaching the retirement age, a negative correlation between the education level and the pension gap between labour market segments can be observed.[11]

**Table 3. Expected retirement benefit in 2015 constant prices and in relation to the expected last remuneration before reaching the statutory retirement age, the civil law contract segment and employment contract segment by sex and education level for the cohort born in 1980.**

| Sex | Education | EC retirement benefits (2015 constant prices) | CLC retirement benefits (2015 constant prices) | Difference (in %) | EC retirement benefits(as % of the last pay) | CLC retirement benefits (as % of the last pay) | Difference (in pp) |
|---|---|---|---|---|---|---|---|
| M | Tertiary | 5,557.02 | 5,063.22 | 8.9% | 41.7% | 38.0% | 3.7 |
| M | Post-secondary / vocational secondary | 3,382.90 | 2,690.41 | 20.5% | 43.4% | 34.5% | 8.9 |
| M | Upper secondary | 2,837.16 | 2,121.96 | 25.2% | 38.8% | 29.0% | 9.8 |
| M | Basic vocational | 2,655.81 | 2,071.03 | 22.0% | 65.6% | 51.1% | 14.5 |
| M | Primary and lower secondary | 2,275.26 | 1,245.32 | 45.3% | 57.0% | 31.2% | 25.8 |
| W | Tertiary | 4,189.07 | 3,706.34 | 11.5% | 36.6% | 32.4% | 4.2 |
| W | Post-secondary / vocational secondary | 2,564.28 | 1,891.34 | 26.2% | 37.6% | 27.7% | 9.9 |
| W | Upper secondary | 2,392.58 | 1,972.56 | 17.6% | 32.6% | 26.8% | 5.8 |
| W | Basic vocational | 1,788.66 | 1,308.39 | 26.9% | 45.7% | 33.4% | 12.3 |
| W | Primary and lower secondary | 1,424.30 | 763.26 | 46.4% | 38.9% | 20.8% | 18.1 |

Source: own calculations.

## 3.2. Impact of differences of employment tenure in the life cycle and contributions paid

In this subsection we decompose the differences in the expected retirement benefits in both segments into (i) the part arising from the different total life cycle employment period of people with careers in the civil law contract segment, $E_i$, and (ii) the part arising from different contributions paid in the segment of civil law contracts (compared to employment contracts), $C_i$ ($i$ indicates the profile).

The impact of differences in the life cycle employment was calculated as the difference between the expected retirement benefit in the segment of employment contracts and the hypothetical retirement benefit that would be obtained (by the given profile) conditional on paying contributions like in the segment of employment contracts, yet in the sequence of the life cycle employment spells like in the segment of civil law contracts. It is described by the following formula:

[11] In the case of absolute quantities there is no such correlation, due to a non-monotonic relation between the education level and expected retirement benefit in a given profile.

**Equation 1. Effect of the life cycle employment period on differences in retirement benefits between segments expressed in absolute values of pension account in the employment contract segment**

$$E_i = \sum_{t=20}^{t=67} P_{t,i}^{UP} * W_{t,i}^{UP} * g_{67-t+1} - \sum_{t=20}^{t=67} P_{t,i}^{CW} * W_{t,i}^{UP} * g_{67-t+1}$$

$E_i$ – effect of life-cycle employment
$P_{t,i}$ – part of year *t* when profile *i* was employed
$W_t$ – amount of the annual contribution at age t
$G_{67-t+1}$ – accumulated growth rate in year 67-*t* +1
CW – variables for civil law contracts
UP – variables for employment contracts
i – index for individual profiles

The effect of differences in contributions paid was calculated as the difference between the expected retirement benefit in the segment of employment contracts and the hypothetical retirement benefit that would be obtained (in the given profile) conditional on a sequence of the life cycle employment spells identical as in the segment of employment contracts, yet with contributions paid like in the segment of civil law contracts. It is described by the following formula:

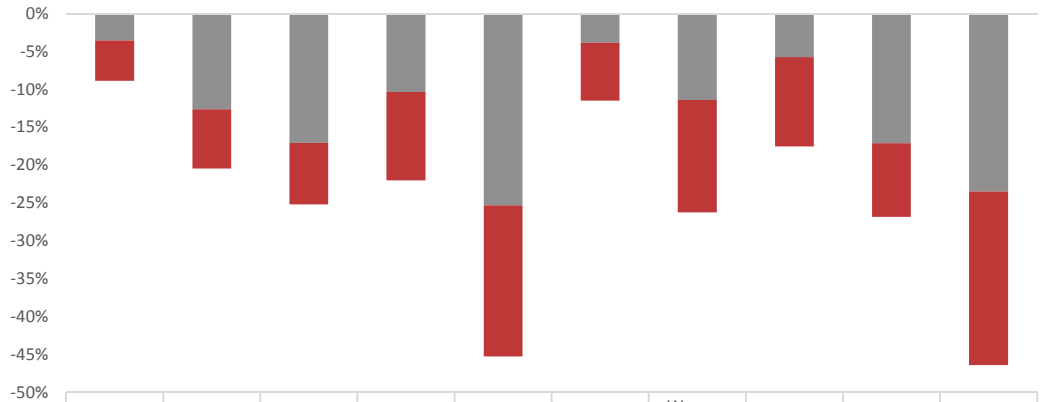
**Equation 2. Effect of contributions paid on differences in retirement benefits between segments expressed in absolute values of pension account in the employment contract segment**

$$C_i = \sum_{t=20}^{t=67} P_{t,i}^{UP} * W_{t,i}^{UP} * g_{67-t+1} - \sum_{t=20}^{t=67} P_{t,i}^{UP} * W_{t,i}^{CW} * g_{67-t+1}$$

$C_i$ – effect of contributions paid
$P_{t,i}$ – part of year t when profile i was employed
$W_t$ – amount of the annual contribution at age t
$G_{67-t+1}$ – accumulated growth rate in year 67-t +1
CW – variables for civil law contracts
UP – variables for employment contracts
i – index for individual profiles

Our results show that in the case of men 9.5 pp out of the 17.7% difference in the expected retirement benefit between segments can be attributed to lower contributions paid, and 8.2 pp – to shorter employment in the life cycle. In the case of women, the respective numbers are 7.3 pp and 9.9 pp. Hence, shorter total employment periods in the life cycle are slightly more important for men and lower contributions paid to the scheme – for women. We also find a significant discrepancy in this respect with regard to the education level (Figure 20). Among people with tertiary education (both sexes) and among women with upper secondary education, the dominant factor underlying differences in retirement benefits between segments is a shorter total employment period in the civil law contract segment. Bases of contributions are less significant and account for approx. 1/3 of the differences. On the other hand, it is the lower total amount of contributions paid in the segment of civil law contracts that plays the dominant role among men with post-secondary or upper secondary education and among women with basic vocational education. Finally, the role of both factors is similar among men with vocational education and women with post-secondary education.

Figure 20. Decomposition of differences of the expected retirement benefits in the segment of civil law contracts and employment contracts into the impact of the employment period in the life cycle and contributions paid by sex and education level for the cohort born in 1980 (in %).




| | Man higher | Man post-secondary / vocational secondary | Man upper secondary | Man basic vocational | Man primary and lower secondary | Woman higher | Woman post-secondary / vocational secondary | Woman upper secondary | Woman basic vocational | Woman primary and lower secondary |
|---|---|---|---|---|---|---|---|---|---|---|
| E - employment period | -5.3% | -7.8% | -8.1% | -11.6% | -19.9% | -7.7% | -14.8% | -11.8% | -9.7% | -22.9% |
| C - contributions paid | -3.6% | -12.7% | -17.1% | -10.4% | -25.3% | -3.9% | -11.4% | -5.8% | -17.1% | -23.5% |

Source: own calculations.

## 3.3. Impact of differences in the sum of contributions paid and indexation of the pension account

This subsection presents another breakdown of factors that contribute to differences in retirement benefits between the labour market segments. It is based on the observation that the pension account balance is determined by two factors, i.e. the amount of contributions paid and total indexation of contributions.[12] Differences in the expected pension account balances, therefore, may be decomposed into two factors: (i) one that is related to the difference in the total sum of contributions paid (regardless of when they are paid and of their amounts), $S_i$, and (ii) one that is related to the difference in total accruals on these contributions by the time a person reaches the retirement age, $O_i$. The decomposition of pension gap between segments into the effect of the sum of contributions paid and the indexation of the pension account, expressed in absolute values of the pension account balance for a given profile, is expressed by equations 3 and 4.[13]

[12] Defined as a difference between the pension account balance upon reaching the retirement age and the total sum of the stream of pension contributions paid (in constant prices of 2015).

[13] We focus on the selected cohort of persons born in 1980, who will receive their first retirement benefit in 2047. In line with the adopted macroeconomic assumptions, indexation of and capital interest on contributions play a slightly more important role for this cohort than for younger ones.

**Equation 3. Effect of the sum of contributions paid on differences in retirement benefits between segments expressed in absolute values of the pension account in the employment contract segment**

$$S_i = \sum_{t=20}^{t=67} P_{t,i}^{UP} * W_{t,i}^{UP} - \sum_{t=20}^{t=67} P_{t,i}^{CW} * W_{t,i}^{CW}$$

S – effect of the sum of contributions paid
$P_{t,i}$ – part of the year *t* when profile *i* was employed
$W_t$ – amount of the annual contribution at age t
CW – variables for civil law contracts
UP – variables for employment contracts
i – index for individual profiles

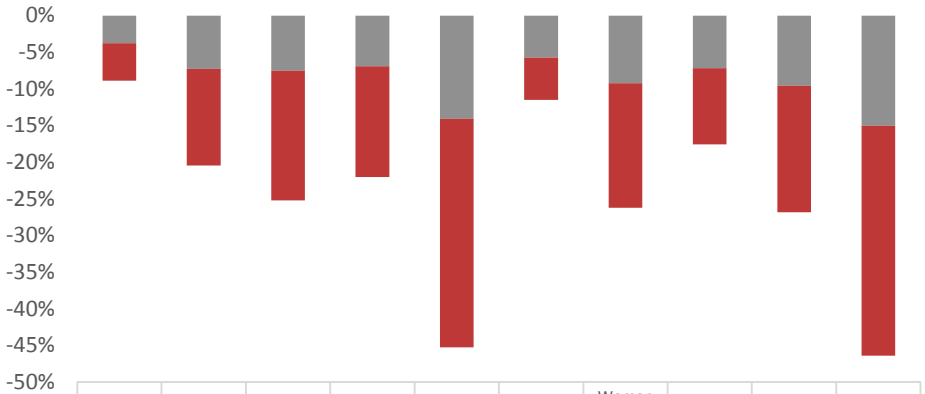
**Equation 4. Effect of the indexation on differences in retirement benefits between segments expressed in absolute values of the pension account in the employment contract segment**

$$O_i = \sum_{t=20}^{t=67} P_{t,i}^{UP} * W_{t,i}^{UP} * g_{67-t+1} - \sum_{t=20}^{t=67} P_{t,i}^{CW} * W_{t,i}^{CW} * g_{67-t+1} - S_i$$

O – effect of the indexation
$P_{t,i}$ – part of year t when profile i was employed
$W_t$ – amount of the annual contribution at age t
$G_{67\text{-}t+1}$ – accumulated growth rate in year 67-t +1
CW – variables for civil law contracts
UP – variables for employment contracts
i – index for individual profiles

The decomposition results are shown on Figure 21. For all profiles, over 50% of differences in retirement benefits between segments can be attributed to differences in indexation and interest accumulated over the life cycle in both segments of the labour market. This factor is particularly important for men with basic vocational education, primary education and upper secondary education, and for women with primary education. This is because although in a given year the indexation is the same for all profiles, civil law contracts are commonly used first and foremost at the early stage of career (cf. Table 5 in the Appendix). Thus, the amount of contributions paid in the civil law contract segment is lower than in the employment contract segment (due to both lower contribution bases and less frequent payments) for many years before the retirement age. For this reason, due to lost opportunity cost, differences in indexation and accumulated interest have greater impact on the final difference between the expected pensions than differences in the total stream of contributions paid. This effect is further strengthened by the fact that indexation of the pension account balance decreases over time. In the first place, it results from population ageing and changes in the demographic structure of the population (that negatively affect indexation in the first pillar) and decreasing (as convergence progresses) pace of economic growth (that negatively affects indexation on the subaccount and interest on the account in the second pillar).

Figure 21. Decomposition of differences in the expected retirement benefits in the segment of civil law contracts and employment contracts into the impact of the sum of contributions and indexation, by sex and education level, for the cohort born in 1980 (in %).




| | Man higher | Man post-secondary / vocational secondary | Man upper secondary | Man basic vocational | Man primary and lower secondary | Woman higher | Woman post-secondary / vocational secondary | Woman upper secondary | Woman basic vocational | Woman primary and lower secondary |
|---|---|---|---|---|---|---|---|---|---|---|
| O - indexation of the pension account | -5.1% | -13.2% | -17.7% | -15.1% | -31.2% | -5.8% | -17.0% | -10.4% | -17.3% | -31.4% |
| S - sum of contributions paid | -3.8% | -7.3% | -7.5% | -6.9% | -14.1% | -5.7% | -9.2% | -7.2% | -9.6% | -15.0% |

Source: own calculations.

# 4. Impact of policy instruments

In the previous section, we have analysed the pension consequences of the widespread use of civil law contracts on labour market. On average, expected retirement benefits in the civil law contract segment are lower than in the employment contract segment. Moreover, we found substantial heterogeneity in expected pension gaps between labour market segments in various socio-demographic groups distinguished on the basis of gender and education level. The factors behind these expected pension gaps also vary between profiles. One may expect that it will be difficult to identify a single public policy that would address this issue and mitigate the consequences of segmentation for future retirement benefits across various socio-demographic groups. In this section, two policy instruments present in the public debate are analysed:

- paying contributions on all contracts of mandate at least from the minimum wage level;
- additional savings in the third pillar with a contribution amounting to (i) 2% of the remuneration only during work under contracts of mandate or (ii) 4% of the remuneration in 2015-2029 and 4% of the remuneration paid only under civil law contracts in 2030-2047.

It is assumed that both instruments affect only the stream of paid contributions, while employment paths (in both segments of the labour market) remain unchanged.

Pursuant to the Social Security System Act, as amended on 23 October 2014, paying contributions for all contracts of mandate at least from the minimum wage level will become mandatory on 1 January 2016. Assuming that from 2016 the minimum wage will be pegged to average wage in the economy,[14] we estimated the impact of this solution on the expected size of retirement benefits in the civil contract segment. The results of this and other policy simulations are shown in Table 4.

**Table 4. Differences in expected retirement benefits between the civil law contract segment and employment contract segment, and calculated change in retirement benefits in the civil law contract segment resulting from paying contributions at least from the minimum wage level and additional saving of 2% or 4% of wage in the third pillar**

| Profile | Pension gap – civil law contracts (in %) | Contributions paid from minimum wage level (in pp) | Voluntary 2% savings plan (in pp) | Voluntary 4% savings plan (in pp) |
|---|---|---|---|---|
| Men; tertiary education | 8.9 | 1.0 | 0.9 | 3.5 |
| Men; post-secondary/vocational secondary education | 20.5 | 5.5 | 0.4 | 2.5 |
| Men; upper secondary education | 25.2 | 7.1 | 0.5 | 2.9 |
| Men; basic vocational education | 22.0 | 5.9 | 0.5 | 2.8 |
| Men; primary, lower secondary education or below | 45.3 | 15.5 | 0.4 | 2.2 |
| **Men** | 17.7 | 4.3 | 0.6 | 3.0 |
| Women; tertiary education | 11.5 | 1.6 | 0.9 | 3.4 |
| Women; post-secondary/vocational secondary education | 26.2 | 7.0 | 0.4 | 2.5 |
| Women; upper secondary education | 17.6 | 3.1 | 0.3 | 2.4 |
| Women; basic vocational education | 26.9 | 14.8 | 0.5 | 2.2 |
| Women; primary, lower secondary education or below | 46.4 | 21.6 | 0.4 | 2.0 |
| **Women** | 17.2 | 4.5 | 0.6 | 3.0 |

Note: Voluntary savings plan in the fully funded pillar amounting to 4% of remuneration in the years 2015-2029 and 4% of remuneration paid exclusively under civil law contracts in the years 2030-2047.
Source: own calculations.

We find that the obligation to pay pension contributions from the minimum wage level allows bridging the expected pension gap between segments by 4.3 pp of 17.7% gap for men and 4.5 pp of 17.2% gap for women (cf. Table 4). The slightly greater impact of this policy on women's retirement benefits is related to lower average pay among women, and in particular to a slightly wider gap in women's remuneration in the civil law contract segment in relation to the minimum wage. For the same reason, this policy has the strongest effect on the pensions gap in groups with lower education level. It has the greatest impact on expected retirement benefits among women with basic vocational, primary or lower secondary education (among whom it reduces the expected pension gap between segments by almost a half) and men with primary or lower secondary education (among whom it reduces the pension gap by 1/3). On the other hand, it is only of marginal importance for persons with tertiary education who work in the civil contract segment. Among men it bridges only 1 pp of the 8.9% pension gap with respect to the employment contract segment, and 1.6 pp of 11.5% gap among women. That's because persons with tertiary education in the civil law

[14] i.e. that it is going to increase at the pace of average remuneration.

contract segment, in general, pay contributions based on pay that is close to the minimum wage. In other profiles an increase of expected pension benefit allows bridging approx. 1/5 of the gap in retirement benefits with respect to the employment contract segment. In aggregate terms, the stream of additional contributions paid as a result of introducing this policy in the years 2016-2040 is estimated at PLN 231 billion (in constant prices of 2015).

Additional savings in the (third) capital pillar of Polish pension system constitute the second analysed instrument. In particular, we assume that persons working under civil law contracts set aside additional 2% of their contribution base in the third pillar. The assumption made with regard to the amount of the additional contribution corresponds with ideas put forward in the public debate; e.g. Rutecka et al. (2014) propose a contribution amounting to 2% under quasi-mandatory workplace pension schemes (initially in companies hiring at least 250 employees). We also assume that future returns in the third pillar are going to be identical as in the second (fully funded) pillar of the general pensions scheme.

Results presented in Table 4 indicate that this solution has little influence on the expected retirement benefits in the civil law contract segment, increasing them only by 0.7 pp for women and by 0.6 pp for men. A voluntary savings plan is the most effective solution in profiles with highest average remuneration, i.e. men and women with tertiary education, whom it would allow to reduce the gap with respect to counterparts in the employment contract segment by 0.9 pp (for both sexes). Additional saving has the weakest impact among women with upper secondary education or basic vocational education (0.3 pp and 0.4 pp of the between segments pension gap, respectively). However, it should be noted that additional saving of 2% of the contribution base increases the stream of contributions in the years 2016-2040 by PLN 33 billion (in constant prices of 2015). This amount is seven times lower than the stream of contributions estimated for paying pension contributions (to the general pension scheme) from the minimum wage level.

Additional savings in the third pillar may translate into a visible increase in retirement benefits of persons in the civil law contract segment if such savings plan lasts for a longer period, in order to compensate for lower contributions paid during work under civil law contracts. Due to the lost opportunity cost (indexation of and return on contributions paid at an early stage of career), the additional contribution should also be higher. For instance, if persons born in 1980 and working in the civil law contract segment would pay contributions representing 4% of their (expected) remuneration in the 2015-2029 period, and 4% of their remuneration only when working under civil law contracts in the 2030-2047 period, it would increase the contribution stream by PLN 228 billion, i.e. an amount close to the one obtained through paying pension contributions (to the general pensions scheme) from the minimum wage level. This solution would bridge the average pension gap between the labour market segments by 3 pp., so less than the obligation to pay contributions from the minimum wage level. However, it would likely affect the labour demand less. At the same time, its impact would be to an even greater extent correlated with the wage level than in case of the additional 2% contribution. One may expect, therefore, that the higher the worker's level of education, the higher the benefits generated by this solution (cf. Table 4).

## Summary

Over the last dozen plus years, Poland experienced a substantial rise in the incidence of temporary contracts, in particular civil law contracts. The latter differ from employment contracts not only in how they are entered into and terminated, but also with respect to the obligations to pay social security contributions, in particular pension contributions. In 2013, approx. one million people in Poland worked under civil law contracts, earning on average lower wages and paying lower pension contributions than their counterparts who had similar socio-demographic characteristics but worked under employment contracts. In this paper, a cohort model of the Polish pension scheme is used to assess the results of this labour market segmentation on the level of retirement pension benefits expected in the future. We focus on a selected cohort of persons born in 1980 who started and developed their careers in parallel with the spread of temporary work and civil law contracts in Poland. Taking into account differences of unemployment spells and differences in the bases of pension contributions (estimated on the basis of LFS, SES and ZUS data), we calculated expected retirement benefits in the employment contract segment and in the civil law contract segment.

Our results indicate that a career in the civil law contract segment entails a leads to lower expected retirement benefit than in the employment contract segment. For the cohort born in 1980 this difference is 17.7% for men and 17.2% for women. The largest differences between persons from the different labour market segments are identified for primary and lower secondary school graduates (above 45%), the smallest for persons with tertiary education (approx. 10%), while for the other education level groups they fall in the range of 18% to 27%. We also find significant differences in factors behind the expected pension gap between segments. For men, the more important factor is the lower amount of social security contributions in the civil law contract segment, while for women it is the shorter period of employment in the life cycle. On the other hand, among the better educated, who generally have smaller expected pension gaps between segments, the dominating factor are the cumulated years of work in the civil law contract segment. Among less educated workers, who in general have larger expected pension gaps between segments, lower contributions paid in the civil law contract segment are more significant. At the same time, for total population and for all analysed profiles separately, more than half of the difference in the level of retirement benefits between segments may be attributed to differences in indexation and interest accrued in both labour market segments. This is related to the fact that work in the civil law contract segment is concentrated in younger age groups (20-39 years) and differences in contributions paid in the first dozen plus years of the professional career are propagated to future retirement benefits.

According to our results, the obligation to pay contributions for all contracts of mandate at least from the minimum wage level, which will come into force as of 1 January 2016, will enable closing ¼ of the pension gap between labour market segments, assuming that it will not raise the risk of unemployment and decrease the number of years worked in the civil law contract segment. The impact of this policy is regressive – it increases as the contribution bases in the civil law contract segment decrease – which means that on average the impact of policy is larger on poorly educated persons than on well-educated persons. It can be expected, however, that for the worse educated and low earners it will be more difficult to meet the assumption about maintaining the employment path. On the other hand, the solution which involves additional savings in the third pillar of the pension scheme while working under civil law contracts is progressive – brings more benefits to those workers who earn relatively well in the contract of mandate segment. Its impact, however, is

rather low – in the case of paying a 2% contribution, it does not exceed 1 pp of the pension gap between the segments, in the case of 4% contribution – 1.2 pp. Voluntary saving under the third pillar in the amount of 4% of the remuneration in the years 2015-2029 and 4% of the remuneration solely for civil law contracts in the years 2030-2047 would close the gap by 3 pp.

Simulations of results of potential policies suggest that actions focused on setting a floor on contribution bases or moderate increases of additional savings will not be sufficient to fully eliminate the pension gap in relation to the employment contract segment. This is true even under the assumption that the obligation to pay contributions for all contracts of mandate at least from the minimum wage level will not make workers affected unemployed or moving to informal employment. Without transition of workers from civil law contracts to employment contracts, the pension gap will not disappear. Limiting the application of civil law contracts in Poland might be encouraged by introducing the so-called single contract, as proposed by Arak, Lewandowski and Żakowiecki (2014). According to this concept, employee's privileges increase gradually with the duration of employment with a given employer, which would reduce staff turnover caused by suddenly increasing privileges after 6 months and 3 years of work. Moreover, increasing the tax deductible expense for personal income tax may contribute to reducing the total tax wedge related to employment contracts in those groups which are most frequently affected by segmentation. Arak, Lewandowski and Żakowiecki (2014) argue that increasing the tax deductible expense by four and a half times and increasing the basic income tax rate from 18% to 20% (with the second rate remaining at the level of 32%) would decrease the taxation of low earners and reduce the total tax wedge imposed on their work, while being neutral for the state budget. Thus, it would make it easier for employers and workers to adapt to paying full pension contributions on the single contract.

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# Appendix

Table 5. Model life cycle employment scenarios in the contract of mandate segment

| | | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Men | Tertiary | | | M | M | M | U | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Men | Post-secondary / vocational secondary | M | M | M | M | M | M | E | E | U | U | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Men | Upper secondary | | M | M | M | M | M | M | M | U | U | U | E | E | E | E | E | E | E | E | E | E | E | E |
| Men | Basic vocational | M | M | M | M | M | U | U | E | E | U | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Men | Primary and lower secondary | | M | M | M | M | M | M | U | U | M | M | M | M | M | U | U | U | E | E | E | E | E | E |
| Women | Tertiary | | | M | M | M | U | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Women | Post-secondary / vocational secondary | | M | M | M | M | M | M | M | U | U | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Women | Upper secondary | | | M | M | M | U | U | E | E | U | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Women | Basic vocational | | M | M | M | M | M | U | U | E | E | E | E | E | E | E | E | E | E | E | E | M | M | M |
| Women | Primary and lower secondary | | | M | M | M | U | E | E | U | U | M | M | M | M | M | M | E | E | E | E | U | U | E |
| | | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 |
| Men | Tertiary | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | U | U | E | E | E | E | |
| Men | Post-secondary / vocational secondary | E | E | E | E | E | E | E | E | M | M | E | E | E | E | E | U | U | E | | | | | |
| Men | Upper secondary | E | E | E | E | E | E | E | E | U | M | M | E | E | U | U | U | E | | | | | | |
| Men | Basic vocational | E | E | E | E | E | E | E | E | E | M | M | U | U | E | E | E | E | | | | | | |
| Men | Primary and lower secondary | E | E | E | E | E | E | E | E | U | U | U | U | M | M | E | | | | | | | | |
| Women | Tertiary | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | U | U | E | E | E | | |
| Women | Post-secondary / vocational secondary | E | E | E | E | E | E | E | E | E | E | U | U | E | E | U | U | E | | | | | | |
| Women | Upper secondary | E | E | E | E | E | E | E | E | E | E | E | E | E | U | U | U | E | | | | | | |
| Women | Basic vocational | M | U | E | E | E | E | E | E | E | E | E | E | E | E | U | U | U | E | | | | | |
| Women | Primary and lower secondary | E | E | E | U | U | U | U | M | E | E | E | E | | | | | | | | | | | |

Note: M – spells of employment under a contract of mandate, E – spells of employment under an employment contract, U – unemployment spells. Blank fields mean inactivity.
Source: own elaboration.

**Table 1. Model life cycle employment scenarios in the employment contract segment**

| | | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Men | Tertiary | | | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Men | Post-secondary / vocational secondary | E | E | E | E | E | E | E | E | U | E | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Men | Upper secondary | | E | E | E | E | E | E | E | E | E | U | U | E | E | E | E | E | E | E | E | E | E | E |
| Men | Basic vocational | E | E | E | E | E | E | U | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Men | Primary and lower secondary | | E | E | E | E | E | E | E | U | E | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Women | Tertiary | | | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Women | Post-secondary / vocational secondary | | E | E | E | E | U | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Women | Upper secondary | | | E | E | E | U | U | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Women | Basic vocational | | E | E | E | E | E | E | U | U | E | E | E | E | E | E | E | E | E | E | E | E | E | E |
| Women | Primary and lower secondary | | | E | E | E | E | E | E | U | U | E | E | E | E | E | E | E | E | E | E | E | E | E |
| | | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 |
| Men | Tertiary | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | U | E | E | E | E | E | E |
| Men | Post-secondary / vocational secondary | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | U | U | E | | | |
| Men | Upper secondary | E | E | E | E | E | E | E | E | U | E | E | E | E | E | E | U | U | E | | | | | |
| Men | Basic vocational | E | E | E | E | E | E | E | E | E | E | E | E | U | E | E | E | E | E | | | | | |
| Men | Primary and lower secondary | E | E | E | E | E | E | E | E | E | E | U | U | E | E | E | E | E | | | | | | |
| Women | Tertiary | E | E | E | E | E | E | E | E | E | E | E | E | E | E | U | E | E | E | E | E | E | E | E |
| Women | Post-secondary / vocational secondary | E | E | E | E | E | E | E | E | E | E | E | E | E | E | E | U | U | E | E | | | | |
| Women | Upper secondary | E | E | E | E | E | E | E | E | E | E | E | E | E | E | U | U | E | E | E | | | | |
| Women | Basic vocational | E | E | E | E | E | E | E | E | E | E | E | E | E | | U | E | E | E | E | E | | | |
| Women | Primary and lower secondary | E | E | E | E | U | U | E | E | E | E | E | E | E | E | E | | | | | | | | |

Note: E – spells of employment under an employment contract, U – unemployment spells. Blank fields mean inactivity.
Source: own elaboration.

**Table 7. Model life cycle contribution base (as a percent of average wage) scenarios in the employment contract segment**

| | | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Men | Tertiary | 78 | 74 | 69 | 110 | 109 | 108 | 108 | 106 | 153 | 154 | 152 | 150 | 148 | 177 | 179 | 177 | 175 | 172 | 174 | 176 | 174 | 172 | 169 |
| Men | Post-secondary / vocational secondary | 65 | 64 | 62 | 79 | 79 | 80 | 81 | 81 | 96 | 97 | 96 | 95 | 94 | 100 | 101 | 100 | 99 | 98 | 99 | 100 | 99 | 98 | 97 |
| Men | Upper secondary | 69 | 66 | 64 | 85 | 85 | 85 | 85 | 83 | 99 | 99 | 98 | 97 | 96 | 102 | 103 | 102 | 101 | 99 | 96 | 97 | 96 | 95 | 93 |
| Men | Basic vocational | 60 | 59 | 57 | 69 | 70 | 70 | 71 | 70 | 78 | 79 | 78 | 77 | 76 | 81 | 82 | 81 | 81 | 79 | 80 | 81 | 80 | 79 | 78 |
| Men | Primary and lower secondary | 56 | 55 | 54 | 64 | 65 | 67 | 69 | 65 | 72 | 73 | 72 | 71 | 70 | 75 | 76 | 75 | 75 | 73 | 74 | 75 | 74 | 73 | 72 |
| Women | Tertiary | 66 | 65 | 64 | 87 | 85 | 85 | 84 | 87 | 109 | 110 | 109 | 109 | 107 | 115 | 116 | 115 | 114 | 113 | 118 | 120 | 119 | 119 | 117 |
| Women | Post-secondary / vocational secondary | 57 | 54 | 52 | 64 | 63 | 63 | 63 | 65 | 72 | 73 | 72 | 72 | 71 | 74 | 75 | 74 | 74 | 73 | 75 | 76 | 76 | 75 | 74 |
| Women | Upper secondary | 62 | 59 | 56 | 70 | 68 | 69 | 69 | 72 | 77 | 78 | 77 | 76 | 75 | 75 | 76 | 75 | 74 | 73 | 74 | 75 | 74 | 73 | 72 |
| Women | Basic vocational | 49 | 48 | 48 | 51 | 51 | 51 | 52 | 51 | 53 | 54 | 54 | 53 | 52 | 54 | 54 | 54 | 54 | 53 | 53 | 53 | 53 | 53 | 52 |
| Women | Primary and lower secondary | 49 | 49 | 48 | 53 | 54 | 55 | 55 | 52 | 53 | 53 | 53 | 52 | 51 | 51 | 52 | 51 | 51 | 50 | 50 | 50 | 49 | 49 | 48 |
| | | **45** | **46** | **47** | **48** | **49** | **50** | **51** | **52** | **53** | **54** | **55** | **56** | **57** | **58** | **59** | **60** | **61** | **62** | **63** | **64** | **65** | **66** | **67** |
| Men | Tertiary | 166 | 167 | 166 | 164 | 161 | 156 | 157 | 156 | 154 | 152 | 147 | 147 | 146 | 145 | 144 | 143 | 143 | 142 | 141 | 140 | 149 | 149 | 148 |
| Men | Post-secondary / vocational secondary | 96 | 97 | 96 | 95 | 93 | 93 | 94 | 93 | 92 | 91 | 93 | 94 | 93 | 93 | 93 | 96 | 97 | 97 | 97 | 96 | 86 | 87 | 87 |
| Men | Upper secondary | 88 | 89 | 88 | 87 | 85 | 83 | 84 | 83 | 82 | 81 | 81 | 82 | 81 | 81 | 80 | 78 | 79 | 78 | 78 | 78 | 81 | 81 | 81 |
| Men | Basic vocational | 75 | 76 | 75 | 74 | 73 | 71 | 71 | 71 | 70 | 70 | 69 | 69 | 69 | 68 | 68 | 61 | 62 | 62 | 62 | 62 | 45 | 45 | 45 |
| Men | Primary and lower secondary | 69 | 70 | 69 | 68 | 67 | 64 | 65 | 64 | 64 | 63 | 62 | 62 | 62 | 62 | 61 | 55 | 56 | 55 | 55 | 55 | 44 | 44 | 44 |
| Women | Tertiary | 122 | 124 | 123 | 122 | 121 | 121 | 122 | 121 | 121 | 119 | 122 | 123 | 122 | 122 | 121 | 126 | 126 | 126 | 126 | 125 | 127 | 128 | 127 |
| Women | Post-secondary / vocational secondary | 76 | 77 | 77 | 76 | 75 | 80 | 81 | 80 | 80 | 79 | 85 | 86 | 85 | 85 | 85 | 86 | 87 | 87 | 86 | 86 | 76 | 76 | 76 |
| Women | Upper secondary | 72 | 73 | 72 | 71 | 70 | 75 | 75 | 75 | 74 | 73 | 82 | 82 | 82 | 81 | 81 | 77 | 77 | 77 | 77 | 76 | 82 | 82 | 82 |
| Women | Basic vocational | 52 | 53 | 52 | 52 | 51 | 51 | 52 | 52 | 51 | 51 | 50 | 51 | 50 | 50 | 50 | 47 | 48 | 48 | 48 | 47 | 43 | 44 | 44 |
| Women | Primary and lower secondary | 48 | 48 | 48 | 47 | 46 | 46 | 47 | 46 | 46 | 45 | 45 | 45 | 45 | 45 | 44 | 43 | 43 | 43 | 43 | 42 | 41 | 41 | 41 |

Source: own elaboration.

**Table 8. Model life cycle contribution base (as a percent of average wage) scenarios in the contract of mandate segment**

| | | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Men | Tertiary | 19 | 18 | 17 | 27 | 27 | 27 | 27 | 27 | 38 | 38 | 38 | 38 | 37 | 44 | 45 | 44 | 44 | 43 | 43 | 44 | 43 | 43 | 42 |
| Men | Post-secondary / vocational secondary | 16 | 16 | 16 | 20 | 20 | 20 | 20 | 20 | 24 | 24 | 24 | 24 | 23 | 25 | 25 | 25 | 25 | 24 | 25 | 25 | 25 | 25 | 24 |
| Men | Upper secondary | 17 | 17 | 16 | 21 | 21 | 21 | 21 | 21 | 25 | 25 | 25 | 24 | 24 | 26 | 26 | 26 | 25 | 25 | 24 | 24 | 24 | 24 | 23 |
| Men | Basic vocational | 15 | 15 | 14 | 17 | 17 | 18 | 18 | 17 | 19 | 20 | 19 | 19 | 19 | 20 | 21 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 19 |
| Men | Primary and lower secondary | 14 | 14 | 14 | 16 | 16 | 17 | 17 | 16 | 18 | 18 | 18 | 18 | 17 | 19 | 19 | 19 | 19 | 18 | 19 | 19 | 19 | 18 | 18 |
| Women | Tertiary | 17 | 16 | 16 | 22 | 21 | 21 | 21 | 22 | 27 | 28 | 27 | 27 | 27 | 29 | 29 | 29 | 29 | 28 | 30 | 30 | 30 | 30 | 29 |
| Women | Post-secondary / vocational secondary | 14 | 14 | 13 | 16 | 16 | 16 | 16 | 16 | 18 | 18 | 18 | 18 | 18 | 18 | 19 | 19 | 18 | 18 | 19 | 19 | 19 | 19 | 19 |
| Women | Upper secondary | 16 | 15 | 14 | 17 | 17 | 17 | 17 | 18 | 19 | 20 | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 18 | 18 | 19 | 18 | 18 | 18 |
| Women | Basic vocational | 12 | 12 | 12 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 14 | 14 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| Women | Primary and lower secondary | 12 | 12 | 12 | 13 | 13 | 14 | 14 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 12 | 12 | 13 | 12 | 12 | 12 |
| | | **45** | **46** | **47** | **48** | **49** | **50** | **51** | **52** | **53** | **54** | **55** | **56** | **57** | **58** | **59** | **60** | **61** | **62** | **63** | **64** | **65** | **66** | **67** |
| Men | Tertiary | 41 | 42 | 41 | 41 | 40 | 39 | 39 | 39 | 39 | 38 | 37 | 37 | 37 | 36 | 36 | 36 | 36 | 35 | 35 | 35 | 37 | 37 | 37 |
| Men | Post-secondary / vocational secondary | 24 | 24 | 24 | 24 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 24 | 24 | 24 | 24 | 24 | 22 | 22 | 22 |
| Men | Upper secondary | 22 | 22 | 22 | 22 | 21 | 21 | 21 | 21 | 21 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 19 | 20 | 20 | 20 |
| Men | Basic vocational | 19 | 19 | 19 | 19 | 18 | 18 | 18 | 18 | 18 | 17 | 17 | 17 | 17 | 17 | 17 | 15 | 15 | 15 | 15 | 15 | 11 | 11 | 11 |
| Men | Primary and lower secondary | 17 | 17 | 17 | 17 | 17 | 16 | 16 | 16 | 16 | 16 | 15 | 16 | 15 | 15 | 15 | 14 | 14 | 14 | 14 | 14 | 11 | 11 | 11 |
| Women | Tertiary | 30 | 31 | 31 | 31 | 30 | 30 | 31 | 30 | 30 | 30 | 31 | 31 | 31 | 30 | 30 | 31 | 32 | 31 | 31 | 31 | 32 | 32 | 32 |
| Women | Post-secondary / vocational secondary | 19 | 19 | 19 | 19 | 19 | 20 | 20 | 20 | 20 | 20 | 21 | 21 | 21 | 21 | 21 | 22 | 22 | 22 | 22 | 22 | 19 | 19 | 19 |
| Women | Upper secondary | 18 | 18 | 18 | 18 | 17 | 19 | 19 | 19 | 18 | 18 | 20 | 21 | 20 | 20 | 20 | 19 | 19 | 19 | 19 | 19 | 20 | 20 | 20 |
| Women | Basic vocational | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 12 | 12 | 12 | 12 | 12 | 12 | 11 | 11 | 11 |
| Women | Primary and lower secondary | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 10 | 10 | 10 |

Source: own elaboration.


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