

Labour market and old-age transfers: Measuring the cohort effects of the pension reforms in Poland using APC approach

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Abstract:

In this paper we use age-period-cohort decomposition (APC) to measure the potential impact of pension reforms in Poland on the sources of income and labour force participation and retirement of individuals. Since 2009 Poland introduced measures that aim at increasing retirement age and prolong working lives. The first reform was introduced in 2009 and left the access to early pensions only to very restricted occupations. The second reform was a gradual increase of the retirement age since 2013. In our analysis we used the Deaton's (1999) decomposition and Polish Labour Force survey, EU Survey on Income and Living Conditions and Social Security data which allow us to calculate labour force participation rates, pension reciprocity rates and labour income by single-age groups. The analysis suggests that the jumps in the labour force participation rates both for women and men were observed in the cohorts influenced by the reform of early pensions.

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1. Introduction

The reversal of the trend in labour force participation in Poland which in the recent years even counter balance the negative demographic trends is even at first glance connected with pension reforms introduced in the past. It was mainly due to the increasing labour force participation of persons in pre-retirement age. However it can be also the effect of many other variables like improving human capital of the younger generations or the effect of the change in the size and structure of labour demand more favourable for persons in preretirement age. Even under the assumption that the changes were due to the reforms the question remains what was the impact of each of the reforms.

The assessment of the impact of pension reforms can be investigated both from the labour market perspective, taking into account labour force participation and labour income of the population affected by the changes. We can also see the impact of reforms on the pension system: share of pensioners in the population by age as well as the level of pension income. The labour market and pension systems are two sides of the same coin. Thus, in order to have a full picture on how the recent reforms affected cohorts covered by the reforms we need to have these two perspectives.

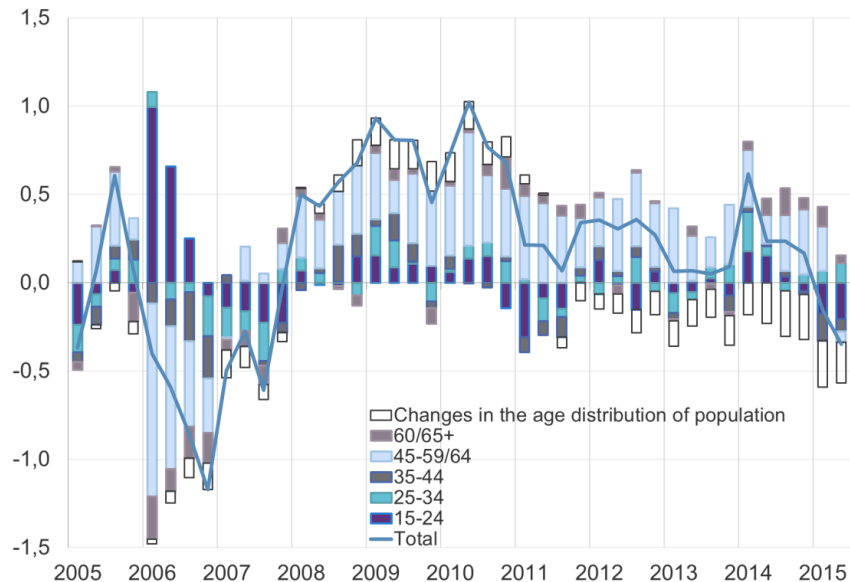
2. Pension system changes in Poland since late 1990s.

After the economic transition, Poland inherited an unsustainable pension system with widespread early retirement possibilities as well as relatively generous pension formula. At the same time, very sharp drop in fertility levels combined with rising life expectancy leads to the one of the fastest population ageing among the European populations.

The pension reform, introduced in 1999 aimed at facing the population ageing challenges and reinstating long-term sustainability of the pension system. This was achieved both by the rise in pensionable age through practical elimination of early retirement and thus, increase of the actual retirement age. Second, there were changes in the way of financing of pensions as well as pension calculation. The pension contribution was divided between two accounts: a non-financial one and financial one – with a choice of one of newly established open pension funds. Pensions are calculated based on the defined contribution (NDC plus FDC) formula. Pension rights accrued before 1999 were re-calculated to the notional initial capital (Chlon-Dominczak, Góra, & Rutkowski, 1999; Chlon-Dominczak, 2002). This reform aimed at both raising actual retirement age as well as gradual reduction of pension income relative to wages. Due to the existing *vacatio legis* the change of retirement age (significant reduction of early retirement) came in force since 2009 (Kula & Ruzik-Sierdzińska, 2011). The second reform was to increase the statutory retirement age. From 2013, this age was increased gradually by 4 months per year; it should have reached 67 for men in 2020 and for women in 2040 (Chłoń-Domińczak, 2016). These reforms had a potential impact on retirement behaviour of women born after 1954 and men born after 1948. Women born in 1953 could still retire at age 55, if they have worked for 30 years and longer. The new pension system covered men born after 1948, who could no longer use the extensive early retirement possibility at the age of 60.

Labour market and pension system indicators show that from 2008 we can observe growth of the labour force participation rate, also in the age group of people 45 and over (Figure 1).

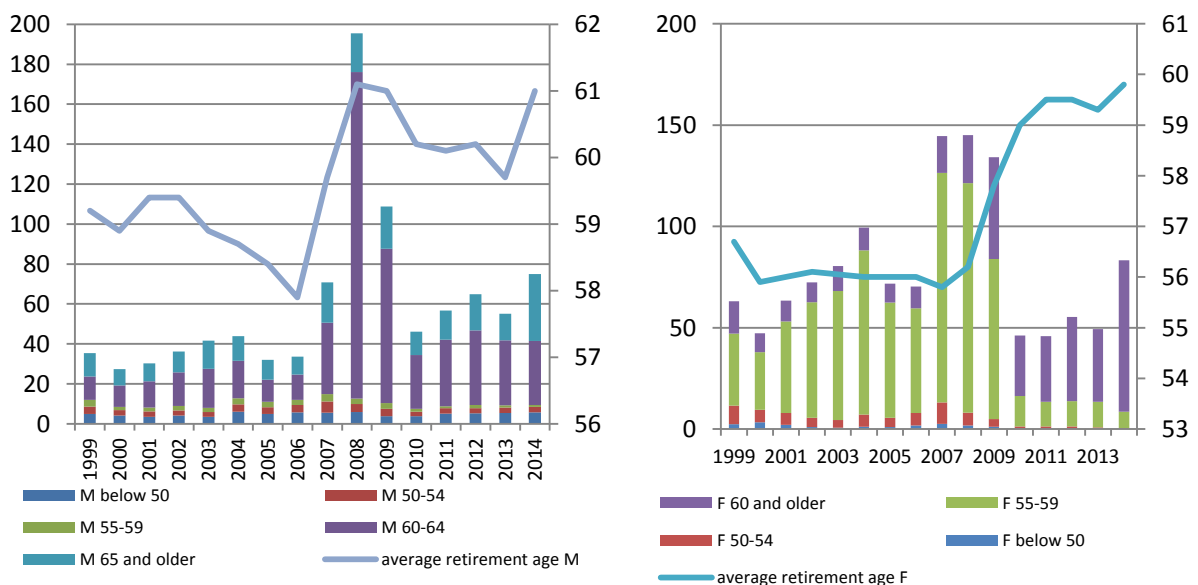
Figure 1. The decomposition of the sources of growth of labour force participation rate in Poland (by age groups)



Source: Labour Force Survey

At the same time, we see the change in the age structure of the new retirees in the general social insurance system as well as an increase of the average retirement age (Figure 2). In particular, the age structure of female retirement changed after 2009, with dominant share of retiring women in age group 60-64 (Figure 2).

Figure 2. The decomposition of the inflow to old-age pension system by sex and age groups and the average age of retirement



Source: Social Security Institution (ZUS)

Measuring the impact of the pension reforms has a crucial importance not only in explaining drivers of the labour supply but also in predicting the changes of the age profiles of net taxes in generational accounting as well as trends in social security expenditure. In this paper we propose age-period-cohort approach to the assessment of the cohort effects introduced by pension reforms from labour market and pension system perspective, also in other countries.

3. Data and method

In this paper we use the age-period-cohort (APC) model to investigate the change in retirement behaviour of men and women in Poland, using the data by age groups about the share of pensionaires, labour market status and household consumption and household income.

The APC models are widely used in population studies (Siegel & Swanson, 2007) but they are also popular in economics (Deaton, 1997). For the estimation we use constrained generalized linear models (CGLIM). Such models were first introduced by (Mason, Mason, Winsborough, & Poole, 1973). This method of estimation take the form of placing at least one additional identifying constraint on the parameter vector. This can be done by constraining two age, two period or two cohort effects to be equal. OLS can be used to calculate estimates for age, period, and cohort effects. With this additional constraint, the model becomes just-identified, the matrix $(X^T X)$ becomes non-singular, and the OLS estimates has one single solution. In our data, we assume two perio effects (for 2006 and 2007) being equal. For our calculations we have used method descibed in (Yang, Fu, and Land 2004) and applied in STATA software.

The most obvious effect of the change in the regulations regarding eligibility of early pensions is the change of the retiremet participation in the age groups before statutory retirement age. The data about the shares of pensionires is provided by Social Insurance Insurance Institution and cover the years 2000-2014.

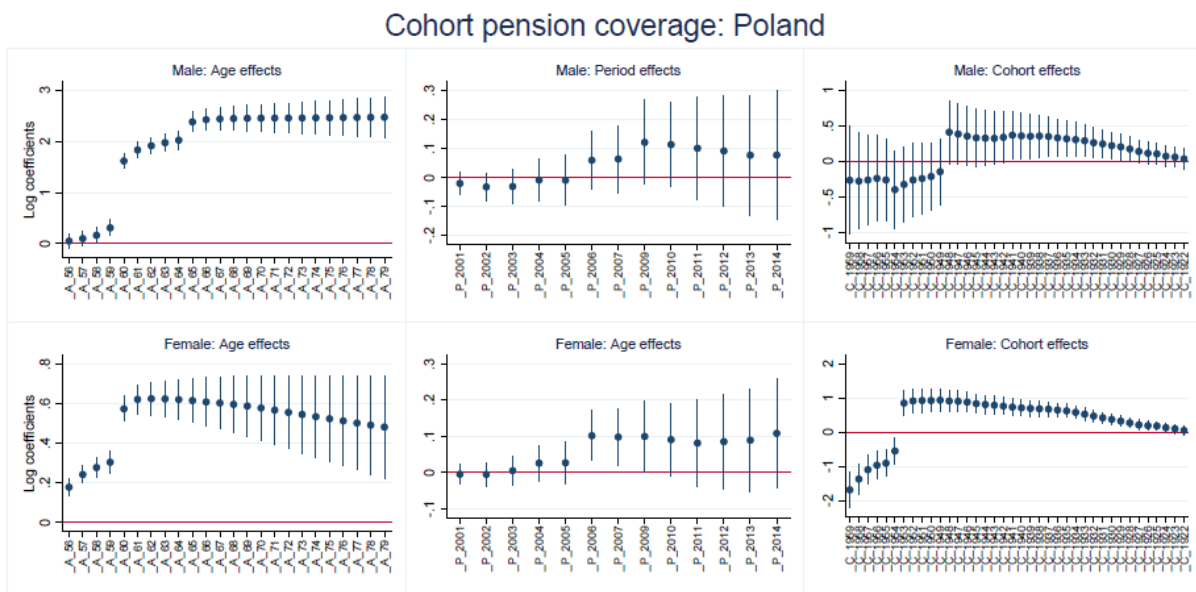
The possible reaction on these changes in eligibility of early pesnions were decisions about labour force paricipation and as a result increase in unemployment among elderly. These changes were described using the data from Polish Labour Force Survey (LFS) from the years 2000-2014.

Then, we apply the same approach to investigate changes in the labour income and pension income age profiles. These age profiles are estimated using the National Transfer Accounts approach (Lee & Mason, 2011; Population Division. Department of Economic and Social Affairs. United Nations, 2013). The data source for the age profiles estimation was the Polish data on the EU Survey on Income and Living Conditions (EU-SILC) between 2005 and 2013. All estimates are made using single year age groups and separate data for men and women.

4. Results (draft)

The results of the application of the APC decomposition (Yang, Fu, and Land 2004) show both age and cohort effects (Figure 3) are significant. In the case of men, there are two ages at which we see changes in coefficient values: for age 60 and 65, which correspond to the legal limits of early retirement age at 60 and “normal” legal retirement age of 65. We also see a strong cohort effect with a drop of regression coefficients, starting from cohort 1949 through all younger cohorts. This indicates that retirement age changes related to the pension reform had an impact on the shift in retirement behaviour of cohorts covered by the new pension system. Similar effects are also observed for women. The increase in the value of regression coefficient at the age of 60 indicates that this is the age when inflow for women to retirement age increases, which is in line with the pensionable age legislation in Poland. There are also strong cohort effects, as the regression coefficient drops for cohorts 1954 and younger, which confirms the impact of the pension reform.

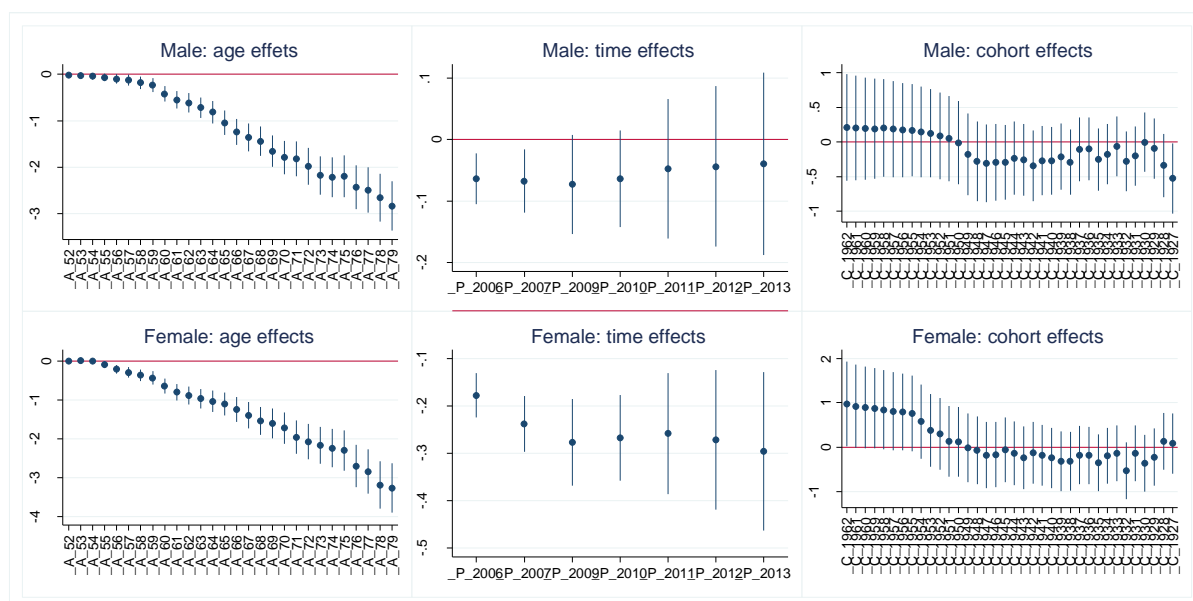
Figure 3. The results of the decomposition of the changes in the retirement participation rates into period, age and cohort effects.



Source: Authors' analysis based on the Polish Social Insurance Institution data

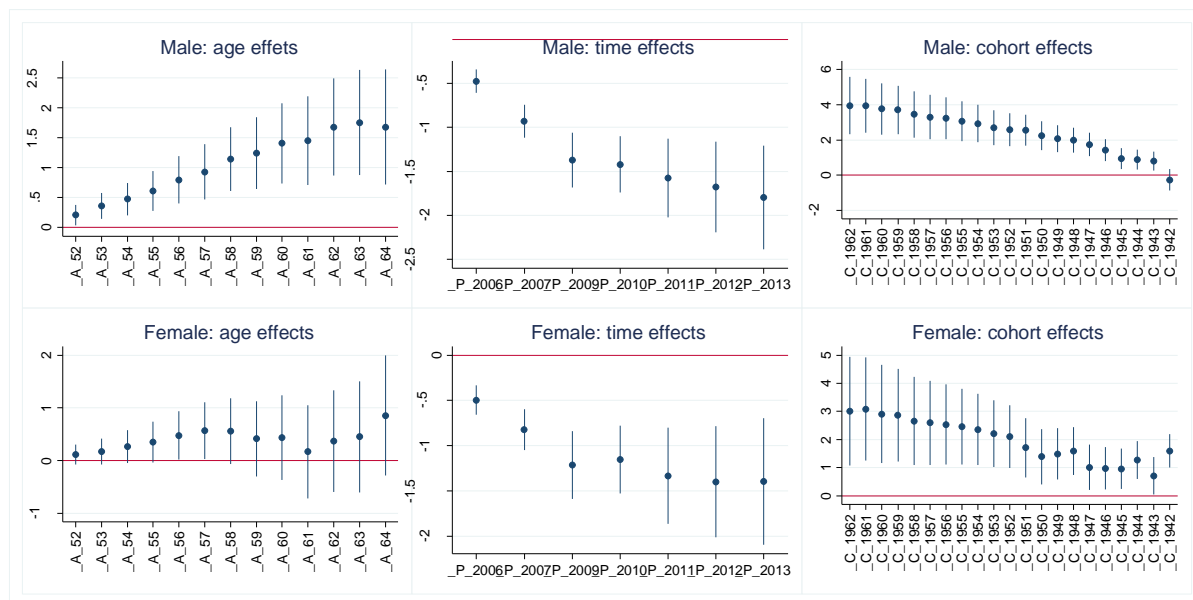
The same method of decomposition was applied to labour force participation rates and unemployment rates from Polish LFS. Labour force participation rates before retirement decline monotonically with age which is reflected by the age effects. The time effects suggest that the changes in LFPRs were on average rather loosely connected with business cycle reflected by time effects. The main source of the growth of the LFPRs during that time were cohort effects. The positive changes in labour force participation refer to the cohorts covered by the reform but the changes seem to be steeper than retirement participation (Figure 3) and are observed also for men and women in similar age.

Figure 4. The results of the decomposition of the changes in the labour force participation rates into period, age and cohort effects.



Source: Authors' analysis based on the Polish LFS data

Figure 5. The results of the decomposition of the changes in the unemployment rates into period, age and cohort effects.



Note: the decomposition of unemployment rates was calculated only for persons aged 65 and less. *Source: Authors' analysis based on the Polish LFS data*

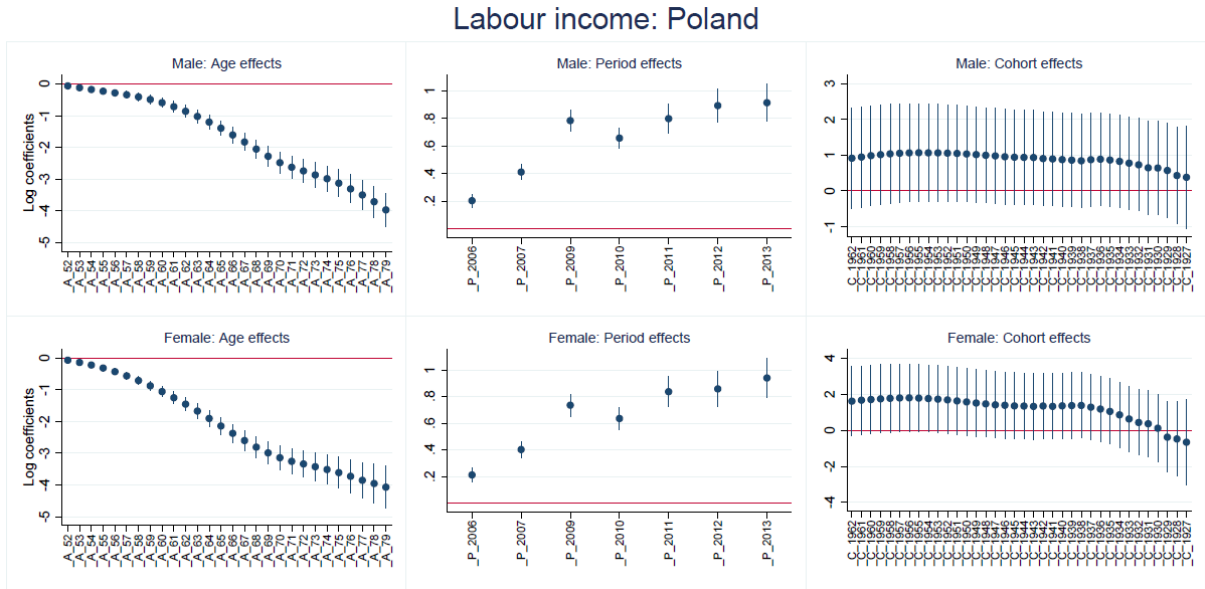
The increase in the labour force participation rates forced by the changing regulations is often connected with the increase in unemployment rate (Figure 5). If this is true in case of the reform introduced in Poland we should have observed significant increase in unemployment rates observed in cohorts covered by the reform. Observations for the period 2005-2013

suggest that the cohort specific increase in unemployment rate for younger cohorts was really observed but not only for cohorts covered by the reform. What is also important it was counterbalanced by the time trend that reflected in general decreasing trend in unemployment in the whole economy.

The decomposition of the age profile of the labour force participation of women is supplemented by the decomposition of the age profiles of labour income and pension income of men and women in ages from 50 to 80, in years 2005-2013 (Figures 6 and 7). The age profiles of labour income and pension income were estimated following the National Transfer Account decomposition (Lee & Mason, 2011). The decomposition of incomes allows assessing, whether the estimated effects in the participation levels in the labour market and pension systems correspond to the changes in the selected sources of income.

The decomposition of changes in the labour income shows the declining effects by age, which means that with age the labour income declines, as a result of gradual withdrawal of the cohort representatives from the labour market. There are no visible cohort effects that can be identified here and estimation errors are quite wide. The results show that the age and period effects are more significant than the cohort effects. The potential interpretation of this result is that people were continuing gaining labour income of some kind even after they claim their old-age pensions.

Figure 6. The results of the decomposition of the changes in the labour income into period, age and cohort effects



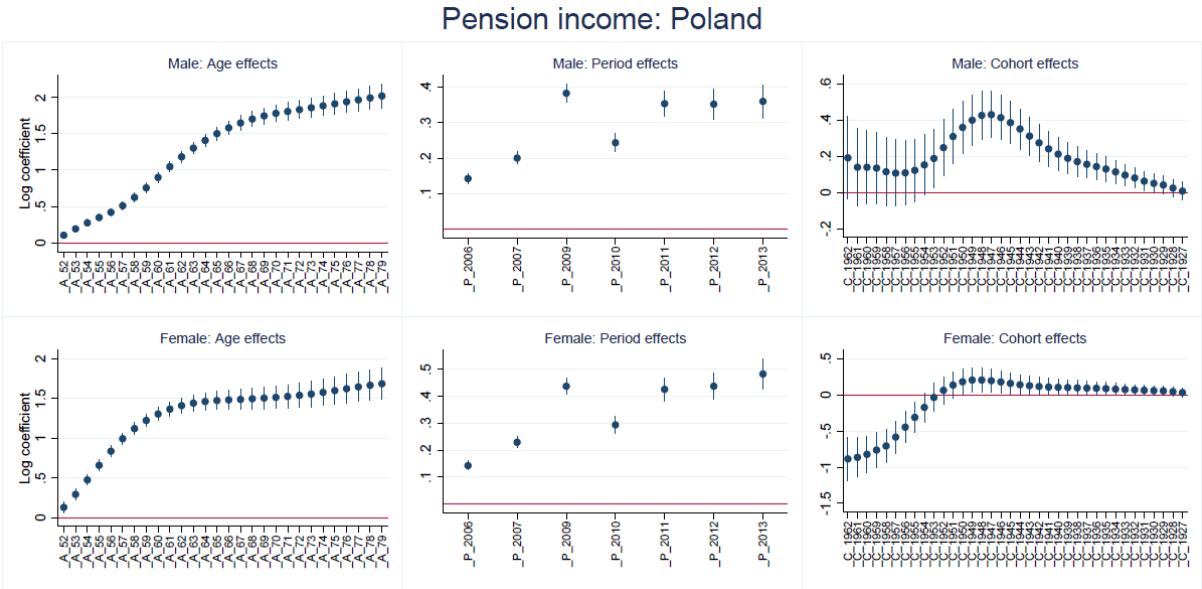
Note: labour income is standardised by the average per capita labour income of people in age group 30-49 years.

Source: Authors' analysis based on the NTA methodology and EU-SILC data, 2005-2013

In the final step we will apply similar decomposition to the assessment of per-capita transfers in pension system, Also age profiles of per capita pension transfers from years 2005-2013

indicate there is a shift in the age profile of transfers for men in the age range 60-64 as well as for women in the age range 55-59 (Figure 6). The pension income decomposition on age, period and cohort effects shows rising age effects for both men and women. The rise is steeper between ages 50 and 60-65, which is due to the rising share of cohort receiving old-age pensions and thus, higher per-capita level of pension income. The further (albeit slower) rise of age effects coefficients can be attributed to institutional solutions (people above 75 years of age get additional care allowance to their pension). Additionally, we can assume that those with higher pensions (i.e. more educated with higher income from wages before retirement) live longer and thus, per-capita pension income increases. The cohort effects of pension income show similar pattern as participation rates. We see decline in indicators for men born in 1949 and later as well as decline for women born in 1954 and later.

Figure 7. The results of the decomposition of the changes in the pension income into period, age and cohort effects



Note: labour income is standardised by the average per capita labour income of people in age group 30-49 years.

Source: Authors' analysis based on the NTA methodology and EU-SILC data, 2005-2013

5. Conclusions

Initial assessment shows that the change clearly influenced the age structure of pension participation. The already observed regularities suggest also that there was an influence of the early pension reform on the labour force participation and to some extent on unemployment rate of elderly. Luckily this influence was counterbalanced by the improving labour market conditions. We also see cohort effects in the case of pension income, while age and period effects are more significant for the labour income.

Our results indicate that the pension reforms in Poland has double impact on the situation of individuals. The change in the effective retirement age due to the cancellation of early pensions led to the higher labour force participation, with visible cohort effects for those cohorts, which are covered by the pension reform and raised pensionable ages. Matching effects are also identified in the case of participation in the retirement system.

In the case of income, we identified cohort effects for the pension income, which also indicates that pension reform outcomes are related not only to the retirement behaviour, but also changes in the level of pensions, resulting from the change in pension formula.

Summarising, evidence from survey data: Labour Force Survey and EU-SILC as well as administrative data from social security indicates that cohorts covered by the reforms of the pension system in Poland, both in the level of labour market and pension system participation as well as relevant income, which confirms that the planned outcomes of the reforms were achieved.

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