THE IMPACT OF CHANGES IN PENSION SCHEME
AFTER 2008 ON GENERAL GOVERNMENT SECTOR’S
DEBT

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Abstract
Changes in the rules governing the Polish pension system, introduced in the last
few years, aimed, on the one hand, at reducing the general government sector’s
expenditure on account of social security benefits. On the other hand, these
changes were to increase the sector’s revenues from social contributions. Both
social security benefits and social contributions mainly concern social security
funds (subsector of the general government sector). The aim of this study is to
evaluate the effects of individual legal acts concerning pension system in Poland
acts introduced on 25.03.2011, 11.05.2012, 6.12.2013). This evaluation is
performed using a deterministic model consisting of a sequence of identity
equations for each institutional sector, preceded by an input-output model. The
sequence of equations takes into account all transactions included in non-
financial national accounts, starting with the production account and ending with
capital account. The model is supplemented by a pension sub-model, taking into
consideration demographic structure changes, propensity to retire, replacement
rate at retirement. The results of the simulation analyses show the isolated effects
of changes in the pension system that are reflected mainly in the secondary
distribution of income account and in the balancing item of non-financial
accounts, i.e. the net lending/net borrowing of individual institutional sectors,
paying particular attention to the deficit and debt of the general government.
Keywords: government deficit, national accounts, pension system.
JEL codes: E17, H55, H68.

1. Introduction
One of the principal roles of the general government is to manage and organize
the process of income redistribution which means mainly the settlement or
approval of the contributions and social benefits (European system ... 2013,
pp. 44-45). These transactions are bilateral flows between households, social
security funds (as a part of general government sector), financial institutions
(subsector of pension funds) and to a small extent also the rest of the world. Since
the time when each new working generation is more than the previous has stopped,
the financing of pension expenditures only from current contributions ceases to
be possible. Ensuring the financial balance of social security funds requires some
kinds of pension system adjustments (Goła 2013, 2014; Holzmann 2013).
Changes in the rules governing the Polish pension system, introduced in the last few years (since 2008), aimed, on the one hand, at reducing the general government sector’s expenditure on account of social security benefits. On the other hand, these changes were to increase this sector’s revenues from social contributions simultaneously limiting the role of financial institutions (private part of the pension system). General extension of the relationships between national economy and the rest of the world also concerns pension transactions mainly due to the transboundary flows of labor force.

The paper aims at the evaluation of the effects of pension system adjustments, which were: restriction on early retirement since 2009, two-stage decrease in the share of social contributions transferred to financial institutions since 2011, gradual increase in the retirement age in 2013-2016. Effects of all changes in pension scheme are evaluated using a deterministic model consisting of a sequence of identity equations for all transactions distinguished in the system of national accounts. The model consists of identity sequences for each institutional sector (non-financial corporations, financial corporations, general government, households, non-profit institutions, rest of the world). The general idea of deterministic macro models construction was taken from multisectoral models made by Inforum Group – Interindustry Forecasting at the University of Maryland (Almon 2011).

Identity centered model based on non-financial national accounts by institutional sectors is supplemented by a pension sub-model, taking into consideration demographic structure changes, propensity to retire, replacement rate at retirement (Trębska 2015). It provides linkages between process of income circulation, the labor market and demographic structure.

The paper is organized as follows. The paragraph following the introduction presents the idea of a multi-equation deterministic model based on the sequence of non-financial national accounts. In accordance with the basic aim of the paper, the attention is focused on the sequence of equations for the general government sector and on the pension sub-model. The next paragraph contains a historical analysis of selected coefficients of the model with a comparison of some indicators describing the pension system in Poland and selected EU countries. Statistical analyses are based on data from Eurostat Database: Annual sector accounts ESA 2010 (non-financial transactions) and Population and social conditions (pensions beneficiaries) as well as on more detailed data about pensions in Poland published by Polish Central Statistical Office. In the subsequent part, which is the realization of the main goal of the paper, the estimations of the changes in the government sector deficit caused by the legal acts concerning pension system in Poland after 2008 are presented. The conclusions are contained in a brief summary.
2. Pension transactions in the sequence of equations for general government

The sequence of national accounts starts from an input-output table, which shows accounts of products and income generation for the entire economy. On the basis of this part of national accounts, the output and value added are determined by final demand. Value added for total economy is decomposed into compensation of employees, other taxes less subsidies on production and operating surplus. The first component is the sum of the costs incurred by employers from each institutional sector, which are primary income of households. Other taxes on production are general government’s primary income and operating surplus is an income of all institutional sectors. The following symbols are used for institutional sectors: \((G)\) for general government, \((H)\) for households, \((C)\) for non-financial corporations, \((F)\) for financial corporations, \((NP)\) for non-profit institutions and \((RW)\) for the rest of the world.

Thus, the balance of primary income of general government \((primI(G))\) is the sum of other taxes less other subsidies on production \(otax(G)\), taxes less subsidies on products \(indtax(G)\), operating surplus \(ops(G)\) and balance of property income \(propI(G)\):

\[
primI(G) = otax*\text{vadd} + indtax*\text{ce} + inv + exp + ops(G) + propI(G)
\]  
(1)

where: \(otax\) is the share of other taxes in value added, \(indtax\) is average indirect tax rate, \(ce\) is final consumption, \(inv\) is accumulation, \(exp\) is exports of goods and services.

Subsequent equations for general government refer to the transactions recorded on secondary distribution of income account which determine gross disposable income \((dispI(G))\) as the sum of primary incomes \((primI(G))\) and net of current transfers \((Itax – current\ taxes\ on\ income,\ wealth,\ etc.,\ socc – net\ social\ contributions,\ socb – social\ benefits\ other\ than\ social\ transfers\ in\ kind,\ ocurr – other\ current\ transfers)\):

\[
dispI(G) = primI(G) + Itax(G) + socc(G) - socb(G) - Itaxp(G) + ocurr(G)
\]  
(2)

Current taxes on income, wealth, etc. that are obtained by general government \((Itax(G))\) are the sum of taxes paid by all institutional sectors (symbols of variables with the letter \(p\)) minus taxes obtained by the rest of the world \((Itaxp(RW))\):

\[
Itax(G) = Itaxp(H) + Itaxp(G) + Itaxp(C) + Itaxp(F) + Itaxp(NP) + Itaxp(RW) - Itaxp(RW)
\]  
(3)

Social contributions that are government’s revenues \((socc(G))\), in turn, are the sum of contributions paid by households and the rest of the world (non-residents employed in the country) minus contributions transferred to financial institutions and the rest of the world:

\[
socc(G) = socc(H) + soccp(RW) - socc(F) - socc(RW)
\]  
(4)

It is assumed in the model that the values of income taxes and social contributions depend on primary income of the sectors which are payers of these transfers. Moreover, the values of these transfers are determined in the model assuming that the rates of fiscal burdens are known for each institutional sector.
The ratio between the amount of social contributions constituting the revenue of general government and total social contributions is analyzed as the following coefficient:

\[ socc(G)r = \frac{socc(G)}{socc(H) + soccp(RW)} \]  

(5)

On the expenditure side of the secondary distribution of income account of general government the major transactions are social benefits. The amount of these transfers is determined on the basis of the pension sub-model, in which the retirements payments, disability pensions and survivors' benefits are distinguished separately, depending on the number of beneficiaries (based on forecasts of demographic structure changes) and average amounts of individual types of benefits (cf. Trębska 2015):

\[ socb = a_1 \cdot (old \cdot pret_o + prod \cdot pret_p) + a_2 \cdot pen_d + a_3 \cdot pen_s + othb \]  

(6)

where: old - elderly population, pret_o - propensity to retire, prod - working age population, pret_p - propensity/possibility to early retire, pen_d - number of disability pensioners, pen_s - the number of survivors' beneficiaries, a_1, a_2, a_3 - respectively average level of retirement payments, disability pensions and survivors' pensions, othb - other social benefits. The number of retirees (the largest group among pensioners) depends on retirement age, individual propensity to retire and options for early retirement allowed in the pension system. All of these three factors are taken into consideration in the empirical part of the paper. The changes of the rules of the pension system functioning after 2008, mentioned in the introduction, concern, among others, the number of elderly population and the possibility of early retirement. Since the analysis focuses on general government’s expenditures, it is important to determine what part of social benefits is paid by this sector (to a small extent these benefits are also paid by financial and non-financial corporation and the rest of the world):

\[ socb(G)r = socb(G) / socb \]  

(7)

On the expenditure side of the use of disposable income account is consumption, whereas the balancing item is gross saving (sav(G)), determined residually in this model as a difference between disposable income \( displ(G) \) and consumption \( ce(G) \). Subsequently, gross saving opens the revenue side on capital account, which together with the net of capital transfers \( cap \) and net borrowing \( bor \) constitutes sources of the accumulation \( inv \) financing. The balancing item of the capital account of general government is net borrowing (the excess of total expenditures over revenues):

\[ bor(G) = sav(G) - inv(G) + cap(G) = displ(G) - ce(G) - inv(G) + cap(G) \]  

(8)

Including financial accounts to the analysis, net borrowing is simultaneously the excess of net incurrence of liabilities over net acquisition of financial assets.

3. Changes of the selected indicators of the pension system in Poland and in chosen European countries

Changes in the functioning of the pension system in Poland are analyzed on the basis of selected coefficients of deterministic model describing revenues and
expenses of the general government sector (cf. formulas (5), (6), (7)). In the period 2000-2016 (cf. Fig. 1), about 98% of social benefits were paid by general government (subsector of social security funds) with a slight downward trend (in 2002-2003 the $socb(G)r$ ratio was equal to 98.5%, and in the years 2014-2016 – 97.7%). This was accompanied by a small increase in the share of the rest of the world sector (from 0.1% to 0.4%), non-financial corporations (from 1.4% to 1.5%) and financial corporations (from 0.1% to 0.3%) in the payment of social benefits.

In turn, the changes in the $socc(G)r$ ratio, illustrating the share of social contributions paid to the general government in the total amount of contributions, clearly indicate the growing scope of the capital part of the Polish pension system until 2010. In 2000, 89% of contributions were paid to general government, whereas in 2010 only 82.3%. At the same time the share of contributions paid to financial corporations (subsector of social security funds) increased from 9% to 15%. The increase in $socc(G)r$ in 2011 to 86.2% resulted from a reduction in the contribution rate transferred to open pension funds (OFE) from 7.3% to 2.3%.

The next step to limit the share of financial corporations was the possibility of complete abandonment of saving in OFE. As a result of these changes, the share of contributions paid to the general government in 2016 amounted to 93.4% (the share of contributions paid to financial corporations was only 3.9%). By comparing the amounts of social contributions paid to general government ($socc(G)$) and social benefits paid by this sector ($socb(G)$), the efficiency of the public pension system (which systematically decreased in the 1990s) is assessed. The value of this relationship above 1 means the need to finance the payment of benefits from other sources than current transfers of contributions – e.g. from taxes or by incurrence of liabilities.

**Fig. 1.** Social contributions and social benefits – indicators for general government in Poland

The comparison of the ratios $socc(G)jr$ and $soch(G)jr$ in the selected EU countries (see Fig. 2) shows that the government sector in Poland is relatively heavily involved in the pension system, both in the collection of contributions (the EU28 average in 2016 was 0.78, only in Finland and Lithuania $socc(G)jr$ ratios were higher than in Poland) as well as the payment of benefits (the EU28 average was 0.87, only in Greece, Bulgaria and Romania $soch(G)jr$ ratios were higher than in Poland). In all analyzed countries, the government sector has a greater share in the payment of social benefits than in the collection of social contributions ($socc(G)jr < soch(G)jr$). The share of the government sector is particularly small in Sweden, Denmark and the UK. In Denmark and Sweden, the main sources of benefits financing are other transfers to government than contributions. In turn, in the UK, financial corporations account for a relatively large share in the payment of benefits (over 20%).

![Social contributions and social benefits - indicators for general government in selected EU countries in 2015](image)

**Fig. 2.** Social contributions and social benefits – indicators for general government in selected EU countries in 2015

Changes in the number of the pension beneficiaries were caused by demographic changes – the growing number of elderly population and declining since 2011 number of working age population (Fig. 3). The number of retirees in relation to the number of elderly population grew up till 2009, exceeding even 100%, which resulted from a relatively large number of people using the option of early retirement (against the announcement of its limitation). In the period 2010-2016, this percentage decreased significantly because of two reasons. One of them was the limited early retirement after 2008 and the second reason was systematic increase in the retirement age started in 2013 (in 2017 it was returned to its previous level). However, the greatest impact on the drop in the number of
beneficiaries was the restrictions regarding the award of disability pensions (the number of pensioners decreased from 3 million in 2000 to 1.2 million in 2016).

![Graph showing pension beneficiaries and demographic structure changes in Poland](image)

**Fig. 3.** Pension beneficiaries and demographic structure changes in Poland

Poland is one of the few European countries where the number of beneficiaries as the share of total population decreased in recent years (see Fig. 4).

![Bar chart showing social contributions and social benefits](image)

**Fig. 4.** Social contributions and social benefits – indicators for general government in the selected EU countries
*data for the years 2007 and 2012 (data for pension beneficiaries in 2015 is not available)
All of the above mentioned changes in the rules governing the Polish pension system had a positive impact on public finances—they contributed to the reduction of general government net borrowing. The estimated effects of particular changes are presented in the next section of the paper.

4. General government deficit declines caused by the changes in pension scheme after 2008

An attempt to estimate the isolated effects of individual legal acts introducing changes to the Polish pension system consists in carrying out a series of counterfactual simulations. The tool of these simulations is a deterministic model based on the sequence of national accounts by institutional sectors combined with the pension sub-model. The results of these simulations determine the hypothetical general government’s deficit in the following years if the given legal act were not introduced. Four simulations were carried out, in which the following counterfactual assumptions were adopted.

1) Restrictions on the possibility of early retirement for women aged 55 and men aged 60 (after meeting certain requirements) were not introduced in 2009. This assumption means that the total number of retirees in subsequent years is estimated basing on the share of early retirees in the working age population observed in 2008 (based on disaggregated data on the number of beneficiaries by types of pension benefits available on Eurostat database). This share is reflected in the pension sub-model by the coefficient \( \text{pret}_e \) (see formula (6)).

2) Dimension of social contributions transferred to the financial institution was not changed in 2011. The share of the contribution transferred to the general government (\( \text{socc}(G)r \) ratio) in subsequent years remains at the level from 2010.

3) The process of systematic raise of the retirement age did not start in 2013. The share of retirees in the elderly population (coefficient \( \text{pret}_s \)) in subsequent years remains at the level from 2012.

4) The possibility of the total resignation from open pension funds was not introduced in 2014. The share of the contribution transferred to the government (\( \text{socc}(G)r \)) remains at the level from 2013.

The results of counterfactual simulations of general government deficit described above, compared with actual levels of deficit, are shown on Fig. 5, whereas the estimations of isolated effects of above mentioned four pension system adjustments are presented in Table 1.
Fig. 5. Net lending of general government (% of GDP) – actual data and simulated values
Source: elaborations based on own calculations and Eurostat Database; Annual sector accounts (update: 07.02.2018).

Table 1. Changes in general government’s deficit resulted from the Polish pension system adjustments

<table>
<thead>
<tr>
<th>No.</th>
<th>Adjustment</th>
<th>Percentage decline of actual deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>sym1</td>
<td>Restrictions on the possibility of early retirement after 2008</td>
<td>0.7 1.2 2.4 4.0 5.6 6.3 8.3 8.7</td>
</tr>
<tr>
<td>sym2</td>
<td>Decrease in the dimension of social contributions paid to the financial institution after 2010</td>
<td>12.0 18.2 18.5 20.7 27.8 29.9</td>
</tr>
<tr>
<td>sym3</td>
<td>Systematic raise of the retirement age in the period 2013-2016</td>
<td>6.8 16.5 28.8 36.8</td>
</tr>
<tr>
<td>sym4</td>
<td>Possibility of the total resignation from open pension funds since 2014</td>
<td>11.8 31.4 31.6</td>
</tr>
</tbody>
</table>

Source: elaborations based on own calculations.

The results of simulation analyses indicate which of the four studied changes in the pension system caused the greatest declines in the general government deficit (in the national accounts deficit is recorded as a negative value). The comparison of actual values of the deficit and the simulated ones shows that the limitation of early retirement had a relatively low impact on the reduction of government debt (declines did not exceed 0.23% of GDP). Growing percentage decline of actual
deficit due to the limitation of early retirement resulted rather from decreasing
deficit than from the growing benefits of this adjustment.
The second of the analyzed changes in the pension system, which was the
reduction in the amount of contributions transferred to financial institutions,
caused the biggest effects until 2014. Due to the increase in the share of social
contributions paid to general government, disposable income of this sector
significantly increased. This change reduced the deficit by 12% (0.6% of GDP)
already in the first year after its introduction. In turn, the next legal act which
increased the share of social contributions paid to general government in 2014 due
to the fact that only about 14% of payers decided to continue saving in open
pension funds, reduced the deficit by 11.8% (0.4% of GDP) in 2014, and by about
31.5% (0.8% of GDP) in 2015 and 2016.
The effects of the gradual increase of the retirement age were increasing each year.
If the retirement age had not been raised, the number of pensioners in 2016 would
have been about 729,000 higher (assuming a propensity to retire at the level of
2012), which would have required higher government spending in the form
of social benefits by about 16.9 million PLN. The raise of the retirement age
caused a reduction in the government deficit by 36.8% (0.9% of GDP) in 2016.

5. Conclusion
The financial balance of social security funds and the entire government sector is
becoming threatened due to the unfavorably changing demographic structure of
the Polish society (as well as that of most European countries). Changes in
the demographic structure are difficult to retain, therefore the government
institutions’ actions focus on such changes in the pension system which would
reduce expenses and increase revenues related to pension transactions. Means of
expenses reduction were systematical declines in the number of people entitled to
benefits (limiting the possibility of early retirement after 2008, increasing the
retirement age in 2013-2016, tightening the rules for granting disability pensions)
and changes in the rules of retirement payment calculation. In turn, a way to
increase revenues of general government was a two-stage reduction in the role of
open pension funds (included in the sector of financial corporations).
The estimation of the effects of the introduction of four pension system
adjustments (see Table 1) shows that the general government’s deficit decreased
in analyzed period due to the increasing scale of benefits resulting from the
introduced statutory changes. However, due to the fact that contributions
transferred to social security funds as a subsector of general government are not
recorded in the sequence of national accounts as liabilities to households, they
constitute the hidden debt of this sector (Liberda 2006).
The decrease in the deficit in 2016 resulted to the greatest extent from the increase
of the retirement age. In the following years an increase in pension expenditure is
expected due to a return to the previous retirement age (60 for women and 65
for men). However, the scale of pension expenditure increase will depend on the
extent to which the elderly population growth rate will be compensated by
the decrease in the propensity to retire and the decline in the replacement rate at
retirement. The decrease in the propensity to retire immediately after reaching the retirement age as a consequence of individual retirement decisions (Góra 2008) may result from financial reasons, i.e. from the predicted decrease in the replacement rate at retirement resulting from the new rules for calculating pensions, less favorable for pensioners. At the same time, the forecasts of a drop in the replacement rate from the public pension system (c.f. The 2015 Ageing Report, 2015) should be a stimulus to increase the propensity to voluntarily save for retirement.

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References


