

# **Institutional uncertainty and retirement decisions in Poland <sup>1</sup>**

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## **Abstract**

The paper analyzes the factors influencing situation and retirement decisions of different cohorts in Poland in years 1995-2007. We checked if changes in economic activity at the later stage of professional life can be observed via changes in the social security legislation and their consequences for different cohorts.

Separate pseudo-panel models were estimated for men and women based on the annual Household Budget Survey datasets. The results show that apart from variables usually identified in the literature that have a significant impact on retirement decisions, institutional changes are also significant in case of Poland. Especially regulations concerning access to pre-retirement allowances and benefits turned out to be significant, as well as changes in possibility to combine work and receiving pension.

JEL Classification: J26

Keywords: retirement, labour supply, pseudo-panels

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## I. INTRODUCTION

Since 1989 – beginning of the transformation to a free market economy – retirement rules in Poland have changed many times. Those changes concerned many almost all aspects of the retirement system from benefit formula (e.g. the length of the period from which earnings were taken for calculating the benefit), through changes of benefit indexation, to the fundamental pension system reform introduced in 1999<sup>4</sup>. Reforms in Poland continue and the current cohorts of employees are still subject to considerable levels of uncertainty as to how high their pensions will be and what rules will be applied to compute them. One of the problems is that there are no final decisions on the rules for paying out the benefits from the capital saved in the funded part of the system. Uncertainty concerning the rules governing the pensions system combined with unfavourable economic situation led many people to take the option of retiring before reaching the official retirement age as soon as such an opportunity becomes available. According to SHARE survey<sup>5</sup> almost 90% of Poles declares attaining the eligibility for old-age pension as the reason of their retirement.

This paper focuses on the retirement behaviour and factors influencing retirement decision in Poland in years 1995-2007. The main aim was to check what factors and to what extent influenced retirement decisions, with a special focus on the institutional changes. We have considered five elements of the social security: introduction and subsequent withdrawal of the pre-retirement allowance (pl. *zasilek przedemerytalny*), introduction and changes in the pre-retirement benefit (pl. *świadczenie przedemerytalne*), nominal retirement ages (55, 60, 65), extension of the availability of the early retirement benefits and the rule allowing retirees to work without any reduction of benefits after reaching the nominal retirement age. The analysis of these mechanisms and their changes, combined with other factors, which can influence the retirement decisions, could provide an empirical support in the discussions concerning labour market and pensions reforms in Poland.

The paper is based on a pseudo-panel dataset, i.e. it is a cohort analysis. The institutional rules we study differ among cohorts, since, first of all, in Poland there are different retirement ages for women and men (60 and 65 respectively, with 55 as early retirement age for women before 2009) and different minimum insurance periods (20 and 25 years, in some cases longer periods necessary to obtain early retirement). Second, some of the rules were affecting only particular cohorts, like pre-retirement allowance, which was available only in period 1997 – 2001 for men born between 1933-1953 and women born between 1938-1958. Because of these two reasons there are differences between cohorts, both in the timing of the retirement and in the labour supply decision (see Figure 1).

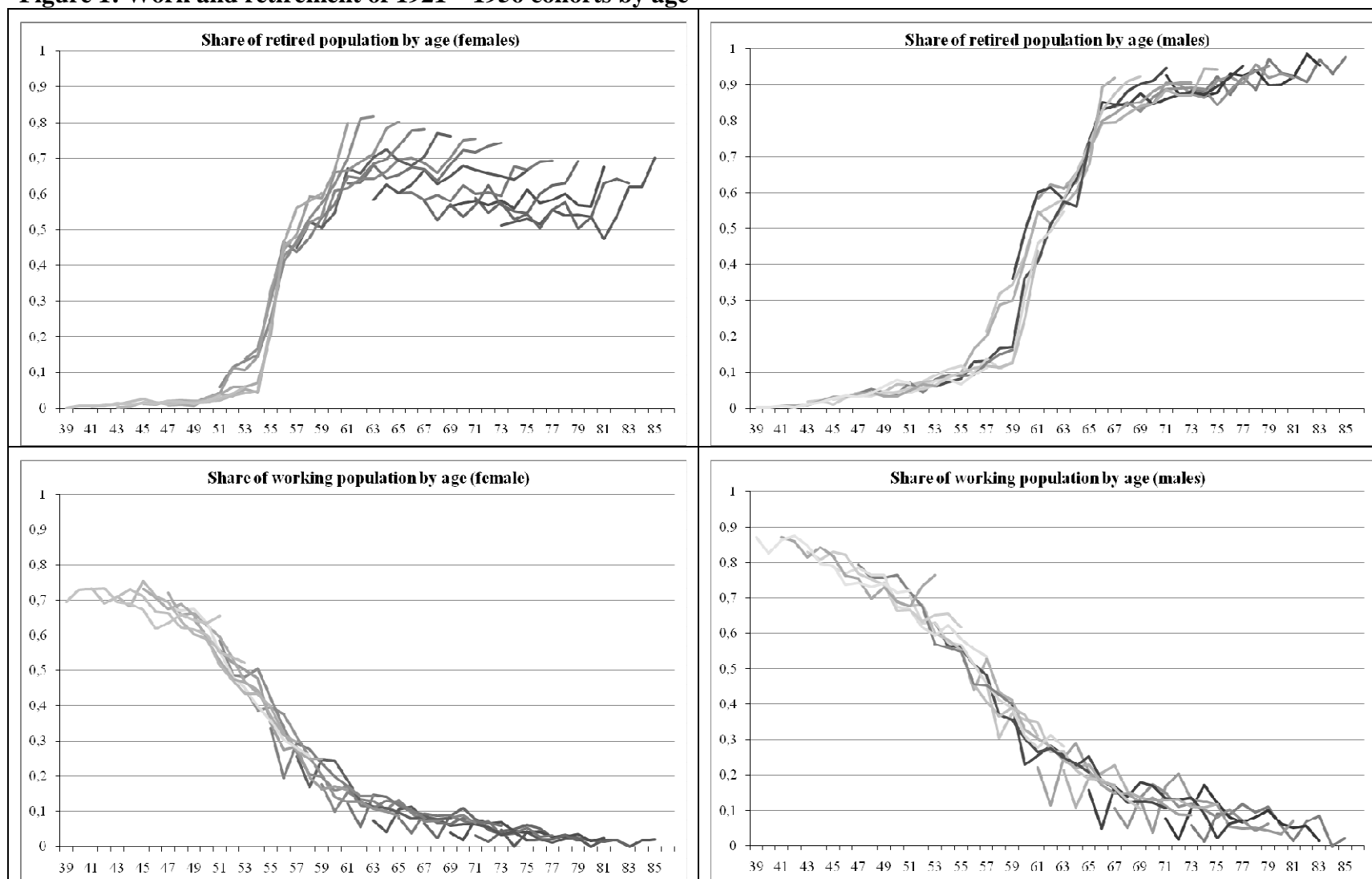
The paper is structured as follows: in the next section we present a brief survey of literature on pensions and retirement decisions and a description of institutional changes in the Polish pension system. Section 3 discusses data and methodology, explaining the choice of pseudo-panel analysis. Section 4 presents the estimation results and their interpretation. Finally, section 5 concludes.

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<sup>4</sup> The 1999 reform introduced the new system based on defined contributions and notional and funded individual retirement accounts, instead of the traditional pay-as-you-go defined benefit system. However, first few individuals covered by the new system retired just in 2009. Thus, we are not able to analyze the impact of this reform on retirement decisions.

<sup>5</sup> Survey of Health, Ageing and Retirement in Europe covers countries from different regions. Poland first participated in the second wave of data collection in 2006-07, see: [www.share-project.org](http://www.share-project.org)

**Figure 1: Work and retirement of 1921 – 1956 cohorts by age**



Source: own calculations based on data from Polish Social Insurance Institution. Cohorts' age on the horizontal axes.

## II. LITERATURE REVIEW

Aging population and pressure it creates on social security systems, and more generally on public finance, made aging related research very popular in recent decades<sup>6</sup>. The issue has been present also in policy analyses for over a decade (see: World Bank 1994; OECD 2000). The literature focuses on two interconnected questions: how to make pension systems more efficient, that is less burdensome for public finance, and what makes people retire.

As far as the answer to the first question is concerned, so far the economists have not been able to find the optimal pension system. However, there is a general consensus that more risk should be shifted from insurers on individuals by introduction of the stronger link between contributions and benefits, and the generosity of the obligatory part of the pension system should be reduced (European Commission, 2010).

The second stream of literature focuses on the labour supply at older ages or on retirement decisions. Empirical analyses enable division of factors influencing probability of leaving the labour force at older ages into economic factors, factors related to the health status, and other. Health status is directly connected to the individual preference for leisure, it can also influence earnings potential of an individual making a choice between retirement and further work (see: Lumsdaine and Mitchell, 1999). Among other factors there are cultural issues and those related to an individual's family situation, see e.g. Bazzoli (1985) or Blau (1997).

An important group of economic factors includes those connected with the access to and the level of social security benefits. Most often analysed are old-age and invalidity pensions. A social security system influences the opportunity set of an individual making retirement decisions. Hazard rate diagrams show spikes in retirement just at the ages of social security entitlement in all OECD countries. So it could be expected that in generous pension systems with high replacement rates (relation of a pension benefit to last earnings), workers would be tempted to retire early. On the other hand, accrual rates at older ages (rates at which benefits increase with further work after a minimum retirement age) may have additional influence on the retirement decision, as it was presented for example by Blöndal and Scarpetta (1999).

In case of the studies for the US, analyses of an impact of the access to continued employer-provided health insurance or Medicare is another stream of literature. Lumsdaine et al. (1994) and Gustman and Steinmeier (1994) found that health insurance has a small effect on retirement behaviour. But according to a recent study of Jones and French (2010) health insurance turned out to be an important determinant of retirement, similar to the US Social Security normal retirement age.

Various studies investigate the effects of a *change* in retirement rules on the retirement decisions. However, the results are not clear. An increase in the level of benefits lowers the retirement age (e.g. Burtless, 1986) and a cut in benefits raises it (French, 2005). Also an increase in the official retirement age delays retirement decision (Gustman and Steinmeier, 1985 and 2002). Gruber and Wise (2004) show that a reform that delays earliest eligibility for benefits would significantly reduce the proportion of retirees at older age. On the other hand, Mitchell and Fields (1984) showed only a small impact of changes in the US social security system and private pension plans on retirement decisions and Lumsdaine et al. (1997) showed significance of only private pension plans.

Generally, as Wise (2003, p. 4) said "...Over the years, the strong relationship between the economic incentives of retirement policies and the ages at which individuals retire from the labour force has been confirmed in multiple studies, using multiple data sources, and applying multiple research methodologies...".

Not many quantitative analyses of an impact of changes in the social security institutional framework on retirement exist for Central and Eastern European countries, in that for Poland, although one can observe

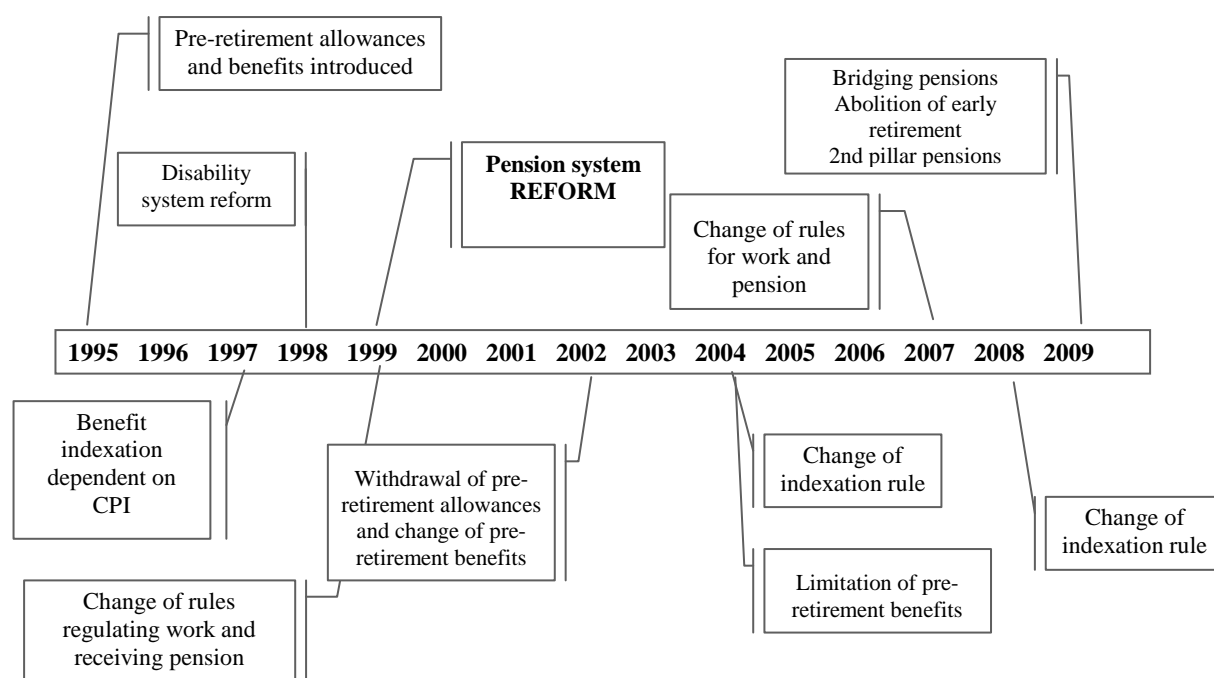
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<sup>6</sup> For reviews of this literature see Lumsdaine and Mitchell (1999) or Kula (2007).

a growing interest in this issue, see: Ruzik (2008) or Bukowski, ed. (2010). An example of a natural experiment – an institutional change in a developing country can be found in Danzer (2010). He analysed an increase in the minimum pension in Ukraine showing the income effect resulting in an increase in retirement of 30 to 47 percent. Retirement incentives were stronger at the lower tail of the educational distribution.

As it was already mentioned, after 1990 Polish pension system has undergone many changes. Scheme 1 presents main types of changes in the largest pension system, the one for employees and the self-employed, influencing institutional environment in which different cohorts worked and were retiring. We present years when a certain regulation came in force.

**Scheme 1: Changes in the social security system between 1995 and 2009**



Although 1999 pension reform did not have any important impact on cohorts retiring before 2009, often changing rules for the benefit indexation has an influence on future relative incomes of working and retiring population. We would also expect that changes of eligibility criteria for pre-retirement benefits and allowances, stricter rules for disability pensions, and the possibility to combine receiving an old-age pension and work are important. In the empirical part of this paper we try to analyse impact of the latter group of the institutional changes on the labour market status at older ages.

### III. METHODOLOGY AND DATA

#### III.1. Methodology

Since there are no representative long panel surveys for Poland, like the GSOEP in Germany or BHPS in Britain, and the time series are relatively short, we were not able to estimate a dynamic model of retirement decision of the type of Gustman and Steinmeier (1985, 1986, 2002). Therefore we conducted a cohort analysis based on a pseudo-panel constructed on Household Budget Survey data. Pseudo-panel data are typically constructed from cross-sections of independent surveys which have been conducted under the same methodology on the same reference population, but in different periods, sometimes consecutive and sometimes not. In our case cohorts, observed in subsequent years, are identified by sex

and year of birth. This allows for analysing labour market status of cohorts with the similar average education, health or income level. We claim that observed differences in retirement behaviour can be partially attributed to changes in the social security system, introduced in years 1995–2007.

The pseudo-panel approach has been successfully implemented to study a number of important socio-economic issues for example by Deaton (1985), Browning et al. (1985), Moffitt (1993), Attanasio (1998), Krueger and Pischke (1992), and Myck and Paull (2004), and provides a tool to analyse dynamic issues when only cross-sectional data is available. Yet the pseudo-panel cohort analysis is particularly useful to study changes in social security systems, since particular rules influence specific age groups differently, mainly when the age-related eligibility rules are changing. Since we will be able to control for other factors influencing retirement decisions of older individuals, like incomes, education level, etc., we can evaluate the influence of the institutional factors on individuals' decisions.

Together we have on average 57 cohorts in a given year, since we consider only people who were between 48 and 76 years old in years 1995 – 2007. It means that a cohort enters the analysis in a year when it reaches the age of 48 and drops out after finishing 76 years. As a result there are fewer cohorts for years 1995, 1996, 2005, 2006, and 2007. Number of individuals observed in one cohort varies between over 200 to 800. According to Verbeek (2008) if cohorts are sufficiently large, a static model based on a pseudo-panel can be estimated with the fixed-effects within estimator. However, the problem is what does “sufficiently large” mean? Verbeek cites papers with average cohort sizes of 190, 500 or even 2000, and states that everything depends on the way in which the cohorts are constructed. The most important aspect is that the variables defining cohorts should be constant over time and must be observed for all the individuals in the sample. Year of birth and sex, as in our paper, fulfil this condition.

In order to analyze factors influencing the share of retired and working individuals in a cohort we build a static fixed effect model<sup>7</sup>. The advantage of pseudo-panel is that in comparison with real panel studies the bias, which affects fixed effect estimator in case of short periods, is much smaller (Verbeek, 2008). However, the status on the labour market in one period is very strongly correlated with the status in the previous period, i.e. if a person was retired in period  $t-1$  he/she is almost certain to remain retired in period  $t$ . Thus, in order to identify factors influencing the retirement decision, we have to estimate a static fixed effects model with AR(1) disturbances. The estimated equations have the following form:

$$(1) \quad p_{ct} = \bar{x}_{ct}'\beta + y_{ct}'\delta + z_t'\gamma + \alpha_c + \bar{\varepsilon}_{ct}, c = 1, \dots, C; t = 1, \dots, T$$

where  $\bar{\varepsilon}_{ct} = \rho\bar{\varepsilon}_{c,t-1} + \bar{\eta}_{ct}$

$p_{ct}$  is the percentage of working or retired individuals in a cohort,  $\bar{x}_{ct}$  the vector of cohort  $c$ 's characteristics in period  $t$  (the average value of all observed  $x_{it}$ 's in a cohort),  $y_{ct}$  is the vector of institutional variables, affecting cohort  $c$  in period  $t$ , while  $z_t$  is the vector of year dummies.  $\alpha_c$  is a cohort effect, which we assume fixed in time, due to the size of the cohorts.

As we show below the static model yields interesting results; however, in the current debate on the retirement reforms it is much more important to analyze the impact of social security rules and individual characteristics on changes in the number of working and retired individuals, not just on their level. In order to study this problem we need to estimate a dynamic model. According to Roodman (2008) most of the assumptions about the data-generating process in our panel would suggest that we should use one of the GMM estimators. System GMM (Blundell-Bond estimator) seems to be better suited for this case, since its advantage is that we can use time invariant regressors, which disappear in Difference GMM (Arellano-Bond estimator). However, the problem with using either of these estimators lies in the number of instruments we would have to use. Although we have a panel in which the number of observations is higher than the number of periods, as usual in pseudo-panels the number of cohorts is not very high. Thus,

<sup>7</sup> As suggested by Verbeek (2008) and confirmed by the Hausman test.

we have to deal with too many instruments and all the consequences caused by it<sup>8</sup>. Another obvious drawback of pseudo-panels is that we cannot identify past values for individuals observed only in period  $t$  and we have to look for instruments, which can replace them.

Verbeek and Vella (2005) suggest that the answer to both problems lies in the instrumental variables approach, what they call the augmented IV estimator. In this estimator we should use both cohort dummies and time dummies. However, in our model cohort effects can be identified by a combination of cohort's age and institutional variables, which have specific values for particular cohorts – retirement age is the best example of this. Therefore, we do not include cohort dummies. Additionally, we have to assume that average cohort's characteristics, i.e. the exogenous variables, and the lagged depended variable are not collinear and vary with time. Analysis of the data shows that this assumption is true. Therefore, the equations have the following form:

$$(2) \quad p_{ct} = \phi p_{c,t-1} + \bar{x}_{ct}' \beta + y_{ct}' \delta + z_t' \gamma + \alpha_c + \bar{\eta}_{ct}$$

where variables are defined as in the equation (1).

As instruments we use, as before, the time specific cohort averages. According to Verbeek and Vella the augmented IV estimator can be estimated as the within estimator. As they claim, the resulting estimator is similar to GMM estimators used with normal panel data. The only problem is that for identification it is necessary "...that the time-invariant instruments have time-varying relationships with the exogenous variables and the lagged dependent variable, while they should not have any time-varying relationship with the equation's error term..." (Verbeek, 2008, p. 14). The first part of the condition should hold, since time invariant instruments are the variables defining cohorts and some institutional variables, and their relation with other cohort's characteristics and lagged dependent variable change in time, because people make different choices regarding their labour and retirement choice. Unfortunately we have no way of testing neither the first nor the second part, since, as we have said above cohorts are identified by a combination of cohort's age and institutional variables. Thus, our estimates may be inconsistent. Nevertheless, we have decided to apply the augmented IV estimator as the best option possible.

### III.2. Data

Main database used for our analyses was Polish annual Household Budget Surveys for years 1995-2007. Database consists of information on household characteristics and on individuals characteristics, in that economic activity of all adult household members.

We have decided to analyse retirement behaviour of persons born in years 1921-1956 that were between 48 and 76 years old in the period of our analyses. The total number of observations in one year varies from 25.5 thousand persons in 1995 to 28.7 thousand in 2007. As in the whole population of an age of our interests, also in our sample number of women is higher than that of men. Women stand for 55 per cent of the sample.

We excluded people working only in agriculture due to a different pension system and different labour market behaviour of this part of the population in Poland.

In order to construct cohorts we defined a cohort based on year of birth and sex. For every cohort and every year we computed share of members that:

- were working,
- received old-age pensions from the pension system (apart from farmers pensions),

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<sup>8</sup> For details see Roodman (2009)

- had a spouse or a partner (here, in some years the question was about wife/husband and in other about a partner in general),
- subjectively assessed the household financial situation as “rather bad” or “bad”,
- lived in a town or city with at least 20 thousand inhabitants,
- had at least secondary education.

Additionally we calculated the average degree of disability in the cohort in a given year based on the number of individuals with different degrees of disability. It was estimated as the weighted share of those who have full and considerable disability (assumed to be disabled in 100%), partial disability (disabled in 50%), or no disability, here questions asked and answers for the question varied most for the analysed period. There is no information on disability for years 1995-1996 and definitions for 1997-1999 are not exactly comparable with later waves of the survey. However, we have recalculated them to fit the rest of the sample.

Level of the average nominal expenditure per capita in the household was adjusted to nominal values using CPI<sup>9</sup>. Finally, a number of binary institutional variables for the changes in legislation have been defined, as shown in the part describing the model.

### III.3. Model

Based on the previously chosen variables we defined two dependent variables: WORK – share of working members of a cohort; and PENS – share of persons in each cohort that have an old-age pension as the source of individual income. Decision to estimate separate models for different dependent variables was based on the fact that there are several definitions of “being a pensioner” used in the literature. Eg. Lazear (1986, p.310) lists following possible definitions of retirement:

- leaving labour force permanently,
- situation when a majority of income is from the old-age pension benefit,
- a considerable decrease in the number of hours worked without the intention to increase labour supply in future,
- being registered by an employer or a social insurance agency as a pensioner.

Our dependent variables are closest to two first definitions. Distinction between work and receiving a pension benefit allows for checking how the same factors influence decisions to continue or stop working and decisions to apply for an old-age pension.

A set of explanatory variables includes:

AGE – age of the cohort in years,

SPOUSE – share of members of the cohort who are married or have a partner,

DISABL – average (degree of) disability/ inability to work in the cohort,

LNEXPADJ – log average expenditures per capita in a household adjusted by the price level, 2007 prices, CPI,

SUB – share of the cohort members who subjectively consider the financial situation of the household as “bad” or “rather bad”,

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<sup>9</sup> The variable “average expenditures” was included into the model as an approximation of the level of income per capita in a household, since information on incomes in BBGD is not very reliable.



TOWN – share of cohort members living in a town of over 20 thousand inhabitants,

EDU – share of cohort members with at least secondary education.

Additionally – and that is the important contribution of our analysis to the existing research – we included so called “institutional variables”, i.e. variables presenting the social security rules or their changes. The inclusion of these variables allows us to check how institutional framework influences the labour supply decisions of the elderly. In the studied period the most frequent changes of the social security rules concerned first of all the indexation rules in the employees and the self-employed pension system, the level of minimum benefits, and the accrual of retirement rights. Unfortunately, BBGD data do not allow for calculation of retirement rights or the level of pensions the individuals would be entitled to. We have considered so called basic amount (*kwota bazowa*) in relation to which all the benefits, including minimum benefits, are calculated; however, no relation between it and work/retirement decisions has been found. Instead, we have included following institutional variables into the model:

- Pre-retirement allowance – introduced in 1995 and suspended after 2001, it had a form of a benefit for people with long labour careers who had lost their jobs.
- Pre-retirement benefit – introduced in 1995, eligibility rules were changed twice: in 2002 and in 2004. It is a benefit for those who were laid off, provided they have reached a certain age and have long labour career.
- Nominal retirement age: till 2008 there were three nominal retirement ages: 55 as the early retirement age for women, 60 as the normal retirement age for women and 65 – the normal retirement age for men. Since 2009 early retirement has been cancelled.
- Extension of the availability of the early retirement benefits – the reform of 1999 assumed that there will be no early retirement in Poland and the early retirement privileges were supposed to be cancelled in 2006. However, the decision was postponed for one year in 2006, then again in 2007. Finally the law was passed in 2008 replacing early retirement with so called “bridging pensions” since 2009.
- The rule allowing retirees to work without any reduction of benefits after reaching the nominal retirement age – till 1998 all retirees obtaining income from work had their benefits reduced. Since 1999 all retirees who have reached the official retirement rate can work without restrictions.

The construction of institutional variables affects particular cohorts differently, due to differences in the eligibility rules. Details on eligibility ages and lengths of contributory/insurance periods are presented in Table A.1 in the Appendix. The advantage of these institutional changes lies also in the fact that most of them were introduced from one year to another, as current adjustments of the system and not a part of some long-term plans. Thus, the elderly population was not able to take them into account in their retirement plans and had to adjust their decisions as the changes appeared.

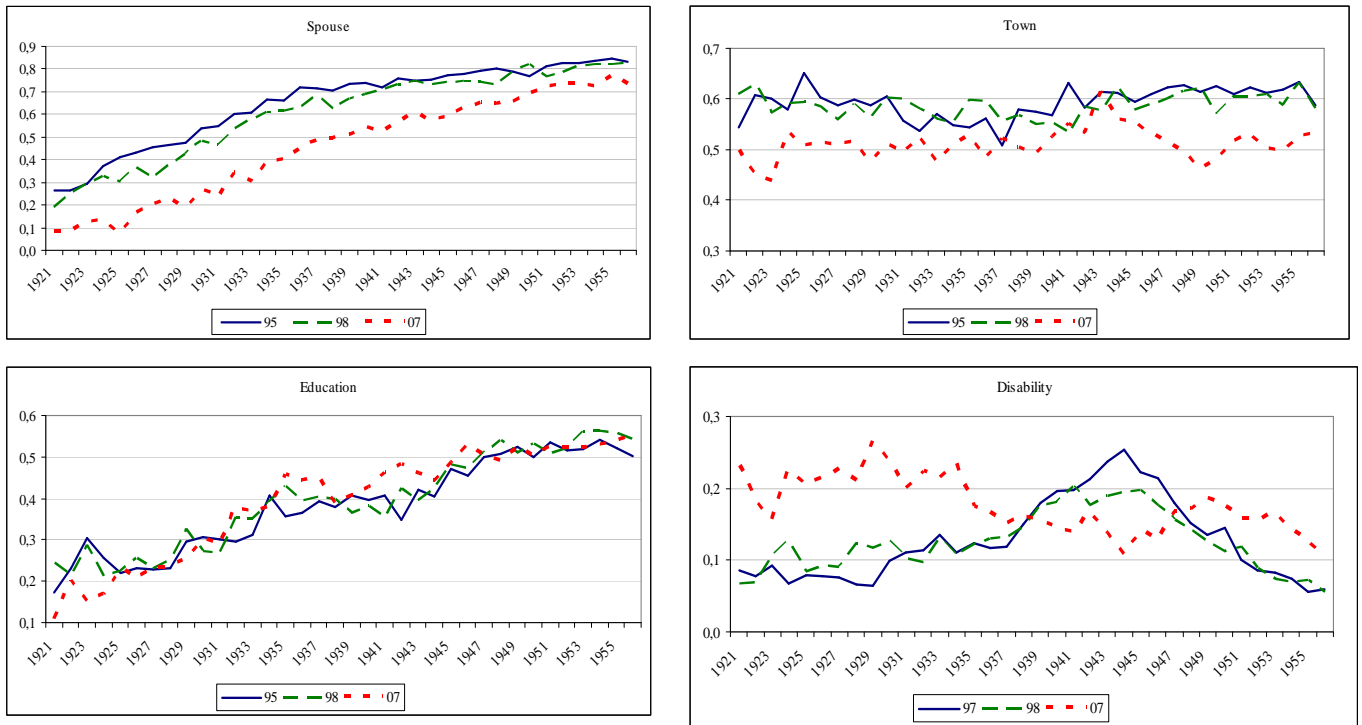
As entitlement rules in the pension system differ for men and women, gender is an important characteristic that influences retirement age. Thus, models for men and women were estimated separately

## IV. RESULTS

### IV.1. Descriptive statistics

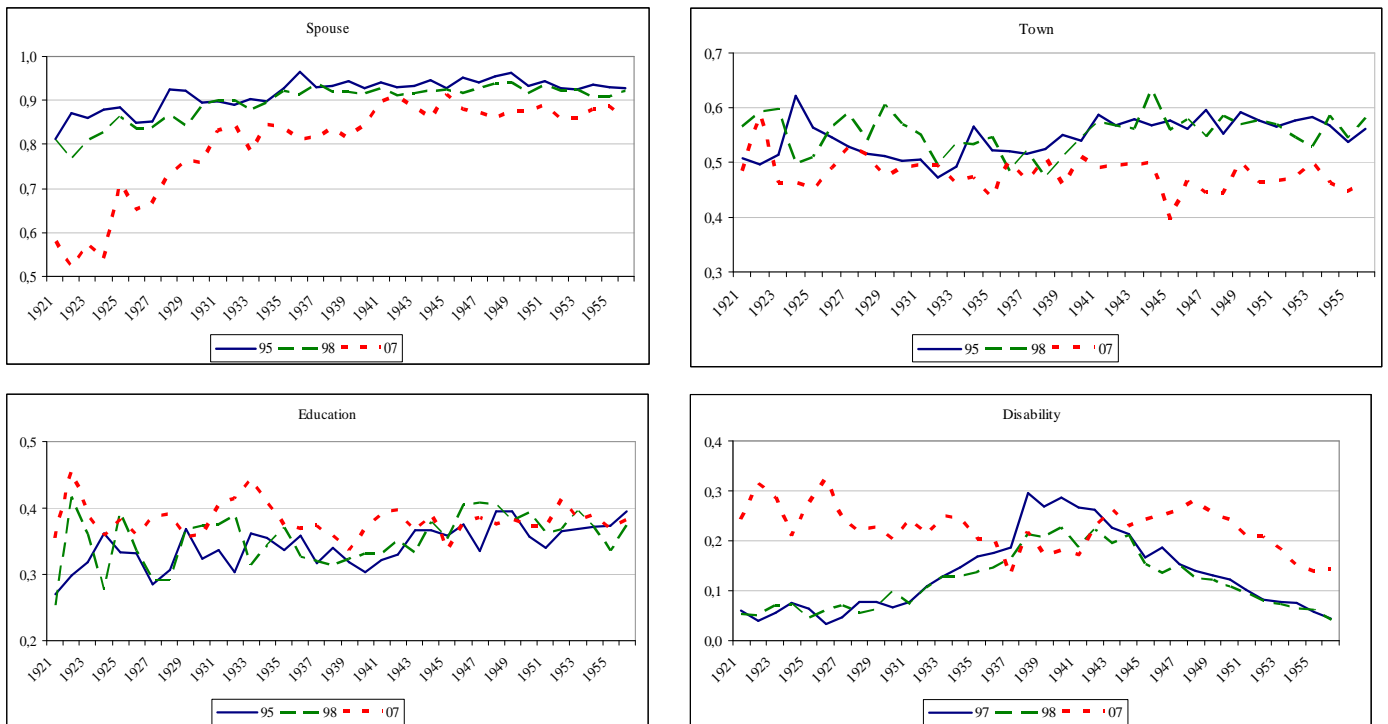
Shares of those with certain characteristic by year and cohort are presented in figures below. On the horizontal axis are years of birth of different cohorts and on the vertical axis shares of those: with a spouse/partner, living in town or city, with at least secondary education, disabled. To be more readable, data are presented for selected years.

**Figure 2: Females born 1921–1956 by different characteristics in years 1997, 1998, and 2007**



Source: own calculations on data from Household Budget Surveys

**Figure 3: Males born 1921–1956 by different characteristics in years 1997, 1998, and 2007**



Source: own calculations on data from Household Budget Surveys

Share of those living with a spouse decreases in time and is of course lower for older generations due to demography. Single person households prevail among older women, over 50 per cent of men even in the oldest cohorts still live with a spouse or a partner.

Living members of the oldest male cohorts are better educated than oldest female cohorts, then the quick “catch up” can be observed in the following generations of women. Among the youngest cohorts higher share of women than of men have at least secondary education.

An interesting picture is observed for disability. For men born in years 1937-44 and women born in years 1939-1948 there is a considerable fall in disability rates between 1997 and 1998 which was the effect of the disability pension reform introduced in that time. Older and younger cohorts were less affected by this institutional change so the disability rates increase for them with age and following usual deterioration of health.

## **IV.2. Pseudo-panel regressions**

### **Static model**

As it was described above we estimate equation (1), i.e. the fixed effects model with AR(1) disturbances in which dependent variables are either the share of retired people (i.e. receiving an old-age pension) in a given cohort or the share of working people in a given cohort. The list of explanatory variables includes not only personal characteristics and institutional variables but also values of lagged average expenditures and subjective evaluation of the financial situation. Both lags were included since past and present financial condition of a family can affect retirement decision. We have included also the year dummies that can be the approximation of different labour market situation in different years. In order to obtain comparable results in all the estimations, i.e. for either sex and for both states – working and retired, we use the same variables’ list and the same estimation technique. The results of estimations are shown in tables 1 and 2.

### ***Receiving pensions***

The results in Table 1 show that the share of retirees in a cohort depends on both individual characteristics and institutional variables. For both sexes significant characteristics include age - the older you are, the more likely you are retired, and lagged subjective evaluation of the financial situation of a household, i.e. if you consider your financial situation to be good, you are likely to be retired next year. Another variable, which is significant for both sexes is the degree of disability: disabled people are less likely to be retired, i.e. to receive an old-age pension. This is connected with the level of disability pension, which can be higher than the early retirement benefit. Thus such people prefer to wait with retirement.

For men the current subjective evaluation of financial situation is not significant, while for women it is highly significant. On the other hand evaluation of the financial situation in the previous year is significant and negative for both sexes. If more persons in a cohort think that their household financial situation is (or was in the previous year) bad or very bad it is less probable that people in this cohort are already receiving pensions. In fact, pensioners’ households in Poland are at relatively lower risk-of-poverty (although increasing) than e.g. households of the unemployed or with small children.

Men are more likely to retire if they have a spouse. This may mean that men are more likely to retire if their wife is also retired (our data are not detailed enough to confirm this hypothesis). Alternatively, in two persons household the total income is higher. This hypothesis is confirmed by the significance of lagged average expenditures for men – the higher the expenditures in the previous year the more likely are men to be pensioners this year. Men are also more likely to be retired if they live in a town or big city.

**Table 1. Factors influencing the share of retirees in a cohort**

Variable	Coefficient	St. error	Coefficient	St. error
	Women		Men	
Age	0,024***	0,008	0,024***	0,005
Spouse	-0,037	0,130	0,335***	0,124
Lnexpadj	0,083	0,096	-0,013	0,063
Lnexpadj(t-1)	0,092	0,094	0,106*	0,060
Sub	-0,374***	0,127	-0,100	0,092
Sub(t-1)	-0,499***	0,119	-0,397***	0,091
Town	0,144	0,119	0,149*	0,086
Edu	0,116	0,123	0,015	0,099
Disabl	-0,421***	0,152	-1,041***	0,093
Allowance	-0,058***	0,018	-0,057***	0,013
Benefit	0,043***	0,012	0,055***	0,011
Retage	-0,018**	0,009	-0,022*	0,012
Extenret	0,035*	0,020	-0,001	0,014
Workret	0,066***	0,019	0,077***	0,016
year 1998	0,004	0,016	-0,052***	0,020
year 1999	-0,006	0,020	-0,097***	0,023
year 2000	0,064***	0,019	0,043**	0,019
year 2001	0,071***	0,017	0,064***	0,016
year 2002	0,024**	0,011	0,021**	0,010
year 2004	0,012	0,010	-0,009	0,008
year 2005	0,029**	0,012	0,010	0,010
year 2006	0,019*	0,011	0,02**	0,008
Constant	-2,06***	0,390	-1,676***	0,441
Number of obs.		269		269
Number of groups		35		35
R-sq:				
within		0,538		0,821
between		0,686		0,956
overall		0,703		0,945
F(22,212)		11,21		44,11
Prob > F		0		0
rho_ar		0,697		0,451
sigma_u		0,139		0,116
sigma_e		0,045		0,034
rho_fov		0,907		0,920
test that all u_i=0:				
F(34,212)		4,690		5,87
Prob > F		0,000		0
Durbin-Watson		1,105		1,524

Significance level: 0,01 - \*\*\*, 0,05 - \*\*, 0,1 - \*

Source: own calculations

All the institutional variables turned out to have a significant impact on being retired, with the only exception of the extension of early retirement for men. As expected, people with right to a pre-retirement allowance, which can be treated as a kind of unemployment benefit, do not retire early. In turn those, who can claim the pre-retirement benefit, are more likely to retire – a pre-retirement benefit may be classified as early retirement. The cohorts, which have the right to combine work and retirement without any reduction in retirement benefits, have higher share of retired people. For women an increased probability of retirement is also visible for cohorts affected by the postponement of the decision to cancel early retirement, which was planned for 2006, and then in 2007 and 2008 it was delayed till the next year<sup>10</sup>. Finally, retirement age turned out to have significant but negative influence on the share of retirees in a

<sup>10</sup> Early retirement was finally cancelled in 2009.

cohort, i.e. in years when a particular cohort reached nominal retirement age (i.e. 55 or 60 for women and 65 for men) the share of retirees was smaller, than in other periods. We are not able to explain these results, since other studies and data for Poland (e.g. SHARE survey or reports of Polish Social Insurance Institution) show the pick in the number of new retirees in these years, thus the share of retired individuals should increase

**Table 2. Factors influencing the share of working individuals in a cohort**

Variable	Coefficient	St. error	Coefficient	St. error
	Women		Men	
Age	-0,014***	0,004	-0,018***	0,004
Spouse	-0,124*	0,065	-0,153*	0,093
Lnexpadj	0,036	0,048	0,119**	0,047
Lnexpadj(t-1)	0,004	0,047	0,027	0,045
Sub	0,037	0,064	-0,12*	0,069
Sub(t-1)	0,097*	0,059	0,056	0,069
Town	-0,053	0,060	-0,064	0,065
Edu	0,098	0,062	-0,069	0,075
Disabl	-0,066	0,076	0,010	0,070
Allowance	0,033***	0,009	0,048***	0,010
Benefit	-0,007	0,006	-0,021**	0,008
Retage	0,007	0,005	0,009	0,009
Extenret	-0,009	0,010	-0,017	0,010
Workret	-0,017*	0,009	-0,017	0,012
year 1998	0,019**	0,008	0,026*	0,015
year 1999	0,022**	0,010	0,03*	0,017
year 2000	0,012	0,009	0,009	0,014
year 2001	-0,002	0,008	-0,001	0,012
year 2002	0,003	0,005	0,006	0,007
year 2004	-0,005	0,005	-0,003	0,006
year 2005	-0,003	0,006	-0,005	0,007
year 2006	-0,002	0,006	-0,003	0,006
Constant	0,866***	0,192	0,69**	0,338
Number of obs.	269		269	
Number of groups	35		35	
R-sq:	within	0,453	0,743	
	between	0,896	0,915	
	overall	0,87	0,899	
F(22,212)	7,92		27,89	
Prob > F	0		0	
rho_ar	0,705		0,438	
sigma_u	0,089		0,090	
sigma_e	0,022		0,026	
rho_fov	0,940		0,924	
test that all u_i=0:				
F(34,212)	3,540		5,71	
Prob > F	0,000		0	
Durbin-Watson	1,317		1,308	

Significance level: 0,01 - \*\*\*, 0,05 - \*\*, 0,1 - \*

Source: own calculations

### **Working**

The corresponding regressions of factors influencing the share of working individuals in a cohort are presented in Table 2. Age is again significant for both men and women, and its impact on the decision to

work is negative. For both sexes having a spouse has a negative influence on working, what confirms the results from Table 1 about the impact of a spouse on man's retirement decision. The results show that for men the current level of expenditures and the current subjective evaluation of the financial situation of a household are positively correlated with working. To a degree it contradicts the results obtained for retirement, where good subjective evaluation of the financial situation has also positive impact on the share of the cohort that receives pensions. However, in the case of retirement this result concerns both sexes and lagged evaluation. In the current case, the lagged evaluation is significant only for women and it corresponds with the other result, since it shows that good lagged evaluation has negative impact on working.

As far as the institutional variables are concerned, only the pre-retirement allowance has a significant and positive impact on the share of working individuals in a cohort. It suggests that people in cohorts, which are entitled to this allowance, work more. Possible explanation is that such people feel safer with such an option and they are ready to work longer, knowing that if they are fired they will have means to live. However, if it is true then the impact of the pre-retirement benefit should also be significant and positive, since it is another "safety option". The problem is that its influence on working is negative and significant only for men. Thus, the parameters' sign for the allowance and the benefit are opposite to those in the retirement case. In a way it may confirm our intuition that the pre-retirement allowance is seen as a kind of unemployment benefit, while the pre-retirement benefit is considered to be part of early retirement.

The last significant institutional variable is the right to combine work and retirement without any reduction in retirement benefits, which has a negative impact on women's work. In Table 1 this variable has a positive influence on the retirement decision. It may mean that people who can benefit from this rule are more likely to retire, since they know that if necessary, they can (return to) work keeping their benefits intact.

We should also notice that in all regressions some of the year dummies are significant. What is more, when they are significant for both retirement and work, they have opposite signs. This can suggest that there are other processes, which influence the shares of working and retired in a cohort, like business cycle, unemployment or some demographic factors. This is a problem, which should be investigated further.

## **Dynamic model**

Our estimations above considered the shares of retirees and working people in each year. However, what we are really interested is the impact of social security rules and individual characteristics on changes in these shares. Thus, we estimate equation (2) for the share of retirees and working individuals in a cohort, again separately for men and women.

### ***Receiving pensions***

As table 3 shows the results of estimation are quite similar to the results of the static case. The share of pensioners in a cohort increase significantly with: age, entitlement to pre-retirement benefit and in years 2000 and 2001. Also more people applied for pensions in times when it was possible to have a benefit and work without restrictions. Having a spouse creates incentives for men to retire. For the cohorts with worse subjective evaluation of financial situation, mainly for women, the share of people receiving old-age pensions is falling. The same direction of significant influence is in the case of disability, usually linked to an entitlement to some kind of a disability pension, and in case of pre-retirement allowance.

Nevertheless, there are two results, which differ from the static case. First of all, contrary to the static case but in accordance with other surveys and reports, the retirement age has a significant and positive effect on the share of female pensioners. This means that when a cohort reaches age of 55 or 60 the share of women receiving retirement benefits significantly increases. Second, with an increase of the share of

individuals with at least secondary education in a cohort, the share of pensioners also increases. This result is counterintuitive; however, it can result from the trend in data, observed especially for younger cohorts: as particular cohorts grow older the share of more educated individuals increases. Obviously, as cohorts age, the number of retirees also rises and although we control for age, there maybe some connection between both processes.

**Table 3. Factors influencing the change of the share of retirees in a cohort**

Variable	Coefficient	St. error	Coefficient	St. error
	Women		Men	
Pension(t-1)	0,682***	0,041	0,440***	0,042
Age	0,007**	0,003	0,015***	0,002
Spouse	0,115	0,111	0,209**	0,103
Lnexpadj	0,108	0,080	-0,060	0,051
Lnexpadj(t-1)	-0,038	0,078	0,040	0,050
Sub	-0,243**	0,104	-0,103	0,076
Sub(t-1)	-0,284***	0,103	-0,230***	0,080
Town	0,013	0,103	0,095	0,071
Edu	0,112	0,111	0,171**	0,083
Disabl	-0,456***	0,100	-0,819***	0,078
Allowance	-0,047***	0,013	-0,039***	0,010
Benefit	0,061***	0,009	0,068***	0,008
Retage	0,046***	0,010	0,017	0,011
Extenret	0,018	0,016	0,006	0,011
Workret	0,029**	0,014	0,079***	0,010
year 1998	-0,010	0,010	-0,012	0,008
year 1999	0,001	0,015	-0,046***	0,010
year 2000	0,059***	0,018	0,062***	0,013
year 2001	0,065***	0,017	0,078***	0,013
year 2002	0,024	0,016	0,038***	0,012
year 2003	0,004	0,015	0,018	0,012
year 2004	0,034**	0,014	0,013	0,012
year 2005	0,035**	0,014	0,016	0,011
year 2006	0,020*	0,011	0,017**	0,009
year 2007	(dropped)		(dropped)	
constant	-0,624	0,653	-0,618	0,427
Number of obs.		305		305
Number of groups		36		36
R-sq:	within	0,937		0,952
	between	0,981		0,977
	overall	0,964		0,977
F(24,245)		152,25		200,47
Prob > F		0		0
sigma_u		0,051		0,055
sigma_e		0,037		0,029
rho_fov		0,651		0,780
test that all u_i=0:				
F(35,245)		1,310		3,69
Prob > F		0,126		0

Significance level: 0,01 - \*\*\*, 0,05 - \*\*, 0,1 - \*

Source: own calculations

## Working

Table 4 presents the results of dynamic model for working individuals. Whether share of men receiving pensions increases if more men in a cohort have a spouse, presence of a spouse negatively influences share of working women in a cohort. Other results are mostly similar to the results presented in table 2: share of working individuals in a cohort decreases with age, expenditures positively influence the change in the share of working men, while subjective evaluation of financial situation that of working women.

As far as the institutional variables are concerned, only the impact of pre-retirement benefits and allowances is significant. This impact is opposite to that for receiving pension, possibly because of the same reasons as suggested in the static model. The only difference in comparison with the static model is that pre-retirement benefits are significant for both sexes.

**Table 4. Factors influencing the change in the share of working individuals in a cohort**

Variable	Coefficient	St. error	Coefficient	St. error
	Women		Men	
Work(t-1)	0,620***	0,039	0,485***	0,050
Age	-0,014***	0,002	-0,015***	0,002
Spouse	-0,020***	0,059	-0,105	0,088
Lnexpadj	0,024	0,043	0,124***	0,043
Lnexpadj(t-1)	0,008	0,042	-0,049	0,042
Sub	-0,040	0,056	-0,113*	0,064
Sub(t-1)	0,155***	0,055	0,076	0,062
Town	0,006	0,055	-0,076	0,060
Edu	0,074	0,062	-0,112	0,070
Disabl	0,069	0,050	0,036	0,053
Allowance	0,043***	0,008	0,038***	0,009
Benefit	-0,013***	0,005	-0,013**	0,006
Retage	-0,006	0,005	-0,005	0,009
Extenret	-0,002	0,009	-0,013	0,009
Workret	0,010	0,007	0,004	0,009
year 1998	-0,014**	0,006	-0,025***	0,009
year 1999	-0,038***	0,008	-0,035***	0,009
year 2000	-0,051***	0,009	-0,054***	0,010
year 2001	-0,057***	0,009	-0,046***	0,010
year 2002	-0,034***	0,008	-0,035***	0,010
year 2003	-0,027***	0,008	-0,024**	0,010
year 2004	-0,024***	0,008	-0,017*	0,010
year 2005	-0,016**	0,007	-0,012	0,009
year 2006	-0,009	0,006	-0,008	0,007
year 2007	(dropped)		(dropped)	
constant	0,751**	0,359	0,790**	0,374
Number of obs.		303		305
Number of groups		36		36
R-sq:	within	0,955		0,929
	between	0,976		0,970
	overall	0,970		0,963
F(24,243)		213,57	F(24,245)	133,23
Prob > F		0		0
sigma_u		0,041		0,044
sigma_e		0,020		0,025
rho_fov		0,809		0,760
test that all u_i=0:				
F(35,243)		2,010	F(35,245)	2,36
Prob > F		0,001		0

Significance level: 0,01 - \*\*\*, 0,05 - \*\*, 0,1 - \*

Source: own calculations



## V. CONCLUSIONS

Our analyses based on pseudo-panel models showed that institutional factors indeed matter for the retirement behaviour of different cohorts. It seems that such factors are more important for the decisions on whether to apply for the old-age benefit than for the decisions about work at older age. What is more, many changes in the Polish social security system increased uncertainty about future rules in the pension system which reduces individual planning horizon and makes people retire as soon as they fulfil eligibility criteria. In the pre-reform pension system – in force until end of 2008 – it was a rational behaviour as an increase in the expected benefit resulting from continued work (accrual rate) was very small. In the new DC system longer work will be rewarded with much higher increases which might change labour market behaviour of cohorts retiring in future.

Institutional factors are more significant than for example education, which is a factor explaining retirement behaviour in many OECD countries. Thus, our study suggested that in Poland education obtained in the past turned out to depreciate much faster after transition from the centrally planned to the market economy and does not explain retirement behaviour well.

In both cases of the dynamic model being either a pensioner or a working person means that there will be also a high share of people in the same state in the next year. So, the recommendation for social policy is that it is important to keep older workers in the labour market as long as possible. It could be done by promotion of part-time work or other flexible work arrangements.

## APPENDIX

**Table A.1. Retirement age (minimum contributory period) - the public system managed by ZUS**

Type of pension	-1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009-	
Statutory															
<i>Females</i>	60 (20)														
<i>Males</i>	65 (25)														
Long career															
<i>Females</i>	55 (30)														
<i>Males</i>	--	--	--	--	--	--	--	--	--	--	--	--	60 (35)	--	
Teachers	No minimum retirement age with 30 years of work in that at least 20 years as a teacher														
<i>Females</i>	55 (20, in that 15 as a teacher)														
<i>Males</i>	60 (25, in that 15 as a teacher)														
Miners	No minimum retirement age for males with 25 years of work underground in mines														
<i>Females</i>	50/55 (20, in that 10 or 15 in mines)														
<i>Males</i>	60/65 (25, in that 10 or 15 in mines)														
Special conditions type A*															
<i>Females</i>	55 (20, in that 15 in special conditions)														
<i>Males</i>	60 (25, in that 15 in special conditions)														
Special conditions type B**															
<i>Females</i>	50 (20, in that 10 in special conditions)														
<i>Males</i>	55 (25, in that 10 in special conditions)														
Pre-retirement benefit (Świadczenie przedemerytalne)															
<i>Females</i>	58/55 or seniority (35)						50 and seniority (30)			56 (20), 55(30)					
<i>Males</i>	63/60 or seniority (40)						60 and seniority (35)			61 (25), 60 (35)					
Pre-retirement allowance (Zasilek przedemerytalny)															
<i>Females</i>	No minimum age (30 or 25 if at least 15 in special conditions)						--	--	--	--	--	--	--	--	--
<i>Males</i>	No minimum age (35 or 30 if at least 15 in special conditions)						--	--	--	--	--	--	--	--	--
Bridging pensions															
<i>Females</i>	--	--	--	--	--	--	--	--	--	--	--	--	--	55 (20)	
<i>Males</i>	--	--	--	--	--	--	--	--	--	--	--	--	--	60 (25)	
Disability/inability to work	Depends upon age at which incapacity began: less than 20 years - 1 year of insurance, 20-22 years old - 2 years of insurance, 22-25 years old - 3 years of insurance, 25-30 years old, 4 years of insurance, 30 years or older - 5 years of insurance.														

\* special list of occupations and types of work.

\*\* special list of occupations and types of work.(e.g. miners, persons working with lead, cadmium or asbestos, steel workers, pilots, divers)

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