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Old-age benefits availability impact on the outflows from activity[♦]

Abstract:

Given longevity, fertility, health and social developments workers become inactive relatively early throughout the Europe. This partially stems from pushing the older workers out from the labour market as well as from workers' own motivation who prefer benefits to wages. We focus on the latter effect and attempt to estimate to what extent workers would stay active longer if they were not demotivated to by the availability of the old-age benefits. We focus on Poland, which severely experiences the problem of ageing population. Persons 50+, in 2013, accounted for 37% of the total population. They enjoy relatively low unemployment rate, but participation and employment rates are very low: 34% and 32% respectively. We analyse whether the discouraged worker effect occurs for this group of workers. We identify cyclical properties of the activity and discouraged worker rates and estimate a set of logistic regressions to identify outflows from activity determinants.

Cross-correlations between cyclical components of the analysed variables indicate the added worker effect prevails over the discouraged worker effect. The second arises with a delay of a few quarters. The process is asymmetric for females; workers often permanently leave the market. Availability of the old-age benefits increases the probability of the outflow from unemployment to inactivity and so does the unemployment rate changes (what approximates the cyclical fluctuations). If the old-age benefits become the main source of income the worker is 7 to 18 times more probable of leaving the workforce comparing to those who receive either the unemployment benefits or social welfare benefits.

JEL classification: J14, J22

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1. Introduction

Activity rates among persons aged 50+ are on average low as related to demographic characteristics observed in Europe in the 21st century. Workers deactivate early for a number of reasons. Among them, one can list the following. (i) Institutions are designed in terms of the nominal age of workers, for instance retirement at 65 today means a totally different situation comparing to retirement at 65 a century ago. (ii) Employers use retirement as an easy and cheap (for them) way to restructure staff they employ. It is a kind of subsidy for them. (iii) Politicians eagerly play with the retirement age; but today it occurs considerably rarely due to the budgetary problems. The effects of the previous policies are, however, still present in the labour markets. (iv) Lump of labour fallacy – many people (probably the vast majority of them) assume the number of jobs is fixed, so retirement of the older workers should improve the situation of the younger ones (see for instance Saint-Paul (2004)). (v) Workers are motivated to retire earlier rather than later. In the majority of the developed countries the social security provisions place a heavy tax on work beyond the earliest retirement age (see for instance Gruber and Wise (1999)). (vi) Workers are motivated to retire earlier rather than later since this is perceived as a way to escape from the income versus leisure tradeoff.

In this paper we focus on the last factor only, i.e. the demotivation effect generated by the availability of the old-age benefits before a worker is very old, which means the he/she is really unable to earn on his/her own. This statement may be perceived as too strong; it does not take into account various social dimensions either. However, if we assume that workers should start receiving old-age benefits much earlier than they become very old (unable to earn on their own), we neglect the interest of the young workers whose remuneration is additionally burdened to raise funds for such a policy (see Góra 2013). We discuss neither the social policy nor political economy issues in this paper. Instead we ask the following question: to what extent easy and early access to the old-age benefits contributes to the widely

observed low activity rates among older workers. We try to answer this question by analysing the outflows from the activity in the framework of the work discouragement.

Discouraged worker effect (due to job market reasons) implies that the activity rates[1] are either pro-cyclical[2] with respect to GDP or counter-cyclical with respect to the unemployment rate (or the other respective macroeconomic reference indicators). In the microeconomic perspective the research most often identifies the determinants of the workers' labour market status. Van Ham et al. (2001) look for discouragement at two stages of the search and matching process. Discouragement can arise when the individual decides on the economic activity; the inactivity constitutes a way to evade unemployment. The second stage of the potential discouragement refers to the job search intensity. The workers, who are characterized by lower employability, seek work less intensively.

Some analyses concern, in particular, the behaviour of the older workers on the labour market. Benitez-Silva (2002) proposes a formal dynamic model of the older workers job search activity. These persons are likely to remain active on the labour market beyond the traditional retirement age. They actively seek work, both on the job and when non-employed, but the job search behaviour depends on the previous work attachment and health conditions. Darby et al. (1998) and O'Brien (2011) analyse cyclical properties of the participation rates. Darby et al. (1998) find the discouraged worker effect, especially for females aged 45-54. O'Brien (2011) finds[3] that the activity rates of older males are influenced by the business cycle. In both analyses the effect is asymmetric in nature. The influence from the cyclical downturn in decreasing participation rates dominates the increase in participation rates induced by the economic recovery. Maestas and Li (2006) analyse the search behaviour of the older non-employed workers. They find that the transition rates are relatively low, as only a

[1] Compare Benati (2001) for a literature survey on methods used in the aggregate analyses.
[2] Cyclical properties of the activity rates can be disturbed if the worker flows are persistent (Clark and Summers 1982).
[3] O'Brien (2011) also finds that the influence of a social security pension value on participation rates is relatively small.

half of the older job seekers find work. 13% can be classified as the discouraged workers[4], the others experience either health or income shocks, exert little job search effort or have relatively high reservation wage.

We base the analysis on the Polish labour market data. Choosing this case stems from the following reasons. In Poland it is prohibited to fire a worker once he/she reaches the retirement age. The traditional version of this age is replaced by the so called the minimum retirement age. A worker can go to a court and sue his/her employer for firing him/her even if the worker is above the minimum retirement age. The old-age benefits are calculated on the basis of the present value of the paid contributions and the age the benefit starts to be paid out at. This reduces, or maybe even abolishes, the tax on further work. However, these characteristics of the Polish labour market have just started to influence the situation. Mentioned regulations were introduced with the pension reform in 1999, which started to be effective for the retiring workers around 2008. These characteristics have not become strong factors behind the retirement decisions yet. Nevertheless, the data show an increase in the activity rates and the actual retirement age in Poland recently (see Eurostat).

The structure of this article is organized as follows. In section 2 we present the quantitative analysis of the discouraged worker effect in the macroeconomic and microeconomic perspectives. We present cross-correlations between the cyclical components of the analysed variables and the selected macroeconomic reference indicators. We look for the asymmetry in the process adjustment of the relationship between either the activity rate or the discouraged worker rate and the unemployment rate. We approximate the discouraged worker effect by the outflow from unemployment to inactivity and we identify the factors that make older workers more willing to refrain from the active job search. We focus on the role of the old-age benefits and the job finding opportunities (approximated by the unemployment

[4] By the discouraged workers Maestas and Li (2006) mean those job seekers who are willing to work at the prevailing wage rate, but are unable to find a job.

rate changes). In section 3 we discuss the results. In section 4 we compile the concluding remarks.

2. Quantitative findings

Empirical analysis refers to Poland to population 50+. This country faces low participation rates (34% in 2013 for persons 50+) accompanied by the low actual retirement age (in 2013 the average age of the new beneficiaries was less than 60 for both males and females). Around 3% of the persons 50+ indicate the retirement is the main reason for not looking employment. For 57.5% of the inactive persons aged 50-69 who receive the old-age benefits having reached eligibility for the benefits is a main reason to quit working[5] (LFS data for 2012).–Simultaneously 50% of those receiving old-age benefits who decide to continue working indicate the main reason is to provide sufficient personal/household income (LFS data for 2012). We base the quantitative analysis on the aggregate and microeconomic LFS data.

2.1. Cyclical properties of the participation and discouraged worker rates

We use the aggregate data of the activity rates and discouraged worker rates[6] for the time period 2000-2013. We focus on of the following age groups: males either 45-64 or 45+, females either 45-59 or 45+. The reference macroeconomic indicators comprise the gross domestic product (GDP, in millions of PLN, chain linked volumes, reference year 2005) and unemployment rate.

The average activity rate for males 45-64 equals 0.662 ± 0.014 and decreases to 0.495 ± 0.008 for males 45+. For females 45-59 the average participation rate equals 0.604 ± 0.036 and decreases to 0.331 ± 0.011 for females 45+. Discouraged worker rates are higher for the subsample of the working age population. The respective rates are 0.024 and 0.018 for males and 0.037 and 0.034 for females. All series display a high degree of

[5] Analogous conclusion arises from SHARE analysis. Moreover, the health status has minor impact on the decision when to leave the labour force (Myck et al. 2014).
[6] By the discouraged worker rate we mean the ratio of the number of the discouraged workers to population.

persistence. Monthly autocorrelation coefficients are higher for the participation rates than for the discouraged worker rates. The summary statistics for the selected variables are presented in table 9 in the Appendix. The unit root existence and stationarity of the series are verified using ADF, KPSS and Phillips-Perron tests (see table 1). The tests results indicate the analysed time series are I(1).

Table 1. ADF, Phillips-Perron and KPSS tests statistics

Variable	Test statistics		
	ADF	Phillips-Perron	KPSS
	I(1) vs. I(2)		
male activity rate 45-64	-7.760	-7.760	0.126
male activity rate 45+	-6.422	-6.453	0.077
female activity rate 45-59	-5.546	-5.704	0.606
female activity rate 45+	-7.980	-8.044	0.208
male discouraged worker rate 45-64	-7.729	-7.857	0.076
male discouraged worker rate 45+	-8.141	-8.361	0.091
female discouraged worker rate 45-59	-6.754	-6.754	0.068
female discouraged worker rate 45+	-6.491	-6.491	0.084
GDP	-5.533[a]	-3.129	0.171
unemployment rate	-2.131	-3.989	0.167
	I(0) vs. I(1)		
male activity rate 45-64	-0.260	-0.217	0.868
male activity rate 45+	-0.956	-1.294	0.618
female activity rate 45-59	1.031	0.449	0.384
female activity rate 45+	-1.688	-1.613	0.217
male discouraged worker rate 45-64	-2.524	-2.524	0.148
male discouraged worker rate 45+	-2.682	-2.696	0.141
female discouraged worker rate 45-59	-1.709	-1.773	0.578
female discouraged worker rate 45+	-1.595	-1.702	0.385
GDP	0.538	0.280	0.895
unemployment rate	-1.320	-0.829	0.661

Notes: The tests for the hypothesis I(0) vs. I(1) include the intercept in the test equation. The ADF and Phillips-Perron tests for the hypothesis I(1) vs. I(2) assume no constant in the test equation. The KPSS test for the hypothesis I(1) vs. I(2) includes the intercept in the test equation. [a] – The test equation includes intercept.

Source: Authors' calculation.

We test for the relationship between the respective activity rates, discouraged worker rates and the variables that characterize the macroeconomic situation. We apply the band-pass Christiano-Fitzgerald filter and high-pass Hodrick-Prescott filter and compute the correlation

coefficients between the cyclical components of the particular series (see table 2). Most of the coefficients imply that the activity rates are counter-cyclical with respect to the GDP or pro-cyclical with respect to the unemployment rate. The discouraged worker rates experience contrary correlations. The qualitative inference is broadened if we look at lags. The statistically significant correlation coefficients of the expected sign arise between (see table 10 in the Appendix): (i) female activity rates and GDP lagged 10 periods or more, (ii) female activity rates and unemployment rate lagged 7 periods or more, (iii) male discouraged worker rates and GDP lagged 2 periods or more, (iv) 45+ female discouraged worker rate and GDP lagged 9 periods or more, (v) male discouraged worker rates and unemployment rate lagged 2 periods or more and (vi) 45+ female discouraged worker rate and unemployment rate lagged 5 periods or more.

Table 2. Correlation coefficients between cyclical components of the male and female activity rates, male and female discouraged workers rates, GDP and unemployment rate computed on the basis of the CF and HP filters estimates

	Christiano-Fitzgerald filter		Hodrick-Prescott filter	
Variable	GDP	unemployment rate	GDP	unemployment rate
male activity rate 45-64	-0.326*	0.259	-0.079	0.048
male activity rate 45+	-0.699	0.206	0.190	0.031
female activity rate 45-59	-0.443**	0.541***	-0.364***	0.545***
female activity rate 45+	-0.326*	0.500***	-0.207	0.491***
male discouraged worker rate 45-64	0.308*	-0.183	-0.305**	0.251*
male discouraged worker rate 45+	0.345*	-0.200	-0.327**	0.270**
female discouraged worker rate 45-59	0.028	-0.045	-0.122	0.091
female discouraged worker rate 45+	-0.010	-0.007	-0.174	0.134

* - significant at the 10 per cent level, ** - significant at the 5 per cent level, *** - significant at the 1 per cent level.

Source: Authors' calculation.

Next we search for the relationship between either the activity rate or discouraged worker rate and the macroeconomic reference indicator. We seek the long-run relationship and test for the potential asymmetry in the process adjustment. Two interesting results arise (see table 3). We find the interdependence between the female activity rate (for females 45+) and 10-periods lagged unemployment rate:

$$female\ activity\ rate_t(for\ females\ 45+) = \alpha_0 + \alpha_1 unemployment\ rate_{t-10} + \varepsilon_t$$

We also find the relationship between the male discouraged worker rate (for males 45+) and the unemployment rate for males 45+ lagged 5 periods:

$$male\ discouraged\ worker\ rate_t(for\ males\ 45+) = \alpha_0 + \alpha_1 unemployment\ rate\ (for\ males\ 45+)_{t-5} + \varepsilon_t$$

Equations define stable long-run relationships. In both specifications the residuals suffer from autocorrelation but once the AR(1) term is added the coefficient estimates do not differ significantly[7]. The models approach the new equilibrium within 4 or 2 quarters respectively. The coefficients of the positive and negative correction terms differ. In case of the female activity rate equation the coefficient standing next to $\hat{\varepsilon}_t^+$ is not statistically different from 0. The coefficient of the $\hat{\varepsilon}_{t-1}^-$ implies the equation after the negative shock returns to the equilibrium within around 2.5 quarters. The Wald test statistics at 10% significance level allows stating that these coefficients differ.

Equation that allows asymmetry simultaneously in the short-run and the long-run (for females) provides more detailed results. Regular ECM estimates show that in the short-run the changes in the unemployment rate have the opposite, to the long-run, impact. Unemployment rate deviation implies one-directional changes in the activity rate; but once the deviations are split it appears that only the negative change in the unemployment rate implies decrease in the activity rate. The positive deviation has statistically insignificant coefficient. The model returns to the equilibrium within 1.5 quarters after the negative shock. The Wald test statistics at 1% significance level allows rejecting the null hypothesis of the coefficients equivalence. The Wald test statistics at 5% significance level allows concluding that the coefficients of $\Delta\text{unemployment rate}^+$ and $\Delta\text{unemployment rate}^-$ differ. The respective coefficients of the correction terms in case of the male discouraged worker rate differ, but not statistically significantly.

[7] $\hat{\alpha}_1$ in the female activity rate equation p-value is just above 0.05.

Table 3. Female activity rate regressed on the lagged unemployment rate and male discouraged worker rate regressed on the lagged male unemployment rate, long-run, ECM and asymmetric ECM estimates results

	Female activity rate (45+)		Male discouraged worker rate (45+)	
	coefficient	standard error	coefficient	standard error
		Long-run relationship		
$unemployment\ rate_{-10}$	-0.129***	0.025		
$unemployment\ rate_{-5}\ (males\ 45+)$			0.039***	0.009
$\bar{R}^2$	0.360		0.286	
LM (p-value)	41.295 (0.00)		14.94 (0.00)	
ADF (p-value)	-2.172 (0.03)		-3.290 (0.00)	
		Error Correction Model		
$\Delta unemployment\ rate$	0.240**	0.100		
$\Delta unemployment\ rate_{-3}\ (males\ 45+)$			-0.081**	0.035
$\hat{\varepsilon}_{t-1}$	-0.267***	0.080	-0.449***	0.108
$\bar{R}^2$	0.247		0.280	
LM (p-value)	2.281 (0.12)		1.065 (0.35)	
ADF (p-value)	-5.951 (0.00)		-6.214 (0.00)	
		Error Correction Model – long-run asymmetry		
$\Delta unemployment\ rate$	0.324***	0.109		
$\Delta unemployment\ rate_{-3}\ (males\ 45+)$			-0.077**	0.036
$\hat{\varepsilon}^{+}_{t-1}$	-0.104	0.123	-0.376**	0.154
$\hat{\varepsilon}^{-}_{t-1}$	-0.404***	0.112	-0.521***	0.152
$\bar{R}^2$	0.280		0.271	
LM (p-value)	2.00 (0.15)		0.769 (0.47)	
ADF (p-value)	-7.30 (0.00)		-6.352 (0.00)	
Wald test long-run asymmetry (p-value)	1.71 (0.095)		0.669 (0.51)	
		Error Correction Model – short-run and long-run asymmetry		
$\Delta unemployment\ rate^{+}$	-0.214	0.238		
$\Delta unemployment\ rate^{-}$	0.636***	0.161		
$\Delta unemployment\ rate^{+}_{-3}\ (males\ 45+)$			-0.068	0.058
$\Delta unemployment\ rate^{-}_{-3}\ (males\ 45+)$			0.013	0.233
$\hat{\varepsilon}^{+}_{t-1}$	0.108	0.144	-0.263	0.194
$\hat{\varepsilon}^{-}_{t-1}$	-0.651***	0.144	-0.536***	0.159
$\bar{R}^2$	0.361		0.206	
LM (2 lags) (p-value)	1.003 (0.38)		0.109 (0.90)	
ADF (p-value)	-6.697 (0.00)		-6.792 (0.00)	
Wald test short-run asymmetry (p-value)	-2.514 (0.02)		-0.983 (0.33)	
Wald test long-run asymmetry (p-value)	3.080 (0.00)		1.080 (0.29)	

* - significant at the 10 per cent level, ** - significant at the 5 per cent level, *** - significant at the 1 per cent level. Data seasonally adjusted. Dependent variable: quarterly female activity rate (45+) or male discouraged worker rate (45+).

Source: Authors' calculation.

The asymmetry in the process adjustment, implied by the asymmetric ECM model for the female activity rate, is further verified by estimating the TAR-ECM and M-TAR ECM specifications (Enders and Granger 1998; Enders and Siklos 2001). The threshold is either assumed $\tau = 0$ or estimated. Only the M-TAR specification with the estimated value of the threshold, on the level of -0.0024, provides statistically significant results (see table 4). The threshold cointegration test t-Max implies that the variables are not cointegrated, but the alternative test $\rho_1 = \rho_2 = 0$ leads to the contrary conclusion. Enders and Siklos (2001) show that the second test can have more power comparing to the first one. The threshold

cointegration is implied by the $\rho_1 = \rho_2$ hypothesis results. The model reverses faster to the equilibrium after the negative impulse.

Table 4. The results of the threshold cointegration tests for the female activity rate

Parameter, Hypotheses	Female activity rate (45+)			
	Pattern of adjustment			
	TAR		M-TAR	
τ	0	-0.0097	0	-0.0024
ρ_1 (above threshold)	-0.185	-0.086	-0.007	0.005
	(0.147)	(0.114)	(0.123)	(0.096)
ρ_2 (below threshold)	-0.116	-0.359	-0.386**	-0.813***
	(0.133)	(0.214)	(0.161)	(0.201)
$\rho_1 = \rho_2$	0.130	1.257	3.491*	13.461**
t-Max value	-0.874	-0.757	-0.058	0.048
$\rho_1 = \rho_2 = 0$	1.110	1.706	2.886	8.152*

* - significant at the 10 per cent level, ** - significant at the 5 per cent level, *** - significant at the 1 per cent level. Standard errors reported in parentheses.

Source: Authors' calculation.

Apart from the asymmetry in the length of the process adjustment, we analyse the asymmetry in the size of the discouraged worker effect along the business cycle according to the solutions proposed by Darby et al. (1998) and O'Brien (2011). The first paper defines the dummy variable of the value 1 from the period when the cyclical component of the GDP reaches the peak until the trough and zero elsewhere. Dummy variable coefficient estimate is not statistically significant, what implies that the influence from either the cyclical downturn or the economic recovery is comparable in size.

O'Brien (2011) follows Connolly (1997). The framework defines the following variables:

$\Delta unemployment\ rate^{+} = \Delta unemployment\ rate$ if $\Delta unemployment\ rate > 0$ and 0 otherwise,

$\Delta unemployment\ rate^{-} = \Delta unemployment\ rate$ if $\Delta unemployment\ rate < 0$ and 0 otherwise.

The two variables present the cumulated positive and negative changes in the unemployment rate:

$$cumulated_t^+ = cumulated_{t-1}^+ + \Delta unemployemnt\ rate_t^+$$

$$cumulated_t^- = cumulated_{t-1}^- + \Delta unemployemnt\ rate_t^-$$

Asymmetry arises when the coefficients of the cumulated responses differ significantly. We estimate the equation od the male discouraged worker rate (45+).

Table 5. Model results allowing asymmetry in the discouraged worker effect

	Male discouraged worker rate (45+)	
	coefficient	standard error
intercept	0.016***	0.001
$cumulated^+$	0.014**	0.006
$cumulated^-$	0.006**	0.002
ρ	0.641***	0.111
$\bar{R}^2$	0.574	
ADF (p-value)	-6.869 (0.00)	
Wald test for the asymmetry response(p-value)	1.842 (0.07)	

* - significant at the 10 per cent level, ** - significant at the 5 per cent level, *** - significant at the 1 per cent level. Data seasonally adjusted. Dependent variable: quarterly male discouraged worker rate (45+). ρ represents the $AR(1)$ coefficient in the error term.

Source: Authors' calculation.

Estimation results (see table 5) indicate the male discouraged worker rate experiences asymmetric responses to the cyclical fluctuations. At 10% significance level the Wald test statistics implies that an increase in the male discouraged worker ratio (45+) is larger in recession than a decrease during the economic recovery.

2.2. What factors discourage workers from the job search?

In the microeconomic perspective we analyse the participation in the labour force. We want to identify the factors that make workers more probable of leaving the labour market. We broaden the standard definition of the discouraged worker effect to identify the role of the old-age benefits' impact on the job search activity. We treat these benefits as the alternative to remuneration source of income. It can be either already available to the workers or the forthcoming option of the income source to those who soon become eligible for the benefits. We want to determine to what extent the old-age benefits discourage workers from

the active job search. We focus on the flow from unemployment to inactivity (as the approximation of the discouraged worker effect). We base the quantitative analysis on the individual yearly LFS data for the time period 2004-2010. We refer either to workers aged 50-59 (females) and 50-64 (males) or workers aged 50+ (females and males). The whole sample consists of more than 4000 individuals, 34% of which refrain from the active job search within the 1 year interval. If we narrow the sample to the working age population 33% of almost 4000 individuals move from unemployment to inactivity. Males constitute 54% of the sample. Around ¼ of the workers indicate the old-age benefit as any source of income in t_0, for 11% this benefit is the main source of income. Almost a half of the workers seek work 13 months or more, $^2/_3$ of the workers have vocational or primary education. The distribution of either the unemployment duration or educational level attained does not differ significantly among those who move from unemployment to inactivity and those who remain unemployed.

Tables 6-8 provide the results of the labour force participation analysis. By the discouraged workers, we mean those agents who have stopped seeking a job during the 1 year interval and we analyse what the impact of the old-age benefits and job finding opportunities on the discouragement from active job search is. In the first case we analyse the changes in the status of the workers who receive the old-age benefits in t_0 (table 6). Females and older workers have higher probability of leaving the labour force. In both models the positive change in the unemployment rate increases the probability of refraining from the active job search.

Next, we look on the participation decisions of the workers regardless the fact they receive or not the old-age benefits in t_0 (see table 7). Similar conclusions arise: females and older workers are more willing to move from unemployment to inactivity. Increase in the unemployment rate, what approximates the decreasing job finding opportunities, increases the probability of discouragement among older workers. If the old-age benefits constitute any

source of income in t_1 the workers are more than twice more probable of refraining from the active job search.

Finally, we directly identify the impact of the old-age benefits by looking at the workers who do not receive any kind of the old-age benefits in t_0 (see table 8). Analogously, females and older workers are more probable of leaving the labour force. Positive change in the unemployment rate increases the probability of discouragement among older workers. If the old-age benefit becomes any source of income in t_1 the workers are 4.5 times more probable of moving from unemployment to inactivity. If we differentiate the main sources of income in t_1, the workers who receive old-age benefits are 7 times more probable of leaving the workforce than those who receive unemployment benefits in t_1 and even 18 times more probable of leaving the workeforce than those who receive social welfare benefits in t_1.

Table 6. Logistic regression of moving from unemployment to inactivity for the workers who receive the old-age benefits in t_0

	Workers who receive the old-age benefits in t_0			
	odds ratio	standard error	odds ratio	standard error
Age (years):				
50-54	1		1	
55-59	1.557**	0.289	1.556**	0.288
60-64	4.363***	1.708	3.479***	0.985
>65			3.439***	1.416
Sex:				
Males	1		1	
Females	1.583***	0.278	1.572***	0.256
$\Delta unemployment\ rate$	1.63E-9***	9.51E-9	1.30E-7***	7.24E-7
Log likelihood	-401.05		-441.47	
LR	31.13 (df=4)		40.98 (df=5)	
p-value	0.00		0.00	
McFadden's Adj R^2	0.025		0.031	
Sensitivity	16.09%		24.91%	
Specificity	94.10%		90.23%	
Correctly classified	65.93%		65.32%	

Notes: * - significant at the 10 per cent level, ** - significant at the 5 per cent level, *** - significant at the 1 per cent level. The sample comprises individuals aged either 50-59 (females) and 50-64 (males) or workers aged 50+, yearly data for the time period 2004-2010. Sample size for the workers aged 50-59 (females) and 50-64 (males) – 637 observations, for the workers aged 50+ – 695 observations.

Source: Authors' calculation.

Table 7. Logistic regression of moving from unemployment to inactivity for the workers who receive or not the old-age benefits in t_0

	Workers who receive or not the old-age benefits in t_0			
	odds ratio	standard error	odds ratio	standard error
Age (years):				
50-54	1		1	
55-59	1.948***	0.236	1.921***	0.231
60-64	6.625***	1.761	4.397***	0.957
>65			3.308***	1.135
Sex:				
Males	1		1	
Females	1.679***	0.191	1.578***	0.171
$\Delta unemployment\ rate$	5.33E-16***	2.07E-15	8.66E-15***	3.28E-14
Old-age benefits as any source of income in t_1:				
NO	1		1	
YES	2.318***	0.287	2.284***	0.276
Log likelihood	-1006.43		-1055.34	
LR	192.49 (df=5)		204.79 (df=6)	
p-value	0.00		0.00	
McFadden's Adj R^2	0.082		0.082	
Sensitivity	18.87%		22.40%	
Specificity	95.48%		94.59%	
Correctly classified	73.34%		73.04%	

Notes: * - significant at the 10 per cent level, ** - significant at the 5 per cent level, *** - significant at the 1 per cent level. The sample comprises individuals aged either 50-59 (females) and 50-64 (males) or workers aged 50+, yearly data for the time period 2004-2010. Sample size for the workers aged 50-59 (females) and 50-64 (males) – 1834 observations, for the workers aged 50+ – 1899 observations.

Source: Authors' calculation.

We also compare the reservation wage of the workers who do not receive old-age benefits as any source of income in t_0 but obtain them in t_1 and remain unemployed in t_1; the subsample comprises 132 observations. 71% of the workers do not change their reservation wage, almost 19% of the workers expect 200 PLN higher wage, 3% expect 400 PLN higher wage and almost 4% expect 600 PLN higher wage; the other indications are marginal.

Table 8. Logistic regression of moving from unemployment to inactivity for the workers who do not receive any kind of the old-age benefits in t_0

	Workers who do not receive any kind of the old-age benefits in t_0			
	odds ratio	standard error	odds ratio	standard error
Age (years):				
50-54	1		1	
55-59	2.405***	0.384	1.933***	0.322
60-64	9.349***	3.385	7.409***	2.713
Sex:				
Males	1		1	
Females	1.745***	0.262	1.830***	0.285
$\Delta unemployment\ rate$	2.26E-17***	1.13E-16	5.77E-14***	2.92E-13
Old-age benefits as any source of income in t_1:				
NO	1			
YES	4.556***	1.180		
Main source of income in t_1:				
Old-age benefits[a]			1	
Unemployment benefit			0.145***	0.100
Social welfare[b]			0.053***	0.029
Invalidity allowance			0.175***	0.100
Log likelihood	-596.15		-574.62	
LR	155.58 (df=5)		198.63 (df=7)	
p-value	0.00		0.00	
McFadden's Adj R^2	0.107		0.135	
Sensitivity	18.67%		24.67%	
Specificity	97.55%		96.32%	
Correctly classified	77.78%		78.36%	

Notes: [a] – old-age benefits – pension or retirement benefits, [b] – social welfare – social benefit, non-income source, dependant. * - significant at the 10 per cent level, ** - significant at the 5 per cent level, *** - significant at the 1 per cent level. The sample comprises individuals aged either 50-59 (females) and 50-64 (males) or workers aged 50+, yearly data for the time period 2004-2010. Sample size for both models – 1197 observations.

Source: Authors' calculation.

Separate considerations refer to the employed workers. 7% of those who receive old-age benefits, as any source of income, work. For 15% of the employed workers, the old-age benefit constitutes any source of income, for 13% of the employed workers old-age benefit is the main source of income. Almost 7% of the employed workers in t_0 move to inactivity in t_1, 59% of them claim they do not seek work because they receive old-age benefits. Simple logistic regressions prove that positive changes in the unemployment rate increases the probability of moving from unemployment to inactivity. The models experience poor statistical properties, though. We have been unable to identify any other factors that

statistically significantly describe the flow of workers from employment to inactivity within the 1 year interval what would imply the discouraged worker effect existence.

3. Discussion

The results provide some interesting conclusions. In the macroeconomic perspective it appears that the added worker effect prevails over the discouraged worker effect. The second one rises with some delay. When the economic conditions worsen the workers at first increase their job search activity, most probably to compensate the household income decrease. As the time elapses they become discouraged from unsuccessful job search and leave the labour market. Substantial delay can be also partially explained by inertia of the labour market and the fact it takes time until the new equilibrium is approached.

ECM estimates provide comparable conclusions. The discouraged worker effect arises once we analyse the unemployment rate lagged 5 to 10 quarters. In the short run the added worker effect prevails. More detailed analysis (of the split unemployment rate deviations) implies that the negative change in the unemployment rate implies decrease in the activity rate. So it seems that when the job finding opportunities improve some workers become 'lazy' and do not take part in the search and matching process[8].

The asymmetry arises in both the magnitude of the reaction and the length of the process adjustment. The market much faster returns to the long-run equilibrium in case of the negative shock to the unemployment rate. The increase in the activity rate induced by improved conditions on the market is only temporary. On the other hand, once the unemployment rate increases the females leave the market practically permanently. Consistent qualitative conclusions arise from the asymmetric ECM and threshold ECM estimates.

The male discouraged worker rate model shows, in turn, that the response of the discouraged worker rate is larger during recessions than it is during expansions. More males

[8] Gałecka-Burdziak and Pater (2014) draw analogous conclusions with respect to working age population.

decide to leave the market when the job finding opportunities decrease than start actively looking for a job once the employment finding chances improve.

All the logistic regression models estimates show that females and older workers have higher probability of leaving the workforce. The outflow from unemployment to inactivity is susceptible to business cycle fluctuations. Increase in the unemployment rate increases the probability of the outflow from unemployment to inactivity. Interesting conclusions arise with respect to benefits impact on the discouragement from the active job search. All models show that the benefits increase the probability of refraining from the active job search. This conclusion arises regardless the fact the workers already receive the benefit or are to receive it within the one year period. Among those who do not receive the old-age benefits, if the old-age benefit becomes the any source of income the worker is 4.5 times more probable of refraining from the labour market. If it becomes the main source of income the worker is 6 times more probable of refraining the active job search than those who are to receive invalidity allowance, 7 time more than those who are to receive unemployment benefits and 18 times more probable than those who are to receive social welfare benefits.

Qualitative findings are consistent with some of the results from the SHARE analysis. Myck et al. (2014) shows that older workers and those who become eligible for the old-age benefits are more probable of refraining from the labour market. The participation is, in turn, positively related to the health status; but at the same time the health status does not significantly differentiate the timing of the flow to inactivity.

4. Concluding remarks

In this paper we present the empirical analysis of the discouraged worker effect among the older workers. We broaden the standard definition of this effect to identify to what extent easy and early access to the old-age benefits contributes to the widely observed low

activity rates among older workers. We treat old-age benefits as the alternative to remuneration source of income – already available or the forthcoming option.

We base the quantitative analysis on the macroeconomic LFS data (2000-2013) and LFS individual data (2004-2010). Being cautious in qualitative interpretation of the results we draw the following conclusions. Cyclical properties of the activity rates are time varying. The discouraged worker effect occurs among older workers but it seems to be time varying as well. The added worker effect prevails at first; the discouraged worker effect arises with some delay. The effect is asymmetric in size and length. Larger effect occurs once the negative shock arises, more people leave the workforce than re-enter the market once job finding opportunities improve. Moreover, workers leave the workforce almost permanently. Interestingly, in the short run, when the employment opportunities improve the workers leave the workforce as well.

Females and older workers are more probable of refraining from the labour market participation. Increase in the unemployment rate and the old-age benefits discourage from the active job search as well. The workers who receive the old-age benefits (and treat them as the main source of income) are 7 to 18 times more probable of leaving the workforce comparing to those who receive either the unemployment benefits or social welfare benefits. Those who receive old-age benefits expect also slightly higher wage rate.

Budgetary constraints and their projections are usually put forward in debates on retirement age and the need to increase it. There are good reasons for that. However, the public hardly accepts that need. Although data we have do not allow us to draw strong conclusions, our paper is a minor contribution to complexity of arguments for higher retirement age understood as the age of availability of the old-age benefits. The benefits seem to contribute to premature withdrawal from the labour market, which means not only an increased fiscal burden but may also lead to a welfare loss. This argument goes beyond purely

fiscal arguments and may help in encouraging people to stay in employment rather than to retire even after reaching the retirement age.

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Appendix

Table 9. Variables main statistical properties, 1999 – 2013

	male activity rate 45 - 64	male activity rate 45+	female activity rate 45 - 59	female activity rate 45+	male discouraged worker rate 45 - 64	male discouraged worker rate 45+	female discouraged worker rate 45 - 59	female discouraged worker rate 45+
Mean	0.662	0.495	0.604	0.331	0.024	0.018	0.037	0.034
Median	0.658	0.495	0.599	0.334	0.023	0.017	0.037	0.033
Stand. Deviation	0.014	0.008	0.036	0.011	0.003	0.002	0.007	0.006
Monthly autocorr.	0.884	0.933	0.940	0.890	0.773	0.742	0.856	0.866
Min	0.642	0.481	0.549	0.302	0.019	0.014	0.023	0.023
Max	0.695	0.508	0.681	0.347	0.031	0.023	0.052	0.048
No. of observations	56	56	56	56	56	56	56	56

Source: LFS, data seasonally adjusted, Authors' calculation.

Table 10. Correlation coefficients between cyclical components of male and female activity rates, male and female discouraged workers rates and lagged GDP and unemployment rate computed on the basis of the HP filter estimates

	Hodrick-Prescott filter							
Variable	male activity rate 45-64	male activity rate 45+	female activity rate 45-59	female activity rate 45+	male discouraged worker rate 45-64	male discouraged worker rate 45+	female discouraged worker rate 45-59	female discouraged worker rate 45+
GDP_{-1}	-0,193	0,050	-0,302	-0,193	-0,235	-0,280*	0,159	0,068
GDP_{-2}	-0,038	0,134	-0,141	-0,115	-0,295*	-0,337**	0,176	0,054
GDP_{-3}	0,025	0,142	-0,032	-0,031	-0,343**	-0,382**	0,244	0,093
GDP_{-4}	0,146	0,046	0,013	-0,070	-0,384**	-0,420***	0,323**	0,145
GDP_{-5}	0,144	-0,026	0,076	-0,036	-0,425***	-0,451***	0,335**	0,134
GDP_{-6}	0,066	-0,137	0,168	0,043	-0,461***	-0,475***	0,296*	0,077
GDP_{-7}	-0,008	-0,241	0,206	0,002	-0,485***	-0,491***	0,265*	0,034
GDP_{-8}	-0,185	-0,323	0,204	0,017	-0,514***	-0,505***	0,151	-0,089
GDP_{-9}	-0,234	-0,289	0,287*	0,156	-0,537***	-0,508***	-0,035	-0,279*
GDP_{-10}	-0,224	-0,262	0,364**	0,262*	-0,542***	-0,503***	-0,153	-0,395***
GDP_{-11}	-0,257	-0,256	0,376**	0,304**	-0,529***	-0,479***	-0,268*	-0,500***
GDP_{-12}	-0,260	-0,158	0,449***	0,440***	-0,484***	-0,428***	-0,299**	-0,513***
u_{-1}	0,219	0,249	0,446***	0,397***	0,186	0,248	-0,174	-0,111
u_{-2}	0,197	0,208	0,298**	0,248	0,307**	0,364**	-0,131	-0,015
u_{-3}	0,180	0,204	0,160	0,149	0,426***	0,474***	-0,084	0,086
u_{-4}	0,168	0,191	0,017	0,083	0,538***	0,574***	-0,036	0,184
u_{-5}	0,168	0,172	-0,123	-0,020	0,636***	0,661***	0,012	0,278*
u_{-6}	0,165	0,132	-0,262*	-0,152	0,718***	0,730***	0,059	0,362**
u_{-7}	0,163	0,106	-0,382**	-0,277*	0,780***	0,780***	0,105	0,436***
u_{-8}	0,170	0,082	-0,447***	-0,367*	0,818***	0,804***	0,154	0,504***
u_{-9}	0,195	0,089	-0,509***	-0,413***	0,823***	0,794***	0,202	0,558***
u_{-10}	0,234	0,100	-0,575***	-0,471***	0,799***	0,755***	0,238	0,587***
u_{-11}	0,235	0,051	-0,598***	-0,505***	0,752***	0,699***	0,248	0,580***
u_{-12}	0,228	-0,015	-0,611***	-0,610***	0,682***	0,623***	0,239	0,545***

* - significant at the 10 per cent level, ** - significant at the 5 per cent level, *** - significant at the 1 per cent level.

Source: Authors' calculation.