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# The impact of easy and early access to old-age benefits on exits from the labour market: a macro-micro analysis

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## Abstract

We examine whether easy and early access to old-age benefits induce older workers to become inactive. We use Polish LFS data. We find added worker effect prevailing over discouraged worker effect. The latter arises after a few quarters and is asymmetric. Females permanently leave the workforce. More males leave the workforce in contractions than re-enter in expansions. If old-age benefit becomes the main source of income, the worker (after 1 year) is 8 to 20 times more likely to exit the market than unemployment or social welfare beneficiaries. Our findings support higher retirement age—the age when workers become eligible for old-age benefits.

**JEL classification:** J14, J22

**Keywords:** Old-age benefits, Discouraged workers, Discouraged worker effect, Exits from the labour market, Unemployment outflow, Inflow to inactivity

## 1 Introduction

We ask the following question: to what extent does easy and early access to old-age benefits contribute to the low participation rates of older workers? We examine this question in the framework of work discouragement. We hypothesise that easy and early access to old-age benefits demotivates workers, if they are not yet at the age when they are incapable of earning on their own. This statement is strong and ignores the social perspective. However, if we assume that workers start receiving old-age benefits earlier than when they are no longer able to earn on their own, we neglect the interests of younger workers whose remuneration has to finance this policy (Góra 2013).

A few factors affect the early exit from the labour market of older workers. Labour market institutions are designed in terms of age limits. To retire at 65 today is different from doing so a century ago. Employers use retirement as a cheap and easy means of restructuring staff and view it as a subsidy, but workers also retire voluntarily. Politicians eagerly modify the retirement age, although today considerably less due to budgetary problems. Thanks to the “lump of labour fallacy”, people perceive the number of jobs as fixed, so retirement of the older workers should improve the situation of younger workers (Saint-Paul 2004). Workers encounter incentives to retire earlier rather than later. In many developed countries, social security provisions impose heavy taxes on work incomes beyond

the earliest retirement age (Gruber and Wise 1999). Workers who retire earlier rather than later perceive it as a way of escaping the income-leisure trade-off.

We focus on the demotivation effect of old-age benefits only and analyse it in the light of the discouraged worker effect. The discouraged workers are persons who have demonstrated some labour force attachment, i.e. they are willing to work and ready to work and have been looking for a job within the previous 12 months, but not in the previous 4 weeks due to certain reasons. If these reasons are job market related, workers enter or exit the market. Thus, the participation rates<sup>1</sup> are pro-cyclical<sup>2</sup> with respect to GDP or counter-cyclical with respect to the unemployment rate. On the contrary, the added worker effect causes an increase in the participation in response to a partner's job loss. Then, the participation rates behave inversely. Changes in the participation rates have been studied in macroeconomic analyses. Benitez-Silva (2002) found that older persons more often remained active in the labour market beyond the traditional retirement age. They actively sought work, both on the job and when not employed, but their behaviour depended on the previous work attachment and health conditions. Darby et al. (1998) and O'Brien (2011) analysed cyclical properties of the participation rates. Darby et al. (1998) found that the discouraged worker effect was especially common among females aged 45–54. O'Brien (2011) proved<sup>3</sup> that the business cycle affected the participation rates of older males. In both articles, the effect was asymmetric. A cyclical downturn influenced participation rates more than an expansion. Thus, the decrease in participation during a recession was higher than the increase during a boom. Maestas and Li (2006) analysed the search behaviour of older not employed workers and reported relatively low transition rates. Only half of the older job seekers found work, while 13% were discouraged<sup>4</sup>. The rest experienced health or income shocks, they made little job search effort or their reservation wages were relatively high.

In a microeconomic perspective, research has identified determinants of the workers' labour market status. van Ham et al. (2001) looked for discouragement at two stages of the search and matching process. Discouragement could arise when an individual chose inactivity to evade unemployment. The second option was when workers with lower employability sought work less intensively, so the search intensity distinguished them.

We believe that the availability of old-age benefits affects the job search behaviour and results in premature labour force withdrawal. If a person receives an old-age benefit or perceives it as a forthcoming income option, she can become discouraged from active job search. We focus on the outflow from unemployment to inactivity to check if the discouragement affects unemployed older workers who (soon) decide on retirement. As we analyse the older workers' behaviour just prior to potential retirement, we do not examine the pure discouraged worker effect. Instead, we extend the traditional definition to look at premature withdrawals from the labour market.

We base our analysis on the Polish labour market. This choice stems from a number of reasons. Participation rates among persons aged 55+ in Poland are on average low compared to demographic characteristics observed in Europe in the twenty-first century.<sup>5</sup> In Poland, there is a so-called minimum retirement age.<sup>6</sup> It is the earliest age at which a worker can retire. Employers may not lay off workers when they reach the retirement age. A worker may sue an employer for being fired above the minimum retirement age.<sup>7</sup> The present value of paid contributions and the age at which the retiree starts receiving the payment determine the value of the old-age benefits. This amount reduces or even negates

the level of tax on continued work. These regulations were implemented with the pension reform of 1999. However, the effective phasing of them started in 2009. Thus, these legal conditions have just begun to affect the situation in the Polish labour market.<sup>8</sup> They have not become strong factors behind retirement decisions yet, but data show a recent increase in participation rates and the actual retirement age in Poland (see Eurostat).<sup>9</sup> However, for our analysis, a legacy of the previous arrangements strongly matters. Until the new pension system was introduced (1999), it had been relatively easy to retire early in Poland. Average actual retirement age in the mid-1990s was roughly 55 years for women and 59 for men—irrespective to its formal level being 60/65.<sup>10</sup> Although early retirement schemes are much less available now, some occupational groups (miners, uniform services, judges and prosecutors) can still enjoy them. The other groups in certain cases can apply for the so-called pre-retirement benefit (a kind of open-ended unemployment benefit that does not require any job search). The 2008 withdrawal of the early retirement schemes was made less drastic through implementation of bridging pensions that are temporal, difficult to obtain, not very generous and paid by employers. This has strongly reduced availability of early retirement for the future, but this did not wipe out the effects of previous arrangements, namely workers prematurely leaving the labour market.

In Section 2, we present macro analysis of the discouraged worker effect and demonstrate cross-correlations between the cyclical components of the analysed variables and the selected macroeconomic indicators. Looking for asymmetry in the duration or size of the discouraged worker effect, we examine the relationship between the participation rate or the discouraged worker rate and the unemployment rate. In a microeconomic perspective (Section 3), we approximate the discouraged worker effect by the outflow from unemployment to inactivity and identify factors that entice older workers to withdraw from the job search. We focus on the roles of old-age benefits and the business cycle. In Section 4, we discuss the results, and in Section 5, we present our conclusions.

We primarily contribute to the literature by analysing the impact of the availability of old-age benefits on the participation of older workers. We check if these benefits tempt workers to exit from the labour force. These benefits may demotivate workers from further job search activity, causing low participation rates. Thus, we extend the definition of the discouraged worker effect and do not refer to pure cyclicity of the labour force participation. In macroeconomic perspective, we seek for the asymmetry in the size and duration of the effect. We find a time-varying discouraged worker effect. The added worker effect prevails at first. Then, the discouraged worker effect arises. It is asymmetric in intensity (stronger in recessions than expansions) and length (certain workers leave the workforce permanently). In a microeconomic perspective, females and older workers are more likely to quit the labour market. The availability of old-age benefits multiplies the probability of withdrawal from the labour market. We perceive our findings as an argument to increase the retirement age, which we understand as the age of the availability of the old-age benefits.

## **2 Discouraged workers from a macroeconomic perspective**

We analysed the population in Poland aged 50+. The share of this group in the total population increased by 11 percentage points to 36% between 1995 and 2014, and it is expected to increase further. At the same time, the life expectancy for a 45-year-old person<sup>11</sup> increased by around 4 years for males and females, and it is also expected to

increase further. Older workers experience low unemployment rate but seek work longer. The average unemployment rate for workers 50+ between 1995 and 2014 was 8%, but it did not exceed 7.5% since 2007. Between 2007 and 2014, older workers (females aged 45–59 and males aged 45–64) sought work on average almost 3 months longer than the total average, although the difference decreased to 1.5 months since 2010.

Older workers demonstrated relatively low attachment to the labour market. The pension reform, mentioned in the introduction, was implemented in 1999, but its impact started to be visible at the end of the 2000s. The labour force participation and the employment rate did not exceed 35% between 1995 and 2014, but they increased since 2006. The mean age of new old-age pensioners also increased. The available data showed that between 2011 and 2014 this average age increased by 0.6 years to 60.4.

The availability of old-age pensions seemed to be an important determinant of the labour force participation. Between 1995 and 2014, the number of persons who justified their inactivity due to retirement increased by 83%. In 2013, around 3% of those 50+ indicated that retirement was the main reason they did not seek employment. Reaching the eligibility age for the old-age benefits had been the main reason for quitting work<sup>12</sup> for 57.5% of those aged 50–69 who were inactive and were receiving old-age benefits (Labour Force Survey (LFS) data for 2012). Simultaneously, 50% of those receiving old-age benefits and continuing work did so primarily to provide sufficient personal/household income (LFS data for 2012).

From an aggregate perspective, we used data on the participation rates and discouraged worker rates<sup>13</sup> in the period 2000–2013. We focused on the following age groups: males aged 45–64 or 45+ and females aged 45–59 or 45+. The lower bound of the age limits reflected the age groups provided in the aggregate LFS time series. The upper bounds (59 or 64) reflected the minimum<sup>14</sup> retirement age. Macroeconomic indicators used for reference included gross domestic product (GDP in PLN millions, chain-linked volumes, reference year 2005) and unemployment rates.

Table 9 in the Appendix contains the summary statistics for the selected variables. The average participation rate for males aged 45–64 equalled  $0.662 \pm 0.014$  and decreased to  $0.495 \pm 0.008$  for those 45+. For females aged 45–59, the average participation rate equalled  $0.604 \pm 0.036$  and decreased to  $0.331 \pm 0.011$  for those 45+. Discouraged worker rates were higher for the subsample of the working age population, 0.024 and 0.018 for males, and 0.037 and 0.034 for females. All series displayed a high degree of persistence. Monthly autocorrelation coefficients were higher for the participation rates than for the discouraged worker rates. We used ADF, KPSS and Phillips-Perron tests to check for the unit root and stationarity in the data (Table 1). We inferred that time series were I(1).

We examined the relationship between the participation rates, discouraged worker rates and the variables that describe the macroeconomic situation. We applied a high-pass Hodrick-Prescott filter and computed the correlation coefficients between the cyclical components of the particular series (see Table 2). Statistically significant results indicated counter-cyclical female participation rates and male discouraged worker rates with respect to the GDP and pro-cyclical with respect to the unemployment rate. We broadened the findings when we looked at lags. Statistically significant correlation coefficients of the expected sign (i.e. in line with the discouraged worker effect) were between the following (Table 10 in the Appendix): (i) female participation rates and GDP lagged by 10 periods

**Table 1** ADF, Phillips-Perron and KPSS test statistics

Variable	Test statistics		
	ADF	Phillips-Perron	KPSS
	I(1) vs. I(2)		
Male participation rate 45–64	–7.760	–7.760	0.126
Male participation rate 45+	–6.422	–6.453	0.077
Female participation rate 45–59	–5.546	–5.704	0.606
Female participation 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 <sup>a</sup>	–3.129	0.171
Unemployment rate	–2.131	–3.989	0.167
	I(0) vs. I(1)		
Male participation rate 45–64	–0.260	–0.217	0.868
Male participation rate 45+	–0.956	–1.294	0.618
Female participation rate 45–59	1.031	0.449	0.384
Female participation 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

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

<sup>a</sup>The test equation includes the intercept

Source: authors' calculations; data sources: LFS and Central Statistical Office Poland

or more, (ii) female participation rates and unemployment rate lagged by 7 periods or more, (iii) male discouraged worker rates and GDP lagged by 2 periods or more, (iv) 45+ female discouraged worker rate and GDP lagged by 9 periods or more, (v) male discouraged worker rates and unemployment rate lagged by 2 periods or more and (vi) 45+ female discouraged worker rate and unemployment rate lagged by 5 periods or more.

**Table 2** Correlation coefficients between cyclical components of male and female participation rates, male and female discouraged workers rates, GDP and unemployment rate computed on the basis of the HP filter estimates

Variable	Hodrick-Prescott filter	
	GDP	Unemployment rate
Male participation rate 45–64	–0.079	0.048
Male participation rate 45+	0.190	0.031
Female participation rate 45–59	–0.364 <sup>c</sup>	0.545 <sup>c</sup>
Female participation rate 45+	–0.207	0.491 <sup>c</sup>
Male discouraged worker rate 45–64	–0.305 <sup>b</sup>	0.251 <sup>a</sup>
Male discouraged worker rate 45+	–0.327 <sup>b</sup>	0.270 <sup>b</sup>
Female discouraged worker rate 45–59	–0.122	0.091
Female discouraged worker rate 45+	–0.174	0.134

<sup>a</sup>Significant at the 10% level; <sup>b</sup>significant at the 5% level; <sup>c</sup>significant at the 1% level

Source: authors' calculations; data sources: LFS and Central Statistical Office Poland

We sought the relationship between either the participation rate or discouraged worker rate and the macroeconomic indicator. We searched for the long-term relationship and tested for potential asymmetry in the adjustment process. We found two interesting results (see Table 3). The first equation described how the female participation rate (for females 45+) depended on the unemployment rate (lagged by 10 periods).

$$\text{female activity rate}_t \text{ (for females 45+)} = \alpha_0 + \alpha_1 \text{ unemployment rate}_{t-10} + \varepsilon_t$$

The second equation displayed how the unemployment rate (for males 45+ lagged by five periods) affected the male discouraged worker rate (for 45+ males).

$$\begin{aligned} \text{male discouraged worker rate}_t \text{ (for males 45+)} \\ = \alpha_0 + \alpha_1 \text{ unemployment rate (for males 45+)}_{t-5} + \varepsilon_t \end{aligned}$$

The equations revealed stable long-term relationships. In both specifications, the residuals suffered from autocorrelation, but once we added the AR(1) term, the results remained virtually unchanged.<sup>15</sup> The models approached a new equilibrium within four or two quarters, respectively. The coefficients of the positive and negative correction terms differed. In the female participation equation, the  $\hat{\varepsilon}_t^+$  coefficient was not statistically different from zero. The  $\hat{\varepsilon}_{t-1}^-$  coefficient proved this equation returned to equilibrium within 2.5 quarters after the negative shock. The Wald test statistics confirmed that these coefficients differed. We did not find statistically significant asymmetry in the duration of the effect in the male discouraged worker rate equation.

Another equation for females allowed for asymmetry in the short- and long term simultaneously and produced more detailed results. Regular ECM estimates indicated that changes in the unemployment rate inversely affected the participation rates in the short term and in the long term. In the long term, we got similar results to the previous ones. The model quickly returned to a long-term equilibrium after the negative shock, but once the unemployment rate increased, the changes were very long lasting. In the short term, the coefficient of the deviation in the unemployment rate implied a one-directional change in the participation rate. Once we separated positive and negative deviations in the unemployment rate, the results differed. The negative change in the unemployment rate entailed a decrease in the participation rate. The positive deviation demonstrated a statistically insignificant coefficient. The coefficients of the  $\Delta \text{unemployment rate}^+$  and  $\Delta \text{unemployment rate}^-$  variables differed statistically significantly (based on Wald test statistics).

We verified the asymmetry in the effect duration for females and estimated the TAR-ECM and M-TAR ECM specifications (Enders and Granger 1998; Enders and Siklos 2001). We assumed the threshold at the level  $\tau = 0$  or estimated it. The M-TAR specification with a threshold value  $-0.0024$  produced statistically significant results (see Table 4). The threshold cointegration t-Max test indicated that variables were not cointegrated, but the alternative test  $\rho_1 = \rho_2 = 0$  led to a contrary outcome. Enders and Siklos (2001) proved that the second test can have more power than the first one. The  $\rho_1 = \rho_2$  hypothesis result implied threshold cointegration. The model returned faster to equilibrium after the negative impulse.

Apart from the asymmetry in the length of the adjustment process, we analysed the asymmetry in the size of the discouraged worker effect over the business cycle. We applied the solutions proposed by Darby et al. (1998) and O'Brien (2011). The first paper defined

**Table 3** Female participation rate regressed on the lagged unemployment rate, and male discouraged worker rate regressed on the lagged male unemployment rate, long-term, ECM and asymmetric ECM estimate results

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

Data seasonally adjusted. Dependent variable: quarterly female participation rate (45+) or male discouraged worker rate (45+)

<sup>a</sup>significant at the 5% level; <sup>b</sup>significant at the 1% level

Source: authors' calculations; data sources: LFS and Central Statistical Office Poland

the dummy variable. It equals one from the period when the cyclical component of GDP reaches a peak until the trough and zero elsewhere. In our model, the dummy variable coefficient was not statistically significant. Thus, the impacts from the cyclical downturn and the economic recovery on the discouraged worker rate were comparable in size.

**Table 4** Results of the threshold cointegration tests for the female participation rate equation

Female participation rate (45+)				
Parameter, hypotheses	Pattern of adjustment			
	TAR		M-TAR	
$\tau$	0	-0.0097	0	-0.0024
$\rho_1$ (above threshold)	-0.185 (0.147)	-0.086 (0.114)	-0.007 (0.123)	0.005 (0.096)
$\rho_2$ (below threshold)	-0.116 (0.133)	-0.359 (0.214)	-0.386 <sup>b</sup> (0.161)	-0.813 <sup>c</sup> (0.201)
$\rho_1 = \rho_2$	0.130	1.257	3.491 <sup>a</sup>	13.461 <sup>b</sup>
t-Max value	-0.874	-0.757	-0.058	0.048
$\rho_1 = \rho_2 = 0$	1.110	1.706	2.886	8.152 <sup>a</sup>

Standard errors reported in parentheses

<sup>a</sup>Significant at the 10% level; <sup>b</sup>significant at the 5% level; <sup>c</sup>significant at the 1% level

Source: authors' calculation; data sources: LFS and Central Statistical Office Poland

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

$\Delta$ unemployment rate<sup>+</sup> =  $\Delta$ unemployment rate if  $\Delta$ unemployment rate > 0 and 0 otherwise,  $\Delta$ unemployment rate<sup>-</sup> =  $\Delta$ unemployment rate if  $\Delta$ unemployment rate < 0 and 0 otherwise.

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

$$\text{cumulated}_t^+ = \text{cumulated}_{t-1}^+ + \Delta\text{unemployment rate}_t^+$$

$$\text{cumulated}_t^- = \text{cumulated}_{t-1}^- + \Delta\text{unemployment rate}_t^-$$

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

Estimation results (Table 5) indicated that the male discouraged worker rate experienced asymmetric responses to the cyclical fluctuations. At a 10% significance level, the Wald test statistics proved that the increase in the male discouraged worker rate (45+) in a recession was larger than the decrease during an economic recovery.

**Table 5** Model results allowing asymmetry in the male discouraged worker rate equation

Male discouraged worker rate (45+)		
	Coefficient	Standard error
Intercept	0.016 <sup>b</sup>	0.001
cumulated <sup>+</sup>	0.014 <sup>a</sup>	0.006
cumulated <sup>-</sup>	0.006 <sup>a</sup>	0.002
$\rho$	0.641 <sup>b</sup>	0.111
$\bar{R}^2$	0.574	
ADF ( $\rho$ value)	-6.869 (0.00)	
Wald test for the asymmetry response ( $\rho$ value)	1.842 (0.07)	

Data seasonally adjusted. Dependent variable: quarterly male discouraged worker rate (45+).  $\rho$  represents the AR(1) coefficient in the error term

<sup>a</sup>significant at the 5% level; <sup>b</sup>significant at the 1% level

Source: authors' calculations; data sources: LFS and Central Statistical Office Poland



### 3 The impact of old-age benefits on outflow from unemployment to inactivity

By looking at labour force participation, we wanted to identify factors that affected workers' withdrawal from the labour market. We broadened the standard definition of the discouraged worker effect. We wanted to determine to what extent old-age benefits discouraged workers from active job search. We treated these benefits as an alternative source of income. They could be already paid out or shortly available to eligible workers. We focused on the outflow from unemployment to inactivity and approximated the discouraged worker effect by this outflow. Thus, we did not analyse pure discouraged worker effect. By discouraged workers, in turn, we meant those who had stopped seeking a job during the 1-year interval.

We based the quantitative analysis on individual annual LFS data for the period 2004–2010. We referred either to workers aged 50–59 (females) and 50–64 (males) or to workers aged 50+ (females and males). Alike in the aggregate analysis, the upper bound of the age limit reflected the minimum retirement age. The whole sample consisted of more than 5000 individuals, 34% of whom had withdrawn from the job search within the 1-year interval. If we narrowed the sample to the working age population, 33% of more than 5000 individuals moved from unemployment to inactivity. Males constituted 57% of the sample. Almost half of the workers had sought work for 13 months or more, and almost two out of three workers had vocational or primary education. The distribution of either sex, educational level or duration of unemployment did not significantly differ between those who moved from unemployment to inactivity or those who remained unemployed. But the distribution of age (more older workers left the unemployment pool) differed between those who changed or not their status in the labour market.

We looked in more detail at incomes of older workers. Around 25% of the workers indicated that old-age benefit was a source of income in  $t_0$ . Around 12% of the workers pointed that this benefit was the main source of income, but for “only” 77% of them, the old-age benefit remained the main source of income in  $t_1$ . Almost 9% of the workers indicated that unemployment benefit was the main source of income in  $t_0$ , and for 10% of them, the old-age benefit became a main source of income in the following year.

At first, we looked at unemployed individuals who were receiving old-age benefits in  $t_0$  and compared their status after the 1-year interval (Table 6). Females and older workers were more likely to leave the labour force. Negative deviations in the unemployment rate led to an increase in the probability of labour market withdrawal.

Next, we checked if workers decided to participate in the market regardless of whether they were receiving old-age benefits in  $t_0$  or not (Table 7). Similar conclusions arose: females and older workers were more willing to move from unemployment to inactivity. Negative changes in the unemployment rate made workers more likely to exit the labour force. If the old-age benefits constituted any source of income in  $t_1$ , the workers were more than twice as likely to withdraw from the job search.

Finally, we directly identified the impact of old-age benefits and looked at the workers who were not receiving any kind of old-age benefits in  $t_0$  (Table 8). Females and older workers were more likely to leave the labour force. A decrease in the unemployment rate raised the probability of older worker outflows from the market. If the old-age benefit became a source of income in  $t_1$ , the workers were 4.7 times more likely to move from unemployment to inactivity. When we differentiated the main source of income in  $t_1$ , the workers who received old-age benefits were 8 times more likely to leave

**Table 6** Logistic regression of moving from unemployment to inactivity for workers receiving old-age benefits in  $t_0$

Workers receiving old-age benefits in $t_0$				
	Odds ratio	Standard error	Odds ratio	Standard error
Age (years)				
50–54	1		1	
55–59	1.747 <sup>b</sup>	0.268	1.748 <sup>b</sup>	0.267
60–64	4.094 <sup>b</sup>	1.342	3.746 <sup>b</sup>	0.887
>65			3.068 <sup>b</sup>	1.050
Sex				
Males	1		1	
Females	1.441 <sup>a</sup>	0.211	1.460 <sup>b</sup>	0.198
$\Delta$ unemployment rate <sup>-c</sup>	0.827 <sup>b</sup>	0.040	0.866 <sup>b</sup>	0.039
Log likelihood	-582.66		-640.32	
LR	42.95 (df = 4)		57.99 (df = 5)	
<i>p</i> value	0.00		0.00	
McFadden's adj. $R^2$	0.036		0.043	
Sensitivity	45.92% <sup>d</sup>		53.02% <sup>e</sup>	
Specificity	68.46% <sup>d</sup>		64.86% <sup>e</sup>	
Correctly classified	60.41% <sup>d</sup>		60.40% <sup>e</sup>	

The sample comprised individuals aged either 50–59 (females) and 50–64 (males) or workers aged 50+; annual data for the time period 2004–2010. Sample size for the workers aged 50–59 (females) and 50–64 (males)—927 observations; for the workers aged 50+—1010 observations

<sup>a</sup>significant at the 5% level; <sup>b</sup>significant at the 1% level

<sup>c</sup>Refers to a 1 percentage point change in the negative change in the unemployment rate

<sup>d</sup>Cut-off level in the classification table 0.3571 (based on the share of the outflow in the whole sample)

<sup>e</sup>Cut-off level in the classification table 0.3772 (based on the share of the outflow in the whole sample)

Source: authors' calculations; data sources: LFS

the workforce than those who received unemployment benefits in  $t_1$  and even 20 times more likely to leave the workforce than those who received social welfare benefits in  $t_1$ .

We considered employed workers separately. Old-age benefits constituted a source of income for 15% of the employed workers. For 13% of the employed workers, the old-age benefits were the main source of income. Around 7% of the employed workers in  $t_0$  moved to inactivity in  $t_1$ , and 59% of them stated they did not seek work because they were receiving old-age benefits. Simple logistic regressions proved that workers were more likely to withdraw from the labour force when they became eligible for old-age benefits. However, the models experienced poor statistical properties, and we have not identified any other influential variables that could indicate the discouraged worker effect.

#### 4 Discussion

The results produced some interesting findings. In a macroeconomic perspective, it appears that the added worker effect prevailed over the discouraged worker effect. The discouraged worker effect arose with lag. When economic conditions worsened, workers at first increased their job search activity, most probably to compensate for the decrease in household income. As time elapsed, they became discouraged with the unsuccessful job search and left the labour market. This substantial delay can be partially explained by the inertia in the labour market and the fact that it takes time until a new equilibrium is reached.

**Table 7** Logistic regression of moving from unemployment to inactivity for the workers receiving or not receiving old-age benefits in  $t_0$ 

Workers receiving or not receiving old-age benefits in $t_0$				
	Odds ratio	Standard error	Odds ratio	Standard error
Age (years)				
50–54	1		1	
55–59	2.135 <sup>a</sup>	0.213	2.102 <sup>a</sup>	0.208
60–64	6.593 <sup>a</sup>	1.469	4.602 <sup>a</sup>	0.840
>65			2.974 <sup>a</sup>	1.014
Sex				
Males	1		1	
Females	1.607 <sup>a</sup>	0.151	1.519 <sup>a</sup>	0.137
$\Delta$ unemployment rate <sup>-b</sup>	0.716 <sup>a</sup>	0.023	0.736 <sup>a</sup>	0.023
Old-age benefits as a source of income in $t_1$				
No	1		1	
Yes	2.285 <sup>a</sup>	0.236	2.284 <sup>a</sup>	0.231
Log likelihood	–1471.27		–1539.94	
LR	276.51 (df = 5)		296.78 (df = 6)	
<i>p</i> value	0.00		0.00	
McFadden's adj. $R^2$	0.082		0.088	
Sensitivity	60.47% <sup>c</sup>		62.27% <sup>d</sup>	
Specificity	66.51% <sup>c</sup>		65.86% <sup>d</sup>	
Correctly classified	64.76% <sup>c</sup>		64.79% <sup>d</sup>	

The sample comprised individuals aged either 50–59 (females) and 50–64 (males) or workers aged 50+; annual data for the period 2004–2010. Sample size for the workers aged 50–59 (females) and 50–64 (females)—2676 observations; for the workers aged 50+—2769 observations

<sup>a</sup>significant at the 1% level

<sup>b</sup>Refers to a 1 percentage point change in the negative change in the unemployment rate

<sup>c</sup>Cut-off level in the classification table 0.2892 (based on the share of the outflow in the whole sample)

<sup>d</sup>Cut-off level in the classification table 0.2987 (based on the share of the outflow in the whole sample)

Source: authors' calculations; data sources: LFS

ECM estimates yielded comparable conclusions. The discouraged worker effect arose once we analysed an unemployment rate lagged by 5 to 10 quarters. It is a rather long lag, but it seems to be characteristic of the Polish labour market. For example, in 2002–2004, Poland experienced jobless growth. In the short term, the added worker effect prevailed. Once we split the unemployment rate deviations into positive and negative changes, the negative change in the unemployment rate induced a decrease in the participation rate. It looks that when it was easier to find a job, some workers became “less active” and did not take part in the search and matching process.<sup>16</sup>

We found the discouraged worker effect asymmetric in size and duration. The female participation rate returned much faster to long-term equilibrium after a negative shock to the unemployment rate. This means that decreases in the unemployment rate resulted in temporary increases in the participation rate only. On the other hand, once the unemployment rate increased, females left the market almost permanently. The findings of the threshold ECM estimates were consistent with the asymmetric ECM results and reinforced the conclusions. The male discouraged worker rate model produced asymmetry in the size of the effect. More males decided to leave the market when it was harder to find a job, compared to the number of those who started actively seeking a job once employment finding chances improved.

**Table 8** Logistic regression of moving from unemployment to inactivity for workers not receiving any kind of old-age benefit in  $t_0$

Workers not receiving any kind of old-age benefit in $t_0$				
	Odds ratio	Standard error	Odds ratio	Standard error
Age (years)				
50–54	1		1	
55–59	2.607 <sup>a</sup>	0.343	2.106 <sup>a</sup>	0.289
60–64	9.713 <sup>a</sup>	2.952	7.763 <sup>a</sup>	2.387
Sex				
Males	1		1	
Females	1.733 <sup>a</sup>	0.216	1.816 <sup>a</sup>	0.235
Δunemployment rate <sup>-b</sup>	0.696 <sup>a</sup>	0.029	0.750 <sup>a</sup>	0.031
Old-age benefits as a source of income in $t_1$				
No	1			
Yes	4.714 <sup>a</sup>	1.023		
Main source of income in $t_1$				
Old-age benefit <sup>c</sup>			1	
Unemployment benefit			0.121 <sup>a</sup>	0.070
Social welfare <sup>d</sup>			0.048 <sup>a</sup>	0.021
Invalidity allowance			0.155 <sup>a</sup>	0.072
Log likelihood	-874.51		-841.02	
LR	230.57 (df = 5)		297.54 (df = 7)	
p value	0.00		0.00	
McFadden's adj. $R^2$	0.110		0.142	
Sensitivity	62.53% <sup>e</sup>		64.56% <sup>e</sup>	
Specificity	68.61% <sup>e</sup>		70.44% <sup>e</sup>	
Correctly classified	67.07% <sup>e</sup>		68.95% <sup>e</sup>	

The sample comprised individuals aged either 50–59 (females) and 50–64 (males) or workers aged 50+; annual data for the period 2004–2010. Sample size for both models—1749 observations

<sup>a</sup>significant at the 1% level

<sup>b</sup>Refers to a 1 percentage point change in the negative change in the unemployment rate

<sup>c</sup>Old-age benefits—pension or retirement benefits

<sup>d</sup>Social welfare—social benefit, non-income source, dependent

<sup>e</sup>Cut-off level in the classification table 0.2533 (based on the share of the outflow in the whole sample)

Source: authors' calculations; data sources: LFS

The logistic regression estimates proved that females and older workers were more likely to leave the workforce. The outflow from unemployment to inactivity was susceptible to business cycle fluctuations. It appears that negative changes in the unemployment rate induced workers to leave the labour market. Thus, when the unemployment rate decreased and it should be easier to find a job, the workers left the market. This suggests that older workers were less active in the labour market, which confirms stylized facts.

Our findings proved that the old-age benefits increased the probability of withdrawal from the labour market. We got this result regardless of whether workers were already receiving the benefit or were to receive it within a 1-year period. We have found that if a worker was not receiving the old-age benefit in  $t_0$  and the old-age benefit became a source of income in the following year ( $t_1$ ), then the worker was 4.7 times more likely to refrain from the job search. If, in turn, a worker was not receiving the old-age benefit in  $t_0$  and the old-age benefit became the main source of income in the following year ( $t_1$ ), then the worker was 6 times more likely to withdraw from the job search than

those who were receiving an invalidity allowance, 8 times more than those who were receiving unemployment benefits and 20 times more than those who were receiving social welfare benefits. These findings mean that eligibility for an old-age benefit generates a strong push out from the labour market.

The aforementioned qualitative findings are consistent with some of the results from the SHARE analysis. Myck et al. (2014) showed that older workers and those who became eligible for old-age benefits were more likely to leave the labour market. The participation was positively related to health status, yet at the same time, health did not significantly differentiate the timing of the outflow to inactivity.

## 5 Conclusions

In this study, we performed an empirical analysis of the discouraged worker effect among older workers. We broadened the standard definition of this effect to identify to what extent easy and early access to old-age benefits contributes to the widely observed low participation rates among older workers. We treated old-age benefits as an alternative source of income to remuneration—either as already available or as a forthcoming option.

We based the quantitative analysis on macroeconomic LFS data (2000–2013) and LFS individual data (2004–2010). Being cautious in the qualitative interpretation of the results, we drew a number of conclusions. The cyclical properties of the participation rates varied over time. The discouraged worker effect occurred among older workers but it appeared to vary over time. The added worker effect prevailed at first; the discouraged worker effect arose after some delay. The effect was asymmetric in intensity and length. A larger effect arose after a negative shock to the unemployment rate; it looks that more people left the workforce during a recession than re-entered in an expansion. The results indicate that workers left the workforce almost permanently. Interestingly, in the short term, when job finding chances improved, the participation rates decreased as well.

We found that females and older workers were more likely to withdraw from the labour market participation. Workers who received old-age benefits (and treated them as the main source of income) were 8 to 20 times more likely to leave the workforce compared to those who received either unemployment benefits or social welfare benefits.

Budgetary constraints and their projections are usually an argument in debates on the retirement age and the need to raise it. However, judging from individual perspective, the public hardly ever agrees with that need. The data do not permit us to draw strong and robust qualitative conclusions. However, we perceive our paper as a minor contribution to the complexity of arguments for a higher retirement age, which we understand as the age of the availability of the old-age benefits. The benefits seem to contribute to premature withdrawal from the labour market. At the macro level, this entails an increased fiscal burden and a welfare loss. Analysed from the labour market perspective, these benefits paid to the very old individuals are a natural part of a social safety net, but these benefits paid to the not-yet-old are not necessarily so needed. Premature withdrawals mean stronger down pressure exerted on the net remuneration for work. The working generation has to bear this higher cost arising from the old-age benefits' premature eligibility. Higher remuneration for work could be possible, if the benefits were not paid out to the not-yet-old. The argument of potentially higher remuneration for the working generation when old-age benefits are not paid to not-yet-old individuals goes beyond purely fiscal statements and may help encourage people to stay in employment rather than retire.

The case of the Polish labour market analysed in this paper gives additional future research possibility. The pension system introduced in 1999 has not only recently started to register individual account values but also started to transform the account values into benefits, which takes into account individual age of retirement. This means workers not only know but directly feel: the later the retirement the higher the benefit. The increase in benefits with postponed retirement is actuarial. Consequently, a new relatively strong factor enters the model. We see the need to extend the analysis in order to directly account for the impact of old-age benefits on workers' intentions and preferences concerning labour market participation.

## Endnotes

<sup>1</sup>Compare Benati (2001) for a literature survey on methods used in the aggregate analyses.

<sup>2</sup>Cyclical properties of the participation rates can be disturbed if worker flows are persistent (Clark and Summers 1982).

<sup>3</sup>O'Brien (2011) also argued that the impact of social security pension values on participation rates was relatively small.

<sup>4</sup>By discouraged workers, Maestas and Li (2006) meant those job seekers who were willing to work at the prevailing wage rate but were unable to find a job.

<sup>5</sup>In 2013, 44.0% as compared to, for instance, 54.8% in the Czech Republic, 67.4% in Germany and 77.7% in Sweden.

<sup>6</sup>Prospectively, it will be 67 as the minimum age for both genders. That age is to be achieved gradually (from the beginning of 2013 each year 3 months up from the initial 60 for women and 65 for men).

<sup>7</sup>Hazans (2007) showed how strong the effect of simultaneous work and old-age benefit income was. He proved that once the possibility of receiving old-age benefits simultaneously with labour income was introduced in 1996 in Estonia, the number of economically active persons aged 65–74 almost doubled in 2003.

<sup>8</sup>The previous pension system, although put down in 1999, left numerous early retirees. These are mostly women who used to retire after 30 years of employment, miners, army and police.

<sup>9</sup>Participation rate increased from 31.7% in 2004 to 44.0% in 2013 (OECD 2015).

<sup>10</sup>That was mainly due to legislation of the Martial Law of 1981–1982. Introduction of easily available various early retirement schemes was a kind of political mean to “buy” social peace.

<sup>11</sup>The difference in the lower bound of the age groups (45 or 50) results from data aggregation performed by the Central Statistical Office.

<sup>12</sup>The SHARE data produce an analogous conclusion. Moreover, health status had only a minor impact on the decision when to leave the labour force (Myck et al. 2014).

<sup>13</sup>By the discouraged worker rate we meant the ratio of the number of discouraged workers to the population.

<sup>14</sup>The reform increasing the retirement age came into force in 2013.

<sup>15</sup>The only difference was that  $p$  value of the  $\hat{\alpha}_1$  in the female participation rate equation was just above 0.05.

<sup>16</sup>Gałęcka-Burdziak and Pater (2016) drew analogous conclusions with respect to the working age population.

## Appendix

**Table 9** The main statistical properties of variables, 1999 – 2013

	Male participation rate 45–64	Male participation rate 45+	Female participation rate 45–59	Female participation 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' calculations; data sources: LFS

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

Variable	Hodrick-Prescott filter							
	Male participation rate 45–64	Male participation rate 45+	Female participation rate 45–59	Female participation 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 <sub>-1</sub>	-0.193	0.050	-0.302	-0.193	-0.235	-0.280 <sup>a</sup>	0.159	0.068
GDP <sub>-2</sub>	-0.038	0.134	-0.141	-0.115	-0.295 <sup>a</sup>	-0.337 <sup>b</sup>	0.176	0.054
GDP <sub>-3</sub>	0.025	0.142	-0.032	-0.031	-0.343 <sup>b</sup>	-0.382 <sup>b</sup>	0.244	0.093
GDP <sub>-4</sub>	0.146	0.046	0.013	-0.070	-0.384 <sup>b</sup>	-0.420 <sup>c</sup>	0.323 <sup>b</sup>	0.145
GDP <sub>-5</sub>	0.144	-0.026	0.076	-0.036	-0.425 <sup>c</sup>	-0.451 <sup>c</sup>	0.335 <sup>b</sup>	0.134
GDP <sub>-6</sub>	0.066	-0.137	0.168	0.043	-0.461 <sup>c</sup>	-0.475 <sup>c</sup>	0.296 <sup>a</sup>	0.077
GDP <sub>-7</sub>	-0.008	-0.241	0.206	0.002	-0.485 <sup>c</sup>	-0.491 <sup>c</sup>	0.265 <sup>a</sup>	0.034
GDP <sub>-8</sub>	-0.185	-0.323	0.204	0.017	-0.514 <sup>c</sup>	-0.505 <sup>c</sup>	0.151	-0.089
GDP <sub>-9</sub>	-0.234	-0.289	0.287 <sup>a</sup>	0.156	-0.537 <sup>c</sup>	-0.508 <sup>c</sup>	-0.035	-0.279 <sup>a</sup>
GDP <sub>-10</sub>	-0.224	-0.262	0.364 <sup>b</sup>	0.262 <sup>a</sup>	-0.542 <sup>c</sup>	-0.503 <sup>c</sup>	-0.153	-0.395 <sup>c</sup>
GDP <sub>-11</sub>	-0.257	-0.256	0.376 <sup>b</sup>	0.304 <sup>b</sup>	-0.529 <sup>c</sup>	-0.479 <sup>c</sup>	-0.268 <sup>a</sup>	-0.500 <sup>c</sup>
GDP <sub>-12</sub>	-0.260	-0.158	0.449 <sup>c</sup>	0.440 <sup>c</sup>	-0.484 <sup>c</sup>	-0.428 <sup>c</sup>	-0.299 <sup>b</sup>	-0.513 <sup>c</sup>
u <sub>-1</sub>	0.219	0.249	0.446 <sup>c</sup>	0.397 <sup>c</sup>	0.186	0.248	-0.174	-0.111
u <sub>-2</sub>	0.197	0.208	0.298 <sup>b</sup>	0.248	0.307 <sup>b</sup>	0.364 <sup>b</sup>	-0.131	-0.015
u <sub>-3</sub>	0.180	0.204	0.160	0.149	0.426 <sup>c</sup>	0.474 <sup>c</sup>	-0.084	0.086
u <sub>-4</sub>	0.168	0.191	0.017	0.083	0.538 <sup>c</sup>	0.574 <sup>c</sup>	-0.036	0.184
u <sub>-5</sub>	0.168	0.172	-0.123	-0.020	0.636 <sup>c</sup>	0.661 <sup>c</sup>	0.012	0.278 <sup>a</sup>
u <sub>-6</sub>	0.165	0.132	-0.262 <sup>a</sup>	-0.152	0.718 <sup>c</sup>	0.730 <sup>c</sup>	0.059	0.362 <sup>b</sup>
u <sub>-7</sub>	0.163	0.106	-0.382 <sup>b</sup>	-0.277 <sup>a</sup>	0.780 <sup>c</sup>	0.780 <sup>c</sup>	0.105	0.436 <sup>c</sup>
u <sub>-8</sub>	0.170	0.082	-0.447 <sup>c</sup>	-0.367 <sup>a</sup>	0.818 <sup>c</sup>	0.804 <sup>c</sup>	0.154	0.504 <sup>c</sup>
u <sub>-9</sub>	0.195	0.089	-0.509 <sup>c</sup>	-0.413 <sup>c</sup>	0.823 <sup>c</sup>	0.794 <sup>c</sup>	0.202	0.558 <sup>c</sup>



**Table 10** Correlation coefficients between cyclical components of male and female participation rates, male and female discouraged worker rates and lagged GDP and unemployment rate computed on the basis of the HP filter estimates (*Continued*)

$u_{-10}$	0.234	0.100	-0.575 <sup>c</sup>	-0.471 <sup>c</sup>	0.799 <sup>c</sup>	0.755 <sup>c</sup>	0.238	0.587 <sup>c</sup>
$u_{-11}$	0.235	0.051	-0.598 <sup>c</sup>	-0.505 <sup>c</sup>	0.752 <sup>c</sup>	0.699 <sup>c</sup>	0.248	0.580 <sup>c</sup>
$u_{-12}$	0.228	-0.015	-0.611 <sup>c</sup>	-0.610 <sup>c</sup>	0.682 <sup>c</sup>	0.623 <sup>c</sup>	0.239	0.545 <sup>c</sup>

<sup>a</sup>Significant at the 10% level; <sup>b</sup>significant at the 5% level; <sup>c</sup>significant at the 1% level

Source: authors' calculations; data sources: LFS and Central Statistical Office Poland

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**Competing interest**

The IZA Journal of European Labor Studies is committed to the IZA Guiding Principles of Research Integrity. The authors declare that they have observed these principles.

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**References**

- Benati L (2001) Some empirical evidence on the 'discouraged worker' effect. *Econ Lett* 70:387–395
- Benitez-Silva H (2002) Job search behavior at the end of the life cycle. Center for Retirement Research at Boston College WP 2002–10, December.
- Clark K, Summers L (1982) Labor force participation: timing and persistence. *The Review of Econ Studies*, Special Issue on Unemployment 49(5):825–844
- Connolly G (1997) The influence in reducing the male full-time unemployment rate in Australia, paper presented to the 26th Conference of Economists, University of Tasmania, 27–29 September 1997.
- Darby J, Hart R, Vecchi M (1998) Labour force participation and the business cycle: a comparative analysis of Europe, Japan and the United States, working papers 9802, Business School—Economics, University of Glasgow
- Enders W, Granger C (1998) Unit-root tests and asymmetric adjustment with an example using the term structure of interest rates. *J Bus Econ Stat* 16:304–311
- Enders W, Siklos P (2001) Co-integration and threshold adjustment. *J Bus Econ Stat* 19:166–177
- Galecka-Burdziak E, Pater R (2016) Discouraged or added worker effect? which one prevails in the Polish labour market? *Acta Oeconomica* 66(3):489–505
- Góra M (2013) Political economy of pension reforms: selected general issues and the Polish pension reform case. *IZA J Labour Dev* 2.2. doi:10.1186/2193-9020-2-2, <http://www.izajold.com/content/pdf/2193-9020-2-2.pdf>
- Gruber J, Wise D A (ed.) (1999) Social security and retirement around the world. NBER. The University of Chicago Press, Chicago
- Hazans M (2007) Looking for the workforce: the elderly, discouraged workers, minorities, and students in the Baltic labour markets. *Empirica* 34:319–349
- Maestas N, Li X (2006) Discouraged workers? Job search outcomes of older workers. University of Michigan Retirement Research Center Working Paper WP 2006-133
- Myck M, Najsztab M, Oczkowska M (2014) Dynamika rynku pracy i zmiany w sytuacji materialnej osób w wieku 50+. In: Chłóń-Domińiczak A (ed) *Portret generacji 50+ w Polsce i Europie. Wyniki badania zdrowia, starzenia się i przechodzenia na emeryturę w Europie (SHARE)*. Instytut Badań Edukacyjnych, Warszawa, <http://eduentuzjasci.pl/publikacje-ee-lista/raporty/196-raport-z-badania/portret-generacji-50-w-polsce-i-w-europie-wyniki-badania-zdrowia-starzenia-sie-i-przechodzenia-na-emeryture-w-europie-share/1060-portret-generacji-50-w-polsce-i-w-europie-wyniki-badania-zdrowia-starzenia-sie-i-przechodzenia-na-emeryture-w-europie-share.html>
- O'Brien M (2011) Discouraged older male workers and the discouraged worker effect. *Australian Journal of Labour Economics* 14(3):217–235
- OECD (2015) OECD labour force statistics 2014. OECD Publishing.
- Saint-Paul G (2004) Why are European countries diverging in their unemployment experience? *J Econ Perspect* 18(4): 49–68
- van Ham M, Mulder CH, Hooimeijer P (2001) Local underemployment and the discouraged worker effect. *Urban Stud* 38(10):1733–1751

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