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Becoming unemployed and poor in Great Britain

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ABSTRACT

In this study on Great Britain, we estimate the labour market and income process of prime-aged men simultaneously and control for spillover effects. Evidence is presented that the risk of becoming unemployed and poor increases with the duration of unemployment and decreases with the duration of employment. Moreover, the experience of poverty influences the labour market and income prospects negatively, though on a much smaller scale than does the labour market position.

KEYWORDS

Unemployment; poverty; state dependence; bivariate random-effects probit model; British Household Panel Survey (BHPS)

JEL CLASSIFICATION

J64; J62; I32; C33

I. Introduction

Studies show that, compared to employment, the experience of unemployment at time point $t - 1$ itself increases the risk of being unemployed in the following period t (see the arrow labelled ‘A’ in Figure 1); this is also called the *scarring effect* of unemployment (e.g. Arulampalam, Booth, and Taylor 2000; Plum and Ayllón 2015). One theoretical explanation is that unemployment sends out a negative signal about an individual’s productivity, and for this reason an employer might avoid hiring an unemployed applicant (Vishwanath 1989). Moreover, the negative signal might be intensified by the duration of unemployment (Kroft, Lange, and Notowidigdo 2013). State dependence is also detected in the field of income dynamics (arrow ‘B’ in Figure 1): someone who lives in a poor household has a higher probability of living in a poor household in the next period than does someone who lives in a non-poor household (see for example, Cappellari and Jenkins 2002). One explanation for state dependence in low income is that poverty increases the risk of social exclusion and weakens social ties, which are an important resource when seeking better-paid employment (see for example, Gordon et al. 2000)

Furthermore, studies have found indications that the labour market and income processes are

interrelated, and that unemployment and poverty exert a negative influence on one another (Biewen 2009; Ayllón 2015). For most households, labour market income is the main income source (OECD 2009); this shrinks if a household member becomes unemployed, and thus increases the risk of turning poor (arrow ‘C’ in Figure 1). Referring to the spillover effect of poverty on employment prospects (arrow ‘D’ in Figure 1), one explanation is that poverty-induced stress may reduce the efforts somebody makes in searching for a new job (Santiago, Wadsworth, and Stump 2011). Building on existing studies, this analysis examines the length of employment and unemployment spells in order to predict the risk of someone becoming unemployed and poor at the same time. Evidence for the United Kingdom is presented to show that the risk of being poor and unemployed increases with the duration of unemployment and decreases with the duration of employment, and that especially the long-term unemployed suffer from a higher risk of staying unemployed and becoming poor.

II. Data

We use data from the British Household Panel Survey (BHPS), which provides annual data at the individual

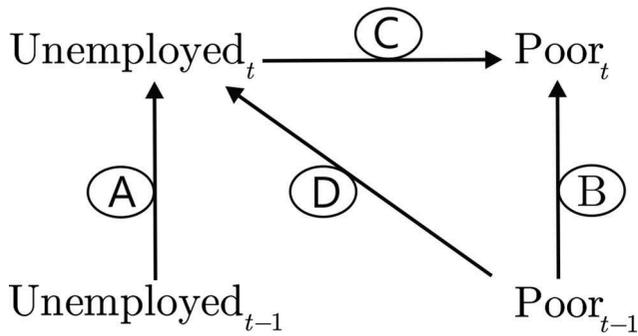


Figure 1. Interrelation of the unemployment and poverty process.

and household level (Taylor 2006). The data set covers the years 1996 to 2008, and is restricted to employed (excluding self-employed, members of the army and persons in full-time education) or unemployed men aged 25–55. The total sample contains 19,957 observations, and 96.82% are defined as employed and 3.18% as unemployed. Furthermore, a household is identified as poor if household net income, adjusted according to the OECD modified scale, is below the annually adjusted threshold of 60% of median household net income. In total, 11.65% of observations are identified as poor. An interrelationship between poverty and unemployment can be detected by examining the descriptive statistics: while about 9.4% of employed men are poor, 79.97% of the unemployed live in a low-income household.

III. Econometric model

To analyse the interrelationship between unemployment and poverty, we follow the suggestion of Ayllón (2015) by applying a bivariate framework. There are two dependent variables: $y_{it}^{ue} = 1$ if the individual i is unemployed at time $t \in \{1, \dots, T_i\}$ and 0 otherwise; and $y_{it}^{poor} = 1$ if the individual lives in a poor household and 0 otherwise. The bivariate model takes the following forms:

$$y_{it}^{ue} = \mathbf{1} \left\{ \begin{aligned} &\varphi_1 y_{it-1}^{ue} + \varphi_2 y_{it-1}^{ue: 90-360 \text{ days}} + \varphi_3 y_{it-1}^{ue: > 360 \text{ days}} + \eta_1 y_{it-1}^{em: 90-360 \text{ days}} + \eta_2 y_{it-1}^{em: 360-720 \text{ days}} \\ &+ \eta_3 y_{it-1}^{em: > 720 \text{ days}} + \phi y_{it-1}^{poor} + x'_{1it} \beta_1 + v_{1i} + u_{1it} > 0 \end{aligned} \right\} \quad (1.1)$$

and

$$y_{it}^{poor} = \mathbf{1} \{ \delta_1 y_{it-1}^{poor} + \delta_2 y_{it}^{ue} + x'_{2it} \beta_2 + v_{2i} + u_{2it} > 0 \} \quad (1.2)$$

Referring to Equation 1.1, the probability of being currently unemployed is explained by the unemployment position in the previous period y_{it-1}^{ue} and its duration, differentiated according to whether the spell of unemployment is short term (below 90 days, omitted as the reference category), medium term (between 90 and 360 days, $y_{it-1}^{ue: 90-360 \text{ days}}$) or long term (more than 360 days, $y_{it-1}^{ue: > 360 \text{ days}}$). Those individuals who were employed at $t - 1$ are assigned to one of four categories, depending on how long they have been employed: entrants (employment spell below 90 days, omitted as the reference category), short term (between 90 and 360 days, $y_{it-1}^{em: 90-360 \text{ days}}$), medium term (between 360 and 720 days, $y_{it-1}^{em: 360-720 \text{ days}}$) and long term (more than 720 days, $y_{it-1}^{em: > 720 \text{ days}}$).¹ Furthermore, the experience of poverty at $t - 1$ (y_{it-1}^{poor}) might increase the risk of becoming unemployed. Moreover, explanatory variables x'_{1it} are included.² The risk of living in a poor household (1.2) is explained by the household income position in the previous period (y_{it-1}^{poor}), the current labour market position (y_{it}^{ue}) and explanatory variables (x'_{2it}). Moreover, it is assumed that the individuals differ in their unobservables, and a time-invariant individual-specific error term v_{ji} with $j \in \{1, 2\}$ is included. The error term u_{jit} refers to an idiosyncratic shock.

As the initial labour market position and income position are not randomly distributed, we follow the suggestion of Wooldridge (2005) and condition the dynamic sequence of (1.1) and (1.2) on the labour market position and the income position, respectively, in the initial period $t = 0$ ³:

¹A distributional chart of the spell length of the different labour market positions can be found in the supplemental data.

²Explanatory variables are: post-secondary education (dummy), age (four categories), marital status (dummy), regional unemployment rate, spouse working (dummy), number of children living in household (categorical: 0, 1, 2, 3, 4+), year dummies.

³Note that \bar{z}_j refers to the explanatory variables post-secondary education and marital status.

$$v_{1i} = a_{01} + \gamma_1 y_{it=0}^{ue} + \lambda_{11} \bar{x}_{1i} + \lambda_{12} \bar{z}_{1i} y_{it=0}^{ue} + \alpha_{1i}$$

and

$$v_{2i} = a_{02} + \gamma_2 y_{it=0}^{poor} + \lambda_{21} \bar{x}_{2i} + \lambda_{22} \bar{z}_{2i} y_{it=0}^{poor} + \alpha_{2i}$$

For identification purposes, it is assumed that $\alpha_{ji} \sim (0, \sigma_{\alpha_j}^2)$ and $u_{jit} \sim (0, \sigma_{u_j}^2)$ with $\sigma_{u_j}^2 = 1$ and the following correlation structure is implemented: $V_\alpha = \begin{pmatrix} \sigma_{\alpha_1}^2 & \\ \rho_\alpha \sigma_{\alpha_1} \sigma_{\alpha_2} & \sigma_{\alpha_2}^2 \end{pmatrix}$ and $V_u = \begin{pmatrix} 1 & \\ \rho_u & 1 \end{pmatrix}$. The individual outcome probabilities are:

$$P_{it}(\alpha_1^*, \alpha_2^*) = \Phi_2 \left[(2y_{it}^{ue} - 1)\mu_{it}^{ue}, (2y_{it}^{poor} - 1)\mu_{it}^{poor}, (2y_{it}^{ue} - 1)(2y_{it}^{poor} - 1)\rho_u \right]$$

with Φ_2 referring to the bivariate normal cumulative distribution function,

$$\begin{aligned} \mu_{it}^{ue} = & \varphi_1 y_{it-1}^{ue} + \varphi_2 y_{it-1}^{ue: 90-360 \text{ days}} + \varphi_3 y_{it-1}^{ue: >360 \text{ days}} + \eta_1 y_{it-1}^{em: 90-360 \text{ days}} + \eta_2 y_{it-1}^{em: 360-720 \text{ days}} \\ & + \eta_3 y_{it-1}^{em: >720 \text{ days}} + \phi y_{it-1}^{poor} + x'_{1it} \beta_1 + \gamma_1 y_{it=0}^{ue} + \lambda_{11} \bar{x}_{1i} + \lambda_{12} \bar{z}_{1i} y_{it=0}^{ue} + \sigma_{\alpha_1} \alpha_1^* \end{aligned}$$

and

$$\begin{aligned} \mu_{it}^{poor} = & \delta_1 y_{it-1}^{poor} + \delta_2 y_{it}^{ue} + x'_{2it} \beta_2 + \gamma_2 y_{it=0}^{poor} + \lambda_{21} \bar{x}_{2i} \\ & + \lambda_{22} \bar{z}_{2i} y_{it=0}^{poor} + \sigma_{\alpha_2} \alpha_2^* \end{aligned}$$

For estimating a bivariate random-effects probit model, we apply the command `bireprob`, which uses maximum simulated likelihood (Plum 2016).

$$\begin{aligned} & \Phi_2 \left[\begin{aligned} & \left(\hat{\phi}_1 + \hat{\phi} y_{it-1}^{poor} + x'_{1it} \hat{\beta}_1 + \hat{\gamma}_1 y_{it=0}^{ue} + \hat{\lambda}_{11} \bar{x}_{1i} + \hat{\lambda}_{12} \bar{z}_{1i} y_{it=0}^{ue} \right) \sqrt{1 - \vartheta_1}, \\ & \left(\hat{\delta}_1 y_{it-1}^{poor} + \hat{\delta}_2 p_1 [y_{it}^{ue}] + x'_{2it} \hat{\beta}_2 + \hat{\gamma}_2 y_{it=0}^{poor} + \hat{\lambda}_{21} \bar{x}_{2i} + \hat{\lambda}_{22} \bar{z}_{2i} y_{it=0}^{poor} \right) \sqrt{1 - \vartheta_2}, \hat{\rho}_u \end{aligned} \right] \\ & - \Phi_2 \left[\begin{aligned} & \left(\hat{\phi} y_{it-1}^{poor} + x'_{1it} \hat{\beta}_1 + \hat{\gamma}_1 y_{it=0}^{ue} + \hat{\lambda}_{11} \bar{x}_{1i} + \hat{\lambda}_{12} \bar{z}_{1i} y_{it=0}^{ue} \right) \sqrt{1 - \vartheta_1}, \\ & \left(\hat{\delta}_1 y_{it-1}^{poor} + \hat{\delta}_2 p_2 [y_{it}^{ue}] + x'_{2it} \hat{\beta}_2 + \hat{\gamma}_2 y_{it=0}^{poor} + \hat{\lambda}_{21} \bar{x}_{2i} + \hat{\lambda}_{22} \bar{z}_{2i} y_{it=0}^{poor} \right) \sqrt{1 - \vartheta_2}, \hat{\rho}_u \end{aligned} \right] \end{aligned}$$

IV. Results

Estimation results can be found in Table 1.⁴ Indications are presented that individuals differ in their unobservables and that these are positively correlated ($\rho_\alpha = 0.262$). The risk of becoming unemployed (left panel) decreases with the duration of employment ($|y_{it-1}^{em: 90-360 \text{ days}}| < |y_{it-1}^{em: 360-720 \text{ days}}| < |y_{it-1}^{em: >720 \text{ days}}|$)⁵ and increases with the duration of unemployment ($y_{it-1}^{ue: 90-360 \text{ days}} < y_{it-1}^{ue: >360 \text{ days}}$). Furthermore, the experience of poverty increases the risk of

becoming unemployed. Moreover, there are indications of state dependence in poverty, and being unemployed increases the poverty risk substantially (right panel).

To derive the impact of the past labour market position on the risk of becoming unemployed and poor, the average partial effects (APE) of becoming unemployed and poor of someone employed and someone unemployed, differentiated according to the different levels of (un)employment duration are calculated⁶:

⁴The complete estimation output can be found in the supplemental data.

⁵The hypothesis that all three coefficients are of the same size is strongly rejected, $\chi^2(2) = 10.26$ [p -value = 0.0059].

⁶The example refers to the risk difference between someone who is short-term unemployed (<90 days) and entrants into employment (employment spell below 90 days). The remaining average partial effects are calculated accordingly.

Table 1. Estimation results.

Dep. variable: being unemployed at t		Dep. variable: being poor at t	
$y_{it-1}^{em: 90-360 \text{ days}}$	-0.246 (0.101)	y_{it}^{ue}	1.980 (0.200)
$y_{it-1}^{em: 360-720 \text{ days}}$	-0.358 (0.110)	y_{it-1}^{poor}	0.854 (0.057)
$y_{it-1}^{em: >720 \text{ days}}$	-0.489 (0.092)		
y_{it-1}^{ue}	0.261 (0.172)		
$y_{it-1}^{ue: 90-360 \text{ days}}$	0.606 (0.164)		
$y_{it-1}^{ue: >360 \text{ days}}$	1.338 (0.159)		
y_{it-1}^{poor}	0.361 (0.080)		
	$\sigma_{a_1}^2$	0.296 (0.092)	
	$\sigma_{a_2}^2$	0.818 (0.091)	
	ρ_a	0.262 (0.102)	
	ρ_u	0.227 (0.078)	
	Log likelihood	-5107.229	
	Observations	19,957	

Own calculations. Standard errors are in parentheses.
Source: BHPS 1996–2008.

with $\vartheta_j = \sigma_{\alpha_j}^2 / (\sigma_{\alpha_j}^2 + 1)$

$$p_1[y_{it}^{ue}] = \Phi \left[\left(\hat{\varphi}_1 + \hat{\varphi} y_{it-1}^{poor} + x'_{1it} \hat{\beta}_1 + \hat{\gamma}_1 y_{it=0}^{ue} + \hat{\lambda}_{11} \bar{x}_{1i} + \hat{\lambda}_{12} \bar{z}_{1i} y_{it=0}^{ue} \right) \sqrt{1 - \vartheta_1} \right]$$

and

$$p_2[y_{it}^{ue}] = \Phi \left[\left(\hat{\varphi} y_{it-1}^{poor} + x'_{1it} \hat{\beta}_1 + \hat{\gamma}_1 y_{it=0}^{ue} + \hat{\lambda}_{11} \bar{x}_{1i} + \hat{\lambda}_{12} \bar{z}_{1i} y_{it=0}^{ue} \right) \sqrt{1 - \vartheta_1} \right]$$

The APE are presented in Table 2. Being unemployed at $t - 1$ for less than 360 days increases on average the risk of being unemployed and poor at t by 0.5–3.2 percentage points (pp), compared to someone who was employed. The risk of being unemployed and poor at t increases on average by 7.1–7.8 pp if at $t - 1$ the individual was long-term unemployed (>360 days), rather than employed.

Finally, the average partial effect of poverty on the risk of becoming unemployed and poor is calculated: someone who was poor at $t - 1$ has on average a 1.0 pp greater risk of being unemployed and poor at t than does someone who was living in a non-poor household.⁷ This effect is noticeably smaller than the effect of medium-term and long-term unemployment on the labour market and income prospects (last two rows of Table 2).

V. Conclusion

This study shows that the risk of becoming unemployed and poor is highly influenced by the labour market position and the duration of employment/unemployment. There are indications that especially the long-term unemployed (unemployment duration of >360 days) face a substantially greater risk of

staying unemployed and becoming poor than do their employed counterparts. Also the experience of

Table 2. Average partial effects of becoming unemployed and poor.

		Employment duration			
		<90 days	90–360 days	360–720 days	>720 days
Unemployment duration	<90 days	0.0053 (0.0036)	0.0089 (0.0039)	0.0102 (0.0040)	0.0115 (0.0042)
	90–360 days	0.0253 (0.0071)	0.0290 (0.0076)	0.0303 (0.0078)	0.0316 (0.0080)
	>360 days	0.0713 (0.0141)	0.0750 (0.0145)	0.0763 (0.0147)	0.0776 (0.0149)

$N = 19,957$, own calculations. Standard errors are in parentheses.
Source: BHPS 1996–2008.

⁷The average partial effect is significantly different from zero at the 1% level.

poverty increases the risk becoming unemployed and poor, though on a much smaller scale.

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