

Low-Wage Employment in Czechia: A Persistent Burden¹

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Abstract

Working for low pay may have substantial negative consequences at both the individual and societal level. This article adds to scarce research on low pay in Czechia, employing pooled longitudinal EU-SILC data for 2004 – 2017. It analyses patterns of low-wage employment and estimates the degree of low-pay persistence in terms of genuine state dependence in low-wage employment, accounting for both observed and unobserved heterogeneity among workers and endogeneity in the initial conditions. The results indicate that low pay exhibits a significant degree of state dependence in Czechia: having a low-paid job on average increases the likelihood of staying low paid in the future by 14 percentage points. The most important individual factors predisposing workers to earn low wages and get stuck in a low-paid job are low education and the female gender.

Keywords: low-wage employment, low pay, low pay persistence, EU-SILC data

JEL Classification: C23, J31, J69

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Introduction

Low-wage employment is an important concern among policymakers in Europe. In the context of growing wage and income inequality registered in developed countries in recent decades (OECD, 2018), the large proportion of

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employees working for low wages and with incomes below the poverty line has become an issue of increasing importance.

When considering the situation of low-paid workers, one of the key issues is whether working in a low-paid job is a long-term and persistent state affecting specific groups of workers or a rather short-term, transitory situation.² For some workers, low pay may transitorily occur at the start of their careers, compensate for a lack of experience and act as a pathway to future, better-paying jobs. Similarly, some workers may experience low pay as a random event during their work careers. Nevertheless, for some groups of workers, a low-paid job may represent a permanent ‘trap’ that is difficult to escape and may be related to several serious social issues.

On the individual level, low-wage employment may increase the risk of poverty (Clark and Kanellopoulos, 2013), have a close relationship to increasing household indebtedness (Rajl, 2019) and, ultimately, lead to a rising share of debtors having been distrained. Furthermore, low pay may increase the incentives for workers to join (at least partially) the shadow sector to avoid taxes and thus increase net wages, which may, however, further deteriorate the working and living conditions of workers due to less coverage from employment protection legislation, unemployment or pension insurance, and the like. On the societal level, large inequalities and a rising share of the populace that is pessimistic about future income growth and improvements in their standard of living may substantially increase the risk of social tensions and represent a serious threat to social cohesion and political stability (van de Werfhorst et al., 2012). All these potentially substantial negative consequences of low pay may be magnified by the impact of technological progress, raising concerns about the sustainability of employment as a guarantee of decent living conditions. Low-paid labour has also been largely affected by the COVID-19 pandemic, which has increased social inequalities (ILO, 2020).

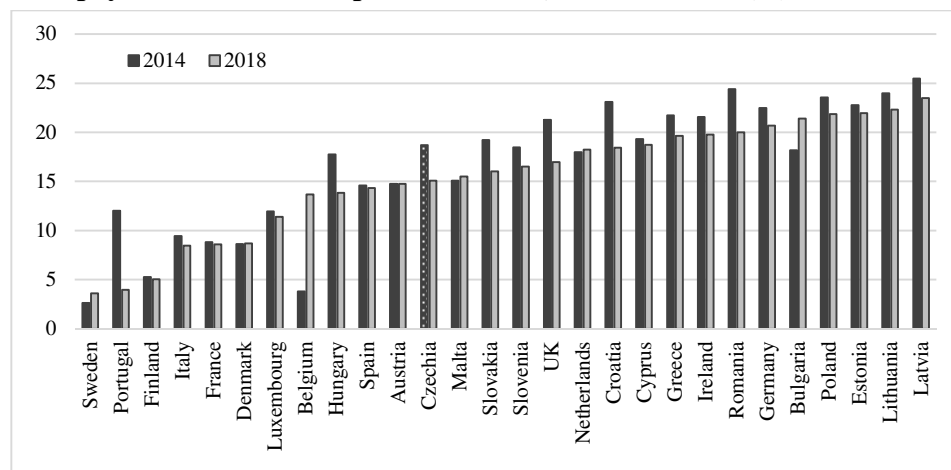
According to Eurostat data from the Structure of Earnings Survey (SES), Czechia had an above-average share of employees working for low wages in 2006 – 2014. As shown in Figure 1, the incidence of low-wage employment was 18.7% in 2014 – higher than the EU-27 average of 16.4% – placing Czechia’s position among EU countries, ranked according to the incidence of low-wage employment, around the middle. Most of the remaining Central and Eastern European (CEE) countries exhibited a higher incidence with the exception of Slovenia, Bulgaria and Hungary. However, the low-pay incidence in Czechia

² Throughout the text, the terms ‘low pay’ and ‘low wage’ are used interchangeably and refer to the same phenomenon.

decreased substantially in the following years, such that by 2018, it only had a low pay incidence of 15.1% – almost even with the EU-27 average of 15.2% – and had slightly improved its situation compared to other countries.

Figure 1

Low-pay Incidence in European Countries, 2014 and 2018 (%)



Note: Low-pay is defined as a wage lower than two-thirds of the national median gross hourly earnings, referring to all employees (both full-time and part-time, excluding apprentices) working in enterprises with 10 employees or more, covering all sectors of the economy except agriculture, forestry and fishing as well as public administration and defence. Countries ranked according to low-pay incidence in 2018.

Source: Eurostat Structure of Earnings Survey, table [EARN_SES_PUB1S__custom_164795].

In order to understand the nature of low-wage employment, it is crucial to know whether low pay is a result of some specific (either observable or unobservable) worker characteristics that make them more prone to having low-paid jobs, or whether the experience of having a low-paid job has a direct causal effect on the likelihood of staying in low-wage employment in the future. Whereas the first option refers to the heterogeneity of individuals, the second – low-pay persistence – relates to state dependence.

The empirical evidence on low-wage employment in CEE to date is limited in comparison to the large amount of literature in Western European countries. In this sense, the article adds to the relatively scarce research on low-wage employment in CEE post-transition countries and represents the first attempt to estimate the nature and extent of low-pay persistence as regards genuine state dependence in Czechia. For this purpose, longitudinal data from the European Union – Statistics on Income and Living Conditions (EU-SILC) for 2004 – 2017 are utilised. This article also provides new insights into the characteristics of the low-wage population in Czechia, which are useful for social policy considerations

regarding the fight against poverty and in-work poverty. Furthermore, knowing who low-wage earners are and what factors drive low pay is crucial for the formulation of any strategy to increase low wages in the country.³

The article is structured as follows. The next section reviews the results of recent literature on low-pay persistence and wage determination in Czechia. The section that follows discusses the definition of low pay, the utilized approach and the data employed. The main characteristics of low-wage employment in Czechia and its raw persistence over time is then described. After providing an outline of the methodological background for the model estimations, the results are presented, and the final section concludes.

1. Literature Review

The main factors determining the wage level in Czechia changed considerably during the process of economic transformation. Whereas before 1989 the most important wage drivers were the demographic characteristics of workers, job tenure or the ideological status of certain jobs, after the Velvet Revolution wages started to reflect education, experience or skills and inter-industry wage differentials started to grow (Mysíková, 2012). After a decade of transformation, wage-age profile, gender differences, occupational structure or returns to education started to resemble those in the countries of Western Europe (Balcar and Gottvald, 2016).

In an international comparison based on SES data from 2018 (Alcantara-Ortega, Henrion and Pérez-Julián, 2021) wages grow rather slowly with the increasing age of workers in Czechia, significantly less than in the majority of other European countries. In a similar vein, the effect of education is rather low by European comparison. In contrast, the effect of gender is very pronounced. Women enjoy much lower returns for education than men in Czechia. The gender wage gap is one of the largest in Europe (at more than 20% until 2018 with a modest decrease thereafter) and, moreover, the largest part of this gap (83%) cannot be attributed to the different characteristics of men and women as observed in the data (Leythienne and Ronkowski, 2018). Other significant factors negatively affecting the level of wages in Czechia include working for a fixed-term contract, working part-time or working in a small enterprise (Alcantara-Ortega et al., 2021). As a result, there are specific groups of workers that are more prone to earning low pay, with the main risk factors including female gender, lower age, low skill and educational level, and manual job position on a part-time or fixed-term contract (Maitre, Nolan and Whelan, 2012).

³ See Myant (2018) for a detailed discussion on low aggregate wage level in the CEE region.

While low pay may be related to many serious social issues, it may be a lesser problem when employment in low-wage jobs is a transitory state serving as a ‘stepping stone’ towards better-paying jobs. This, however, often does not seem to be the case in many countries. Instead, low pay is a persistent and recurring state for a significant share of workers (Clark and Kanellopoulos, 2013), representing a ‘dead end’ rather than a means of access. Mason and Salverda (2010) in this sense refer to low-paid jobs as ‘sticky jobs’. Low pay may signal that a worker’s productivity is low to a potential employer and, furthermore, may be associated with deterioration in human capital and a reduced intensity in the search for a better-paid job. As a result, working in a low-paid job may negatively affect future employment prospects in a similar way to an unemployment trap through these ‘scarring’ effects (Schnabel, 2021).

Not only do low-paid workers tend to remain in similar jobs, they are also more likely to enter unemployment or inactivity. Stewart (2007), using 1991 – 1996 British Household Panel Survey data, showed that low pay and unemployment have comparable effects on future employment prospects. In this sense, low-paid work may not be an effective tool to fight poverty as workers become ‘stuck’ to low-paid jobs, becoming a pathway to long-term, in-work poverty. Moreover, low-pay persistence may even extend to future generations, as indicated by the recent research of Gregg, Macmillan and Vittori (2019), who found a J-shaped relationship between parental income and sons earnings in British Cohort Study Data.

Previous literature generally found a significant degree of low-pay persistence both in studies of particular countries and in a cross-country framework, although they differ in evaluating the importance of personal or job-related determinants. Stewart and Swaffield (1999) revealed a significant low-pay persistence in UK data that was higher for women and lower for workers employed in large firms and members of trade unions. Similarly, Asplund et al. (1998) report that the effect of occupational factors is larger than the individual characteristics of low-paid workers in Denmark and Finland. In the same vein, Cappellari (2000) reveals significant state dependence in low pay using Italian data and shows that while individual characteristics may affect low-pay persistence, job-related factors are important drivers that reduce low-pay inflow. Further, Sloane and Theodossiou (1998) found out that individual characteristics such as age, education and marital status are important factors explaining differences in low-pay persistence; however, job-related factors also play some role. Mosthaf, Schnabel and Stephani (2011) confirm substantial low-pay persistence in Germany and show that upward wage mobility is higher for male, younger and higher educated low-wage earners, with occupational characteristics also affecting the

probability of escaping low pay. Silva et al. (2018) examined the duration of the low-wage situation in Portuguese data and concluded that female, less educated and older workers tend to stay longer in low pay. The size of the company and regional effects also played a role. Other studies generally confirm the persistence of low pay in European countries, with varying accents on different factors (e.g., Bazen, 2001; Vieira, 2005; Cuesta, 2008). Clark and Kanellopoulos (2013) conducted a cross-national analysis of European Community Household Panel (ECHP) data for 12 Western European countries between 1994 and 2001 so as to estimate the extent of state dependence in low-paid jobs for male workers. Their results suggest statistically significant positive state dependence in all the countries, although its magnitude varied.

As regards the limited number of studies in CEE countries, Kiersztyn (2015) analysed long-term development in the persistence of low wages in Poland between 1988 and 2013. The author concluded that the experience of low-paid employment increases the likelihood of being low-paid five years later, even after controlling for the characteristics of workers and the effects of economic development. Bachmann, Bechara and Schaffner (2016) studied wage inequality and mobility in Europe between 2004 and 2011. They show that Czechia has a modest level of both wage inequality and mobility when compared to other European countries. Further, the authors show that, generally, earnings persistence is higher in both tails of the distribution in Europe compared to the middle. However, they do not provide detailed estimates on earnings persistence in CEE countries despite reporting substantial cross-country differences in wage mobility across European countries. Further empirical evidence in CEE is lacking.

2. Definition and Data

The definition of low-wage work is not uniform in the literature (see, e.g., Grimshaw, 2011; Keese, Puymoyen and Swaim, 1998; OECD, 1996). In general, there are three ways to define low-paid work: through (i) absolute wage levels, (ii) relative wages or (iii) a fixed share of employees in the distribution of income (e.g., the bottom 20% of employees).

The first definition, in absolute wage levels, is often used to highlight the link between poverty and low wages (e.g., Cooke and Lawton, 2008) but its variation over time and between countries, preventing comparisons, is a disadvantage. The second, relative and most frequently used definition (also employed in reports from the Organisation for Economic Co-operation and Development; OECD) better allows for international comparisons and also takes into account the fact that relative income has both social and economic aspects. The third method of

definition is used less often (e.g., Sloane and Theodossiou, 1994; Clark and Kanellopoulos, 2013) and serves mainly to monitor the relative disadvantage of low-pay penalties between countries and over time (Grimshaw, 2011).

For each of these definitions, utilization of gross or net wages is possible. Although some studies work with net wages (e.g., Cappellari, 2000), gross earnings are the most frequently used as they are close to a textbook definition of the price of labour and capture the market evaluation of employee productivity. Wage may be further measured on an hourly or monthly basis. The use of a monthly (or weekly, annual) wage is in line with the concept of estimating a certain financial amount that enables the coverage of basic needs. However, the monthly wage depends on hours worked, which may vary between demographic groups and also evolve over time. As a result, its use does not allow for the analysis of part-time employees.⁴

Following the OECD's approach, this research uses the relative indicator of the share of full-time employees working for a wage lower than two-thirds of the median wage to measure the extent of low-paid work in baseline model estimations.⁵ EU-SILC survey data covering the 2004 – 2017 period are employed, which provide a detailed picture of the characteristics of low-paid employees.⁶ The data are unique as regards the availability of both personal and household characteristics as well as the availability of both cross-sectional and longitudinal components, the latter being crucial to the analysis of low-pay persistence. For the purposes of this research, the use of EU-SILC is appropriate since it is the only source of longitudinal data including information on wages available for CEE countries.⁷

EU-SILC is a household survey harmonized across all EU member states and has been compulsorily conducted annually since 2005. EU-SILC is not a classical longitudinal dataset but a four-year rotating panel, and the number of individual observations over time is limited. It also has some limitations in terms of wage measurement (Iacovou, Kaminska and Levy, 2012; Jenkins and Van Kerm,

⁴ Furthermore, the concept of low-paid work by definition excludes the self-employed, who often represent an even more vulnerable form of employment.

⁵ Whereas the OECD works with hourly wages, this research uses monthly wages.

⁶ Data from Eurostat are used, cross-sectional EU-SILC – Cross UDB 2005 – 2017 and longitudinal EU-SILC – Long 2008 – 2017, March 2019 version.

⁷ At the micro level, the limited availability of internationally comparable data on individual incomes in CEE countries represents a relatively significant obstacle to the analysis of low-paid work. Studies for Western European countries often use the ECHP or the SES. The SES has several limitations for use in low-paid labour research: it completely omits the agricultural and public sectors as well as small businesses with less than 10 employees, has no longitudinal component and lacks information on household levels. The ECHP ended in 2001 and did not cover Czechia at all.

2014) which are typical of surveys at the household level (see discussions in Maitre et al., 2012; or Bachmann et al., 2016). Compared to data from surveys based on company records commonly used for official wage statistics, wages in household surveys are usually underestimated. However, the statistical bias increases with wages (Večerník and Mysíková, 2016), which implies a lower bias in analyses related to poverty and low wages. To eliminate possible distortions resulting from these limitations, I use the strategy described in Engel and Schaffner (2012).

The data present annual income variables and monthly economic activity during year t while job characteristics and current economic activity relate to the survey collection time $t + 1$. The data contain information on yearly gross wages in t ; gross monthly wages are calculated according to the number of months worked in period t ; hourly wages are unavailable due to the lack of data on the number of hours actually worked. For the panel model specification, I utilize information for four consecutive years available in the longitudinal datasets, so there are four observations per individual. However, once low-pay persistence is analysed, lagged variables are used, which leaves three observations per individual. The sample is limited to workers 16 to 64 years old who reported full-time (dependent) employment throughout the whole year t .⁸ I eliminated individuals who received any sickness benefits in period t as this biases the construction of their monthly wage variable considerably. This leaves an average of 3,300 individuals per year (for details, see the last column of Table 1).

3. Low-pay Characteristics and Transitions

The EU-SILC sample data confirm the trend of decreasing low-pay incidence after 2014 indicated by the SES data. The figures, together with transition probabilities, are displayed in Table 1 while Table 2 offers a detailed picture of low-pay incidence across different socio-demographic subgroups. The share of employees working for low wages was around 18% in 2004 – 2006 and afterwards declined to 16 – 17%, the level it hovered at until 2016 (Table 1, col. (a)). 2017 witnessed a significant fall in the incidence of low pay to 14%. Figure 2 (i) depicts the development of low-pay incidence together with the unemployment rate, and it suggests a positive link between business cycle trends and the share of employees being paid low wages.

⁸ I do not consider part-time workers as their exact number of hours worked in period t is not available in the data. However, the share of part-time employment in Czechia is very low (Fialová, 2017). In line with previous research, I exclude a highly heterogeneous and very small group of workers employed in category ISCO 0 (armed forces occupations).

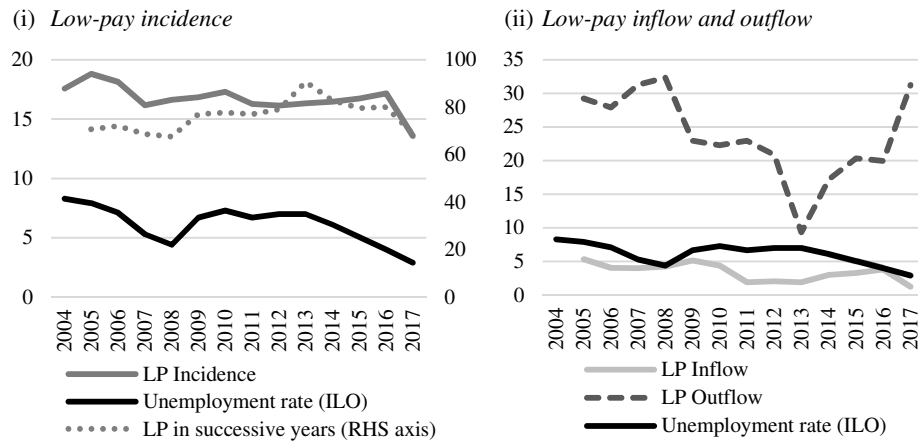
Table 1
Transition Probabilities of Low Pay

	LP Incidence	LP in successive years	LP Inflow	LP Outflow	LP Persistence Ratio	LP Persistence Ratio	N
	$Pr(LP_t = 1)$	$Pr(LP_t = 1 \mid LP_{t-1} = 1)$	$Pr(LP_t = 1 \mid LP_{t-1} = 0)$	$Pr(LP_t = 0 \mid LP_{t-1} = 1)$	$(e) = (b)/(c)$	$(f) = (b) - (c)$	(g)
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Total	0.169	0.761	0.035	0.239	21.714	0.726	43357
2004	0.176	–	–	–	–	–	–
2005	0.188	0.708	0.053	0.292	13.263	0.655	2255
2006	0.181	0.721	0.041	0.279	17.801	0.681	3812
2007	0.162	0.687	0.040	0.313	17.196	0.647	5180
2008	0.166	0.677	0.042	0.323	15.981	0.635	4066
2009	0.168	0.771	0.052	0.229	14.941	0.719	3634
2010	0.173	0.777	0.044	0.223	17.721	0.734	3566
2011	0.163	0.771	0.019	0.229	40.165	0.751	3981
2012	0.161	0.791	0.021	0.209	37.911	0.770	3598
2013	0.163	0.906	0.019	0.094	46.617	0.887	3393
2014	0.165	0.828	0.030	0.172	27.592	0.798	3215
2015	0.167	0.797	0.033	0.203	24.133	0.764	3364
2016	0.172	0.801	0.038	0.199	20.873	0.762	2146
2017	0.136	0.688	0.013	0.312	54.912	0.675	1147

Note: LP incidence (a) was calculated as a share of low-wage earners in t . LP in successive years (b) was calculated as a share of the low paid in t , and who were also low paid in $t - 1$, from the total number of those who were low paid in $t - 1$. LP Inflow (c) was calculated as a share of the low paid in t , and who were not low-paid in $t - 1$, from the total number of those who were not low-paid in $t - 1$. LP Outflow (d) was calculated as a share of the not low-paid in t , and who were low-paid in $t - 1$, from the total number of those who were low-paid in $t - 1$. Low-pay is defined as a wage lower than two-thirds of the sample's median gross wage, referring to full-time, full-year employees only (see details on the sample selection in the text).

Source: EU-SILC longitudinal data 2005 – 2018, author's calculations.

Figure 2
Transition Probabilities of Low Pay and Unemployment Rate (%)



Note: For definitions of transition probabilities, see note in Table 1.

Source: EU-SILC longitudinal data 2005 – 2018, Czech Statistical Office, authors' calculations.

The share of employees paid by low wages was highly differentiated across socio-demographic subgroups (Table 2). Low-paid work is much more a female phenomenon than male since the share of women paid low wages (28%) was more than three times higher than the share of men (8.3%). The youngest employees, aged 16 – 24, had a comparably high low-pay incidence (30.1%), much higher than any other age group. In contrast, the lowest incidence of low pay, around 13%, was registered to the age categories 25 – 34. The share of employees paid low wages then rises with increasing age. Older workers aged 50 – 54 have the second highest incidence of low pay (after the youngest workers), followed by employees aged 55 – 64. The negative relation between low-pay incidence and educational attainment is in line with economic expectations. Nevertheless, the differences are striking: While almost half of employees with only primary education receive low wages, less than 18.4% of employees with secondary education and only 2.4% of those with tertiary education are low paid.

As regards household characteristics, striking differences were revealed for employees living in poor households and those living in households not classified as poor. While 62.5% of poor employees work for low wages, only 15.8% of those who are not poor receive low wages. This suggests the existence of a positive link between low pay and poverty. However, the link is not straightforward as one of the most important drivers of poverty is the absence of any work and work income. The majority of low-paid workers live in medium- or high-income households: 92% of low-paid employees did not live in poor households, and the proportion of the low paid living in poor households was 8% only.

Table 2

Low-pay Incidence in Particular Groups (% , average, 2004 – 2017)

Total full-time, full-year working population		16.9
Gender	Men	8.3
	Women	28.0
Age	16 – 24	30.1
	25 – 29	13.2
	30 – 34	12.7
	35 – 39	14.9
	40 – 44	15.4
	45 – 49	16.9
	50 – 54	19.9
	55 – 64	17.5
Education	Primary	48.6
	Secondary	18.4
	Tertiary	2.4
Household characteristics	Poor	62.5
	Not poor	15.8
Region	Prague	6.6
	Central Bohemia	13.4
	Southwest	16.1
	Northwest	21.1
	Northeast	18.1
	Southeast	18.6
	Central Moravia	19.4
	Moravian-Silesian	19.5

Note: The low pay threshold is two-thirds of the sample's median gross earnings of full-time, full-year employees for each year. Figures are calculated using longitudinal data pooled across 2004 – 2017 and represent percentage shares of workers in a given category earning less than the full-sample low-pay threshold. Households classified as poor in the sense of monetary poverty if their equivalized income stood below the at-risk-of-poverty threshold, which was calculated as 60% of median equivalized household income calculated on the full EU-SILC data sample.

Source: EU-SILC longitudinal data 2005 – 2018, authors' calculations.

There were also large differences in the incidence of low pay between Czech regions: The lowest figures were observed in the capital region, Prague, due to its substantially higher overall wage level. On the contrary, the highest shares of the low paid were in the Northwest, a region suffering from high unemployment and low wages. Generally, low pay is more prevalent in the regions of Moravia compared to those of Bohemia.

Table 1 offers a detailed view on low-pay probabilities and transitions in the examined period. While column (a) describes raw probabilities, that is, the incidence of low pay without taking into account the status of the individual in the previous period, columns (b – d) present conditional probabilities given the status in the previous period. Column (b) shows the probability of being low paid in period t conditional upon being low paid in period $t - 1$, in other words, remaining in low pay for two successive years. This probability is much higher than the raw figures on low-pay incidence (col. (a)) – the figure on data pooled

across the whole time period equals 0.761. That means that a low-paid worker has a 0.761 probability of staying in a low-paid job the following year. The estimated conditional probability increased after the 2008/2009 financial crisis, peaking in 2013 (a period of economic recession in Czechia) and decreased thereafter. Column (c) describes the inflow into low pay, that is, the conditional probability that a worker who was not in a low-paid job will end up in a low-paid job the following year. Clearly, this probability is much lower compared to the probability of initially low-paid workers (col. (b)) – it is only 0.035 in data pooled across the whole time period. The inflow into low pay had a declining trend in the examined period, which is in line with the fact that the incidence of low pay was falling. Furthermore, the probability that an initially low-paid worker will exit their low-pay status and find a better-paying job in the following period (col. (d)) is much lower, at 0.239, than the probability of staying low-paid for two successive years (col. (b)). The outflow from low-paid employment exhibited large volatility in the examined period and seems to be negatively sensitive to business cycle developments (Figure 2, panel (ii)).

Columns (e) and (f) of Table 1 quantify the perspective on low-pay persistence. Column (e) estimates how many times more likely it is for the low paid to remain low paid the following year than it is to newly enter low pay. Column (f) shows how much more likely (expressed in probability points) the low paid are to stay low paid than the not low paid are to become low paid. Both these ratios indicate that the low-paid workers in period t are substantially more likely to be low paid in the subsequent period $t + 1$ than those workers who are not low paid in t . These raw estimates thus indicate a significant persistence in low pay. The following analysis aims to reveal the degree to which low-pay persistence is the result of worker heterogeneity on the one hand and true state dependence on the other.

4. Methodology

The utilized approach is inspired by Clark and Kanellopoulos's (2013) examination of low-pay persistence in Western European countries. A dynamic random effects probit model is employed that accounts for both observed and unobserved worker heterogeneity, which is necessary to estimate the state dependence.⁹

The model needs to tackle the initial conditions problem, that is, the potential endogeneity of the starting state, meaning that low-pay status in the initial

⁹ Bachmann et al. (2016) concluded that wage inequality is to a large degree determined by unobservable characteristics in Czechia.

observed period of the individual history may be correlated with unobserved heterogeneity. The issue stems from the fact that the first period observed in the data might not (and usually does not) correspond to the start of the stochastic process resulting in the experience of the outcome (Grotti and Cutuli, 2018). My approach builds on a simple solution to the initial condition problem introduced by Wooldridge (2005) which conditions on the response at the initial period and models unobserved heterogeneity through the inclusion of values for all the time-varying explanatory variables at each period in the model. I follow the Rabe-Hesketh and Skrondal (2013) modification of the original Wooldridge (2005) solution which provides unbiased estimates and can be implemented even for unbalanced panels (Skrondal and Rabe-Hesketh, 2014), as is the case in this research. Under this approach, unobserved heterogeneity is addressed by the inclusion of the initial period values and within-unit averages of time-variant explanatory variables as well as the initial period value of the dependent variable. Furthermore, inclusion of the means for all time-varying variables may also deal with the potential correlation between the explanatory variables and unobserved heterogeneity (Mundlak, 1978). Intuitively, longitudinal averages of individual characteristics reflect underlying individual-specific factors, and, consequently, the remaining individual differences may be more plausibly expected to be independent of observed explanatory variables (Cappellari and Jenkins, 2008). The Stata procedure *xtpdyn* proposed by Grotti and Cutuli (2018) is employed, and the estimation is based on the *meprobit* Stata command.

The estimated equation has the following form:

$$LP_{it} = \gamma LP_{it-1} + \beta X_{it} + \delta_1 LP_{i0} + \delta_2 X_{i0} + \delta_3 \bar{X}_i + \sum_{k=1}^{12} w_k W_{ik} + \alpha_i + u_{it} \quad (1)$$

where LP_{it} is a binary dependent variable that equals 1 if an employee's wage fell below the low-pay threshold in period t (two-thirds of sample median wage in the baseline estimations) and LP_{it-1} is a lagged dependent variable. X_{it} is a vector of explanatory variables, LP_{i0} is the initial period value of the dependent variable, X_{i0} is the initial period value of time-variant explanatory variables and \bar{X}_i is an additional regressor representing the longitudinal means of all time-variant variables (with the exception of intrinsically time-varying variables, such as age, and also the variable for education; for a detailed discussion, see Cappellari and Jenkins, 2008).

The control variables included in vector X_{it} are commonly used in this type of research and capture the effect of both demand and supply side factors in the wage setting process. They cover a male dummy and dummies for age at five-year

intervals (ages 16 – 24 and 55 – 64 cover 10-year intervals due to the low number of observations), a dummy for being married, education (secondary and tertiary), type of occupation (ISCO), degree of urbanization in the area of residence (medium and thinly populated areas) and regional dummies (eight regions corresponding to NUTS-2 level). I also add the regional rate of unemployment (persons aged 20 – 64, from the Labour Force Surveys) to account for trends in the regional macroeconomic environment since low-pay dynamics and unemployment trends show correlation.¹⁰

Calendar time may be an important factor affecting low-pay persistence and reflect changes in the institutional environment, business cycle effects (that were not covered by the inclusion of the regional unemployment rates) and other calendar time-varying effects. I include indicator variables for each year covered by the EU-SILC survey in the low-pay probability equation (1): W_{it} is a survey-year indicator variable for respondent i and acts as an intercept-shifter. The reference year t is 2017 (and hence 2016 is $t - 1$).

Furthermore, α_i is the individual-specific constant unobserved heterogeneity, and u_{it} is the unobserved error term. Subscript t refers to the order of an individual's observation and takes the values $\{2, 3, 4\}$. The longitudinal EU-SILC data are pooled across the period 2005 – 2017 and analysed as a panel, with individuals being the cross-sectional dimension and the order of an individual's observation being the time dimension.

The transition probabilities of individuals in t may be further derived by conditioning on low-pay status in $t - 1$, itself done by using the estimated coefficients and other parameters of the model. State dependence in low pay refers to the extent to which the chances of being low paid t differ according to whether an individual was low paid at $t - 1$, controlling for both observed and unobserved heterogeneity. To measure the magnitude of state dependence, the average partial effect (APE) is the most often utilized measure (Cappelari and Jenkins, 2008) as it shows the 'partial effect averaged across the population distribution of the unobserved heterogeneity' (Wooldridge, 2004, p. 2). The APE may be equated by taking the difference between the predicted probability of low-paid status in t , conditional upon low-paid status in $t - 1$ (i.e., low-pay incidence in two successive years), and the predicted probability of low-paid status in t , conditional on being not low-paid in $t - 1$ (i.e. low-pay inflow), for each individual and taking the average across all individuals (Cappelari and Jenkins, 2008). There are several

¹⁰ Correlations between the explanatory variables are displayed in appendix 1 and suggest no existence of multicollinearity between the variables. In the same light, none of the variables have a VIF higher than 5.

ways how the APE may be estimated (Stewart, 2007). The relationship used here may be formalized in the following way (Grotti and Cutuli, 2018):

$$APE = \Phi(\beta X_{it} + \gamma) - \Phi(\beta X_{it}) \quad (2)$$

where $\Phi(\cdot)$ represents a standard normal cumulative distribution function, X includes all the time-varying and time-constant explanatory variables and variables capturing unobserved heterogeneity, β is the vector of associated coefficients and γ is the coefficient associated with the lagged dependent variable.

5. Results and Discussion

Table 3 shows the marginal effects on the probability of being low paid obtained through the dynamic probit estimation. Column (a) represents the baseline estimates of the model, which use the low-paid status of an individual defined by the threshold set at two-thirds of the sample's median wage as a dependent variable.

The first row of Table 3 expresses the estimate of the dynamic marginal effect by low-pay status in $t - 1$ on the probability of low pay regardless of individual or job characteristics. The effect is positive and significant, which indicates that having a low-paid job in period $t - 1$ significantly increases the probability of being low-paid in period t , and the magnitude of that effect is about 16.5 percentage points. Apparently, accounting for observed and unobserved factors as well as for the endogeneity of initial conditions is important in studying low pay. In the raw data, low-pay persistence was 0.726 (column (f) of Table 1). When controlling for observable factors in a simple probit regression on pooled longitudinal data, the marginal effect of low-pay status in $t - 1$ drops to 0.553 (eq. 1 without term α_i ; results not reported). Consequently, when controlling for unobservable characteristics as well in a dynamic panel probit regression, it declines further to 0.238 (eq. 1 without the additional variables controlling for the initial conditions problem; results not reported) and then, finally, to 0.165 when the endogenous initial selection is controlled for (baseline estimation of eq. 1, column (a) of Table 3).

The estimated degree of state dependence in low pay in Czechia is comparable to the situation prevailing in some Western European countries as estimated in previous research by Clark and Kanellopoulos (2013) for male employees only. In contrast, the results of Cappellari (2000) for Italy and Stewart and Swaffield (1999) for the United Kingdom suggest a substantially larger degree of state dependence in low pay. Yet, the authors use a different definition of the low-paid population and also a different methodology for the treatment of heterogeneity, which complicates the comparison.

Table 3

Low-pay Probability: Results of a Dynamic Random Effects Probit Model with Unobserved Heterogeneity

		Baseline 2/3 sample median	2/3 national median	1/2 sample median	1st quartile	1st – 3rd deciles
		(a)	(b)	(c)	(d)	(e)
Low paid $t - 1$		0.165***	0.165***	0.047***	0.202***	0.205***
Male		-0.065***	-0.073***	-0.012***	-0.126***	-0.165***
Age	16 – 24	0.018***	0.026***	0.001	0.048***	0.05***
	25 – 29	0.005	0.002	-0.001	0.007	0.012
	30 – 34	0.000	0.002	0.000	-0.003	0.004
	40 – 44	0.002	-0.003	-0.001	0.005	0.001
	45 – 49	0.002	0.003	-0.001	0.010	0.007
	50 – 54	0.011**	0.018***	0.001	0.03***	0.032***
	55 – 64	0.017***	0.023***	0.002*	0.04***	0.055***
Married		-0.003	-0.006*	0.000	-0.013**	-0.018***
Education	Secondary	-0.027***	-0.027***	-0.003***	-0.061***	-0.066***
	Tertiary	-0.059***	-0.068***	-0.007***	-0.136***	-0.177***
ISCO	ISCO2	0.018	0.010	-0.005	-0.006	-0.002
	ISCO3	0.036	0.032	0.001	0.039	0.043
	ISCO4	0.038	0.036	-0.010	0.066	0.061
	ISCO5-6	0.054**	0.046*	-0.004	0.083*	0.089*
	ISCO7	0.022	-0.003	-0.009	0.031	0.015
	ISCO8	0.025	0.002	-0.006	0.035	0.055
	ISCO9	0.053*	0.038	-0.002	0.048	0.060
Urbanization	Densely pop. area	-0.034	-0.034	-0.003	0.020	-0.027
	Medium pop. area	-0.006	-0.012	-0.003	0.06*	0.063
Region	Central Bohemia	0.011**	0.01*	0.000	0.013	0.027**
	Southwest	0.022***	0.021***	0.001	0.037***	0.039***
	Northwest	0.032***	0.031**	0.003	0.036*	0.031
	Northeast	0.029***	0.029***	0.003	0.051***	0.064***
	Southeast	0.039***	0.036***	0.003	0.056***	0.063***
	Central Moravia	0.036***	0.039***	0.003	0.058***	0.063***
	Moravian-Silesian	0.036***	0.033***	0.002	0.041**	0.036
Unemployment rate		-0.001	-0.001	0.000	0.001	0.004
Log pseudolikelihood		-7859.3	-8207.1	-3284.7	-10192.5	-11309.1
Wald chi2		4645.44	4925.15	1682.97	5646.68	5826.34
Low paid incidence, pooled		0.168	0.190	0.046	0.255	0.303
APE		0.143	0.142	0.049	0.152	0.145

Note: Dependent variable: low-pay status in period t . Definition of low-pay threshold given in column headings and described in the text. Marginal effects at means reported, ***/**/* statistically significant at 1%/5%/10% levels respectively. APE – estimates of average partial effect. The model allows for correlation between the explanatory variables and the unobserved heterogeneity by covering the initial period values and within-unit averages of time-variant explanatory variables as well as of the initial period value of the dependent variable (estimated coefficients not reported for brevity). Sample size: see Table 1.

Source: EU-SILC pooled longitudinal data 2005 – 2018, authors' calculations.

My results further show that men have a significantly lower probability of low pay; they are about 6.5 percentage points less likely to earn low wages than women. This finding is in line with the fact that Czechia has very high gender differences in pay that make women more prone to earning low wages compared to men. Having a larger formal education is another significant factor reducing low-pay probabilities, in accordance with human capital theory. Workers with

secondary education are about 2.7 percentage points less likely to be low paid compared to those with only primary education; a tertiary education degree reduces this probability by 5.9 percentage points.

Also not surprising with regard to human capital accumulation theory, the youngest workers have a significantly higher probability of low pay compared to the reference category of workers aged 35 – 39. Moreover, having a low-paid job is also significantly more likely for older workers. More specifically, my results indicate that young workers aged 16 – 24 are about 1.8 percentage points more likely to have a low-paid job compared to those 35 – 39 old. The low-pay likelihood is slightly lower for workers older than 50 years, but it increases according to the age categories so that workers aged 50 – 54 years are about 1.1 percentage points and workers older than 55 years about 1.7 percentage points more likely to be low paid compared to the reference group. This outcome suggests that low pay in Czechia is not solely a phenomenon of young workers, who accept lower wages at the beginning of their careers to compensate for a lack of experience, but that it hits older, experienced workers before the end of their work careers as well, irrespective of their other characteristics.

Further, when accounting for other observable and unobservable characteristics among workers, type of occupation seems not to have a significant effect, with the exception of a significant positive estimate in the ISCO 5 and 6 categories, which cover service workers, shop and market sales workers (ISCO 5) and skilled agricultural and fishery workers (ISCO 6). Workers in these two groups have about a 5.4 percentage points higher probability of low pay than the ISCO 1 (managers) reference group. For workers in other occupational categories, low pay seems attributable to other worker characteristics and not to the occupational group itself.

Marital status and variables referring to the degree of urbanization in the place of residence do not prove significant in the estimation. Similarly, regional unemployment rate developments do not show a significant impact – the insignificance of this variable may be due to the fact that a major part of the effects of macroeconomic developments is covered by the inclusion of the calendar year dummies in the model, whereas specific regional factors do not vary much in time and are covered by regional dummies. Specific regional economic developments captured by the regional unemployment rate then do not show a significant impact in such a framework.

Both sets of coefficients by regional and calendar time dummies are significant in the baseline estimation. Table 3 does not display the estimated coefficients; marginal effects at means are reported instead since these are more straightforward to interpret. However, the marginal effects of time dummies are not estimable, and, therefore, they are not reported in the table. All the coefficients by time dummies for the years 2005 – 2016 were significant and positive,

which means that the likelihood of having a low-paid job was higher in the years before 2017; within this period, the highest figures were recorded in 2005 and 2009 – 2010 and the lowest in 2008 and 2012. This result indicates that changes in the institutional environment, business cycle effects and other calendar time-varying effects are important drivers of low pay in Czechia. In the same vein, the specific conditions of regions did prove significant in the estimation (marginal effects reported in Table 3). Compared with the capital region, workers in the other regions have a higher likelihood of earning low pay. The marginal effects range between 1.1 percentage points for Central Bohemia (the capital region's suburb) and 3.2 percentage points in the Northwest, 3.6 percentage points in Central Moravia and Moravian-Silesia and 3.9 percentage points, the highest, in the Southeast: working in these regions increases the low-pay probability of workers irrespective of their characteristics. Regional labour market differences in Czechia are relatively high compared to other countries in the CEE region, although they tended to decrease after 2010 (Fialová and Želinský, 2019). Our results confirm that these relatively large disparities translate into a likelihood of working for low pay as well.

The estimated parameters of the model were utilized to compute the APE (last row of Table 3), a measure of genuine state dependence in low pay, quantifying the magnitude of the effect of past low-pay status regardless of individual or job characteristics. The APE for the overall sample was estimated at 14.3 percentage points, meaning that when controlling for heterogeneity, past low-pay status is on average associated with an increase in probability of earning low pay of about 14 percentage points. This outcome confirms the existence of genuine state dependence in low pay regardless of individual or job characteristics in Czechia. The result is roughly the same order of magnitude as the results of Clark and Kanellopoulos (2013) for Western Europe.

The APE for the baseline model specification was estimated on the overall sample as well as on specific profiles, defined in terms of gender, age and education. The specific profile results are reported in Table 4. The findings indicate very high differences in low-pay persistence for individuals differing in gender and attained educational degree. The APE of women is almost two times as high as that of men: whereas for women, past low-pay status is on average associated with an increase of about 20 percentage points in the probability of earning low pay, for men, it is 12 percentage points only.

Furthermore, workers with only primary education have an APE of 18 percentage points. This slightly decreases for workers with secondary education (14 percentage points), whereas for tertiary educated workers, the APE reaches 9 percentage points only.

In contrast, the magnitude of the effect of low-pay status in the previous period does not vary substantially between different age groups, although the results point to a moderately higher degree of low-pay persistence for younger and older workers. For those aged 16 – 24 and 55 – 64, the APE reaches 16 percentage points, which is only slightly more than the lowest figure for workers aged 35 – 39, standing at 14 percentage points.

Table 4

Average Partial Effect: Estimation of State Dependence in Low Pay for Specific Profiles

	Total sample	Gender		Age								Education		
		Male	Female	16 – 24	25 – 29	30 – 34	35 – 39	40 – 44	45 – 49	50 – 54	55 – 64	Primary	Secondary	Tertiary
APE	0.143	0.121	0.203	0.163	0.149	0.143	0.136	0.145	0.145	0.154	0.160	0.182	0.141	0.094

Note: Estimates of the average partial effect (APE, eq. 2) based on the results of a dynamic random effects probit model with unobserved heterogeneity; the baseline estimations are reported in Table 3, col. (a).

Source: EU-SILC pooled longitudinal data 2005 – 2018, authors' calculations.

My findings suggest that not only do women and workers with a lower educational degree have a higher likelihood of earning low-pay, they also have a higher likelihood of getting stuck in a low-paid job for prolonged time periods. In contrast, the effect of age on low-pay persistence is not as overwhelming: whereas younger and older workers do show a significantly higher likelihood of working for low pay compared to prime-aged workers, their magnitudes of low-pay persistence differ only slightly. The major individual characteristics affecting the degree of low-pay persistence thus seem to be gender and education.

Since the literature lacks any clear consensus regarding the definition of low-paid population, I have also checked how my results are altered by the particular choice of low-pay threshold through utilization of four different alternative low-pay measures. Columns (b) – (e) of Table 3 provide the results of robustness checks on the model estimations. Firstly, I use the low-pay threshold defined as two-thirds of the national median in the wage sphere instead of the sample median (the national median is higher than in the survey sample and is associated with higher figures of low-pay incidence).¹¹ Next, I modify the threshold to one-half of the sample median wage. Lastly, I define the low-paid population as those earning wages within the first quartile and first three deciles of the wage distribution.

The results of the robustness checks generally confirm the baseline estimates of the effect of the explanatory variables with some minor differences mainly stemming from the different size of the low-paid sample, which also affects the degree of persistence measured by the APE (last row of Table 3). The lowest

APE of 4.9 percentage points was found in the sample where low-pay threshold is defined as one half of the sample median, which implies a very low incidence of low pay (4.7% only; see the second last row of Table 3). Generally, the larger the low-paid population defined by a particular threshold, the greater the APE and, thus, the state dependence. Moreover, a higher degree of state dependence was estimated for low-paid populations defined as a constant share of the total sample (first quartile and first three deciles of the wage distribution) with an APE of around 15 percentage points. Nevertheless, significant state dependence was confirmed under all definitions employed.

Conclusion

This article analysed the extent of low-wage employment, its nature and its persistence in Czechia, a post-transition country in Central and Eastern Europe. I examined the determinants of low pay at the individual level, and, after controlling for both the observed and unobserved heterogeneity of workers and the endogeneity of the initial conditions, I estimated the degree of low-pay persistence in the sense of genuine state dependence.

My findings suggest that low-wage employment in Czechia may be to certain degree classified as a long-term and persistent state affecting specific groups of workers with all the negative individual and social issues that may bring about. Having a low-paid job significantly increases the probability of being low paid in the next period, and the magnitude of the effect is on average about 14 percentage points. The existence of state dependence was confirmed by estimations made with various low-pay thresholds employed. This means that low-paid jobs, to a certain degree, predispose workers to stay low paid in the future, regardless of personal or job characteristics.

Furthermore, the most important personal characteristics that increase the likelihood of low-wage employment are female gender, lower educational degree and lower as well as higher age. Moreover, gender and education are also the major individual factors affecting the magnitude of low-pay persistence: not only do women and workers with lower education have a higher likelihood of earning low-pay, they also exhibit a higher likelihood of getting stuck in a low-paid job for prolonged time periods. In contrast, the effect of age on the degree of low-pay persistence is not as pronounced. Although younger and older workers exhibit a significantly higher likelihood of working for low pay compared to prime-aged

¹¹ The data come from the official statistics of the Average Earnings Information System (ISPV). Wage sphere, defined by the ISPV, corresponds with the business sector of the economy.

workers, the magnitudes of low-pay persistence does not vary substantially between the age groups.

My results have several policy implications. Firstly, the role of education and qualification is crucial to fighting low wages in Czechia. Higher educational attainment not only significantly reduces the likelihood of earning a low wage but also increases the chances of workers leaving low-paid jobs. Secondly, it is not primarily young workers who are more likely to be found in low-paid jobs, older workers also have a significantly higher likelihood of being low paid. Again, training and increasing the qualification of workers play a prominent role in leaving the low-wage situation. Thirdly, my results support the relevance of policies promoting equal pay for men and women. Czechia exhibits one of the greatest gender wage inequalities among EU countries, and the lower wages of women are also reflected in their higher likelihood of being and staying low paid compared to men.

The data also suggest the existence of a positive link between low pay and poverty, which is, however, not straightforward since the vast majority of low-paid workers in Czechia do not live in poor households. Nevertheless, low pay may turn into a pathway to long-term, in-work poverty and social exclusion for those workers who are persistently trapped in low-paid jobs. The degree of low-pay persistence may be to a certain extent related to a country's labour market institutional framework (Clark and Kanellopoulos, 2013), similar to other labour market outcomes. However, identifying the particular institutional factors that exert an effect is left for future research.

To my best knowledge, this article represents one of the first studies on low-pay persistence in the CEE region. My results suggest that the degree of low-pay persistence in Czechia is comparable to some Western European countries as estimated by previous research. While there are substantial cross-country differences in wage mobility across European countries and income inequalities in Czechia are generally low, further comparative research on the CEE would bring more insights into patterns of low-wage employment in this region.

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Appendix 1

Correlations between Explanatory Variables

	Male	Age	Married	Sec. educ.	Tert. educ.	Dens. pop.	Med. pop.	ISCO2	ISCO3	ISCO4	ISCO5-6	ISCO7	ISCO8
Age	-0.0591*	1											
Married	-0.003	0.3724*	1										
Secondary	0.0236*	-0.0243*	-0.0175*	1									
Tertiary education	0.0031	-0.0049	0.0301*	-0.8728*	1								
Densely pop. area	-0.0267*	0.0015	-0.0488*	-0.1123*	0.1409*	1							
Medium pop. area	0.009	-0.005	-0.0089	0.0325*	-0.0343*	-0.4074*	1						
ISCO2	-0.0495*	0.0129*	0.0261*	-0.4568*	0.5369*	0.1230*	-0.0297*	1					
ISCO3	-0.0823*	-0.0006	0.0301*	0.0069	0.0445*	0.0809*	-0.0074	-0.1958*	1				
ISCO4	-0.2240*	-0.0118*	-0.0056	0.0719*	-0.0566*	0.0164*	0.0028	-0.1216*	-0.1728*	1			
ISCO5-6	-0.1434*	-0.0460*	-0.0517*	0.1186*	-0.1438*	-0.0086	-0.0042	-0.1476*	-0.2097*	-0.1302*	1		
ISCO7	0.2820*	-0.0167*	-0.0269*	0.1931*	-0.2147*	-0.0784*	0.0215*	-0.1778*	-0.2527*	-0.1570*	-0.1905*	1	
ISCO8	0.1788*	-0.0056	-0.0157*	0.1394*	-0.1818*	-0.1078*	0.0085	-0.1484*	-0.2110*	-0.1310*	-0.1590*	-0.1916*	1
ISCO9	-0.0884*	0.0473*	-0.005	-0.0171*	-0.1091*	-0.0355*	0.0016	-0.0886*	-0.1259*	-0.0782*	-0.0949*	-0.1144*	-0.0955*

Note: * statistically significant at 1% level.

Source: EU-SILC pooled longitudinal data 2005 – 2018, authors' calculations.