

DISCUSSION PAPER SERIES

IZA DP No. 17598

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Wage Workers**

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ISSN: 2365-9793

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## ABSTRACT

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# Labour Market Dynamics of Minimum Wage Workers

Ireland is the only country in Europe with a direct question in its Labour Force Survey to identify minimum wage employees. By combining this with the longitudinal component of the Labour Force Survey, we examine the labour market transitions of minimum wage employees over a period of up to five quarters. After one quarter, just over half of minimum wage employees are still on minimum wage while 28 percent have moved to higher pay. After one year, almost half have moved to higher pay, with just one-third remaining on minimum wage. Employees that move to higher pay are more likely to change jobs compared to those that stay on minimum wage. Despite this, the majority (almost 90 percent) of minimum wage employees that transition to higher pay do so with the same employer. We employ a dynamic random effects probit model to estimate the degree of genuine state dependence of minimum wage employment. While there is some degree of true state dependence, much of the persistence in minimum wage employment is due to observed and unobserved heterogeneity, whereby minimum wage employees possess characteristics that result in them entering, and staying on, minimum wage. Our results also indicate that minimum wage employees are about five times more likely than higher paid employees to transition into economic inactivity. However, the majority of these are young people in education, and as such may not be overly concerning to policymakers.

**JEL Classification:** J31, J62, J20

**Keywords:** minimum wage, state dependence, labour market dynamics

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## 1. Introduction

Understanding the labour market dynamics of minimum wage workers will help determine whether this type of employment is a cause for concern for policymakers. Specifically, it will show the extent to which minimum wage employment represents a stepping stone to better quality employment as opposed to a low wage trap. Minimum wage workers are the lowest paid in the labour market and, therefore, individuals that find themselves in this type of employment over the long term could suffer poverty risk, lack of career progression, and possible stigmatisation. However, if minimum wage employment tends to be relatively short-term and typically acts as a stepping-stone to higher pay for younger and less experienced workers, this is of less concern. This paper uses a longitudinal dataset, within which minimum wage workers are self-identified, to examine the labour market transitions of minimum wage employees in Ireland.

When examining the labour market dynamics of minimum wage workers, it is important to distinguish two distinct reasons why people may find themselves in persistent minimum wage employment. Firstly, persistent minimum wage employment could relate to observed or unobserved heterogeneity. Employees that find themselves in minimum wage employment in the first place may be systematically different to higher paid employees in ways that make them prone to experience this labour market state consistently over time. The second possibility relates to what is called ‘genuine state dependence’. This would occur if being a minimum wage worker in time period  $t$  had a direct causal effect on experiencing minimum wage employment at time  $t+1$ . One possible reason for this would be if wage enhancing skills depreciate when a worker is engaged in low-paid employment, known as ‘scarring’. While ‘scarring’ is more commonly associated with spells of unemployment, it may also occur with low-paid employment (Clark and Kanellopoulos, 2013). Furthermore, it is possible that employers may look unfavourably on individuals with a history of being a minimum wage worker, making it difficult to escape to higher pay. Disentangling heterogeneity from genuine state dependence in this type of dynamic framework is often referred to as the initial conditions problem, and to address this, we employ the widely used dynamic random effects probit model, proposed by Wooldridge (2005).

There is very little direct research examining state dependence among minimum wage workers, which emphasises the contribution to the literature of the current study. However, a related literature looks at labour market dynamics of low pay more generally and it is worth briefly summarising its main findings. While there is no precise and consistent definition of ‘low pay’, a commonly used threshold in existing studies is two-thirds of median hourly pay (see, e.g., Buddelmeyer et al., 2010; Cai et al., 2018; Cai, 2014; Mosthaf et al., 2014; Knabe and Plum, 2013). Many studies find evidence of some genuine state dependence of low pay, albeit at much lower levels than unconditional transition probabilities would suggest, thereby indicating the importance of accounting for heterogeneity and initial conditions (see, e.g., Stewart and Swaffield, 1999; Clark and Kanellopoulos, 2013; Cappellari, 2007; Cappellari, 2002).<sup>1</sup> Several studies, while finding evidence of genuine state dependence, also find evidence that low pay is often a stepping-stone to higher paid jobs (see, e.g., Cai et al., 2018; Fok et al., 2015; Cai, 2014). Knabe and Plum (2013) find that low-wage employment is beneficial as a springboard to higher pay for those with low education and a history of unemployment. However, for highly educated people, low paid jobs appear to have no value, leading the authors to state that their findings cannot support the claim that ‘any job is better than no job’. Stewart (2007) examines state dependence in unemployment, and the potential role that low-paid work plays, and finds that low

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<sup>1</sup> Brodaty (2018) looks at low-paid and high-paid workers and finds that state dependence is prevalent at both the top and bottom of the wage distribution.

wage employment at  $t-1$  is almost as damaging as being unemployed at  $t-1$  on a person's probability of finding employment at time  $t$ .

Related work by Booth et al. (2002) examines whether temporary jobs represent a stepping stone to better employment, or lead to long-term employment-related disadvantage. This is relevant to minimum wage dynamics, as a relatively high percentage of minimum wage workers in Ireland are on temporary contracts, and these workers have been shown to be particularly susceptible to adverse employment effects (McGuinness and Redmond, 2019). Booth et al. (2002) find that temporary work, which could be seasonal, casual or a fixed-term contract, is associated with lower job satisfaction, training and remuneration. While the wage penalty associated with seasonal and casual employment is large and persistent, temporary fixed-term contracts are often a stepping-stone to permanent jobs and higher pay. The wages of women who start off on a fixed-term contract catch up to their permanent peers within 7-10 years.

The closest work to ours, and to our knowledge the only other paper that specifically examines minimum wage dynamics using a methodology to account for initial conditions, is Jones et al. (2007). They utilise the British Household Panel Survey to examine minimum wage persistence in Britain. They find some evidence of state dependence but note that a considerable number of workers move quickly out of minimum wage employment. Jones et al. (2007) estimate hourly wage by dividing usual gross weekly earnings by hours and categorise workers as minimum wage (or not) based on this. An advantage of our data, is that we have a direct minimum wage question, unique to the Irish Labour Force Survey (LFS), which helps to avoid issues relating to measurement error associated with self-reported usual hours worked.

Smith and Vavrichek (1992) examine the wage mobility of minimum wage workers in the US. Using self-reported hourly wage data for employees in the mid-1980s, and focusing on workers that remain employed on an hourly-paid basis, Smith and Vavrichek (1992) find that approximately 40 percent of workers who initially reported being on the minimum wage, moved to higher pay after four months. After one year, 63 percent were on higher pay. Compared to those that stayed on minimum wage, those that moved to higher pay were, on average, better educated and were working longer hours. The authors also found that, controlling for other factors such as education, gender and race, older minimum wage workers were less likely to advance to higher pay than younger workers. In related work, Even and Macpherson (2003) study the dynamics of minimum wage workers in the US, using panel data from the Current Population Survey from 1979 to 1999. They note that minimum wage employment is short-lived for the majority of workers. Just under half are on higher pay one year later, while almost one quarter leave employment. This is much higher than the percentage of higher paid workers that leave employment over the same period (8.6 percent). Even and Macpherson (2003) point to changes in industry or occupation, as well as access to on-the-job-training, as being important factors for progression to higher pay.

In this paper we focus specifically on minimum wage employment. Compared to "low pay" more generally, minimum wage employment is a more precisely defined and understandable concept. For example, a 'minimum wage worker' is a more easily understood label than a 'low paid worker'. This label may have stigma attached to it, such that it may send a message to employers about the productivity of any potential employee. Furthermore, as these are the lowest paid jobs, they may offer the least opportunities for skills development and therefore could lead to more scarring than other types of low-paid work, thus, potentially resulting in quite distinct patterns of labour dynamics and state dependence. By utilising the minimum wage question in the Irish LFS, along with the longitudinal component of the LFS, we address the following four questions. (1) what is the likelihood of transitioning from minimum wage to higher pay, and how much of the persistence in minimum wage

employment is due to genuine state dependence? (2) of the employees that transition from minimum wage to higher pay, what percentage do so by changing jobs versus staying with their current employer? (3) what percentage of minimum wage employees transition into unemployment or inactivity, and how does this compare to higher paid employees? (4) what are the characteristics of minimum wage employees that transition to unemployment and inactivity, compared to higher paid employees making the same transition?<sup>2</sup>

Our findings indicate that, for many, minimum wage employment is a stepping-stone to higher pay. After one year, half of minimum wage employees have moved to higher pay, with just one-third remaining on the minimum wage. The vast majority (approximately 90 percent) of minimum wage employees that move to higher pay, do so within the same job. While we detect some degree of genuine state dependence, our results show that persistence in minimum wage employment is largely due to unobserved heterogeneity. Finally, we show that minimum wage employees are five times more likely to enter inactivity than higher paid employees. However, these are usually young workers in education, and therefore may be of less concern to policymakers than, for example, older workers supporting families.

## **2. Minimum Wage Policy in Ireland**

A national minimum wage was first introduced in Ireland in 2000 at a rate of €5.58 per hour.<sup>3</sup> In the years following its introduction, Ireland experienced strong economic growth and the minimum wage was increased several times. By 2007, the national minimum wage in Ireland stood at €8.65 per hour, representing an increase of over 50 percent from its 2000 level. In 2008, with the onset of the global financial crisis, Ireland entered into a prolonged economic downturn during which time there were no increases to the minimum wage. By 2015, the minimum wage was still at its 2007 level of €8.65 per hour.

In 2015, a Low Pay Commission was established in Ireland. The Low Pay Commission is tasked with making yearly recommendations to the Irish government as to what the minimum wage should be. Their aim is to set a minimum wage that is fair sustainable and assists low-paid workers without harming overall employment or competitiveness. Since its inception, the government has implemented all of the Low Pay Commission's recommendations. In 2016, the minimum wage increased from €8.65 to €9.15 per hour, which was the first increase since 2007. There were subsequent increases in each year that followed, and as of 2023, the minimum wage in Ireland stands at €11.30 per hour.

The minimum wage is often shown as a percentage of median wage in order to indicate its relative magnitude. In 2022, the year for which we have a full year of wage data, the median hourly wage in Ireland was €20.69 and the minimum wage was €10.50 per hour. Therefore, the minimum wage in 2022 was 51 percent of the median wage. In late 2022, the Irish government committed to implementing a living wage by 2026. The target for the living wage is 60 percent of median hourly wages. The first step to achieving this was an increase in the minimum wage from €10.50 to €11.30 in 2023. A further increase was recommended by the Low Pay Commission, and accepted by government

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<sup>2</sup> The current paper builds on a previous report by Redmond et al. (2018) who presented descriptive evidence of transition rates of minimum wage workers to other employment states over a period of three quarters, using Ireland's Quarterly National Household Survey in 2016 and 2017.

<sup>3</sup> Equivalent to £4.40 in Irish pounds. Note that the euro was not officially introduced in Ireland until 2002.

in its 2024 budget, whereby the minimum wage was increased again from €11.30 to €12.70 in January 2024, thereby moving it closer to the living wage target.

It should be noted that the minimum wage rates referred to above (e.g., €11.30 in 2022) refer to the full adult national minimum wage rate. Sub-minimum youth rates also exist in Ireland. Those aged 19 can be paid 90 percent of the full rate, those aged 18 can be paid 80 percent of the full rate, and those aged less than 18 years can be paid 70 percent of the full rate. However, Redmond et al. (2023) find that sub-minimum youth rates are not frequently used in Ireland. While all employees aged 15–19 could legally be paid a sub-minimum wage, just under one-quarter are actually on a sub-minimum rate, with approximately three-quarters earning either the full minimum wage or higher pay. Redmond et al. (2023) find that less than one percent all employees in Ireland earn a sub-minimum youth rate, while approximately six percent are on the full minimum wage rate. The area of sub-minimum youth rates is an area of active policy debate in Ireland. In March 2023, the European Social Charter found Ireland to be in breach of its labour rights obligations, as it found the youth minimum wage rates were too low to allow for a decent standard of living. As such, several politicians and trade unions are calling for the abolition of youth rates.

The recent increases to the Irish minimum wage have given rise to a number of studies examining their impacts. A consistent finding is that minimum wage increases in Ireland have been associated with reductions in hours worked (Redmond and McGuinness, 2023; McGuinness and Redmond, 2019). However, there does not appear to be a significant impact on employment. Other stylized facts have emerged from this research. For example, minimum wage employment in Ireland is heavily concentrated among the retail, accommodation and food sectors, with approximately half of minimum wage employees located in these sectors alone.

### **3. Data and Empirical Strategy**

We use data from the quarterly Irish Labour Force Survey (LFS). In 2016 a question was added to Ireland's LFS which directly captures whether an employee is on the minimum wage. Ireland is the only country in Europe with such a question in its LFS. Taking the 2022 survey as an example, the actual minimum wage question that appears in the LFS is the following,

*The national minimum wage is €11.30 per hour. Are your gross hourly earnings excluding bonuses, overtime and allowances:*

- *Less than €11.30 per hour*
- *Exactly €11.30 per hour*
- *More than €11.30 per hour*

Employees that indicate that they are paid the full rate minimum wage, or a sub-minimum wage rate, are classified as minimum wage employees for the purpose of our analysis. To our knowledge, the use of such a question to measure the incidence of the minimum wage is unique internationally and should have the effect of reducing measurement error compared to approaches that combine earnings and hours data.

There is a longitudinal component to the LFS. Specifically, households are asked to participate for five consecutive quarters. Therefore, one fifth of households in the survey are replaced each quarter. Our analysis is at the individual level, so we follow the individuals in the households for up to five quarters.

The survey was originally called the Quarterly National Household Survey (QNHS) but switched to the LFS in quarter 3 of 2017. At the time the change was made, there was no carry over of the longitudinal component. This means that the longitudinal series started anew at quarter 3 of 2017. For this reason, despite the minimum wage question being present in 2016, our analysis begins with quarter 3 of 2017 and goes to quarter 1 of 2023.

Table 1 shows the incidence of minimum wage employment over time, from 2018 to 2022.<sup>4</sup> While there has been some variation over time, the percentage of employees on minimum wage in Ireland has remained at around seven or eight percent.

A person who indicates that they are on the minimum wage is asked the minimum wage question again in all subsequent quarters to capture whether they have subsequently transitioned to higher pay or stayed on minimum wage. If an employee indicates that they are earning above the minimum wage, they are subsequently asked the minimum wage question again if they either change employers or if the minimum wage rate has increased in that survey quarter. This is because individuals that are paid above the minimum wage and stay with the same employer are unlikely to subsequently have their wages cut to the minimum wage in subsequent periods. It should be noted that our main question of interest is whether minimum wage employees transition to higher pay or remain in minimum wage employment. The fact that the minimum wage question is asked in all consecutive quarters to minimum wage employees allows us to effectively address this question.

**Table 1: Incidence of Minimum Wage Employment in Ireland**

Year	Employees on Minimum Wage (%)
2018	8.1% (N=47,248)
2019	7.0% (N=50,680)
2020	6.9% (N=41,407)
2021	8.2% (N=39,533)
2022	6.7% (N=44,394)

**Notes:** Source, Irish Labour Force Survey. Four quarters of data are pooled for each year to calculate the incidence of minimum wage employment, which is the percentage of all employees on minimum wage. The number of observations for each year is denoted by “N”.

Our sample consists of individuals aged 15 to 74. Individuals can be in one of four labour market states: minimum wage employee; higher paid (above minimum wage); unemployed; inactive. We do not include self-employed individuals in our analysis.<sup>5</sup> Our data also includes a number of potentially important variables that are likely to determine minimum wage status and are therefore included in our dynamic random effects probit model. These include, gender, nationality (Irish / non-Irish), age,

<sup>4</sup> We have four quarters of data for the years 2018 to 2022. For 2017, we have just two quarters of data (quarter 3 and 4) and for 2023 we have one quarter of data (quarter 1). Therefore 2017 and 2023 are not directly comparable with other years and their incidence is not shown in Table 1. The incidence of minimum wage employment based on the restricted number of quarters for 2017 and 2023 is 8.8% and 11%, respectively.

<sup>5</sup> The minimum wage question in the LFS is only asked to employees.



work status (part-time / full-time), contract type (temporary versus permanent), firm size, sector of employment and student status (student / non-student). For firm size we create a binary variable which equals one for firms with less than 10 employees and zero for larger firms. For the student variable, we use the LFS question that asks individuals whether they participated “in formal education and training (student or apprentice) in the last 4 weeks”. Individuals answering yes are classified as students. As minimum wage employment tends to have a strong sectoral concentration, for the sector variable we create a dummy variable which equals to one if a person is employed in either the accommodation, food or retail sector and zero otherwise.

In Table 2 we show the average characteristics of individuals in each of the four states: minimum wage employees; higher paid employees; unemployed; inactive. There are notable differences between minimum wage and higher paid employees. Compared to higher paid employees, those on minimum wage are, on average, approximately ten years younger, over 30 percentage points more likely to be students, 25 percentage points more likely to be on a temporary contract, approximately 40 percentage points less likely to be in fulltime employment, 40 percentage points more likely to work in accommodation, food or retail and 15 percentage points more likely to work in a small firm (less than 10 employees). In addition, minimum wage employees have fewer children; the average number of children for a minimum wage employee is 0.5 compared to 1.1 for higher paid employees.

Compared to employees, unemployed individuals are more likely to be male; 54 percent of unemployed individuals are men compared to 50.3 percent of higher paid employees and 45.7 percent of minimum wage employees. However, the inactive group contain a higher share of women, at 60 percent. The inactive group are also older than all other groups, with an average age of 46.6 years.

**Table 2: Average characteristics of minimum wage employees, higher paid employees, unemployed individuals and inactive individuals**

	Minimum Wage	Higher Pay	Unemployed	Inactive
Male (%)	45.7	50.3	54.1	40.6
Age (years)	30.1	41.5	36.1	46.6
Irish national (%)	81.7	83.3	80.3	89.3
Student (%)	40.0	6.5	18.8	25.4
No. of children	0.5	1.1	0.7	0.6
Fulltime work (%)	41.2	83.6	-	-
Temp contract (%)	32.1	6.7	-	-
Accommodation / food / retail (%)	51.4	13.6	-	-
Small firm (%)	32.3	15.9	-	-
Observations (N)	N=16,014	N=206,082	N=14,581	N=163,279

**Notes:** Source, Irish Labour Force Survey.

Our methodology involves estimating the impact that being a minimum wage worker at time  $t-1$  has on the probability of being a minimum wage worker at time  $t$ . We begin by considering the latent equation,

$$MW_{it}^* = \beta MW_{it-1} + X_{it}'\gamma + c_i + u_{it} \quad (1)$$

where  $MW_{it}^*$  is the latent dependent variable for being on the minimum wage. Note that we are dealing with panel data consisting of individuals  $i=1,\dots,N$  and time periods  $t=1,\dots,T$ . The observed outcome is a binary indicator denoting a person's minimum wage status, such that,

$$MW_{it} = 1 \text{ if } MW_{it}^* > 0 \text{ (if on the minimum wage)}$$

$$MW_{it} = 0 \text{ if } MW_{it}^* \leq 0 \text{ (if not on minimum wage)}$$

Our main coefficient of interest in equation (1) is  $\beta$ , as this captures the impact of previous minimum wage status on current minimum wage status. Equation (1) also contains  $X'_{it}$  which is a vector of covariates that may influence minimum wage status. These include time-constant and time-varying variables. The term  $c_i$  denotes time-invariant, individual heterogeneity which is unobserved. Finally,  $u_{it}$  is an idiosyncratic error term that follows a normal distribution  $N(0, \sigma_u^2)$ .

A well-known challenge when attempting to estimate non-linear, dynamic panel data models is the initial conditions problem. If a person's time-invariant, unobserved heterogeneity impacts their likelihood of being on minimum wage in the initial time-period, then the initial condition cannot be treated as exogenous. This creates a correlation between the lagged dependent variable and the unobserved heterogeneity (see Heckman, 1981). If one treats the initial condition as exogenous, then this can result in  $\beta$  being biased. Put simply, there may be unobservable traits that resulted in a person initially entering minimum wage employment, and these same traits could continue to affect the probability of minimum wage employment over time. As such, instead of picking up true state dependence,  $\beta$  may include spurious state dependence that is due to unobserved heterogeneity.

Wooldridge (2005) proposed a simple solution to the initial conditions problem in dynamic, nonlinear panel models. The Wooldridge (2005) approach involves modelling the distribution of the unobserved effect,  $c_i$ , conditional on the initial value of the dependent variable and other exogenous variables. Wooldridge (2005) suggests using the full history of the exogenous variables. However, in practice, many of the applications of the Wooldridge estimator, including the current paper, involve unbalanced panels.<sup>6</sup> Therefore, a Mundlak (1978) correction is used, whereby new variables are included in the model which are calculated as longitudinal averages of time-varying variables for each individual.<sup>7</sup> Specifically, the Mundlak correction specifies the relationship between the unobserved heterogeneity and the time-varying variables as  $c_i = \bar{X}'_i \rho + \epsilon_i$ , where  $\epsilon_i$  is independent of  $X_{it}$  and  $u_{it}$  for all  $i$  and  $t$ . The inclusion of Mundlak variables makes the coefficients on the corresponding non-averaged variables interpretable as within-person effects.<sup>8</sup> The auxiliary density for the unobserved heterogeneity is therefore specified as  $c_i = \alpha_0 + \alpha_1 MW_{i1} + \bar{X}'_i \alpha_2 + a_i$ , where  $MW_{i1}$  denotes the initial minimum wage status in the first time period,  $\bar{X}'_i$  is a vector of the time-averaged Mundlak variables, and  $a_i | (MW_{i1}, \bar{X}_i) \sim \text{Normal}(0, \sigma_a^2)$ . Plugging  $c_i$  into the latent equation (1) gives,

$$MW_{it}^* = \beta MW_{it-1} + X'_{it} \gamma + \alpha_0 + \alpha_1 MW_{i1} + \bar{X}'_i \alpha_2 + a_i + u_{it} \quad (2)$$

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<sup>6</sup> A model that included variables capturing the full history of the explanatory variable at each time-period would require a balanced panel.

<sup>7</sup> For example, if individual  $i$  is observed for three time periods, and if variable  $z$  takes the value of 2 in time period 1, 4 in time period 2 and 3 in time period 3, then the new Mundlak variable ( $\bar{z}$ ) equals 3 (average of 2, 4 and 3).

<sup>8</sup> One could think of treating the individual-level, time-invariant heterogeneity as parameters to be estimated, as in a fixed effects model, but this produces inconsistent estimates and is referred to as the incidental parameters problem (Heckman, 1981; Neyman and Scott, 1948).

where  $u_{it} | (\bar{X}_i, MW_{it-1}, \dots, MW_{i1}, a_i) \sim \text{Normal}(0,1)$ . We now have a probit model with response probability,

$$\Phi(\beta MW_{it-1} + X'_{it}\gamma + \alpha_0 + \alpha_1 MW_{i1} + \bar{X}'_i \alpha_2 + a_i) \quad (3)$$

As shown by Wooldridge (2005), the likelihood function is that of a standard random effects probit model. Therefore, Wooldridge's dynamic random effects probit model can be implemented with commonly used statistical software. The explanatory variables in the model include the one-period lag of the binary outcome variable, the initial condition of minimum wage status, and the additional contemporaneous covariates, as well the Mundlak transformed versions of the time-varying covariates. One can calculate average partial effects integrated over the population distribution of the individual-level, unobserved heterogeneity.

#### 4. Results

We begin by showing unconditional transition probabilities in Table 3. Panel A of Table 3 shows a person's labour market status at time  $t$ , based on their labour market status at time  $t-1$ . The first column shows the transition rates of minimum wage employees. Just over half (55 percent) of employees that find themselves in minimum wage employment in one quarter will be in minimum wage employment in the following quarter. Approximately 30 percent will transition from minimum wage to higher pay (above minimum wage). Column 1 of Panel A also shows that just under 4 percent of employees on minimum wage in one quarter will find themselves unemployed in the following quarter, while 13 percent of minimum wage employees transition into economic inactivity. These transition rates into unemployment and inactivity are markedly higher when compared to higher paid workers (see column 2). We see that minimum wage employees are over three times more likely to transition into unemployment than higher paid employees, and nearly five times more likely to transition into economic inactivity.

Column 3 of Panel A in Table 3 shows that 6.4 percent of unemployed individuals transition into minimum wage employment in the following quarter, while 18.7 percent of unemployed individuals transition into higher paid work. Given minimum wage employment accounts for only 7 to 8 percent of all employees, the transition from unemployment into minimum wage employment is relatively high. Likewise, the transition into minimum wage employment from inactivity (at 2.3 percent) is also relatively high when we consider that just 3.5 percent of inactive individuals transition into higher pay. The vast majority (90 percent) of people in inactivity in one quarter remain inactive in the following quarter.

**Table 3: Unconditional Labour Market Transition Rates****A**

	<b>Minimum Wage (time t-1)</b>	<b>Higher Pay (time t-1)</b>	<b>Unemployed (time t-1)</b>	<b>Inactive (time t-1)</b>
<b>Minimum wage (time t)</b>	55.2%	1.6%	6.4%	2.3%
<b>Higher Pay (time t)</b>	27.8%	94.6%	18.7%	3.5%
<b>Unemployed (time t)</b>	3.6%	1.08%	45.5%	4.5%
<b>Inactive (time t)</b>	13.4%	2.8%	29.4%	89.9%
<b>Observations (N)</b>	N=9,479	N=137,989	N=8,986	N=111,356

**B**

	<b>Minimum Wage (time t-4)</b>	<b>Higher Pay (time t-4)</b>	<b>Unemployed (time t-4)</b>	<b>Inactive (time t-4)</b>
<b>Minimum wage (time t)</b>	33.2%	2.2%	5.9%	3.3%
<b>Higher Pay (time t)</b>	47.1%	92.0%	35.0%	5.8%
<b>Unemployed (time t)</b>	4%	1.4%	32.7%	4.0%
<b>Inactive (time t)</b>	15.7%	4.3%	26.5%	86.9%
<b>Observations (N)</b>	N=2,800	N=48,990	N=2,520	N=49,030

Note that the transition probabilities in Panel A of Table 3 relate to a short time period – i.e., from one quarter to the next. Allowing for a longer time period between states allows for more time to transition out of one state and into another. In Panel B of Table 3 we again report unconditional transition probabilities, but this time we look at a person’s status at time t based on their status at time t-4. Therefore, we are examining the labour market status of individuals one year (but up to 15 months) after their initial state.<sup>9</sup> There is a notable difference with respect to people transitioning out of minimum wage and into higher pay. Nearly half of minimum wage employees have moved to higher pay when surveyed one year later, while only one-third remain on minimum wage. This suggests that, for many, minimum wage acts as a stepping-stone to higher pay over a relatively short time frame. The other labour market transition patterns are similar to Panel A, with one exception. When looking at transitions over a one-year period, a greater share of unemployed individuals find higher paid work. Approximately 35 percent of unemployed individuals are in higher paid (above minimum wage)

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<sup>9</sup> If a person was surveyed in the last week of quarter t, and surveyed in the first week of quarter t-4, then 15 months would separate the two recorded labour market states.

employment when surveyed one year later, compared to just 19 percent when surveyed one quarter later.

Despite minimum wage acting as a stepping stone to higher pay for many workers, there is a relatively high transition rate from minimum wage to unemployment and inactivity, and this may be a cause for concern. However, it is important to examine the characteristics of these workers. For example, if most minimum wage workers that transition to inactivity are young people moving into education, then this may alleviate policymakers' concerns.

In Table 4, we show the average characteristics of minimum wage workers that transitioned from minimum wage employment to unemployment or inactivity. For comparison, we show the same statistics for higher paid workers that transition to either of these states. There are some notable differences. Of the minimum wage employees that transition to inactivity and employment, 62 percent and 33 percent, respectively, are students. The corresponding figures for higher paid employees are 23 percent (to inactivity) and 11 percent (to unemployment). Minimum wage employees transitioning to unemployment and inactivity are 9 years and 14 years, respectively, younger than higher paid employees transitioning to these states. They also have fewer children. The average number of children among minimum wage workers that move into unemployment or inactivity is 0.3. This compares to 0.8 and 0.9 for higher paid workers moving to unemployment and inactivity, respectively. Taken together, this indicates that although a greater percentage of minimum wage employees move into unemployment or inactivity, compared to higher paid workers, this may not be overly concerning to policymakers, as many of these minimum wage employees are young workers in full-time education and have few children.

**Table 4: Characteristics of employees transitioning to unemployment or inactivity**

	<b>MW to Unemployment</b>	<b>MW to inactivity</b>	<b>Higher Pay to Unemployment</b>	<b>Higher Pay to Inactivity</b>
Male (%)	50.2	42.8	52.2	40.3
Age (years)	28.2	27.0	36.6	41.0
Irish national (%)	83.4	88.2	78.0	83.7
Student (%)	33.0	61.8	11.1	23.0
No. of children	0.3	0.3	0.8	0.9

While many minimum wage employees move to higher paid employment relatively quickly, a high share remain on minimum wage. Just over half are still on minimum wage one quarter later, and one-third are on minimum wage one year later. However, this cannot be taken as a measure of true state dependence, for reasons discussed earlier relating to unobserved heterogeneity and initial conditions. To estimate true state dependence of minimum wage employment, we implement the dynamic random effects probit model (equation 3). We begin by including in our sample any individual that experienced at least one quarter of employment. Therefore, an individual could be employed in all quarters, or could be employed in some quarters and unemployed or inactive in other quarters. As such, included in our vector of covariates (the  $X'$  in equation (3)) is a lag indicator of unemployment/inactivity. The other covariates in  $X'$  include gender, nationality (Irish / non-Irish), age, number of children, small firm indicator (less than 10 employees), binary indicator of student status, binary indicator for being employed in accommodation, food or retail, binary indicator for full-time

work status, and a binary indicator for being on a temporary employment contract. We also include a set of year dummy variables, as well as the Mundlak variables (the  $\bar{X}$ ' describe in equation (3)).

We focus on the average partial effects associated with the lag of the minimum wage variable, as this is our estimate of persistence or state dependence of minimum wage employment. Column (1) and (2) of Table 5 below shows the marginal effects associated with the minimum wage lag from the dynamic random effects probit estimator. In Column (1), the sample includes anybody that was in employment for at least one quarter. This indicates that being a minimum wage employee in time period  $t-1$  leads to an 18.4 percentage point increase in the probability of being on minimum wage in the following quarter. In column (2), we restrict our sample to individuals that were in employment in all quarters.<sup>10</sup> This indicates that, among people that stayed in employment, being a minimum wage employee at time period  $t-1$  is associated with a 24 percentage-point increase in the likelihood of staying on minimum wage time  $t$ .

**Table 5: State Persistence of Minimum Wage Status (Average Partial Effects)**

	Wooldridge DREP Estimator		RE - No Initial Conditions	Probit - No Initial Conditions
	(1)	(2)	(3)	(4)
MW <sub>t-1</sub>	0.184*** (0.009)	0.244*** (0.018)	0.367*** (0.008)	0.440*** (0.007)
Observations	129,817	106,804	133,443	133,443

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Recall that the unconditional transition probabilities shown in Table 3 indicated that just over half of minimum wage workers in one period find themselves in minimum wage employment in the following period. The estimated effects for persistence in columns (1) and (2) suggest that the true level of state persistence is much lower than the unconditional probabilities would suggest, highlighting the importance of accounting for initial conditions. However, as specifications in (1) and (2) also control for a range of covariates (age, gender, nationality etc.), a better comparison would be to estimate models that control for these characteristics but, unlike Wooldridge's dynamic random effects probit estimator, do not control for initial conditions. Column (3) shows the results of a random effects model that includes the same covariates as (1) and (2), but does not include the initial condition or the Mundlak variables. This is estimated on the sample of individuals that were in employment in at least one period and is therefore comparable to the coefficient in column (1).<sup>11</sup> The estimate of persistence is twice as large in this model that does not control for initial conditions. Finally, in column (4) we estimate a simple probit model of minimum wage status on lagged minimum wage status, along with the additional covariates (apart from the initial condition and Mundlak variables). This coefficient is even higher, indicating persistence of 44 percent from one period to the next. Taken together, the

<sup>10</sup> The specification is the same as before, apart from no lagged indicator of unemployment / inactivity.

<sup>11</sup> Using the sample that was used in column (2) tells the same story. For brevity and clarity, we therefore focus on one sample when estimating the models in columns (3) and (4).

results in Table 5 show that, while there is some degree of true state dependence, unobserved heterogeneity accounts for a large share of observed minimum wage persistence.

Given that minimum wage employment is a stepping-stone to higher pay for many employees, we investigate whether this arises from changing jobs or getting a pay rise with the same employer. In Table 6 we show, for different labour market transition states, the percentage of employees that started a new job. Of employees that moved from minimum wage to higher pay, 12 percent did so by changing employer. This compares to just 4 percent for employees that stayed on the minimum wage and 2 percent of employees that stayed on higher pay (above minimum wage). Therefore, while moving from minimum wage to higher pay is associated with a higher probability of changing jobs compared to staying on either minimum wage or higher pay, this indicates that the vast majority (almost 90 percent) of people that transition from minimum wage to higher pay do so with the same employer.

**Table 6: Percentage of Employees that Start a New Job by Labour Market Transition Status**

Labour Market Transition Status	Started a New Job (%)	Stayed in the Same Job (%)
From minimum wage to higher pay	12.1%	87.9%
Stayed on minimum wage	3.9%	96.1%
Stayed on higher pay	2.2%	97.8%

Finally, we examine the characteristics of minimum wage employees that advance to higher pay, compared to those who remain on the minimum wage after a period of five quarters. This is shown in Table 7. The two statistically significant differences relate to age and the probability of being a student. While 41 percent of those that stay on the minimum wage are classified as students, the corresponding figure for those that transition to higher pay is just 31 percent. Employees that move to higher pay are 1.6 years older, on average, than employees who remain on minimum wage after 5 quarters.

**Table 7: Characteristics of employees based on minimum wage transition status after 5 quarters**

	Stayed on MW	Moved from MW to higher pay	Difference
Male (%)	48.3	46.5	1.8
Age (years)	31.2	32.8	-1.6**
Irish national (%)	87.2	85.3	1.9
Student (%)	40.9	31.4	9.5***
No. of children	0.38	0.45	0.07

Notes: Descriptive statistics are shown for those that remain on minimum wage after five quarters, compared to those who start on minimum wage but are in higher pay after five quarters. The “Difference” column indicates whether the statistics are statistically significantly different.

## 5. Conclusion

Understanding the labour market dynamics of minimum wage employment is important for evaluating whether this labour market state tends to be a stepping-stone to higher pay or one in which employees

become trapped. Genuine state persistence of minimum wage employment could be due to employers looking unfavourably at an individual with a history of being a minimum wage worker. It could also arise if employees in minimum wage jobs are engaged in unskilled work, with little on-the-job training, which results in their skills depreciating over time.

To investigate minimum wage dynamics, we exploit a unique feature of the Irish Labour Force Survey (LFS) data, whereby employees are directly asked about their minimum wage status. We show that, after just one quarter, almost 30 percent of minimum wage employees will have transitioned to higher pay. After one year, almost half will have transitioned to higher pay, while just one-third remain on minimum wage. Therefore, the unconditional transition rates suggest that, for many, minimum wage employment appears to be a short-term stepping-stone to higher paid employment. These figures are particularly striking given that the minimum wage in Ireland continued to rise quite substantially over the study period.

Unconditional transition probabilities, however, do not distinguish genuine state dependence from unobserved heterogeneity. Minimum wage employees may be systematically different in ways which resulted in them entering minimum wage employment in the first place, and which persist over time. We implement Wooldridge's (2005) dynamic random effects probit model to address the initial conditions problem. Controlling for this dramatically reduces the probability that being a minimum wage employee in period  $t$  leads to minimum wage employment in  $t+1$ . For individuals employed in all periods in the panel, being a minimum wage worker in one quarter leads to a 25 percentage point increase in the probability of being a minimum wage worker in the next quarter. Therefore, while there is some persistence in minimum wage employment, many workers move to higher pay over the short term, and much of the persistence is not due to genuine state dependence. Of those that move to higher pay, the vast majority do so with the same employer.

There may be concerns that minimum wage jobs are more precarious, resulting in a higher rate of transitions to unemployment and inactivity among minimum wage employees. We find this to be the case, as minimum wage employees are approximately three times more likely to transition into unemployment compared to higher paid workers, and approximately five times more likely to transition to economic inactivity. However, minimum wage workers that transition to inactivity tend to be young workers in education, which may not be overly concerning to policymakers, particularly if the transitions relate to students previously working part-time reverting to full-time study.

From a methodological perspective, the work is unique as it represents the first study to estimate dynamic state dependence using a direct question to indicate minimum wage status. To the extent that such an approach will tend to reduce measurement error, we believe that the results presented here are particularly informative.

#### **Disclosure statement**

There are no competing interests to declare.

#### **Data availability statement**

The data use in this study are available free of charge from the Central Statistics Office in Ireland. For details on data access please visit

<https://www.cso.ie/en/aboutus/lgdp/csodatapolicies/dataforresearchers>



## Acknowledgements

This paper is part of the Cowork4YOUTH research project. Cowork4YOUTH studies employment opportunities for youth aged 25-29 in EEA peripheral regions and is funded by Iceland, Liechtenstein and Norway through the EEA and Norway Grants Fund for Youth Employment. This paper also received funding from the Irish Low Pay Commission. The authors are solely responsible for the content and the views expressed.

## References

- Booth, A.L., Francesconi, M. and Frank, J., 2002. Temporary jobs: stepping stones or dead ends?. *The Economic Journal*, 112(480), pp.F189-F213.
- Brodaty, T., 2018. Is the ladder sticky? Measuring semi-parametrically state dependence in earnings mobility. *Applied Economics*, 50(2), pp.143-156.
- Buddelmeyer, H., Lee, W.S. and Wooden, M., 2010. Low-paid employment and unemployment dynamics in Australia. *Economic Record*, 86(272), pp.28-48.
- Cai, L., 2014. State-Dependence and Stepping-Stone Effects of Low-Pay Employment in Australia. *Economic Record*, 90(291), pp.486-506.
- Cai, L., Mavromaras, K. and Sloane, P., 2018. Low Paid Employment in Britain: Estimating State-Dependence and Stepping Stone Effects. *Oxford Bulletin of Economics and Statistics*, 80(2), pp.283-326.
- Cappellari, L., 2002. Do the 'working poor' stay poor? An analysis of low pay transitions in Italy. *Oxford Bulletin of Economics and Statistics*, 64(2), pp.87-110.
- Cappellari, L., 2007. Earnings mobility among Italian low-paid workers. *Journal of Population Economics*, 20, pp.465-482.
- Clark, K. and Kanellopoulos, N.C., 2013. Low pay persistence in Europe. *Labour Economics*, 23, pp.122-134.
- Even, W.E. and Macpherson, D.A., 2003. The wage and employment dynamics of minimum wage workers. *Southern Economic Journal*, 69(3), pp.676-690.
- Fok, Y.K., Scutella, R. and Wilkins, R., 2015. The Low-Pay No-Pay Cycle: Are There Systematic Differences across Demographic Groups?. *Oxford Bulletin of Economics and Statistics*, 77(6), pp.872-896.
- Heckman J. 1981. The incidental parameters problem and the problem of initial conditions in estimating a discrete time-discrete data stochastic process. In: Manski CF, McFadden D (eds) *Structural analysis of discrete data with economic applications*. MIT Press, Cambridge, MA, pp 114-178
- Jones, M.K., Jones, R.J., Murphy, P.D. and Sloane, P.J., 2007. A persistence model of the national minimum wage. IZA Discussion Paper No. 2595.
- Knabe, A. and Plum, A., 2013. Low-wage Jobs—Springboard to High-paid Ones?. *LABOUR*, 27(3), pp.310-330.
- McGuinness, S. and Redmond, P., 2019. The Impact of a Minimum-Wage Increase on Temporary-Contract Workers. *Fiscal Studies*, 40(2), pp.149-173.

- Mosthaf, A., Schank, T. and Schnabel, C., 2014. Low-wage employment versus unemployment: Which one provides better prospects for women?. *IZA Journal of European Labor Studies*, 3, pp.1-17.
- Mundlak, Y., 1978. On the pooling of time series and cross section data. *Econometrica*, 46(1) pp.69-85.
- Redmond, P., McGuinness, S. and Maitre, B. 2018. An examination of the labour market transitions of minimum wage workers in Ireland. Dublin: Economic and Social Research Institute.
- Redmond, P., Staffa, E., Ciprikis, K. and McGuinness, S. (2023). Sub-minimum wages in Ireland. Dublin: Economic and Social Research Institute.
- Stewart, M.B. and Swaffield, J.K., 1999. Low pay dynamics and transition probabilities. *Economica*, 66(261), pp.23-42.
- Stewart, M.B., 2007. The interrelated dynamics of unemployment and low-wage employment. *Journal of Applied Econometrics*, 22(3), pp.511-531.
- Smith, R.E. and Vavrichek, B., 1992. The wage mobility of minimum wage workers. *ILR Review*, 46(1), pp.82-88.
- Wooldridge, J.M., 2005. Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity. *Journal of Applied Econometrics*, 20(1), pp.39-54.