

# Human capital formation and state dependence in low pay

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The results in this paper are not official statistics, they have been created for research purposes from the Integrated Data Infrastructure (IDI) managed by Statistics New Zealand. The opinions, findings, recommendations and conclusions expressed in this paper are those of the author(s) not Statistics NZ.

Access to the anonymised data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business or organisation and the results in this [report, paper] have been confidentialised to protect these groups from identification.

Careful consideration has been given to the privacy, security and confidentiality issues associated with using administrative and survey data in the IDI. Further detail can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from [www.stats.govt.nz](http://www.stats.govt.nz).

# Introduction

## Motivation

- ▶ Wages follow a hump-shaped pattern over the life-cycle
- ▶ Wage-growth depends on qualification level
- ▶ Younger worker at higher risk being on low-pay → higher likelihood exiting the low-pay sector
- ▶ **This study:** Tests heterogeneity in changes of low-pay persistence across age and by qualification

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## Novelties

1. Analyse **changes** in low-pay persistence
2. Looking at monthly transitions
3. Running age- and qualification-specific regressions
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## Findings in a nutshell

- ▶ Large heterogeneity in wage-growth rates across age and qualification level
- ▶ Biggest drop in low-pay persistence observed for qualified workers (5 to 10 pp after one year)
- ▶ Young and qualified worker manage to transit into better paying firms → improved employer-employee match

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# Literature review

## Human capital formation

- ▶ Wages follow a concave pattern over the life cycle
  1. On-the-job training (Brown, 1989)
  2. Improved firm matches (Topel & Ward, 1992; Abowd et al. 1999)
- ▶ Wage growth depends on individuals' qualification (Low et al., 2011; Lagakos et al., 2018)
- ▶ Signalling effect of job type might be age-dependending (McCormick, 1990)

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## Low pay dynamics

- ▶ Does the experience of working in the low-pay sector significantly increase the likelihood to stay on low pay (*low pay persistence*)?
- ▶ “low pay is a temporary phenomenon” (Sloane & Theodossiou 1996, p. 665)
- ▶ Fok et al. (2015) using HILDA data:
  1. Find larger degree of low pay persistence for those in older age groups
  2. Higher persistence with higher educational attainment
- ▶ Low-pay persistence is considered constant over time and homogeneous across population.

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# Data and Descriptive Statistics

## Data

- ▶ **Spine:** Census 2013 with men aged 20-60
- ▶ **IR tax data:** Gauge monthly income from wages and salaries (aggregated)
- ▶ Trimming to continuously employed 01/2013-03/2016
- ▶ **Low pay:** 20% lowest income. Restrict sample to low-paid in 01-03/2013 ( $N = 26\,487$ )
- ▶ **Qualification:**
  - ▶ No qualification
  - ▶ Level 1-4
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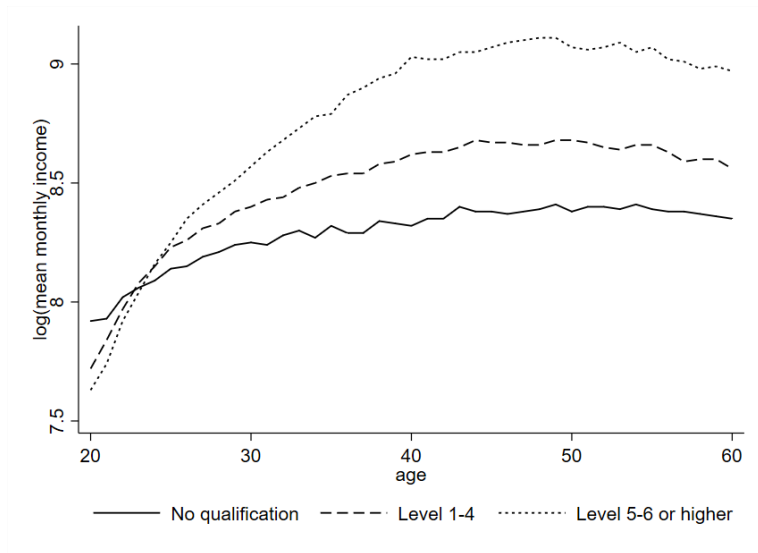
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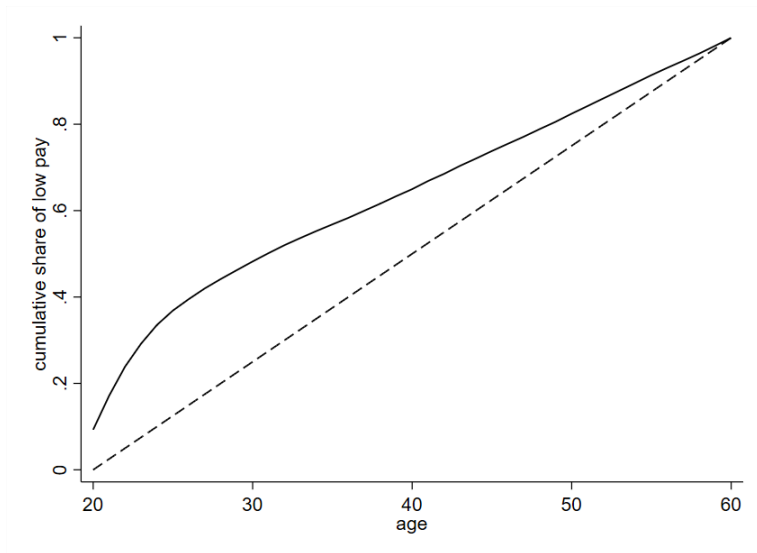
# Data and Descriptive Statistics

## Wage evolution (March 2013)



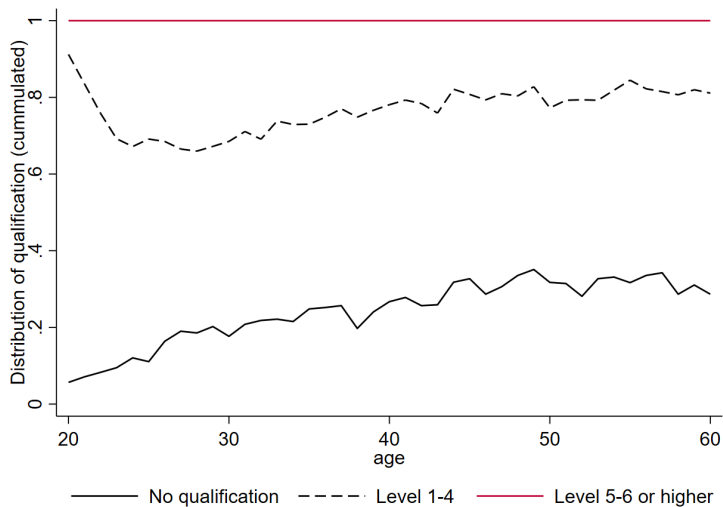
# Data and Descriptive Statistics

Low pay distribution across age



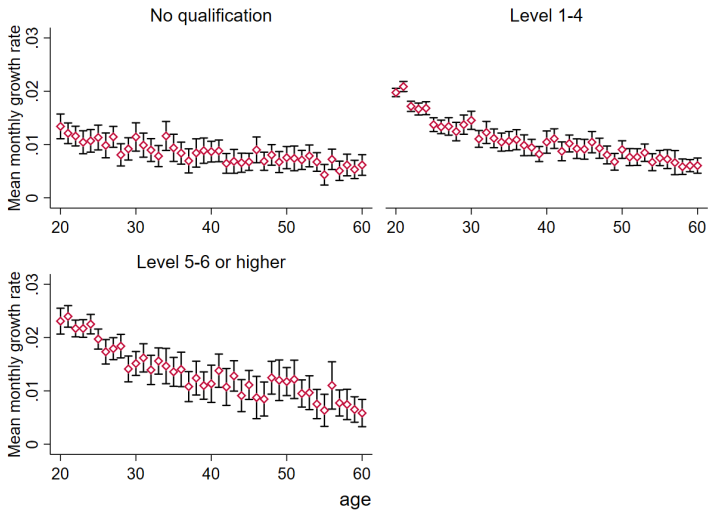
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## Low pay and qualification



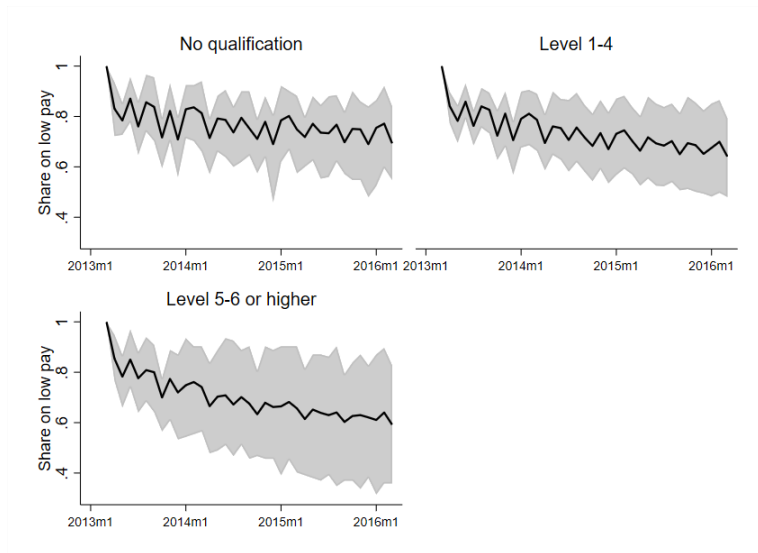
# Data and Descriptive Statistics

## Mean monthly wage growth rates



# Data and Descriptive Statistics

## Low pay transitions



## Identification strategy

Markov process in a non-linear model:

$$y_{it} = \mathbf{1} \left( \alpha y_{it-1} + \sum_{r=21}^{60} \delta_r(\text{age} = r) + \sum_{s=2}^3 \gamma_s(\text{qual} = s) + x_i' \beta + \nu_i + u_{it} > 0 \right) \quad (1)$$

with  $i = 1, \dots, N$  are individuals and  $t = 2, \dots, 36$  is a time identifier on the monthly basis.  $y_{it} = 1$  if individual  $i$  is on low pay at time  $t$  and 0 otherwise.



## Identification strategy

Table: Combinations of lagged labour market position

$j$	On low pay in		
	$t-1$	$t-2$	$t-3$
1	0	0	0
2	0	0	1
3	0	1	0
4	0	1	1
5	1	0	0
6	1	0	1
7	1	1	0
8	1	1	1

## Identification strategy

Accounting for the past three months ( $y_{it-3}$ ):

$$y_{it} = \mathbf{1} \left( \sum_{j=2}^8 \alpha_j (y_{it-3} = j) + \sum_{r=21}^{60} \delta_r (\text{age} = r) + \sum_{s=2}^3 \gamma_s (\text{qual} = s) + x_i' \beta + \nu_i + u_{it} > 0 \right) \quad (2)$$

Adding time-trend  $\lambda_t$ :

$$y_{it} = \mathbf{1} \left( \sum_{j=2}^8 \alpha_j (y_{it-3} = j) + \lambda_t + \sum_{r=21}^{60} \delta_r (\text{age} = r) + \sum_{s=2}^3 \gamma_s (\text{qual} = s) + x_i' \beta + \nu_i + u_{it} > 0 \right) \quad (3)$$

## Identification strategy

Interacting time-trend with lagged labour market positions:

$$y_{it} = \mathbf{1} \left( \sum_{j=2}^8 \alpha_j (y_{it-3} = j) + \lambda_t + \sum_{j=2}^8 \theta_j (y_{it-3} = j) \lambda_t + \sum_{r=21}^{60} \delta_r (\text{age} = r) + \sum_{s=2}^3 \gamma_s (\text{qual} = s) + x_i' \beta + \nu_i + u_{it} > 0 \right) \quad (4)$$

Age-qualification specific models

$$y_{it}^{a,q} = \mathbf{1} \left( \sum_{j=2}^8 \alpha_j (y_{it-3} = j) + \lambda_t + \sum_{j=2}^8 \theta_j (y_{it-3} = j) \lambda_t + x_i' \beta + \nu_i + u_{it} > 0 \right) \quad (5)$$

# Identification strategy

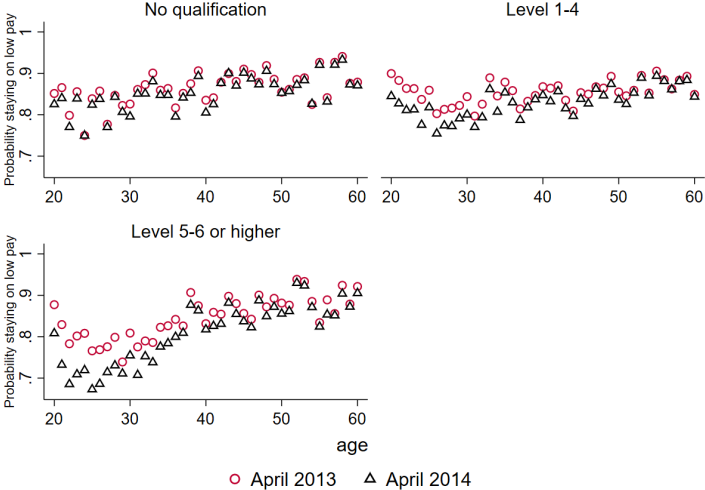
## Average partial effect

$$PE_i^{a,q} = \Phi \left[ \left( \hat{\alpha}_8 + \hat{\lambda}_{14} + \hat{\theta}_8 \hat{\lambda}_{14} + x_i' \hat{\beta} \right) \left( \sqrt{1 - \hat{\lambda}} \right) \right] \\ - \Phi \left[ \left( \hat{\alpha}_8 + \hat{\lambda}_2 + \hat{\theta}_8 \hat{\lambda}_2 + x_i' \hat{\beta} \right) \left( \sqrt{1 - \hat{\lambda}} \right) \right] \quad (6)$$

with  $\hat{\lambda} = \hat{\sigma}_\nu / (\hat{\sigma}_\nu + 1)$ .

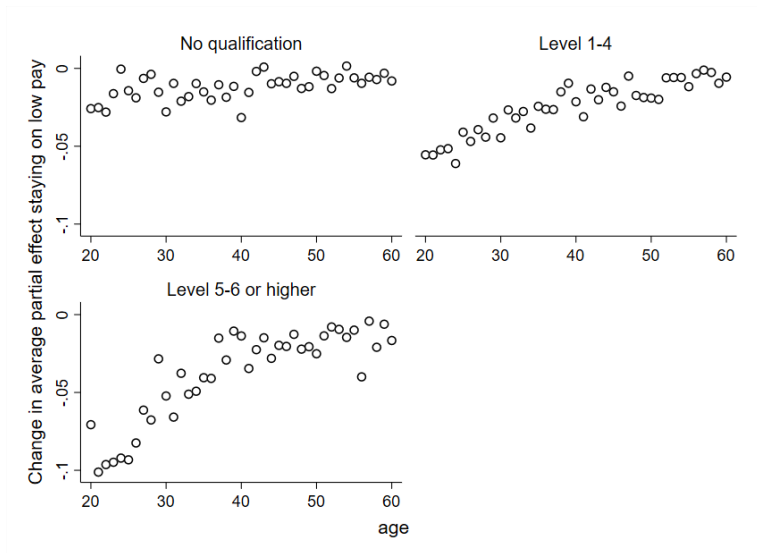
# Results

## Probability staying on low pay



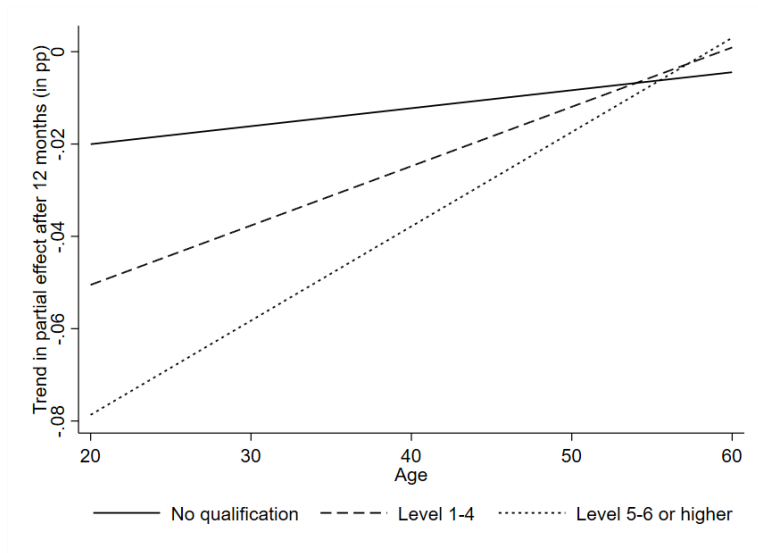
# Results

## Average partial effects



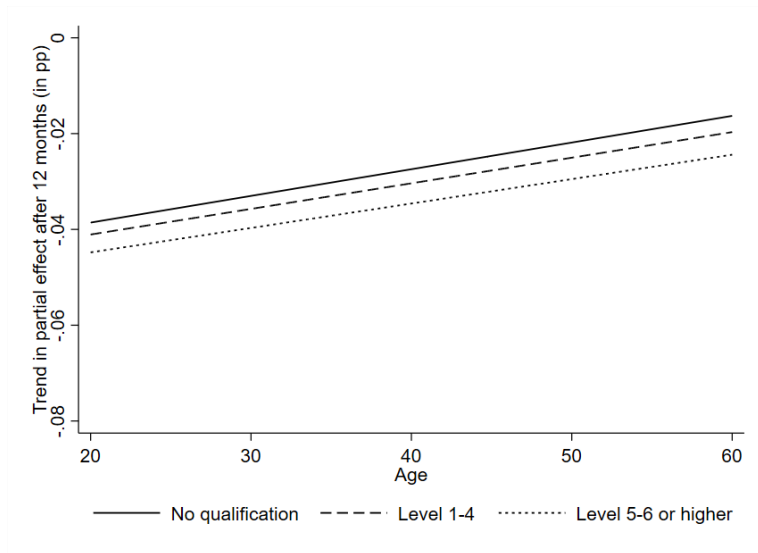
# Results

OLS regression



# Results

OLS regression (pooled sample)





# Results

## Wage distribution of employer



# Conclusion

- ▶ Wage pattern takes a hump-shaped pattern over the life-cycle
- ▶ Focus: How changes persistence in low pay over time?
- ▶ First study to run age-qualification specific regressions
- ▶ Finding: Large variation across age and qualification
- ▶ Explanation: Improved employer-employee matches for young and qualified worker

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Thank You for Your Attention!