March 28, 2019

The Characteristics of Individuals Experiencing Low Wage Growth and Consequences of Low Wage Growth[☆]

Guyonne Kalb[a,b,c], Jordy Meekes[a,b,c]

[a]*The University of Melbourne, Melbourne Institute of Applied Economic and Social Research, Melbourne, Australia*
[b]*LCC - The ARC Centre of Excellence for Children and Families over the Life Course, Australia.*
[c]*IZA - Institute of Labor Economics, Bonn, Germany*

Abstract

Similar to what is observed in many other developed countries, wage growth has been low in Australia recently. Unlike the macro-oriented studies available on this topic, this paper takes a highly individualistic approach to examine how wage growth is distributed across the population over the period 2002 to 2017. We explore to what extent wage growth is explained by individual characteristics and job characteristics, while controlling for changes in aggregate factors. We also examine the link between low wage growth and financial stress or difficulties. Our results show that the employee's age, occupation and industry explain a large share of differences in wage growth. Conversely, the employee's gender, education and employment contract seem less important. It appears that the aggregate or macro-level wage growth component forms only a small part of the overall individual wage growth. Further, we show that wage growth has a significant positive correlation with financial well-being indicators. Finally, the results clearly show that post 2008, and particularly from 2013 onwards, wage growth had significantly slowed down. This result remains, even after controlling for a broad range of individual, household and job characteristics (and for time-invariant unobserved characteristics).

Keywords: individual wage growth, aggregate wage growth, financial well-being

[☆]This paper uses unit record data from Release 17 of the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA survey is conducted by the Melbourne Institute of Applied Economic and Social Research on behalf of the Australian Government Department of Social Services (DSS). The findings and views reported in this paper, however, are those of the authors and should not be attributed to the Australian Government, DSS or the Melbourne Institute. This research was supported by the Australian Research Council Centre of Excellence for Children and Families over the Life Course (CE140100027). Guyonne Kalb is an Associate Investigator and Jordy Meekes is a Research Fellow at this Centre. The Life Course Centre (LCC) is administered by the Institute for Social Science Research at The University of Queensland, with nodes at The University of Western Australia, The University of Melbourne and The University of Sydney.

1. Introduction

In recent years, wage growth has stagnated in several developed countries. This slow-down in wage growth has been observed internationally in the US, Canada, Australia, UK and several European countries (Elsby et al., 2016; Pinheiro and Yang, 2017; Bell and Blanchflower, 2018a; Bishop, 2018). Predicted wage growth has been higher than actual wage growth in the US and Australia (Pinheiro and Yang, 2017; Bishop, 2018). In recent years the Reserve Bank of Australia (RBA) has persistently overestimated wage growth by about 1 percentage point, while the annual wage growth has been steadily declining from about 4% in 2011 to less than 2% in 2017. Different measures of labour costs all point to a similar slow-down in earnings growth. Bishop (2018) notes that since 2012 both the size and frequency of wage increases have reduced, leading to lower overall wage growth.

Various macro-oriented explanations have been given to explain the decline in wage growth, including the increase in flexibility of wages to market conditions, decrease in unionisation rates, labour market slack, underemployment, and weak labour productivity growth (Jacobs and Rush, 2015; Brouillette et al., 2017; Bell and Blanchflower, 2018b). However, studies pay less attention to how the decline in wage growth is distributed across the population – for example to what extent it varies among workers with different demographic or job characteristics.

This paper addresses three research questions around low wage growth, where wage growth is defined as the within-individual year-to-year change in nominal hourly wage. First, how is wage growth distributed across the population? Second, to what extent is wage growth explained by individual characteristics and job characteristics, while also controlling for changes in aggregate factors such as award rates and collective/enterprise agreements that outline minimum pay rates? We also aim to control explicitly for promotions by recording job and occupation changes, and implicitly for wage increases due to steps within a specific pay scale through age of the respondent.

Whether low wage growth has a social impact depends on whether it makes families vulnerable to financial distress, and/or whether it widens inequality between low and high-income earners. For example, when a mortgage is entered with the expectation that wage growth and inflation will quickly make repayments easier as time goes by, low wage growth may lead to high financial pressure on the family for a longer period of time, particularly if house prices are flat or declining. Therefore, we also aim to answer a third question: how is low wage growth linked to financial stress and/or the individual's subjective rating of prosperity?

Differences in hourly wage growth across subgroups of workers can be explained by human capital theory, and/or search and matching theory (Bowlus and Liu, 2013; Lagakos et al., 2018). Based on human capital theory, we expect that the most able workers are provided with the most opportunities to accumulate human capital and, as a result, experience the highest wage growth

over their careers. Based on the literature, we hypothesise that these subgroups are characterised by: (i) lower age, as the incentive to learn and to accumulate human capital reduces with age, and young employees are also the least experienced with the most still to learn; (ii) higher education attainment, as the ability to learn increases with education; and (iii) long-term contracts as opportunities to learn are more likely to be provided by the employer to workers on permanent contracts as employers expect these workers to be in their firm for a longer period of time, making investment in these workers more worthwhile. (iv) Aside from skill, ability and experience, differences in job preferences may also affect nominal wage growth. That is, if someone is more selective with regard to the non-financial features of the job that they are willing to work in, e.g. in terms of job location, access to flexible work schedules or working hours, or type of occupation/industry, then a standard job search model suggests that the wage offer curve is less steep due to a slower arrival rate of jobs. This may be more relevant for women than men (Loprest, 1992). (v) Additionally, negative (positive) discrimination may make women (or other groups) less (more) likely to move up to higher paying jobs.

Alternatively, search and matching theory suggests that workers who are more able to move to better paid employment will realise higher wage growth (Burdett, 1978; Burdett et al., 2011). The literature indicates that subgroups of workers who are likely to do better in terms of job-to-job mobility and job matching are younger workers who face low mobility costs, and workers who have higher education as there is high demand for their skills (Manning, 2003). This leads to workers in high demand experiencing more wage growth through increased job-to-job mobility and bargaining power, especially during economic upturns with tight labour markets (Hirsch et al., 2018). In contrast, frictions in the labour market and misallocation have led to poor labour market outcomes for workers, especially for workers who face low labour market demand.

Over the last decades the demand side of the labour market has changed due to structural changes in specific economic sectors. For example, job polarisation caused by technological change and automation of jobs decreased demand for workers who perform routine tasks relative to workers in cognitive jobs. In routine jobs the scope for wage growth is thus likely to be more limited.

Our paper focusses on which worker characteristics explain differences in wage growth, to understand which underlying theoretical mechanisms may be most prevalent. Additional evidence on this topic can inform more effective policy design by determining who are affected and which policy levers may be relevant.

To answer our research questions we use the Household Income and Labour Dynamics in Australia (HILDA) 2001-2017, which allows us to follow all employed respondents aged 21 to 64. We use the within-individual year-to-year log change in nominal hourly wage as the depen-

dent variable in a pooled ordinary least squares (OLS) analysis and in a fixed effects (FE) panel data analysis. HILDA data are particularly suitable for these analyses, as a rich set of variables is observed on individuals and the households in which they live, in addition to a range of job characteristics. To answer our third research question, we also need some measure of financial well-being to assess potential consequences of low wage growth. HILDA reports a number of indicators that are suitable for constructing a financial stress index, as well as a subjective prosperity measure. The financial stress index and a poorness index are then used as dependent variables in a generic empirical model with wage growth as one of the explanatory variables.

An earlier study by Treasury (2017) also examines the distribution of wage growth over individuals and businesses with different characteristics using HILDA 2001-2015 data. However, this is a more descriptive study using univariate analyses that does not allow for holding other – individual or aggregate – attributes constant.

Results from different specifications in our paper consistently show that the employee's age, occupation and industry explain a large share of differences in wage growth, while the employee's gender, education and employment contract appear less important. The analyses also show that wage growth is positively and significantly correlated with financial well-being indicators. Furthermore the results clearly show that post 2008, and particularly from 2013 onwards, wage growth was significantly lower than in 2002, even after controlling for a broad range of individual, household and job characteristics (and for time-invariant unobserved characteristics).

The next section first describes the data used and our sample selections. Section 3 provides a descriptive analysis of wage growth over 16 years of pooled data. The approach used in the multivariate analysis is outlined in Section 4. Results are then reported in Section 5, before concluding in Section 6.

2. Data

We use all 17 waves over the period 2001-2017 of the HILDA that are currently available, following all individuals aged 21 to 64 in the sample who are employed as wage and salary workers. The HILDA survey is based on a representative sample of Australian households (excluding those living in very remote areas). All individuals over 15 years of age living in these households are interviewed face to face at yearly intervals.

2.1. Dependent Variables

We use the within-individual year-to-year log change in nominal hourly wage as the dependent variable. The hourly wage is constructed by taking the usual weekly earnings divided by the usual weekly hours worked. The respondent needs to be observed in at least two subsequent waves to

compute the wage growth variable. We allow for comparisons of the wage growth variable to the measures typically used in the existing literature by using macro-level industry-specific data on the Wage Price Index (WPI), Average Weekly Ordinary-Time Earnings (AWOTE) and Average Annualised Wage Increase (AAWI).[1] We include all three indexes as each of them measures a related but different aspect of labour costs. The WPI captures changes in wage rates excluding bonuses, while controlling for changes in the composition of the workforce. The AWOTE captures changes in total earnings by individuals, which includes bonuses and depends on changes in the workforce. The AAWI captures changes based on federal enterprise wage agreements in all economic sectors. We use these three indexes to provide a clear picture of aggregate changes in earnings, which allows us to analyse the importance of worker characteristics for individual wage growth while taking into account changes at the aggregate level.

We use two variables to assess the potential consequences of low wage growth for the worker's financial well-being. We use information collected on financial difficulties to construct a measure of financial stress. HILDA reports several indicators that are suitable for constructing a financial stress measure. These indicators are subjective measures but they are based on individuals' responses to concrete questions regarding financial difficulties. They include the following seven concrete (and severe) financial hardships: unable to heat the home; unable to pay bills; unable to pay mortgage or rent on time; pawned or sold something; went without meals; asked for financial help from friends or family; and asked for help from welfare/community organisations. In addition, we use information on the respondent's self-reported prosperity given current needs and financial responsibilities. The respondent's self-reported prosperity is collected as an ordinal variable with six categories, ranging from prosperous to very poor.

2.2. Covariates and Sample Selections

Our analyses include a rich set of variables with information on individuals and the households in which they live, including gender, age, education attained, current education/training enrolment, number of household members, number and age of children, Indigenous status, country of birth, marital status, individual's annual personal income (categorised in year-specific quintiles), long-term health condition and location of residency at the SA3 level; as well as information on job characteristics such as type of contract (permanent/fixed-term/casual), occupation, industry and type of job (full-time/part-time). Job-to-job turnover is represented by an indicator variable that

[1]The following data on these macro-economic measures are used. For the WPI, we use the Ordinary Hourly Rates of Pay Excluding Bonuses in June of each year (Australian Bureau of Statistics, 2018b). For the AWOTE, we use the Average Weekly Earnings in May of each year (Australian Bureau of Statistics, 2018a). For the AAWI, we use the Trends Historical Table in June of each year (Australian Government Department of Jobs and Small Business, 2018). WPI and AWOTE numbers are not available for the Agriculture, Forestry and Fishing industry.

equals one if the tenure in the job is less than one year and zero otherwise. A transition in occupation is represented by an indicator variable which equals one if the current occupation differs from the occupation in the previous year. A transition in industry is represented by an indicator variable which equals one if current industry differs from industry in the previous year.

Our sample of analysis is determined by the following sample selections. We only keep full-time employed individuals, i.e. individuals working more than 35 hours in their main jobs. This is an important selection as it eliminates the confounding effects of underemployment, and of transitions from part-time to full-time work on wage growth. For example, wage growth varies considerably following transitions between unemployment, part-time employment and full-time employment (Moscarini and Postel-Vinay, 2016, 2017; Daly and Hobijn, 2017; Moscarini and Postel-Vinay, 2018). Moreover, a focus on full-time workers limits selectivity into promotions or other opportunities based on having a full-time job versus a part-time job. Also, full-time workers tend to have a stronger attachment to the labour market than part-time workers, which lowers the incidence of job-to-unemployment (or job-to-non-employment) transitions, limiting the confounding effects of signalling. By restricting our analysis to full-time workers, we focus on the within-group wage growth of full-time workers while taking out between-group composition effects. [2]

We further restrict the sample by excluding several employee-year observations. Employee-year observations involving employees working more than 80 hours in their main job are excluded. Employee-year observations involving workers earning more than 10,000 AUD a week in their main job, as well as observations with an hourly wage of less than 8 AUD, are excluded. We also remove the bottom 1 percentile and top 1 percentile (on an annual basis) of percentage growth in hourly wage and main wage. These selections limit the incidence and problems associated with outliers, and the volatility of wages and working hours.

3. Descriptive Analysis

The first research question is addressed using descriptive analysis. We present summary statistics for our key variables in Table 1. Table 1 reveals the range of the values that the nominal wage of workers takes. To limit the impact of "outliers" on our results, we follow the literature in using the log change in hourly wage as the dependent variable in our multivariate analysis. We use information from the pooled years 2002 to 2017.[3] Applying the sample selections described in the

[2]Lass and Wooden (2019) consider all workers as they are interested in wage growth for part-time versus full-time workers, and casual or fixed-term workers versus workers with a permanent contract.

[3]For several variables, e.g. change in hourly wage, job-to-job turnover and contract transitions, we focus on the change from $t-1$ to t. Hence, in all graphs and tables, data are included over the period 2002 to 2017. We exclude $t = 2001$, as we need wage information from the previous year to construct our wage growth variable.

previous section, we have observations for 10,891 unique persons, who are observed in full-time employment in at least two consecutive waves.

Individual-level wage growth is at least partly due to the fact that many employees receive regular annual increases due to the presence of discrete annual steps within a pay scale. Annual steps within a pay scale are often set within award rates, which are generally higher than the national minimum wage and depend on the industry, occupation and location of a worker. The award wages cause, from an international perspective, the relatively high minimum wages and high wage growth in Australia. The aggregate wage indexes are based on industry-specific changes in wage using data on the entire population of Australian workers. We pay attention to differently defined macro-level wage growth by comparing the WPI, AWOTE, and AAWI with the average individual wage growth observed in the HILDA data. We link inflation, WPI, AWOTE and AAWI to individuals in the HILDA sample on the basis of year of observation and industry of the individual.

It is clear from Table 1 that average hourly individual wage growth observed in HILDA is much higher than any of the aggregate wage indexes indicate. The difference between the hourly wage growth in HILDA and the wage indexes can be explained to some extent by our sample selections. For example, individuals who churn in and out of employment are less likely to be included in our analysis, since the individuals in our sample of analysis need to be in full-time employment for at least two consecutive waves to be included. Moreover, workers who churn in and out of employment are more likely to be affected by structural changes in labour demand such as automation (Gregory et al., 2019). More generally, disadvantaged individuals are less likely to be represented in our analysis (especially post-Global Financial Crisis (GFC)), as they are more likely to be displaced and remain non-employed or only gain part-time employment.

Table 1
Individual summary statistics.

	N	Mean	Median	Min.	Max.
Hourly wage (AUD)	59,152	31.20	27.47	3.200	193.8
Log hourly wage (#)	59,152	3.340	3.313	1.163	5.267
Growth hourly wage (%)	59,152	7.722	4.552	-58.00	151.1
Log change hourly wage (#)	59,152	0.0516	0.0445	-0.867	0.920
Wage main job (AUD, weekly)	59,152	1,367	1,181	200	9,990
Log wage main job (AUD)	59,152	7.106	7.074	5.298	9.209
Growth wage main job (%)	59,152	7.445	4.255	-59.65	151.1
Log change wage main job (#)	59,152	0.0525	0.0417	-0.908	0.920
Working hours main job (#, weekly)	59,152	43.74	40	35	80
Inflation (%)	59,152	2.415	2.500	1	4.400
WPI (%)	58,271	3.299	3.300	1	6
AWOTE (%)	58,271	3.652	3.760	-8.643	14.32
AAWI (%)	59,152	3.745	3.745	2.335	5.127
Financial stress index (#)	59,152	0.282	0	0	7
Poorness index (#)	53,490	3.082	3	1	6
Number of individuals (#)			10,891		

Notes: The time period under observation is from 2002 to December 2017. The number of observations, sample mean, median, minimum and maximum are provided. The number of observations for WPI and AWOTE is lower as there is no information available for the economic sector "Agriculture, forestry and fishing".

Figure 1 shows mean and median nominal wage development over the 2002-2017 period. In 16 years time the mean and median value nearly doubled. However, the growth in mean and median nominal wage slowed down since 2007. Figure 2 shows that average wage growth over the 2002-2017 period varied substantially (between around 6 to 11%), and over our entire period under observation both mean and median wage growth is at its lowest level in 2017. The patterns of wage growth observed in the HILDA data reflect the patterns observed for the aggregate wage indexes, but the HILDA wage growth is always at a higher level. This descriptive finding is consistent with reports by the RBA on declining wage growth in Australia, and it is important to note that even full-time workers, who are among the least disadvantaged individuals in the population, experience lower wage growth.

Fig. 1. Changes in mean and median hourly wages over time (main job).

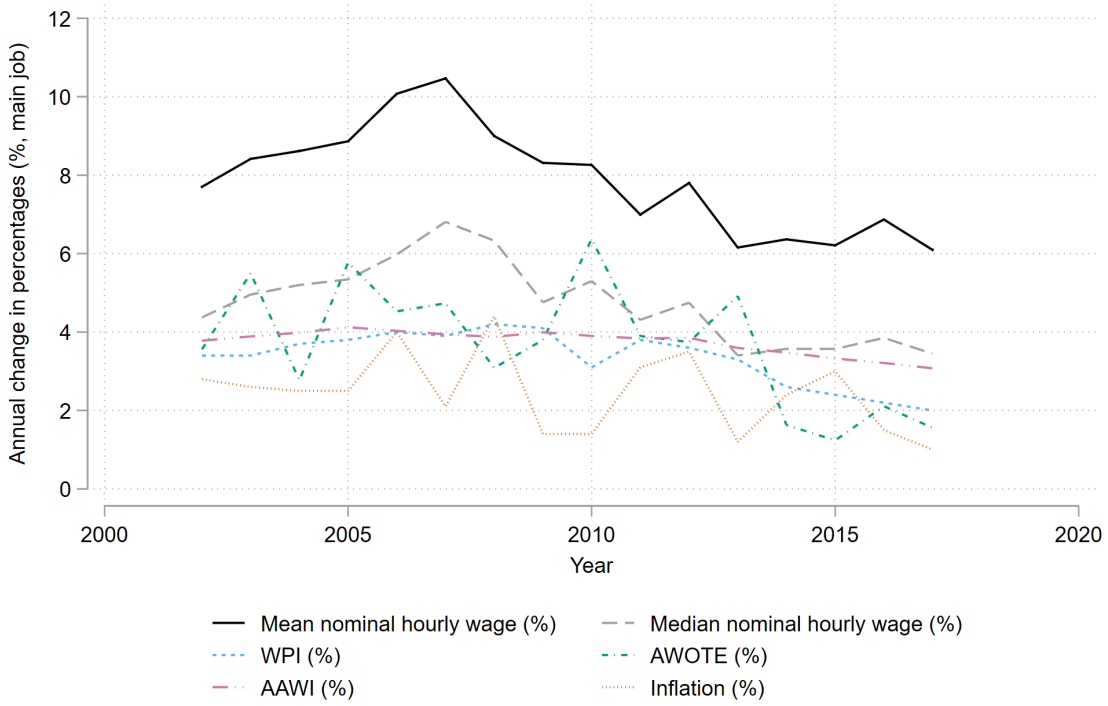

Fig. 2. Changes in mean and median nominal hourly wage and the wage indexes over time.

Examining the distribution of the change in log wage in Figure 3, the HILDA data displays a distribution ranging from negative to positive values, which is slightly skewed towards positive values. This distribution is plotted for four different years. This shows that 2007 is the most different, with a clear shift to the right, indicating higher positive wage changes. Since 2007, both the size and frequency of wage increases have reduced. The years 2012 and 2017 have slightly shifted to the left (indicating lower wage growth) compared to 2002.

Figure 3 is consistent with several findings in the literature (Elsby et al., 2016). First, there is evidence of a nominal wage stickiness (visible in the large peak at zero change) and a resistance to nominal wage cuts (visible from the relatively low share of workers who experience negative year-to-year wage changes). This is more easily observed in Figure B1 of Appendix B, which shows a graph of the year-specific density plot of percentage change in nominal hourly wages. Second, wage increases are pro cyclical, as evidenced by the higher share of positive year-to-year log changes in 2007. This finding could be explained by higher job-to-job mobility and increased bargaining power during economic upturns.

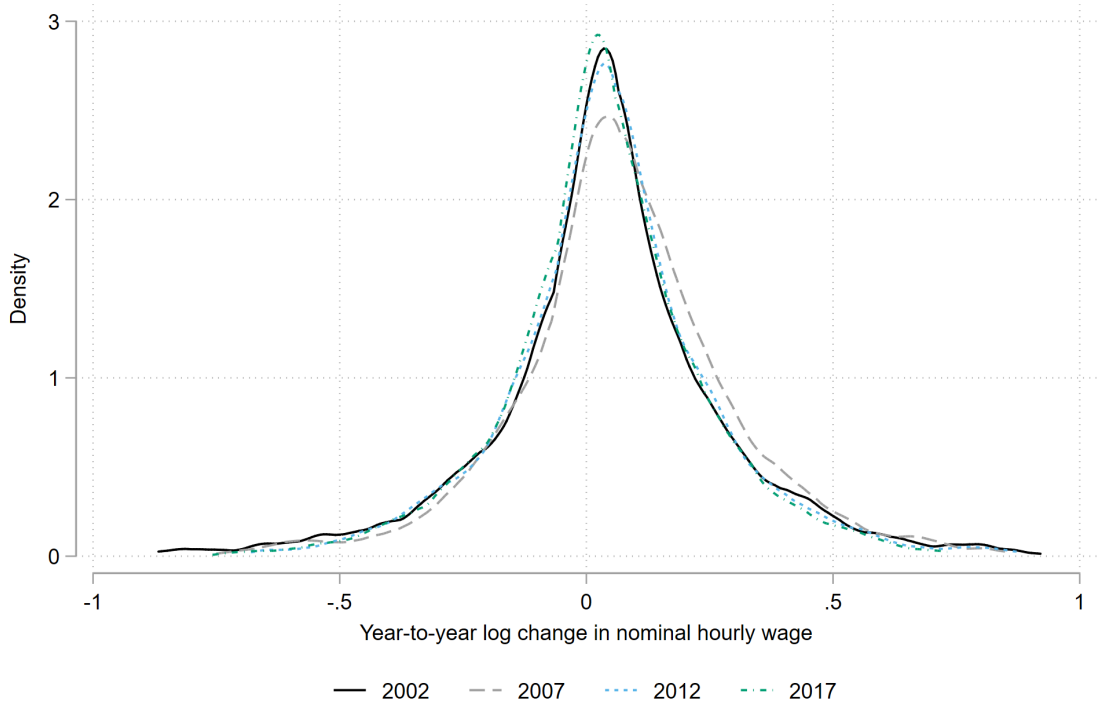

Fig. 3. Year-specific density plot of log change in nominal hourly wages (main job).

We repeat wage growth comparisons over time for a number of subgroups of interest: men versus women, by age, by education level, by income group, by occupation and by industry. We assess whether the role of individual characteristics and job characteristics in wage growth depends

on the level of wage growth (high versus low) by comparing this role in the period until 2008 and in the period after 2008. These comparisons allow us to identify potential differences in the development of wage growth over time depending on an employee's observables.

Tables 2 and 3 both present average wage growth by subgroups for the 2002-2008 versus the 2009-2017 period (roughly pre- and post-GFC). Table 2 focusses on the individuals' characteristics, showing lower percentage wage growth in the post-GFC period than in the pre-GFC period for all groups. However, there are some clear differences between groups in terms of wage growth. For example, comparing wage growth for men and women over time, Table 2 shows that wage growth, although similar for the two groups, is slightly higher for men pre-GFC and slightly higher for women post-GFC, with women seemingly suffering less from the downturn in 2008.[4]

Younger employees have higher wage growth than older employees. This difference is reduced after the GFC, but younger employees remain with a higher average wage growth than older employees. This is to be expected as employees tend to start at the bottom of a pay scale and are more likely to receive increments for the first few years of employment. Younger employees are also more likely to experience promotions than older employees who have reached the top of their pay scale. More highly educated persons and employees at higher incomes receive higher wage increases than their counterparts, which again decrease after the GFC without changing the pattern of who receives the highest wage growth.

Table 3 focusses on the employment characteristics in our sample, and again we observe that wage growth decreases across the board between the pre- and post-GFC period. Employees on a casual contract receive the highest wage increases, followed by employees on a permanent contract and a fixed-term contract. In Australia, casual workers are entitled to a premium on the hourly pay rate. This casual wage premium compensates for the lack of paid leave and job protection, and may explain why wage growth for casual workers is higher compared to permanent workers' wage growth. Again relativities remain the same pre- and post-GFC.

Relativities in pre- and post-GFC mean wage growth are not maintained for occupations and industries, where we observe (sometimes large) changes in rankings based on wage growth. Consistent with job search and matching theory, changes in labour demand across occupations and industries explain some of the changes in wage growth. E.g., the Australian mining industry almost doubled in dollar value over the period 2005 to 2012, which was accompanied by an increased demand for workers in the mining industry. Indeed, mining remained amongst the industries with the highest wage growth. However, occupations and industries characterised by increased labour demand could also provide more scope for learning, suggesting potential spillover effects between human capital accumulation and job search as discussed by Bowlus and Liu (2013).

[4] Also see Figure B2 of Appendix B for wage growth over time by gender.

Table 2
Mean percentage year-to-year growth in nominal hourly wages (main job) by observables.

	Time period			
	2002-2008		2009-2017	
	N	Mean wage growth (%)	N	Mean wage growth (%)
Gender:				
Female (=1)	7,860	8.699	13,688	7.087
Male (=1)	14,235	9.230	23,369	6.847
Age:				
$21 \leq age < 25$ years (=1)	1,530	14.07	2,432	10.97
$25 \leq age < 30$ years (=1)	2,935	11.79	5,712	8.515
$30 \leq age < 35$ years (=1)	3,113	9.530	4,950	7.930
$35 \leq age < 40$ years (=1)	3,026	9.305	4,395	7.041
$40 \leq age < 45$ years (=1)	3,333	7.598	4,653	6.249
$45 \leq age < 50$ years (=1)	3,325	7.448	4,762	6.011
$50 \leq age < 55$ years (=1)	2,624	7.522	4,757	5.097
$55 \leq age < 60$ years (=1)	1,626	7.040	3,652	5.399
$60 \leq age < 65$ years (=1)	583	7.784	1,744	5.629
Education:				
Year 11 (=1)	4,391	7.647	5,337	5.936
Year 12 (=1)	3,006	9.548	5,024	7.270
Cert III and IV (=1)	5,397	8.812	9,643	6.324
Diploma and adv. diploma (=1)	2,301	8.588	4,062	6.734
Bachelor, grad and postgrad (=1)	7,000	10.02	12,991	7.733
Household situation:				
Partner (=1)	15,789	8.906	27,370	6.834
No partner (=1)	6,306	9.379	9,687	7.222
Own resident children (=1)	10,047	8.504	16,902	6.298
No own resident children (=1)	12,048	9.489	20,155	7.470
Background:				
Indigenous origin (=1)	288	10.83	625	6.749
Not of Indigenous origin (=1)	21,807	9.018	36,432	6.938
Born abroad (=1)	4,645	9.064	7,475	6.818
Not born abroad (=1)	17,450	9.035	29,582	6.965
Individual's income:				
First quintile (=1)	4,446	8.139	7,426	5.999
Second quintile (=1)	4,396	9.464	7,409	6.526
Third quintile (=1)	4,442	8.763	7,423	7.199
Fourth quintile (=1)	4,397	8.944	7,416	7.304
Fifth quintile (=1)	4,414	9.907	7,383	7.652
Health status:				
Long-term health condition (=1)	2,986	8.498	5,381	5.621
No long-term health condition (=1)	19,109	9.126	31,676	7.159

Notes: The number of observations and mean wage growth are provided at the individual-year level. The time period under observation is from 2002 to 2017.

Table 3
Mean percentage year-to-year growth in nominal hourly wages (main job) by job characteristics.

	Time period			
	2002-2008		2009-2017	
	N	Mean wage growth (%)	N	Mean wage growth (%)
Type of contract:				
Permanent contract (=1)	5,397	8.812	9,643	6.324
Fixed-term contract (=1)	4,391	7.647	5,337	5.936
Casual contract(=1)	3,006	9.548	5,024	7.270
Occupation:				
Managers (=1)	3,305	9.232	6,420	7.361
Professionals (=1)	6,071	10.14	10,331	7.893
Technicians and trades (=1)	3,333	9.696	5,494	7.481
Community and personal service (=1)	1,439	8.627	2,528	6.848
Clerical and admin (=1)	3,620	7.080	5,520	5.921
Sales (=1)	1,092	10.20	1,686	5.475
Machinery operators and drivers (=1)	1,856	8.278	2,956	5.222
Labourers (=1)	1,379	7.857	2,122	5.862
Job industry:				
Agriculture, forestry and fishing (=1)	417	6.863	464	5.214
Mining (=1)	558	10.99	1,094	9.656
Manufacturing (=1)	3,188	8.955	4,050	6.038
Electricity, gas and water service (=1)	329	10.13	664	7.138
Construction (=1)	1,332	11.03	2,937	7.550
Wholesale trade (=1)	975	8.039	1,651	5.434
Retail trade (=1)	1,406	8.760	2,289	5.949
Accommodation and food service (=1)	573	8.304	920	5.556
Transportation and storage (=1)	1,173	8.268	2,080	6.418
Information and communication (=1)	752	9.048	889	7.812
Financial and insurance (=1)	1,071	8.713	1,899	8.345
Rental, hiring and real estate (=1)	270	12.67	554	6.727
Professional, scientific and technical (=1)	1,593	11.40	2,962	7.268
Administrative and support service (=1)	407	10.62	848	7.671
Public administration and safety (=1)	2,598	8.852	4,040	7.296
Education and training (=1)	2,375	8.311	3,897	7.272
Human health and social work (=1)	2,085	8.043	4,189	6.897
Arts and recreation service (=1)	314	8.189	491	5.384
Other service activities (=1)	679	8.072	1,139	6.758

Notes: The number of observations and mean wage growth are provided at the individual-year level. The time period under observation is from 2002 to 2017.

4. Methodology - Empirical Models

Research questions 2 and 3 are addressed by multivariate panel analyses. In the multivariate analyses we explore the worker characteristics that explain differences in wage growth, while including a large set of covariates and controlling for various aggregate factors.

Following the literature, we express wage growth as $log(w_{ir,t}/w_{ir,t-1}) = log(w_{ir,t}) - log(w_{ir,t-1}) = \Delta log(w_{ir,t})$ and specify an empirical model to estimate the effect of various individual characteristics and job characteristics on the change in log hourly wage:

$$\Delta log(w_{ir,t}) = \beta' X_{irt} + \alpha_i + A_r + D_t + \varepsilon_{irt} \tag{1}$$

$i \in 1, 2, ..., N$; $r \in 1, 2, ..., R$; $t \in 2002, 2007, ..., 2017$

where subscripts i, r and t denote the worker, regional residence SA3 and year, respectively. The worker's characteristics, including demographics, occupation and industry, are represented by X. The parameter estimates on the employee's observables are denoted by β, which allows us to examine the main individual and job characteristics that influence wage growth.[5] Individual-specific fixed effects are denoted by α, which are included to control for time-constant unobserved heterogeneity such as worker's motivation and ability. A refers to residential area fixed effects that control for local labour market conditions at the SA3 level. We also include calendar year fixed effects, D, to control for inflation and business cycle effects. ε refers to the idiosyncratic error term.

Equation (1) is estimated using pooled OLS (i.e. without the individual-specific fixed effects term α) and a fixed effects panel model. The OLS analyses describe the correlations of individual and job characteristics and macro-economic circumstances (e.g. unemployment and WPI) with wage growth. A fixed effects specification allows us to focus on the impact of local macro-economic circumstances and individual characteristics that change over time.

Equation (2) presents an empirical model to examine the role of hourly wage change in two measures of financial well-being.

$$y_{ir,t} = \delta \Delta log(w_{ir,t}) + \beta' X_{irt} + \alpha_i + A_r + D_t + \varepsilon_{irt} \tag{2}$$

where the main parameter of interest is δ, which measures the impact of hourly wage growth on y. (2) is a generic empirical model in which y in turn stands for the financial stress index and the poorness index. The FE analysis of financial stress allows us to determine the impact

[5] When sufficiently small, β can be interpreted as the approximate percentage increase in wage growth as a result of a one-unit increase in X. The precise percentage change is $exp(\beta) - 1$.

of variations in within-individual wage growth on financial stress while controlling for individual-specific differences. This enables us to study whether low wage growth for individuals is correlated with financial difficulties.

5. Empirical Analysis

5.1. Wage Growth

Table 4 presents OLS results for six different specifications of Equation (1), starting with a limited set of explanatory variables, including only gender, age, education and year fixed effects, and then gradually adding more explanatory variables.[6] The results from these multivariate analyses are different to those found in the descriptive analysis by Treasury (2017) which found differences by education and age, but fairly similar low growth by income and occupation.

Table 4 shows that women are not significantly different from men in terms of wage growth in any of the specifications.[7] Higher wage growth is observed for younger employees compared to older employees. The role of age in wage growth is robust across all specifications with only some variations in the size of the differences, although it disappears for workers over 40 years in the FE specification (see Table A1). Education appears relevant for wage growth, but this works through occupation, and the coefficients become insignificant as soon as occupation and industry are included in Column (4) of Table 4. Similarly the AAWI wage index is only significant when occupation and industry are not included, and AAWI has the strongest correlation of the three wage indexes as the WPI and AWOTE are insignificant in all specifications. All information contained in the wage indexes is also contained in the occupation and industry indicators. Conversely, the contract type casual work is only significant when occupation is included, as this contract type is probably more common for lower-skill occupations, so that omitting occupation from the model confounds the results for casual work. The results for the occupation indicators show that workers who have more cognitive, less routine, occupations experience higher wage growth, including managers, professionals, technicians and service.[8] In contrast, occupations with more routine tasks such as clerks, machinery operators and labourers experience the lowest wage growth. The results

[6] See Table 4 (continued) in Appendix A for the calendar year effects on wage growth. Results based on the FE specification are presented in Table A1 of Appendix A, which are similar in many ways.

[7] An additional analysis (not reported here) allowing for a different coefficient on women pre- and post-GFC shows the same lower wage growth (compared to men) pre-GFC and weakly significant higher wage growth post-GFC as in the descriptive statistics. This finding is interesting in light of the considerable attention of individuals, government and firms to equal pay for men and women in recent years, which would lead us to expect higher wage growth for female workers.

[8] See Autor and Dorn (2013) and Goos et al. (2014) for how a classification of occupations based on the Routine Task Intensity index is constructed for the US and Europe, respectively.

for occupation are fairly robust over the specifications, except for the category of ”labourers”, the coefficient of which becomes insignificant in the FE model from being highly significant in the OLS specification.

Table 4
The role of worker characteristics in wage growth (Eq. (1)); OLS estimator.

	Change in hourly wage (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
Demographic characteristics:						
Female	-0.0010	-0.0008	-0.0011	0.0011	0.0012	0.0012
	(0.0013)	(0.0013)	(0.0013)	(0.0015)	(0.0015)	(0.0015)
Age: reference group is $21 \leq age < 25$ years						
$25 \leq age < 30$ years	-0.0215***	-0.0214***	-0.0213***	-0.0216***	-0.0216***	-0.0216***
	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0039)
$30 \leq age < 35$ years	-0.0318***	-0.0317***	-0.0315***	-0.0319***	-0.0316***	-0.0316***
	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0039)	(0.0039)
$35 \leq age < 40$ years	-0.0359***	-0.0357***	-0.0355***	-0.0355***	-0.0345***	-0.0345***
	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0039)	(0.0039)
$40 \leq age < 45$ years	-0.0456***	-0.0455***	-0.0452***	-0.0450***	-0.0439***	-0.0439***
	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0039)	(0.0039)
$45 \leq age < 50$ years	-0.0469***	-0.0469***	-0.0465***	-0.0462***	-0.0455***	-0.0455***
	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0039)	(0.0039)
$50 \leq age < 55$ years	-0.0512***	-0.0512***	-0.0507***	-0.0503***	-0.0499***	-0.0499***
	(0.0038)	(0.0038)	(0.0038)	(0.0038)	(0.0039)	(0.0039)
$55 \leq age < 60$ years	-0.0511***	-0.0511***	-0.0506***	-0.0498***	-0.0498***	-0.0498***
	(0.0040)	(0.0040)	(0.0040)	(0.0040)	(0.0041)	(0.0041)
$60 \leq age < 65$ years	-0.0477***	-0.0477***	-0.0471***	-0.0459***	-0.0465***	-0.0465***
	(0.0047)	(0.0047)	(0.0047)	(0.0047)	(0.0047)	(0.0047)
Education: reference group is < Year 12						
Year 12	0.0034	0.0036	0.0035	0.0007	0.0000	0.0000
	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0023)	(0.0023)
Cert III and IV	0.0010	0.0008	0.0010	-0.0024	-0.0025	-0.0025
	(0.0019)	(0.0019)	(0.0019)	(0.0020)	(0.0020)	(0.0020)
Diploma and adv. diploma	0.0071***	0.0070***	0.0073***	0.0013	0.0006	0.0006
	(0.0022)	(0.0022)	(0.0022)	(0.0024)	(0.0025)	(0.0025)
Bachelor, grad and postgrad	0.0134***	0.0130***	0.0132***	0.0043*	0.0028	0.0028
	(0.0018)	(0.0018)	(0.0018)	(0.0023)	(0.0024)	(0.0024)
Wage index:						
AAWI		0.0039**				-0.0019
		(0.0017)				(0.0030)
Job characteristics:						
Contract type: reference group is permanent contract						
Fixed-term contract			0.0100***	0.0097***	0.0097***	0.0096***
			(0.0028)	(0.0029)	(0.0029)	(0.0029)
Casual contract			0.0047	0.0089*	0.0084*	0.0084*
			(0.0047)	(0.0048)	(0.0049)	(0.0049)
Occupation: reference group is managers						
Professionals				0.0002	0.0003	0.0003
				(0.0024)	(0.0024)	(0.0024)
Technicians and trades				-0.0042	-0.0034	-0.0034
				(0.0029)	(0.0029)	(0.0029)
Community and personal service				-0.0055	-0.0049	-0.0049
				(0.0034)	(0.0035)	(0.0035)
Clerical and admin				-0.0137***	-0.0126***	-0.0126***
				(0.0026)	(0.0027)	(0.0027)
Sales				-0.0092**	-0.0083*	-0.0083*
				(0.0042)	(0.0043)	(0.0043)
Machinery operators and drivers				-0.0185***	-0.0169***	-0.0168***
				(0.0033)	(0.0035)	(0.0035)
Labourers				-0.0157***	-0.0150***	-0.0150***
				(0.0037)	(0.0039)	(0.0039)

Table 4 (Continued)
The role of worker characteristics in wage growth (Eq. (1)); OLS estimator.

	Change in hourly wage (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
Job characteristics (Continued):						
Industry: reference group is mining						
Agriculture, forestry and fishing				-0.0359***	-0.0304***	-0.0318***
				(0.0080)	(0.0086)	(0.0091)
Manufacturing				-0.0171***	-0.0128**	-0.0128**
				(0.0050)	(0.0057)	(0.0057)
Electricity, gas, water and water supply				-0.0080	-0.0035	-0.0031
				(0.0068)	(0.0074)	(0.0074)
Construction				-0.0130**	-0.0091	-0.0075
				(0.0055)	(0.0062)	(0.0066)
Wholesale trade				-0.0229***	-0.0190***	-0.0194***
				(0.0058)	(0.0064)	(0.0065)
Retail trade				-0.0229***	-0.0184***	-0.0194***
				(0.0056)	(0.0062)	(0.0065)
Accommodation and food service activities				-0.0330***	-0.0290***	-0.0300***
				(0.0066)	(0.0071)	(0.0074)
Transportation and storage				-0.0137**	-0.0090	-0.0092
				(0.0055)	(0.0061)	(0.0061)
Information and communication				-0.0163***	-0.0131*	-0.0139**
				(0.0061)	(0.0067)	(0.0069)
Financial and insurance activities				-0.0124**	-0.0097	-0.0101
				(0.0056)	(0.0063)	(0.0063)
Rental, hiring and real estate activities				-0.0156*	-0.0126	-0.0126
				(0.0085)	(0.0089)	(0.0089)
Professional, scientific and technical activities				-0.0152***	-0.0115*	-0.0112*
				(0.0054)	(0.0061)	(0.0061)
Administrative and support service activities				-0.0115	-0.0073	-0.0075
				(0.0070)	(0.0075)	(0.0075)
Public administration and safety				-0.0137***	-0.0105*	-0.0106*
				(0.0051)	(0.0058)	(0.0058)
Education and training				-0.0216***	-0.0174***	-0.0167***
				(0.0052)	(0.0058)	(0.0059)
Human health and social work activities				-0.0234***	-0.0193***	-0.0195***
				(0.0052)	(0.0058)	(0.0059)
Arts and recreation service activities				-0.0285***	-0.0241***	-0.0246***
				(0.0072)	(0.0078)	(0.0079)
Other service activities				-0.0243***	-0.0204***	-0.0209***
				(0.0065)	(0.0071)	(0.0071)
Number of observations	59,152	59,152	59,152	59,152	59,152	59,152
Number of individuals	10,891	10,891	10,891	10,891	10,891	10,891
SA3 regional area FE	No	No	No	No	Yes	Yes
Industry-year FE	No	No	No	No	No	No

Notes: Each column gives output of a different OLS regression. Parameter estimates are reported. Clustered (by individual) standard errors are in parentheses. ***,**,*, correspond to the significance level of 1%, 5%, 10%, respectively. The reference categories of female, age and education consist of workers who are male, aged 21 to 25 years and attained year 11 or below, respectively. The reference categories of employment contract, occupation, job industry and year consist of workers with a permanent contract, managers, mining industry and year 2002, respectively. The regressions include zero-one indicator variables for Indigenous, born abroad, number of household members (3), marital status (5), number of own resident children (3), job industry (18), the SA3 regional location of the household (320) and calendar year (15).

The results for the industry indicators in Table 4 show that workers employed in economic sectors producing tradeables experience the highest wage growth, including workers in mining, manufacturing, supply of utilities, transport and storage, financial activities and real estate activities. In contrast, workers in industries focusing on non-tradeables such as activities in arts, services or accommodation experience the lowest wage growth. Industry shows more varying results even within OLS or FE specifications. In the FE specifications, most effects become insignificant while the size of the estimates remain comparable, which could indicate that very few employees switch industry. The OLS results show that there are substantial differences between industries (as was also evident from the descriptive statistics in Table 3).

Once we include SA3 regional area fixed effects, the estimates of the occupation indicators and industry indicators become smaller while the role of individual characteristics in wage growth stays comparable. This observation suggests that part of wage growth is area-specific through for example differences in occupations and industries in the different local labour markets of respondents. The year fixed effects in the OLS specification show the declining wage growth post 2010, with a difference of about 3.5% comparing 2017 to 2007 (see Appendix A). The coefficients in the FE specification are much stronger showing a difference of about 5% comparing 2017 to 2007 (when wage growth was at its highest), indicating the importance of examining the within-individual effects (see Appendix A). Note that the year fixed effects capture aggregate factors such as business cycle effects, but also changes in inflation over time. The strong negative effects from 2013 onwards are striking, especially considering that the composition of the employee population may have changed over time, with more disadvantaged employees leaving employment post-GFC. This observation is consistent with the mechanism that during an economic downturn, within-individual wage growth declines due to a drop in job-to-job mobility and bargaining power, also for the (more advantaged) full-time employed.

Table 5 provides a further extension of our specification to explore the impact of adding industry-year fixed effects to the OLS and FE specification. Adding industry-year fixed effects is important to control for aggregate factors such as industry awards that increase over time, but does not change the role of worker characteristics in wage growth to a large extent. Next, we add dummies for income quintiles which show a positive relationship with wage growth. This finding suggests income inequality is increasing, as we observe that wage growth is highest for the top 20% of income earners. We also add a health variable, indicating the presence of a long-term condition, which is only significantly negative in the OLS, perhaps indicating the limited number of individuals who develop a long-term condition over the time of the survey.

Table 5
The role of worker characteristics in wage growth (Eq. (1)).

	Change in hourly wage (log)			
	OLS		FE	
	(1)	(2)	(3)	(4)
Demographic characteristics:				
Female	0.0010	0.0023		
	(0.0015)	(0.0015)		
$25 \leq age < 30$ years	-0.0219***	-0.0235***	-0.0242***	-0.0277***
	(0.0039)	(0.0040)	(0.0061)	(0.0061)
$30 \leq age < 35$ years	-0.0316***	-0.0337***	-0.0267***	-0.0315***
	(0.0039)	(0.0039)	(0.0084)	(0.0085)
$35 \leq age < 40$ years	-0.0344***	-0.0367***	-0.0218**	-0.0267**
	(0.0039)	(0.0040)	(0.0110)	(0.0111)
$40 \leq age < 45$ years	-0.0438***	-0.0457***	-0.0248*	-0.0292**
	(0.0039)	(0.0040)	(0.0138)	(0.0138)
$45 \leq age < 50$ years	-0.0451***	-0.0466***	-0.0198	-0.0235
	(0.0039)	(0.0040)	(0.0166)	(0.0166)
$50 \leq age < 55$ years	-0.0499***	-0.0511***	-0.0203	-0.0234
	(0.0039)	(0.0040)	(0.0195)	(0.0195)
$55 \leq age < 60$ years	-0.0498***	-0.0507***	-0.0152	-0.0175
	(0.0041)	(0.0042)	(0.0226)	(0.0226)
$60 \leq age < 65$ years	-0.0469***	-0.0474***	-0.0073	-0.0090
	(0.0047)	(0.0048)	(0.0257)	(0.0257)
Year 12	-0.0003	-0.0019	0.0033	0.0040
	(0.0023)	(0.0023)	(0.0142)	(0.0141)
Cert III and IV	-0.0023	-0.0042**	0.0100	0.0085
	(0.0021)	(0.0021)	(0.0100)	(0.0100)
Diploma and adv. diploma	0.0010	-0.0012	0.0164	0.0147
	(0.0025)	(0.0025)	(0.0135)	(0.0134)
Bachelor, grad and postgrad	0.0030	-0.0000	0.0139	0.0108
	(0.0024)	(0.0025)	(0.0156)	(0.0155)
Income groups:				
Second quintile		0.0097***		0.0136***
		(0.0025)		(0.0039)
Third quintile		0.0103***		0.0177***
		(0.0027)		(0.0047)
Fourth quintile		0.0116***		0.0241***
		(0.0029)		(0.0054)
Fifth quintile		0.0124***		0.0258***
		(0.0032)		(0.0063)
Health status:				
Long-term health condition		-0.0042*		-0.0018
		(0.0022)		(0.0035)

Table 5 (Continued)
The role of worker characteristics in wage growth (Eq. (1)).

	Change in hourly wage (log)			
	OLS		FE	
	(1)	(2)	(3)	(4)
Job characteristics:				
Fixed-term contract	0.0097***	0.0098**	0.0093**	0.0101
	(0.0029)	(0.0037)	(0.0042)	(0.0061)
Casual contract	0.0090*	-0.0058	0.0280***	-0.0012
	(0.0049)	(0.0056)	(0.0078)	(0.0095)
Perm to fixed-term contract		-0.0022		-0.0024
		(0.0060)		(0.0078)
Perm to casual contract		0.0286**		0.0355**
		(0.0112)		(0.0144)
Fixed-term to perm contract		-0.0004		0.0019
		(0.0044)		(0.0052)
Fixed-term to casual contract		-0.0167		-0.0034
		(0.0239)		(0.0311)
Casual to perm contract		-0.0405***		-0.0361***
		(0.0078)		(0.0091)
Casual to fixed-term contract		-0.0503***		-0.0366
		(0.0188)		(0.0230)
Job-to-job turnover		0.0234***		0.0233***
		(0.0035)		(0.0042)
Occupation-to-occupation turnover		0.0001		-0.0007
		(0.0020)		(0.0027)
Industry-to-industry turnover		-0.0002		-0.0002
		(0.0022)		(0.0029)
Professionals	0.0005	0.0007	0.0028	0.0028
	(0.0024)	(0.0025)	(0.0045)	(0.0045)
Technicians and trades	-0.0033	-0.0011	0.0002	0.0009
	(0.0029)	(0.0030)	(0.0063)	(0.0064)
Community and personal service	-0.0047	-0.0014	-0.0042	-0.0030
	(0.0035)	(0.0036)	(0.0080)	(0.0080)
Clerical and admin	-0.0123***	-0.0104***	-0.0113**	-0.0110**
	(0.0027)	(0.0029)	(0.0053)	(0.0053)
Sales	-0.0087**	-0.0076*	-0.0075	-0.0073
	(0.0043)	(0.0043)	(0.0074)	(0.0074)
Machinery operators and drivers	-0.0167***	-0.0128***	-0.0182**	-0.0165**
	(0.0035)	(0.0036)	(0.0079)	(0.0079)
Labourers	-0.0154***	-0.0104***	-0.0084	-0.0068
	(0.0039)	(0.0040)	(0.0077)	(0.0077)
Number of observations	59,152	59,152	59,152	59,152
Number of individuals	10,891	10,891	10,891	10,891
SA3 regional area FE	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes

Notes: Table 5 complements Table 4 by adding industry-year fixed effects and adding a number of variables. The reference categories of income and health status consist of workers in the first income quintile and no long-term health condition, respectively. The reference categories of employment contract, contract transition, job-to-job turnover, occupation-to-occupation turnover and industry-to-industry turnover consist of workers with a permanent contract, no contract transition, no job-to-job turnover, no occupation-to-occupation turnover and no industry-to-industry turnover, respectively. See Table 4 for additional notes.

At the same time we add transition indicators for contract type, job, occupation and industry. Including transition indicators for contract type is important to control for changes in hourly wage caused by for example workers who switch from a casual contract to a permanent contract, which leads to a loss of their casual wage premium. This mechanism explains the strong negative effects of the contract type transition indicators that we observe in Columns (2) and (4).

Adding transition indicators does not change results much for the individual and job characteristics, except that casual contract no longer has a significant positive coefficient. This observation suggests that job-to-job turnover and the contract type transitions take out the within-variation in wage growth among workers who have a permanent contract or casual contact. However, consistent with the study by Amuedo-Dorantes and Serrano-Padial (2007), workers with a fixed-term contract seem to experience wage growth on the job and through job-to-job turnover as this estimate remains significant (see Column (2)). Table 5 also shows that job-to-job turnover is positively correlated with wage growth, possibly indicating a wage premium or promotion for the individuals who change jobs. However, occupation transitions and industry transitions are not significant as shown in Columns (2) and (4) of Table 5.

5.2. Financial Stress and Poorness

The results in relation to our third question investigating the impact of wage growth on financial well-being are reported in Table 6. Table 6 shows a clear correlation of wage growth with financial stress (Columns (1) and (3)) and with the poorness index (Columns (2) and (4)), which is slightly smaller in the FE specification. The impact is fairly modest: e.g. a 10% increase in wage would reduce the financial stress index (which runs from 0 to 7) by around 0.004 (or 0.003 in the FE model). The poorness index (with values between 1 and 6) would be reduced by 0.006 or 0.005 respectively for a wage growth of 10%.

Several of the other characteristics appear more relevant for these two indexes, although many of these become insignificant in the FE specification, whereas the wage growth remains significant. Income quintiles and having a long-term health condition are an obvious exception, with each having a significant coefficient in both specifications. Age has an opposite effect on the poorness index for several age groups compared to the impact on the financial stress index. This appears due to the youngest group being different from the other groups in how they perceive prosperity, while the other age groups have similar outcomes relative to each other as are observed for the financial stress index.

Table 6
The role of wage growth in financial stress (Eq. (2)).

	OLS		FE	
	Fin. stress index	Poorness index	Fin. stress index	Poorness index
	(1)	(2)	(3)	(4)
Change in hourly wage (log)	-0.0388***	-0.0635***	-0.0345***	-0.0508***
	(0.0139)	(0.0119)	(0.0126)	(0.0105)
Demographic characteristics:				
Female	-0.0050	-0.0830***		
	(0.0130)	(0.0141)		
$25 \leq age < 30$ years	0.0118	0.1221***	-0.0230	0.0506***
	(0.0200)	(0.0159)	(0.0228)	(0.0177)
$30 \leq age < 35$ years	0.0307	0.2096***	-0.0493	0.0731***
	(0.0235)	(0.0191)	(0.0310)	(0.0239)
$35 \leq age < 40$ years	0.0200	0.2387***	-0.0528	0.0839***
	(0.0252)	(0.0211)	(0.0384)	(0.0297)
$40 \leq age < 45$ years	-0.0122	0.2509***	-0.0469	0.0952***
	(0.0261)	(0.0215)	(0.0445)	(0.0356)
$45 \leq age < 50$ years	-0.0678***	0.2293***	-0.0456	0.0969**
	(0.0252)	(0.0216)	(0.0505)	(0.0409)
$50 \leq age < 55$ years	-0.1033***	0.2012***	-0.0227	0.0952**
	(0.0250)	(0.0222)	(0.0563)	(0.0462)
$55 \leq age < 60$ years	-0.1470***	0.1696***	-0.0131	0.0720
	(0.0247)	(0.0238)	(0.0640)	(0.0521)
$60 \leq age < 65$ years	-0.1546***	0.1667***	0.0149	0.0667
	(0.0275)	(0.0289)	(0.0717)	(0.0596)
Year 12	-0.0031	-0.0433**	-0.0416	-0.0042
	(0.0246)	(0.0212)	(0.0701)	(0.0547)
Cert III and IV	-0.0020	-0.0322*	0.0126	0.0206
	(0.0212)	(0.0186)	(0.0551)	(0.0386)
Diploma and adv. diploma	-0.0242	-0.0707***	0.0438	0.0951*
	(0.0258)	(0.0245)	(0.0624)	(0.0494)
Bachelor, grad and postgrad	-0.0627***	-0.1630***	-0.0377	0.0144
	(0.0210)	(0.0220)	(0.0722)	(0.0572)
Income groups:				
Second quintile	-0.0843***	-0.0639***	-0.0534***	-0.0416***
	(0.0156)	(0.0129)	(0.0150)	(0.0107)
Third quintile	-0.1356***	-0.1424***	-0.0759***	-0.0808***
	(0.0170)	(0.0143)	(0.0171)	(0.0124)
Fourth quintile	-0.1957***	-0.2471***	-0.1061***	-0.1283***
	(0.0173)	(0.0158)	(0.0185)	(0.0139)
Fifth quintile	-0.2381***	-0.4753***	-0.1242***	-0.2183***
	(0.0183)	(0.0184)	(0.0193)	(0.0157)
Health status:				
Long-term health condition	0.1352***	0.1090***	0.0216*	0.0150*
	(0.0139)	(0.0121)	(0.0112)	(0.0088)
Number of observations	59,152	53,490	59,152	53,490
Number of individuals	10,891	10,305	10,891	10,305

Notes: Each column gives output of a different regression. Parameter estimates are reported. Clustered (by individual) standard errors are in parentheses. ***,**,*, correspond to the significance level of 1%, 5%, 10%, respectively. The reference categories of female, age and education consist of workers who are male, aged 21 to 25 years and attained year 11 or below, respectively. The reference categories of income and health status consist of workers in the first income quintile and no long-term health condition, respectively. The regressions include zero-one indicator variables for Indigenous, born abroad, number of household members (3), marital status (5), number of own resident children (3), employment contract (2), occupation (7), job industry (18), job-to-job turnover, occupation-to-occupation turnover, industry-to-industry turnover, the SA3 regional location of the household (320), calendar year (15) and industry-year FE.

6. Conclusion

As in many other countries, employees in Australia have experienced declining wage growth since the GFC. In this paper, we have examined how within-individual year-to-year wage growth is distributed across full-time workers and to what extent it is explained by individual characteristics and job characteristics. We used the Australian HILDA survey data covering the period from 2001 to 2017, which allows us to take into account a rich set of observable characteristics and to examine whether low wage growth has a social impact by making people vulnerable to financial distress.

Our descriptive analysis shows that wage growth has been lower over the past few years, especially since 2010 suggesting that wage increases are pro cyclical. Moreover, we show that average individual year-to-year wage growth is always higher than the aggregate wage growth indexes indicate, possibly (at least partly) due to our focus on full-time workers who experience step increases in pay scales, and more frequent promotions and job changes than other workers may experience.

Our empirical analysis shows that wage growth seems largely determined by job characteristics such as occupation and industry. Workers who have occupations that are more cognitive, less routine, experience about 1 to 1.5% higher wage growth. Workers employed in economic sectors that produce tradeables experience about 2 to 2.5% higher wage growth. Job-to-job turnover is also associated with a 2.5% increase in wage growth. Transitions in occupation or industry seem irrelevant for wage growth. The year fixed effects reveal a difference in wage growth of about 3.5 to 5%, including both business cycle and inflation effects.

Individual characteristics like gender or education seem less important for wage growth, particularly when controlling for the worker's job characteristics. Only the worker's age is important and explains changes in wage growth for workers aged 21 to 40 years, consistent with the literature on wage growth over the life cycle that suggests higher wage growth early in the career (i.e. at younger ages). The employment contract of a worker seems relevant for wage growth only through transitions from a casual to a fixed-term or permanent contract, as these transitions remove the casual wage premium and therefore decrease wage growth. These findings suggest that underlying mechanisms based on search and matching theory, and on human capital theory are both important for wage growth.

Overall, our results suggest that both individual and aggregate factors are relevant for wage growth. However, it is striking that the worker's occupation and industry together are just as important as business cycle effects. In this regard, there exists much wage growth inequality across full-time workers independent of where the economy is in the business cycle. Finally, although the impact is small, wage growth has a significant positive correlation with financial well-being indicators. This finding underscores the potential social impact of declining wage growth.

In answering the questions in this paper, we need to keep in mind that a study of wage growth is by definition excluding the most disadvantaged groups in society: those out of the labour force and those in unemployment. However, even for full-time employed workers we observe declining wage growth and much wage growth inequality. Given the changes over time that we observe in the aggregate wages indexes for the entire Australian population, more disadvantaged workers are likely to have been worse off than full-time workers.

Amuedo-Dorantes, C., Serrano-Padial, R., 2007. Wage growth implications of fixed-term employment: An analysis by contract duration and job mobility. Labour Economics 14 (5), 829–847.
URL http://www.sciencedirect.com/science/article/pii/S0927537106000625

Australian Bureau of Statistics, 2018a. Average Weekly Earnings, Australia. Cat.no. 6302.0.
URL http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/6302.0Main+Features1Nov%202018?OpenDocument

Australian Bureau of Statistics, 2018b. Wage Price Index, Australia. Cat.no. 6345.0.

Australian Government Department of Jobs and Small Business, 2018. Trends in Federal Enterprise Bargaining Report.

Autor, D. H., Dorn, D., Aug. 2013. The growth of low-skill service jobs and the polarization of the US labor market. American Economic Review 103 (5), 1553–1597.
URL http://www.aeaweb.org/articles?id=10.1257/aer.103.5.1553

Bell, D. N., Blanchflower, D. G., Aug. 2018a. The lack of wage growth and the falling NAIRU. National Institute Economic Review 245 (1), R40–R55.
URL https://doi.org/10.1177/002795011824500114

Bell, D. N., Blanchflower, D. G., Feb. 2018b. Underemployment and the lack of wage pressure in the UK. National Institute Economic Review 243 (1), R53–R61.
URL https://doi.org/10.1177/002795011824300114

Bishop, J., 2018. The effect of minimum wage increases on wages hours worked and job loss. RBA Bulletin.

Bowlus, A. J., Liu, H., Nov. 2013. The contributions of search and human capital to earnings growth over the life cycle. European Economic Review 64, 305–331.
URL http://www.sciencedirect.com/science/article/pii/S0014292113001293

Brouillette, D., Ketcheson, J., Kostyshyna, O., Lachaine, L., 2017. Wage growth in Canada and the United States: Factors behind recent weakness. Bank of Canada: Staff Analytical Note.

Burdett, K., 1978. A theory of employee job search and quit rates. The American Economic Review 68 (1), 212–220.
URL http://www.jstor.org/stable/1809701

Burdett, K., Carrillo-Tudela, C., Coles, M. G., 2011. Human capital accumulation and labor market equilibrium. International Economic Review 52 (3), 657–677.
URL http://onlinelibrary.wiley.com/doi/abs/10.1111/j.1468-2354.2011.00644.x

Daly, M. C., Hobijn, B., May 2017. Composition and aggregate real wage growth. American Economic Review: Papers and Proceedings 107 (5), 349–352.
URL http://www.aeaweb.org/articles?id=10.1257/aer.p20171075

Elsby, M. W. L., Shin, D., Solon, G., Dec. 2016. Wage adjustment in the Great Recession and other downturns: Evidence from the United States and Great Britain. Journal of Labor Economics 34 (S1), S249–S291.
URL http://www.journals.uchicago.edu/doi/abs/10.1086/682407

Goos, M., Manning, A., Salomons, A., 2014. Explaining job polarization: Routine-biased technological change and offshoring. American Economic Review 104 (8), 2509–26.
URL https://ideas.repec.org/a/aea/aecrev/v104y2014i8p2509-26.html

Gregory, T., Salomons, A., Zierahn, U., 2019. Racing with or against the machine? Evidence from Europe. IZA Discussion Papers 12063.
URL https://www.iza.org/publications/dp/12063/racing-with-or-against-the-machine-evidence-from-eur

Hirsch, B., Jahn, E. J., Schnabel, C., May 2018. Do employers have more monopsony power in slack labor markets?

ILR Review 71 (3), 676–704.
URL https://doi.org/10.1177/0019793917720383

Jacobs, D., Rush, A., 2015. Why is wage growth so low? RBA Bulletin.

Lagakos, D., Moll, B., Porzio, T., Qian, N., Schoellman, T., Dec. 2018. Life cycle wage growth across countries. Journal of Political Economy 126 (2), 797–849.
URL http://www.journals.uchicago.edu/doi/full/10.1086/696225

Lass, I., Wooden, M., 2019. Non-standard Employment and Wages in Australia. Rba conference paper.

Loprest, P. J., 1992. Gender differences in wage growth and job mobility. American Economic Review: Papers and Proceedings 82 (2), 526–532.
URL http://www.jstor.org/stable/2117456

Manning, A., Apr. 2003. The real thin theory: Monopsony in modern labour markets. Labour Economics 10 (2), 105–131.
URL http://www.sciencedirect.com/science/article/pii/S0927537103000186

Moscarini, G., Postel-Vinay, F., May 2016. Wage posting and business cycles. American Economic Review: Papers and Proceedings 106 (5), 208–213.
URL http://www.aeaweb.org/articles?id=10.1257/aer.p20161051

Moscarini, G., Postel-Vinay, F., May 2017. The relative power of employment-to-employment reallocation and unemployment exits in predicting wage growth. American Economic Review: Papers and Proceedings 107 (5), 364–368.
URL http://www.aeaweb.org/articles?id=10.1257/aer.p20171078

Moscarini, G., Postel-Vinay, F., 2018. On the job search and business cycles. IZA Discussion Papers 11853.
URL https://www.iza.org/publications/dp/11853/on-the-job-search-and-business-cycles

Pinheiro, R., Yang, M., Mar. 2017. Wage growth after the Great Recession. Federal Reserve Bank of Cleveland Economic Commentary (2017-04).
URL https://www.clevelandfed.org/newsroom-and-events/publications/economic-commentary/2017-economic-commentaries/ec-201704-wage-growth-after-great-recession

Treasury, November 2017. Analysis of wage growth. Report, november 2017, commonwealth australia.

Appendix A Additional Tables

Table 4 (Continued)
The role of worker characteristics in wage growth (Eq. (1)); OLS estimator

	Change in hourly wage (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
Business cycle effects (relative to 2002):						
Year 2003	0.0102	0.0100	0.0103	0.0105	0.0108	0.0109*
	(0.0066)	(0.0066)	(0.0066)	(0.0066)	(0.0066)	(0.0066)
Year 2004	0.0137**	0.0128**	0.0139**	0.0139**	0.0144**	0.0148**
	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0058)
Year 2005	0.0138**	0.0128**	0.0139**	0.0141**	0.0150**	0.0155***
	(0.0058)	(0.0058)	(0.0058)	(0.0058)	(0.0058)	(0.0059)
Year 2006	0.0237***	0.0230***	0.0238***	0.0237***	0.0244***	0.0247***
	(0.0058)	(0.0058)	(0.0058)	(0.0058)	(0.0058)	(0.0058)
Year 2007	0.0282***	0.0280***	0.0284***	0.0281***	0.0284***	0.0285***
	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0057)
Year 2008	0.0158***	0.0154***	0.0158***	0.0156***	0.0163***	0.0165***
	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0057)	(0.0057)
Year 2009	0.0104*	0.0097*	0.0105*	0.0101*	0.0108*	0.0111**
	(0.0056)	(0.0056)	(0.0056)	(0.0056)	(0.0056)	(0.0056)
Year 2010	0.0127**	0.0123**	0.0127**	0.0124**	0.0133**	0.0135**
	(0.0054)	(0.0054)	(0.0054)	(0.0054)	(0.0055)	(0.0055)
Year 2011	-0.0004	-0.0002	-0.0003	-0.0007	0.0003	0.0002
	(0.0055)	(0.0055)	(0.0055)	(0.0055)	(0.0055)	(0.0056)
Year 2012	0.0055	0.0053	0.0056	0.0052	0.0065	0.0065
	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0053)
Year 2013	-0.0094*	-0.0089*	-0.0094*	-0.0098*	-0.0085	-0.0088*
	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0054)
Year 2014	-0.0059	-0.0048	-0.0058	-0.0062	-0.0047	-0.0053
	(0.0052)	(0.0053)	(0.0052)	(0.0052)	(0.0053)	(0.0054)
Year 2015	-0.0065	-0.0047	-0.0064	-0.0067	-0.0051	-0.0060
	(0.0052)	(0.0053)	(0.0052)	(0.0052)	(0.0052)	(0.0055)
Year 2016	-0.0010	0.0016	-0.0009	-0.0012	0.0002	-0.0011
	(0.0052)	(0.0054)	(0.0052)	(0.0052)	(0.0053)	(0.0057)
Year 2017	-0.0078	-0.0047	-0.0078	-0.0080	-0.0066	-0.0081
	(0.0052)	(0.0054)	(0.0052)	(0.0052)	(0.0052)	(0.0058)
Number of observations	59,152	59,152	59,152	59,152	59,152	59,152
Number of individuals	10,891	10,891	10,891	10,891	10,891	10,891
SA3 regional area FE	No	No	No	No	Yes	Yes
Industry-year FE	No	No	No	No	No	No

Notes: Each column gives output of a different OLS regression. Parameter estimates are reported. Clustered (by individual) standard errors are in parentheses. ***,**,*, correspond to the significance level of 1%, 5%, 10%, respectively. The reference categories of female, age and education consist of workers who are male, aged 21 to 25 years and attained year 11, respectively. The reference categories of employment contract, occupation, job industry and year consist of workers with a permanent contract, managers, mining industry and year 2002, respectively. The regressions include zero-one indicator variables for Indigenous, born abroad, number of household members (3), marital status (5), number of own resident children (3), job industry (18), the SA3 regional location of the household (320) and calendar year (15).

Table A1
The role of worker characteristics in wage growth (Eq. (1)); FE estimator.

	Change in hourly wage (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
Demographic characteristics:						
$25 \leq age < 30$ years	-0.0236***	-0.0239***	-0.0230***	-0.0236***	-0.0240***	-0.0240***
	(0.0060)	(0.0060)	(0.0060)	(0.0060)	(0.0060)	(0.0060)
$30 \leq age < 35$ years	-0.0257***	-0.0261***	-0.0250***	-0.0259***	-0.0266***	-0.0266***
	(0.0083)	(0.0083)	(0.0083)	(0.0083)	(0.0084)	(0.0084)
$35 \leq age < 40$ years	-0.0210*	-0.0214**	-0.0203*	-0.0213**	-0.0211*	-0.0211*
	(0.0109)	(0.0109)	(0.0109)	(0.0109)	(0.0110)	(0.0110)
$40 \leq age < 45$ years	-0.0240*	-0.0243*	-0.0235*	-0.0243*	-0.0235*	-0.0235*
	(0.0137)	(0.0137)	(0.0137)	(0.0137)	(0.0137)	(0.0137)
$45 \leq age < 50$ years	-0.0180	-0.0181	-0.0176	-0.0181	-0.0179	-0.0179
	(0.0165)	(0.0165)	(0.0165)	(0.0165)	(0.0166)	(0.0166)
$50 \leq age < 55$ years	-0.0172	-0.0171	-0.0169	-0.0169	-0.0170	-0.0170
	(0.0195)	(0.0195)	(0.0195)	(0.0195)	(0.0195)	(0.0195)
$55 \leq age < 60$ years	-0.0110	-0.0107	-0.0108	-0.0106	-0.0109	-0.0109
	(0.0225)	(0.0225)	(0.0225)	(0.0225)	(0.0226)	(0.0226)
$60 \leq age < 65$ years	-0.0013	-0.0010	-0.0014	-0.0008	-0.0014	-0.0014
	(0.0256)	(0.0256)	(0.0256)	(0.0256)	(0.0257)	(0.0257)
Year 12	0.0030	0.0032	0.0030	0.0031	0.0042	0.0042
	(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0142)	(0.0142)
Cert III and IV	0.0104	0.0105	0.0107	0.0096	0.0092	0.0092
	(0.0101)	(0.0101)	(0.0101)	(0.0100)	(0.0101)	(0.0101)
Diploma and adv. diploma	0.0151	0.0152	0.0152	0.0136	0.0153	0.0153
	(0.0135)	(0.0135)	(0.0136)	(0.0136)	(0.0135)	(0.0135)
Bachelor, grad and postgrad	0.0144	0.0146	0.0141	0.0096	0.0141	0.0141
	(0.0154)	(0.0153)	(0.0154)	(0.0154)	(0.0156)	(0.0156)
Wage index:						
AAWI		0.0061*				0
		(0.0031)				(0.0038)
Job characteristics:						
Fixed-term contract			0.0098**	0.0094**	0.0094**	0.0094**
			(0.0042)	(0.0042)	(0.0042)	(0.0042)
Casual contract			0.0254***	0.0271***	0.0272***	0.0272***
			(0.0077)	(0.0078)	(0.0078)	(0.0078)
Professionals				0.0031	0.0024	0.0024
				(0.0044)	(0.0044)	(0.0044)
Technicians and trades				0.0001	-0.0004	-0.0004
				(0.0063)	(0.0063)	(0.0063)
Community and personal service				-0.0055	-0.0054	-0.0054
				(0.0078)	(0.0080)	(0.0080)
Clerical and admin				-0.0126**	-0.0122**	-0.0122**
				(0.0052)	(0.0053)	(0.0053)
Sales				-0.0082	-0.0073	-0.0073
				(0.0073)	(0.0074)	(0.0074)
Machinery operators and drivers				-0.0197**	-0.0193**	-0.0193**
				(0.0078)	(0.0079)	(0.0079)
Labourers				-0.0093	-0.0088	-0.0088
				(0.0077)	(0.0078)	(0.0078)

Table A1 (Continued)
The role of worker characteristics in wage growth (Eq. (1)); FE estimator.

	Change in hourly wage (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
Job characteristics (Continued):						
Agriculture, forestry and fishing				-0.0354*	-0.0251	-0.0251
				(0.0185)	(0.0190)	(0.0193)
Manufacturing				-0.0098	-0.0044	-0.0044
				(0.0126)	(0.0128)	(0.0128)
Electricity, gas, water and water supply				0.0052	0.0121	0.0121
				(0.0168)	(0.0170)	(0.0170)
Construction				0.0034	0.0104	0.0103
				(0.0134)	(0.0136)	(0.0138)
Wholesale trade				-0.0248*	-0.0181	-0.0181
				(0.0132)	(0.0135)	(0.0135)
Retail trade				-0.0116	-0.0029	-0.0029
				(0.0140)	(0.0142)	(0.0144)
Accommodation and food service activities				-0.0325**	-0.0209	-0.0209
				(0.0164)	(0.0168)	(0.0170)
Transportation and storage				-0.0090	-0.0024	-0.0024
				(0.0136)	(0.0138)	(0.0138)
Information and communication				-0.0098	-0.0052	-0.0052
				(0.0162)	(0.0164)	(0.0165)
Financial and insurance activities				-0.0104	-0.0044	-0.0044
				(0.0156)	(0.0159)	(0.0159)
Rental, hiring and real estate activities				-0.0144	-0.0039	-0.0039
				(0.0189)	(0.0191)	(0.0191)
Professional, scientific and technical activities				-0.0061	0	0
				(0.0132)	(0.0134)	(0.0134)
Administrative and support service activities				-0.0084	-0.0006	-0.0006
				(0.0151)	(0.0151)	(0.0151)
Public administration and safety				-0.0015	0.0048	0.0048
				(0.0132)	(0.0134)	(0.0134)
Education and training				0.0043	0.0115	0.0115
				(0.0148)	(0.0151)	(0.0152)
Human health and social work activities				-0.0117	-0.0050	-0.0050
				(0.0138)	(0.0140)	(0.0140)
Arts and recreation service activities				-0.0310*	-0.0250	-0.0250
				(0.0170)	(0.0172)	(0.0173)
Other service activities				-0.0172	-0.0101	-0.0101
				(0.0148)	(0.0150)	(0.0151)

Table A1 (Continued)
The role of worker characteristics in wage growth (Eq. (1)); FE estimator.

	Change in hourly wage (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
Business cycle effects:						
Year 2003	0.0075	0.0071	0.0078	0.0079	0.0076	0.0076
	(0.0069)	(0.0069)	(0.0069)	(0.0069)	(0.0069)	(0.0069)
Year 2004	0.0092	0.0076	0.0098	0.0093	0.0090	0.0090
	(0.0062)	(0.0063)	(0.0062)	(0.0062)	(0.0062)	(0.0063)
Year 2005	0.0080	0.0062	0.0085	0.0082	0.0080	0.0080
	(0.0065)	(0.0066)	(0.0065)	(0.0065)	(0.0066)	(0.0067)
Year 2006	0.0164**	0.0152**	0.0168**	0.0163**	0.0160**	0.0160**
	(0.0067)	(0.0067)	(0.0067)	(0.0067)	(0.0067)	(0.0068)
Year 2007	0.0185***	0.0179***	0.0191***	0.0182***	0.0175**	0.0175**
	(0.0069)	(0.0069)	(0.0069)	(0.0069)	(0.0070)	(0.0070)
Year 2008	0.0054	0.0047	0.0060	0.0050	0.0047	0.0047
	(0.0073)	(0.0073)	(0.0073)	(0.0073)	(0.0073)	(0.0073)
Year 2009	0.0000	-0.0014	0.0008	-0.0004	-0.0007	-0.0007
	(0.0075)	(0.0076)	(0.0075)	(0.0076)	(0.0076)	(0.0076)
Year 2010	0.0025	0.0016	0.0031	0.0021	0.0018	0.0018
	(0.0078)	(0.0078)	(0.0078)	(0.0078)	(0.0079)	(0.0079)
Year 2011	-0.0129	-0.0129	-0.0121	-0.0134	-0.0133	-0.0133
	(0.0084)	(0.0084)	(0.0084)	(0.0084)	(0.0084)	(0.0084)
Year 2012	-0.0079	-0.0085	-0.0071	-0.0083	-0.0081	-0.0081
	(0.0087)	(0.0087)	(0.0087)	(0.0088)	(0.0088)	(0.0088)
Year 2013	-0.0243***	-0.0236**	-0.0234**	-0.0245***	-0.0242***	-0.0242***
	(0.0093)	(0.0093)	(0.0093)	(0.0093)	(0.0093)	(0.0093)
Year 2014	-0.0204**	-0.0190*	-0.0194**	-0.0206**	-0.0198**	-0.0198**
	(0.0097)	(0.0098)	(0.0097)	(0.0098)	(0.0098)	(0.0099)
Year 2015	-0.0250**	-0.0225**	-0.0240**	-0.0252**	-0.0242**	-0.0241**
	(0.0103)	(0.0104)	(0.0103)	(0.0103)	(0.0103)	(0.0105)
Year 2016	-0.0222**	-0.0183*	-0.0212**	-0.0225**	-0.0213**	-0.0213*
	(0.0108)	(0.0110)	(0.0108)	(0.0108)	(0.0108)	(0.0112)
Year 2017	-0.0297***	-0.0251**	-0.0287**	-0.0301***	-0.0294***	-0.0294**
	(0.0114)	(0.0116)	(0.0114)	(0.0114)	(0.0114)	(0.0118)
Number of observations	59,152	59,152	59,152	59,152	59,152	59,152
Number of individuals	10,891	10,891	10,891	10,891	10,891	10,891
SA3 regional area FE	No	No	No	No	Yes	Yes
Industry-year FE	No	No	No	No	No	No

Notes: Each column gives output of a different FE regression. Parameter estimates are reported. Clustered (by individual) standard errors are in parentheses. ***,**,*, correspond to the significance level of 1%, 5%, 10%, respectively. The reference categories of female, age and education consist of workers who are male, aged 21 to 25 years and attained year 11, respectively. The reference categories of employment contract, occupation, job industry and year consist of workers with a permanent contract, managers, mining industry and year 2002, respectively. The regressions include zero-one indicator variables for Indigenous, born abroad, number of household members (3), marital status (5), number of own resident children (3), job industry (18), the SA3 regional location of the household (320) and calendar year (15).

Appendix B Additional Figures

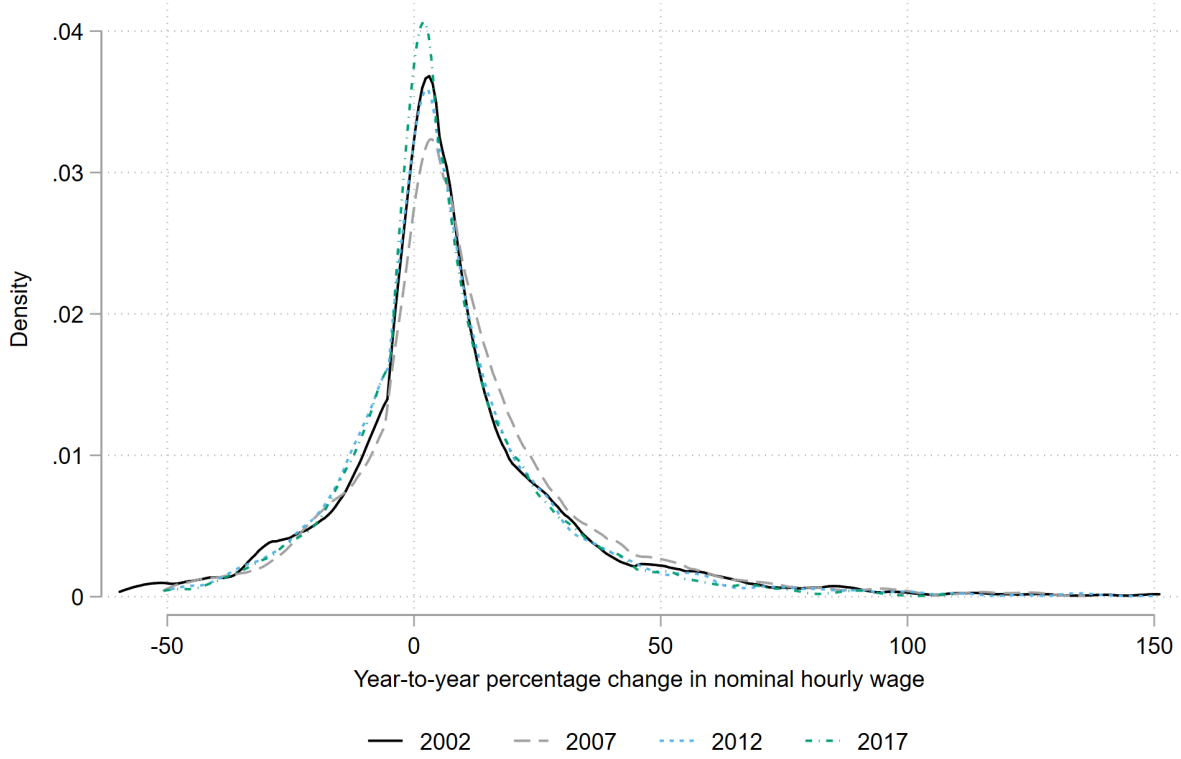

Fig. B1. Year-specific density plot of percentage change in nominal hourly wages (main job).

Fig. B2. Year-to-year growth in median weekly nominal hourly wages over time by gender (main job).