

The Effect of Minimum Wage Increases on Wages, Hours Worked and Job Loss

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Photo: Sarote Pruksachat

Abstract

Australia has a detailed system of ‘awards’ that specify different minimum wages depending on the industry, location and skill of an employee. I find that legislated adjustments to award wages in Australia between 1998 and 2008 were almost fully passed on to wages in award-reliant jobs. There is no evidence that modest, incremental increases in award wages had an adverse effect on hours worked or the job destruction rate.

The effects of minimum wages on employment have been widely debated internationally. Economic theory makes no clear predictions: although the traditional competitive model of the labour market suggests that a minimum wage rise will reduce employment – if set above the market clearing wage – other theoretical models can predict the opposite. For example, an increase

in the minimum wage could *increase* employment in a labour market where firms have some degree of market power that allows them to set wages (e.g. Card and Krueger (1994)). Empirical evidence for other countries has been varied, depending on the methodologies and datasets used but, on balance, suggests that modest and incremental increases in minimum wages do not have significant adverse effects on hours worked and job loss. There has been limited empirical evidence for Australia, partly because of data constraints. This article contributes to the debate by using an approach and a job-level dataset that are uniquely suited to studying the effects of minimum wage increases in Australia.

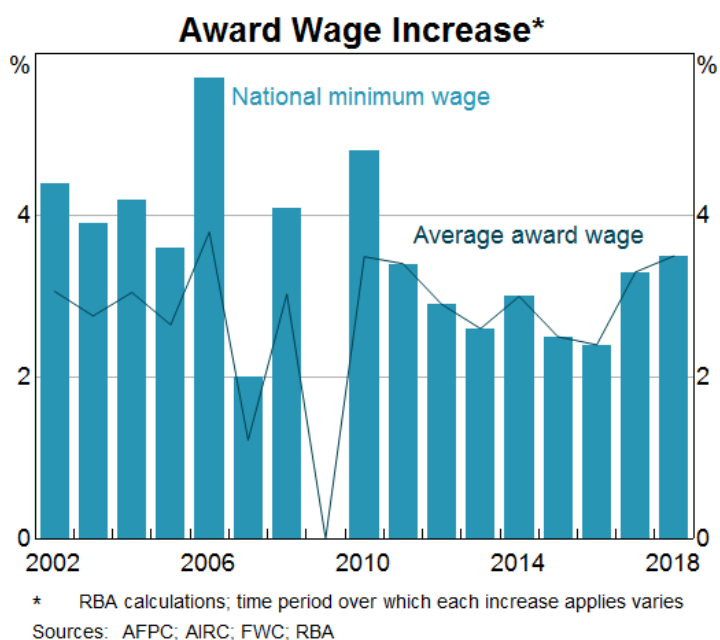
The analysis focuses on the minimum wage changes most common in Australia: annual adjustments by the Fair Work Commission (FWC).^[1] These adjustments have typically been modest, incremental and, to some extent, predictable. The analysis finds that these changes are almost fully passed on to wages in award-reliant jobs, and appear to have had little adverse effect on hours worked or job loss. These findings are consistent with the international evidence and the FWC's (2018) current assessment of that evidence. However, the findings do not necessarily generalise to large, unanticipated changes in minimum wages.

Minimum Wages in Australia

The National Minimum Wage (NMW) sets a legal floor on wages. As of 1 July 2018, this was equal to \$18.93 per hour for an adult employee. Australia also has a detailed system of award wages that are layered on top of the NMW. These 'award wages' can depend on the industry, age, skill level and qualifications of an employee, among other factors. For example, an employee who supervises lift operators at a ski resort is entitled to a wage of \$24.63 per hour, 30 per cent above the NMW. As such, while many 'minimum wage' employees are paid the NMW – particularly lower-skilled workers and those not covered by an award or enterprise agreement – many others are entitled to a higher wage.

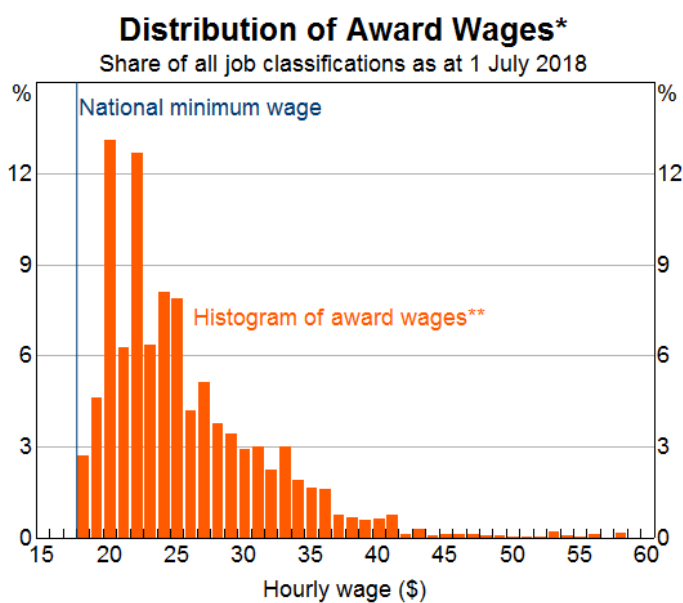
The NMW and all award wages are adjusted at the same time every year, usually in early July. The size of these adjustments is decided at a national level by the FWC. Any adjustments are applied consistently across awards; historically the FWC has either added a flat dollar amount to all award wages (1993–2010) or raised all award wages by the same percentage amount (2011–18). Adjustments to individual awards are less common. In its recent Annual Wage Review, the FWC announced a 3.5 per cent increase in the NMW and minimum wages across all awards, which took effect on 1 July 2018 (Graph 1).

Graph 1



Australia's system for setting minimum wages is more complicated than in most other countries. Unlike other countries that set a single minimum wage (e.g. the United Kingdom, Germany and New Zealand) or a minimum wage that varies by state (e.g. the United States), the Australian system has thousands of award wages that currently range from \$18.93 per hour to as high as \$171.00 per hour (Graph 2). Because award wages are often set above the NMW, the share of Australian employees whose pay is set according to a minimum wage is relatively high by world standards. Nearly one-quarter of all employees in Australia have their wage set according to a minimum or award wage, and this share has risen over recent years (RBA (Reserve Bank of Australia) 2017). The large share of employees affected by FWC decisions also reflects that the NMW in Australia is high relative to other nations, both in absolute terms and as a share of median earnings (Productivity Commission 2015a).

Graph 2



* Ordinary time base wage rates for full-time adult employees; excludes wages above \$60 per hour
 ** Not weighted by number of employees in each job classification
 Sources: Fair Work Ombudsman; RBA

The Effect of Minimum Wages on Employment

Australia's unique institutions for setting minimum wages mean that the findings of empirical studies for other countries do not necessarily apply in the Australian context. The complexity in Australia's wage-setting institutions also makes estimating the effects of minimum wages using Australian data a difficult task.^[2]

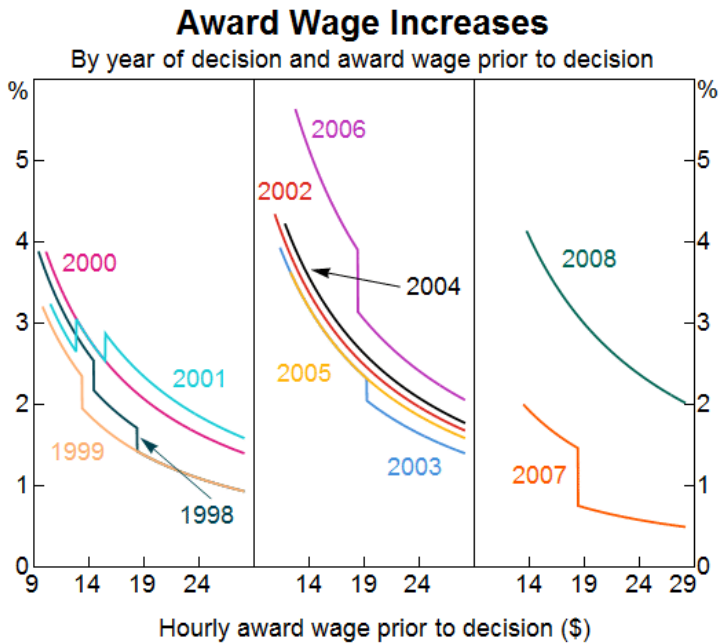
The main challenge in estimating the effect of minimum wages on employment is that it is hard to disentangle the effects of minimum wages from the effects of everything else that is going on in the labour market. For example, if minimum wages are adjusted at the same time as a change in income tax rates, then any change in employment that occurs around the change in minimum wages may in fact be due to the tax changes rather than the FWC decision. To isolate the effects of the minimum wage changes on employment, we need to consider a group of workers who are affected by the change and another group that are not (i.e. a control group), but are otherwise subject to the same forces affecting the economy and the labour market. The challenge for researchers is that it can be difficult to find a suitable control group of individuals who are not affected – or less affected – by the change.

I overcome this challenge by recognising that, while all jobs have their minimum wages adjusted at the same time each year, historically, some jobs have had larger adjustments than others. This means that we can compare the labour market outcomes of those receiving a relatively large adjustment to those receiving a smaller adjustment.

The decade leading up to the late 2000s is particularly useful for studying the effects of award wages on labour market outcomes. During this period, the FWC routinely granted flat dollar increases to all awards each year, irrespective of the existing wage rates contained in those awards. For example, in May 2000, the FWC increased all award wages by 39 cents per hour. This meant that employees on relatively low award wages received larger wage increases in *percentage terms* than those on higher award wages: a worker earning \$10.14 per hour (the NMW at the time) was entitled to a wage rise of 3.9 per cent, while a worker on \$18 per hour received an increase of only around 2 per cent (Graph 3). On some occasions, the FWC also granted smaller flat dollar increases to higher award wage ranges, rather than a single flat dollar increase. For example, in 2003, the FWC announced an increase of 45 cents per hour for all award wages up to \$19.26 per hour, and 39 cents per hour for all wages above this level. This created a discontinuity in the profile of percentage wage increases at \$19.26 per hour (Graph 3). These discontinuities tended to exacerbate the differences in the size of the award wage increase between low- and high-award-wage employees.^[3]

This article uses these differences in the size of minimum wage adjustments across different jobs to disentangle the separate effect of minimum wages from the effect of other changes in the labour market. The idea is to simply compare the change in each variable of interest – wages, hours worked or job loss – around each FWC decision between jobs that experienced a relatively large percentage adjustment and those that only had a small adjustment.

Graph 3



Data

The approach described above requires detailed data on the wages and employment outcomes of individual employees or individual jobs before and after each FWC decision. This article uses a source of data not previously used in Australian research on minimum wages: job-level data from the Australian Bureau of Statistics (ABS) Wage Price Index (WPI) survey. This survey includes 3,000 firms per quarter. Each firm is being surveyed every quarter for five years, before being rotated out of the sample (roughly one-fifth of the sample is replaced each year). After being selected into the sample, a firm is asked to randomly select a certain number of jobs from their payroll records. The firm then reports information on each of these jobs over time. Around 18,000 jobs are included in the survey every quarter. Approximately 15–20 per cent of these jobs have their pay set exactly according to an award.

A key advantage of this dataset is that it includes both a precise measure of actual wages and an indicator for whether a job's wage is set according to a minimum or award wage. This allows one to focus on jobs directly affected by minimum wage decisions. This approach differs from most previous studies (particularly for the United States), which, due to data limitations, tend to focus on low-wage industries, such as the restaurant sector, or on lower-productivity employees, such as teenagers. Using low-wage groups as a proxy for employees reliant on minimum wages may lead to

biased estimates of the effect of minimum wages on employment (Jardim *et al* 2017). The WPI data also allow one to study the effect of changes to minimum wages on hourly wages themselves, which is rarely possible with more traditional data. The pass-through of award wages to hourly wages is a key consideration for the FWC in terms of assessing whether firms are complying with their legal obligations. The elasticity of hourly wages with respect to minimum wages is also one of the key parameters in assessing the effect of minimum wage increases on income inequality (Leigh 2007).

The WPI survey follows jobs, rather than employees (for example, a graduate economist at the Reserve Bank of Australia). If the occupant of the job leaves the firm or moves to a different job within the firm, the ABS substitutes the job leaver with the employee who replaced her or an existing employee with the same job title. For this reason, the results in this study pertain to jobs, rather than individual employees. The estimation sample includes all private sector jobs filled by an adult on an award rate. Juniors, apprentices and trainees are excluded from the analysis, as their award wage adjustment cannot be inferred.^[4] This is unfortunate because these groups may be particularly vulnerable to job loss following an increase in award wages.^[5] This leaves a sample of 32,174 job-period observations spanning the 11 FWC decisions over the period between 1998 and 2008.

Empirical Strategy

A difference-in-differences (DD) model is used to estimate the effects of minimum wage changes on wages, hours worked and the job destruction rate of award-reliant jobs. The intuition for this approach was discussed above; the DD model compares the change in each outcome variable – wages, hours worked or job destruction – around each FWC decision between jobs that experienced a relatively large percentage increase in their award wage and those that experienced a relatively small increase. This means jobs that experienced a relatively small adjustment to their award wages fulfil the role of a ‘control group’ for those jobs that had a larger increase. The size of the award wage adjustment a particular job received is inferred from its wage level immediately before the decision. Given that attention is restricted to jobs paid exactly an award wage before each FWC decision, the results provide direct estimates of the effects of minimum wages on award-reliant jobs.

Changes in wages, hours worked or job destruction around each FWC decision are measured from the WPI survey immediately before the decision to the survey six months later. This gives valid estimates of the effect of the minimum wage on wages, hours worked and job loss to the extent that employers' adjustments to award changes happen within six months (Borland 2018). During

the period between 1998 and 2008, there were 11 minimum wage decisions. The approach taken here is to pool the 11 decisions together and use a single DD estimator that constrains the coefficient of interest to be constant across the decisions. This maximises the available sample to estimate the effects of interest. The model includes controls for any macroeconomic shocks that affect all wage groups and controls for any characteristics of each wage group that do not change over time.^[6] Details of the model are provided in [Appendix A](#).

The following outcome variables are considered:

- **Wages:** the log of the job's hourly wage, excluding any wage changes due to changes in the job occupant's grade or performance.
- **Hours worked:** the log of the ordinary-time hours paid for during the most recent pay period. This includes hours of paid leave (e.g. annual leave and sick leave) but excludes overtime hours.
- **Job destruction rate:** a binary variable that equals one if the job had ceased by the survey date in question, conditional on the job existing six months earlier, and zero otherwise. This captures both redundancies and firm failure, but does not include cases where the job incumbent leaves the firm (either voluntarily or involuntarily) or if the firm only makes some of the employees in a given position redundant.

The estimates for wages and hours worked are conditional on the job being in the sample in the survey before and after a given FWC decision. If a job is vacant or made redundant in either period, it is dropped from the sample for estimating the wage and hours effect. This is not the case for the job destruction rate estimate.

Results

The estimates for wages, hours worked and the job destruction rate are shown in Table 1. Separate estimates are presented using the full sample and a sample that omits the first four FWC decisions (1998–2001). Although the sample size is larger for the full sample, there is a data issue prior to 2002 that could potentially distort the regression results.^[7]

Table 1: Effect of Award Wages on Wages, Hours Worked and the Job Destruction Rate^(a)

Effect of a 1 per cent increase in award wages

	Wages (%)	Hours worked (%)	Job destruction rate (ppt)
1998–2008 sample	0.84***	0.26	–0.22
	(0.03)	(0.37)	(0.44)

	Wages (%)	Hours worked (%)	Job destruction rate (ppt)
2002–08 sample	0.93***	0.13	–0.37
	(0.04)	(0.47)	(0.55)

(a) Standard errors (in parentheses) are clustered at the individual job level; ***, ** and * denote statistical significance at the 1, 5 and 10 per cent levels, respectively

Sources: ABS; RBA

There is strong evidence that award adjustments are passed on to wages. Using the full sample, the elasticity of wages with respect to the award wage is estimated to be 0.84 and highly statistically significant (Table 1). The estimate is larger in the shorter sample period (0.93) which suggests that measurement issues in the first few years of data may be attenuating the size of the overall elasticity in the full sample. A wage elasticity of 0.93 implies that a 1 per cent increase in award wages leads to a 0.93 per cent increase in actual wages for award-reliant workers. Full pass-through of minimum wage changes into wages would require this elasticity be equal to one. Given the estimate is slightly less than one, it suggests less-than-full pass-through of FWC decisions to wages.^[8] This may reflect some degree of noncompliance by firms in their legal obligations (see Productivity Commission (2015b, p 12) for a discussion), or simply measurement error. In any case, the elasticity is sufficiently close to one to characterise this as near-complete pass-through.

Having established that award wage increases are passed through to wages, the next step is to see if this leads to any reduction in hours worked or job loss; this would be the case if the DD estimates are negative for hours worked and positive for the job destruction rate. There is no evidence that award wage changes have an adverse effect on hours worked or the job destruction rate: in both cases the DD estimate is not significantly different from zero (Table 1). (And the point estimates were in fact the opposite signs to an adverse effect.)

Robustness tests

Like any analysis using a DD approach, these results are sensitive to violations of the so called ‘parallel trends’ assumption. The assumption is that, in the absence of a change in award wages, the wages, hours worked and probability of job loss of low-award-wage workers would have followed the same trajectory as high-award-wage workers. This would be violated if, say, there is a change in tax policy that affects low-wage earners relatively more than high-wage earners that occurs at the same time as the change in award wages. If this happens, we may incorrectly attribute the effect of the tax change to the award wage. Bishop (2018) discusses several ways of testing the validity of the parallel trends assumption. These include placebo tests, using additional control groups, controlling

for firm-specific shocks, and accounting for 'pre trends' in the outcome variables. The results of these tests suggest that the baseline estimates are likely to be robust to potential violations of the parallel trends assumption.

Conclusion

There is widespread interest in understanding the effects of minimum wage increases. This article adds to the evidence base by using an approach uniquely suited to Australia and a dataset that provides several advantages over those used previously in the literature. It finds that small, incremental adjustments to awards are mostly passed on to wages in award-reliant jobs. These adjustments appear to have no discernible adverse effect on hours worked or job loss.

There are several things to keep in mind when interpreting these findings. Firstly, as discussed, these results are for adult employees only and do not include juniors. Secondly, the results do not necessarily generalise to large, unanticipated changes in award wages. There will always be some point at which a minimum wage adjustment will begin to reduce employment significantly. Thirdly, the approach considers six month windows around FWC decisions; it is possible that firms take longer to respond to changes in minimum wages. Finally, although this article finds no evidence of an effect of award adjustments on job destruction, this does not rule out an adverse effect on employment. It is possible that the adverse consequences of higher wage floors may be borne by job seekers, rather than current job holders.

Appendix A The Difference-in-differences Model

The DD equation is,

$$y_{ikt} = \beta_0 + \lambda'_t \beta_1 + \beta_2 FWC_k + \beta_3 (d_t * FWC_k) + \varepsilon_{ikt}$$

where y_{ikt} is the dependent variable of interest for job i in wage group k at time t . λ_t is a full set of time dummies that control for any macroeconomic shocks that affect all wage groups in any of the 22 time periods (there are 11 different FWC decisions each with their own 'before' and 'after' period). FWC_k is the log change in award wages for wage group k due to the FWC decision. There are also a set of interactions between FWC_k and d_t , the latter being a dummy that takes the value of zero in the 'before' period immediately prior to an award increase and a value of one in the 'after' period six months later. The coefficient of interest is β_3 . When the dependent variable is the log hourly wage (or log hours worked), this DD coefficient is the elasticity of wages (or hours) with respect to the award wage, a parameter of key interest to policymakers.

Footnotes

- [*] The Author is from the Economic Research Department. This article draws extensively on Bishop (2018).
- [1] The FWC is an independent body with responsibility for adjusting minimum and award wages. The FWC began operation on 1 July 2009 as Fair Work Australia, after assuming responsibility for award wage-setting from the Australian Fair Pay Commission (established in 2005) and the Australian Industrial Relations Commission before that. In this article, 'FWC' is used to refer to any of the various national and state industrial relations commissions with responsibility for setting award wages since the late 1990s.
- [2] There have been several other Australian minimum wage studies. These studies often have data or other limitations that make their findings difficult to interpret (see Borland (2018) or Appendix C of Productivity Commission (2015a) for a review).
- [3] The only exception was in 2001, when the FWC awarded a series of larger flat dollar increases to higher award-wage earners. Details on each decision are available in Bishop (2018, [Appendix A](#)). Although the FWC had been announcing flat dollar increases to all awards as early as 1993, this article focuses on the period after 1998 due to data availability. It also omits the flat dollar increase announced in 2010 from the analysis as it may lead to results that are contaminated by the effects of award modernisation. Since 2011, the FWC has announced flat *percentage* increases to all awards each year (in addition to any adjustments associated with award modernisation between 2010 and 2014).
- [4] Award wages for juniors, apprentices and trainees are set as a proportion of a relevant adult classification in the award; as such, any percentage award wage adjustment for these employees will be the same as the relevant adult classification. However, the size of this adjustment cannot be inferred using WPI data because the relevant adult classification for these groups is not available. Juniors (aged 20 years or younger) accounted for 15 per cent of all employees on award wages in 2016 (ABS (Australian Bureau of Statistics) 2017).
- [5] Jobs not within the scope of the federal industrial relations system after 2006 are also excluded from the estimation sample, due to the uncertainty about what award wage adjustments such jobs experienced during this period of industrial relations reform.
- [6] A wage group is defined as any job paid a certain wage. For example, all jobs paid \$20 per hour will be one group.

- [7] This data issue relates to the fact that it is not possible to perfectly observe whether a job was paid according to an award before 2002. For this period, it is only possible to identify the job's pay-setting mechanism (e.g. award or enterprise bargaining agreement) using procedures such as text searches for relevant keywords in the job-level data, which can be error-prone. After 2002, the pay-setting mechanism was explicitly coded in the dataset and therefore measured with less error.
- [8] The hypothesis that the wage elasticity is equal to one can be rejected at the 1 and 10 per cent levels of significance using the 1998–2008 and 2002–08 samples, respectively.

References

ABS (Australian Bureau of Statistics) (2017), 'Employee Earnings and Hours, Australia, May 2016', ABS Cat No 6306.0, January.

Bishop J (2018), [The Effect of Minimum Wage Increases on Wages, Hours Worked and Job Loss](#), RBA Research Discussion Paper No 2018-06.

Borland J (2018), 'A Review of Methods Applied in International Research on the Employment Effects of the Minimum Wage and Implication for Australian Research', Fair Work Commission Research Report 4/2018, Fair Work Commission, Canberra.

Card D and Krueger (1994), 'Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania', *The American Economic Review*, 84(4), pp 772–793.

FWC (Fair Work Commission) (2018), 'Decision – Annual Wage Review 2017–18', [2018] FWCFB 3500.

Jardim E, M Long, R Plotnick, E van Inwegen, J Vigdor and H Wething (2017), 'Minimum Wage Increases, Wages, and Low-Wage Employment: Evidence from Seattle' *NBER Working Paper No 23532*.

Leigh A (2007), 'Does Raising the Minimum Wage Help the Poor?', *Economic Record*, 83(263), pp 432–445.

Productivity Commission (2015a), 'Workplace Relations Framework, Final Report', Productivity Commission Inquiry Report No 76, Productivity Commission, Canberra.

Productivity Commission (2015b), 'Exploring the Effects of Minimum Wage Increases on Employment Using a Large Administrative Dataset', *Workplace Relations Framework – Technical Supplement*, Productivity Commission, Canberra.

RBA (Reserve Bank of Australia) (2017), '[Box C: Minimum Wage Decision](#)', *Statement on Monetary Policy*, August, pp 42–43.