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IZA DP No. 10670

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ABSTRACT

The Structure of the Wage Gap for Temporary Workers: Evidence from Australian Panel Data*

This study uses panel data for Australia from the HILDA Survey to estimate the wage differential between workers in temporary jobs and workers in permanent jobs. Specifically, unconditional quantile regression methods with fixed effects are used to examine how this gap varies over the entire wages distribution. While fixed-term contract workers are on rates of pay that are similar to permanent workers, low-paid casual workers experience a wage penalty and high-paid casual workers a wage premium compared to their permanent counterparts. Finally, temporary agency workers usually receive a wage premium, which is particularly large for the most well paid.

JEL Classification: J31, J41, C21, C23

Keywords: temporary employment wages, HILDA Survey, quantile regression, longitudinal data

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1. Introduction

In recent decades, many European countries have seen a marked increase in the incidence of temporary forms of employment, such as fixed-term contracts, temporary agency work and casual work. This development has triggered a scientific and public debate about whether, and the extent to which, these employment forms are inferior to permanent forms of employment. Such debates have also been taking place in countries outside of Europe, including Australia. Indeed, Australia is of particular interest, both because the share of temporary in total employment is very high, and because, unlike most other rich countries, it is casual work, and not fixed-term contracts, that is the most prevalent form of temporary employment. Data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, for example, indicate that around 32% of Australian employees were employed on either a casual basis or a fixed-term contract in 2014, but with casual workers representing the majority of this group (72%).

A widely accepted finding is that workers employed on temporary contracts are paid noticeably less than workers employed on a permanent basis. The OECD (2015), for example, reports on data for 21 member countries, with hourly wages for temporary employees ranging from 60% to 90% of the median hourly wages of permanent full-time employees. More importantly, while these wage gaps narrow once other worker characteristics are controlled for, they mostly remain reasonably large and significant. A notable exception here, however, is Australia, with the estimated wage penalty attached to temporary employment (defined in the OECD study as either casual or fixed-term contract employment) declining to 2% to 3% in cross-sectional regression analyses, and to zero in longitudinal analyses where individual-specific effects are incorporated.

The absence of any sizeable wage penalty for casual work in Australia should not be surprising. Indeed, more surprising is that a sizeable wage premium is not found. This is because Australian industrial law provides for the payment to casual employees of a loading on top of their regular wage rate (as specified in the relevant industry 'award' or enterprise agreement). Prior to July 2010 the level of this premium varied across industries depending on the particular 'award' that applied to each industry, but with 20% widely regarded as the historical norm. The payment of a premium is generally argued as necessary to compensate for the absence of other entitlements that are available to non-casual employees, including paid sick leave, paid annual leave, paid public holidays, and redundancy / severance pay (Creighton and Stewart 2010). But despite this regulatory requirement, previous studies have

generally reported that casual employment in Australia is associated with, at most, a very modest wage premium (Booth and Wood 2008; Green, Kler, and Leeves 2010; Green and Leeves 2013; Watson 2005; Wooden 2001b). Wooden (2001b), for example, reports an hourly wage premium for casual employees of only around 5% among men and around 7% for women in a cross-sectional analysis of data from 1995. Very differently, Green and Leeves (2013) use panel data for male employees covering the period 2001 to 2008, and thus are able to control for person-specific fixed traits, but find a similarly small wage premium – around 6%.

Workers on fixed-term contracts, in contrast, have access to most entitlements that permanent workers do and hence there is no regulatory requirement for the payment of any additional loading. And indeed previous Australian research has not found any evidence of any wage premium for this group (Green et al. 2010; Watson 2005). However, and in contrast to the research undertaken in other countries, nor has any evidence of a sizeable wage penalty for this group been found.

In summary, the literature for Australia points to a modest wage premium for casual workers, and similar wages for fixed-term workers, compared to permanent workers. A major shortcoming of previous Australian studies, however, is that they are all focused on the mean of the wage distribution. Evidence from other countries, however, tells us that the effects of temporary employment on wages may differ between low and high-paid workers (Barbieri and Cutuli 2009; Bosio 2009, Bosio 2014; Comi and Grasseni 2012; Mertens, Gash, and McGinnity 2007; Mertens and McGinnity 2005; Santangelo 2011). More specifically, these studies usually find a relatively large wage penalty for temporary workers at the bottom of the wage distribution, which then shrinks as we proceed towards the top of the distribution. It is therefore possible that Australian studies, which have focused on the mean of the wage distribution, have overlooked important differences in the wage gap between temporary and permanent workers at different points of the wage distribution. Rectifying this gap is a major objective of this study.

International research, however, is also not without shortcomings. With the exception of Bosio (2014) and Santangelo (2011), all of the studies on the effect of temporary employment on wages at different points in the distribution have estimated conditional quantile regression models. As is explained in Firpo, Fortin, and Lemieux (2009), in conditional quantile regression the definition of the quantiles, and thus the interpretation of the results, depends on the independent variables in the models. In contrast, in unconditional quantile regression the quantiles are determined pre-regression, rendering results comparable across models with

varying numbers of covariates. Further, and perhaps most importantly, all previous studies on this issue have simply estimated cross-section models, and hence results might be biased due to unobserved heterogeneity.

The present study seeks to improve on the weaknesses identified above. Longitudinal data from the HILDA Survey are used to estimate quantile regressions of hourly wage outcomes, where the key explanatory variable identifies the contractual status of the worker. It is thus the first Australian study to examine how the relationship between contract type and wage outcomes varies across the entire wage distribution. Further, and in contrast to most international research, the measure of contract type identifies four classes of workers (rather than just two) – permanent employees, casual employees, fixed-term contract workers, and temporary agency workers. Finally, and unlike previous research on this topic, unconditional quantile regression models with fixed effects are estimated, thus both solving the problem of shifting conditional distributions upon the inclusion of covariates and accounting for unobserved time-invariant heterogeneity.

2. Temporary Workers' Wages in Australia: Theoretical Considerations

The usual starting point for reasoning about a possible wage gap between temporary and permanent workers is the theory of compensating wage differentials (Rosen 1986). According to this theory, different working conditions for workers with the same level of competence should result in a wage premium for those workers with the less favourable conditions. Therefore, temporary workers should be compensated with higher wages given the shorter job tenure (and hence lesser job security) that is inherent in temporary employment contracts.

In the Australian case, compensating wage differentials are particularly likely for casual workers. As previously mentioned, casual employees in Australia are usually entitled to a pay loading, typically justified on the grounds that they lack any entitlement to paid leave and paid public holidays and can be dismissed (or rather, not hired again) at any time.[1] Historically, the level of the pay loading would vary across workers depending on rates specified either in an enterprise agreement or the industry award applicable to a worker's employer. Evidence from the late 1990s and early 2000s, however, suggests that this loading typically ranged around 20% of the wage of a comparable non-casual worker (Watson 2005;

[1] Note, however, that long-term casuals (i.e., those who have passed the minimum employment period of six months, or twelve months in case of those who work for a small business) are entitled to legal protection against unfair dismissal.

Wooden 2001a).[2] Furthermore, since the mid-2000s (following amendments to the *Workplace Relations Act 1996*) even casual employees who were not covered by the awards system were required to be paid a loading of 20%.

But as already noted in the Introduction, empirical research has found little evidence that temporary workers receive a wage premium. Indeed, the presence of a wage penalty is the usual finding. And even in Australia any premium for casual workers appears to be far less than the mandated 20% loading on rates of pay specified in awards and agreements. Several arguments can be found in the literature as to why temporary workers would experience a wage penalty. The insider-outsider model (e.g., Bentolila and Dolado 1994; Lindbeck and Snower 2001) as well as buffer stock models (Atkinson 1984; Booth, Francesconi, and Frank 2002a), for example, suggest that firms with a stable core of permanent workers will also employ a buffer stock of temporary workers, who can easily be laid off if demand declines. The higher firing costs of permanent workers, compared to temporary workers in the same firm, increase the job security of the permanents, placing them in a better position to bargain for higher wages. The bargaining power of permanent workers is further enhanced by the traditional tendency for unions to better represent the interests of permanent workers (Campbell 1996; Gumbrell-McCormick 2011), which is reflected in lower rates of union membership among temporary employees. Data from the HILDA Survey, for example, indicate that in Australia in 2014 only about 7% of casual employees were trade union members. This compares with 25% of permanent employees.

Over time, temporary workers can also be expected to become less productive than otherwise comparable permanent workers. Since workers in temporary jobs, almost by definition, have relatively short expected job tenures at time of hire, the incentive to invest in training, both by the employer and the workers themselves, will be low. And empirical research mostly reports evidence that is consistent with this hypothesis (Booth et al. 2002b; Draca and Green 2004; Nienhüser and Matiaske 2006). This relative lack of access to, and interest in training opportunities is expected to lead to the emergence of a productivity gap between temporary and permanent workers, which in turn will be reflected in differences in wages.

Other explanations revolve around the notion of temporary employment as a form of investment on the part of workers, though in these cases the wage penalty experienced should

[2] In the wake of the restructuring of the awards system in 2010, new legislation required that all casual loadings in awards be gradually increased to at least 25%, taking full effect on 1 July 2014 (Creighton and Stewart 2010).

only be relatively short-lived. First, employers may use temporary jobs as probationary or screening device given uncertainty about workers' abilities (Faccini 2014; Houseman and Polivka 2000). And indeed studies of both the UK and Germany have reported evidence of relatively large fractions of fixed-term contract workers subsequently receiving a permanent employment contract with the same employer (Boockmann and Hagen 2005; Booth et al. 2002b).[3] Workers will be willing to accept lower wages during the 'probationary' period given the prospect of being moved on to a permanent contract. Second, temporary work might allow workers to accumulate a greater variety of labour market experience. For example, temporary jobs may be part of a search process during which workers, who are still unsure about their career and location preferences, gradually learn about which types of jobs best suit their skills and interests (Booth et al. 2002b). This argument might be expected to apply with particular force to temporary agency workers, who are claimed to accumulate more (general) human capital than direct-hire employees and more quickly acquire information on whether they are suited for a certain field as a result of the frequent change of host companies (Jahn 2010; Segal and Sullivan 1998).

Very differently, some workers may select into temporary jobs because they place more weight on flexible work arrangements than on high wages (OECD 2015). This might be expected to be especially likely for casual workers given, in theory, such workers are not bound to a fixed number of hours and can refuse shifts that do not suit them. To date, the evidence on the importance of such preference-based considerations is very mixed (cf. Bonet et al. 2013; Morris and Vekker 2001).

Some further considerations apply specifically with regard to temporary agency workers. The placement activity of the employment agency can be regarded as a service to employees (as well as employers), which is paid for in part by the employee, in the form of lower wages (Jahn 2010). Furthermore, it has been argued that hiring through a temporary employment agency enables the employer to discriminate between wages of existing and new staff without causing problems of morale and productivity, either among the existing workers or the new workers (Houseman, Kalleberg, and Erickcek 2003). However, as this applies both to higher or lower wages for new employees, the predictions from this argument are not straightforward and depend on the tightness of the labour market. Note further that in

[3] Booth et al. (2002b), for example, report that in the UK (in the 1990s) about 28% of men and 34% of women in casual jobs, and 38% of men and 36% of women in fixed-term contract jobs, transited into permanent employment. More importantly, about 70% of workers gaining permanency did so with the same employer.

Australia temporary agency workers are exceptional in that they can be hired on a permanent, fixed-term or casual basis. Some of them will therefore be entitled to a casual pay loading.

Overall, we suspect that the negative influences of relatively low bargaining power and productivity will outweigh any positive effects from compensating wage differentials, and hence expect temporary work to be associated with wage penalties. In Australia, however, the situation for casual employees is very different given the requirement to pay loadings, and hence for this group we expect pay premiums.

There are, however, reasons to suspect that the wage effects of temporary employment are not uniform across the wage distribution. At the very bottom of the wage distribution, nationwide or industry-specific minimum wages work to compress wage differences between workers in many countries, suggesting a small wage gap between permanent and temporary jobs. This is expected to be especially the case in Australia, which has both a relatively high national minimum wage,[4] and legal minima that apply to a great many other low-wage workers. However, other forces act to widen the temporary wage gap, especially at this part of the distribution. First, the reasons why employers hire temporary workers differ between low-paid and high-paid workers. Specifically, accommodating fluctuations in demand by means of temporary workers is more likely in low-skilled jobs with easy measurement of productivity and low need for firm-specific human capital (Mertens et al. 2007; Mertens and McGinnity 2005). Second, given evidence that the union wage premium is larger for low-paid than for high-paid workers (Schmitt 2008; Cai and Liu 2008 for men), it follows that the role of unions in widening the wage gap between permanent and temporary workers is also larger among the low-paid workers (Bosio 2014; Comi and Grasseni 2012). At the bottom of the wage distribution we also expect to observe a negative selection process where less able or lowly motivated workers are concentrated in low-paid temporary jobs (Mertens et al. 2007). The bargaining power of low-paid temporary workers might further be particularly low. Bargaining for compensating wage differentials presupposes that workers are able to choose between two jobs instead of between a temporary job and unemployment (Mertens et al. 2007). Low-paid temporary workers can be expected to have fewer job alternatives than high-paid temporary workers, reflecting their relative lack of skills, which in turn is reflected in greater exposure to job loss and unemployment. Furthermore, as a direct consequence of

[4] According to data available on the OECD website (http://stats.oecd.org), in purchasing power parity terms, the real minimum hourly wage in Australia is higher than in any other OECD country except France and Chile.

their low bargaining power, we might also suspect a particularly high degree of non-compliance with wage legislation among employers of low-paid temporary workers.

In Australia, at this part of the wage distribution, it is again casual employees who are most exposed to oppositional forces in terms of wages. On the one hand, as the casual loading is only obligatory at comparatively low wages (the National Minimum Wage or the minimum pay rates set out in awards), wage premiums for casuals are particularly likely at the bottom of the distribution. On the other hand, as mentioned earlier, enterprise agreements usually also include casual loadings, and hence the casual loading extends well up the wage distribution. Furthermore, casual employees are much more likely to be paid at award rates, whereas permanent employees are more likely to be covered by enterprise and individual agreements which involve pay at or above award rates. Data collected from employers by the Australian Bureau of Statistics (ABS), for example, indicate that in May 2016 almost 45% of casual (non-managerial) employees are paid exactly the award rate, which compares with just 18% of permanent (non-managerial) employees (ABS, Data Cube 5, Table 2). Finally, we expect that casual employees are more frequently subject to employer non-compliance with wage legislation, which can be inferred from the fact that they are overrepresented among those paid below the minimum wage (Bray 2013; Nelms, Nicholson, and Wheatly 2011). The bargaining power of low-paid casuals is particularly low due to their lack of outside options. In Australia, the highest unemployment rates are found in the occupation (labourers) and industry (accommodation and food services) with the highest shares of casuals (Kryger 2015). Low-skilled casuals will therefore particularly often have to choose between the casual job and unemployment.

In contrast to workers at the bottom of the wage distribution, high-paid temporary workers have relatively high bargaining power as they will usually be highly skilled and have more alternative job offers. They can therefore be expected to seek and accept offers of temporary work only if there is a premium attached to it, rendering compensating wage differentials more likely at this end of the wage distribution (Mertens and McGinnity 2005). High-skilled workers might even deliberately seek temporary jobs in order to be able to renegotiate conditions with employers on a regular basis (Bosio 2014). Employers, in turn, will be likely to hire high-skilled temporary workers to meet a short-term or sudden demand for specific (and often rare) skills, rather than to build a buffer stock of easily dismissible workers or to save on labour cost. This argument might apply particularly to temporary agency workers given this form of employment enables employers to quickly access specialist expertise. While empirical evidence suggests that the share of employers who

consider access to specialist skills an important reason for hiring agency workers is relatively small, although highly variable across countries (e.g., Brennan, Valos, and Hindle 2003; ECORYS-NEI 2002), it can be assumed that this motivation will be more important towards the top of the wage and skill distribution. The highly skilled agency workers who fit these requirements can be expected to be in high demand and therefore to receive a higher wage. In contrast, the wage premium for high-skilled fixed-term contract workers might be lower, if not completely absent: In some high-skilled occupations, fixed-term contracts are part of a normal career path and should therefore not be connected to any wage difference (Mertens and McGinnity 2005).

In summary, we expect a wage penalty for temporary workers at the bottom of the wage distribution, which is most pronounced for casual employees. In contrast, we expect temporary workers at the top of the wage distribution to attract a wage premium. Further, we expect this premium to be particularly marked among temporary agency workers.

3. Data and Method

Data and sample. We use data from fourteen waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey, a longitudinal study that commenced in 2001 and interviews adult members of a nationally representative sample of Australian households on a yearly basis (see Watson and Wooden 2012). Among other topics, the HILDA Survey provides comprehensive information on individuals' employment and income situations. The sample is restricted to employees (where a person who is an employee of their own business is defined to be self-employed and hence out of scope) aged between 21 and 64 years. Any observations where the respondent was unable, or unwilling, to report whether they were employed on a permanent, fixed-term or casual employment contract, or where the value on the dependent variable seemed extreme (which we define, somewhat arbitrarily, as an hourly wage below A$5 and above A$200) were also excluded. These exclusions resulted in the loss of just 205 and 1214 observations, respectively. The final working sample comprised 8356 men and 8516 women, contributing 45,549 and 45,606 observations respectively.

Method. The effect of temporary employment on wages is investigated within a quantile regression framework. While conventional regression models estimate the effect of the independent variables at the mean of the distribution of the outcome variable, quantile regression allows us to gauge the effect at various points of the distribution. We can thus investigate how the wage gap between temporary and permanent workers varies along the

wage distribution. As previously mentioned, most of the existing studies on the effects of temporary employment on wages at different points in the distribution have used conditional quantile regression methods, as initially developed by Koenker and Bassett (1978). In this approach the quantiles of the distribution are defined by the covariates, meaning the coefficients actually designate the effect on the conditional distribution rather than the unconditional distribution of the outcome variable (Porter 2015). For example, if we investigate the effect of casual work at the 10th decile of the wage distribution and additionally control for educational level, the resulting coefficient for casual work measures the average effect at the 10th decile of the separate wage distributions for each educational level. As workers at the 10th decile of the wage distribution for postgraduates can be expected to have a much higher wage than workers at the 10th decile of the distribution for workers who have only completed year 11, the resulting averaged coefficient is difficult to interpret. Furthermore, the inclusion of additional covariates alters the interpretation of the quantiles, impeding the comparison of coefficients across models with different covariates.

In order to investigate the effect of temporary employment at specific quantiles of the overall wage distribution, unconditional quantile regression (UQR) methods, as developed by Firpo et al. (2009), have to be applied. Within this framework, the quantiles are defined pre-regression and therefore do not vary with the additional covariates included in the model. The method involves regressing the Recentered Influence Function (RIF) of the unconditional quantile of the dependent variable on the explanatory variables. The RIF is calculated as follows:

$$(Y; q_\tau, F_y) = q_\tau + [(\tau - \mathbb{1}\{Y \leq q_\tau\})/f_y(q_\tau)]$$

where Y is the outcome variable (the hourly wage), τ designates the specific quantile, q_τ is the value of the outcome variable at this quantile, $f_y(q_\tau)$ is the density at the point q_τ (as estimated by kernel methods), and $\mathbb{1}\{Y \leq q_\tau\}$ is a dummy variable which indicates whether the outcome variable is below q_τ. After this transformation, we can simply run a least squares regression with the RIF as the dependent variable.

We also incorporate individual fixed effects using the extension to the Firpo et al. estimator developed by Borgen (2016), thus controlling for all unobserved person-specific traits that are time invariant. The density is estimated using the Gaussian kernel and the Silverman optimal bandwidth, while standard errors are bootstrapped (50 replications) and clustered on the individuals. The RIFs and the subsequent regressions are calculated separately for men and women. For comparative purposes, we also report results from pooled

cross-sectional unconditional quantile regressions and from regressions where the outcome variable is measured at the mean.

Dependent variable. The dependent variable is the natural logarithm of the hourly wage deflated by the Australian Wage Price Index (using September values with the base year being 2008/09).[5] Hourly wages are derived by dividing usual gross weekly wages and salary from the main job (with missing values imputed[6]) by usual weekly working hours in that job (where usual working hours includes both paid and unpaid overtime).

Employment type. We distinguish between permanent employment (which serves as the reference category), fixed-term contracts, casual employment and temporary agency work (also sometimes referred to as labour hire). The first three categories are mutually exclusive. Temporary agency workers, however, could be employed on either a permanent, fixed-term or casual basis. Following Buddelmeyer, McVicar, and Wooden (2015), we thus create a fourth category of employee, with all employees who report being employed through a labour-hire firm or temporary employment agency, regardless of their contract type, being classified as temporary agency workers.

Control variables. The models control for a range of socio-demographic and work-related characteristics. Regarding socio-demographics, we include age (in quadratic form), six dummies for the highest educational level, and a separate dummy for full-time students. The household context is considered by including a dummy for individuals living with a partner and a second dummy for those living with their own children below the age of 15. An indicator for the presence of a long-term health condition that impacts on work is also included. We account for regional differences in wage levels in two different ways: first, by the inclusion of variables identifying whether an individual lived in a major city[7], in an inner-regional part of Australia, or in a more remote area; and second, through the inclusion of indicators for the eight different Australian states and territories. We also control for any time effects through the inclusion of thirteen year dummies. In the pooled cross-sectional models we additionally include controls for indigenous origin and region of birth (Aboriginal or Torres Strait Islander, born overseas in one of the main English-speaking countries – Canada, Ireland, New Zealand, South Africa, UK, and the USA – and born overseas in another

[5] The Wage Price Index is produced by the Australian Bureau of Statistics (ABS). Figures are released on a quarterly basis on the ABS website (www.abs.gov.au) in ABS catalogue number 6345.0.

[6] The value of the hourly wage was imputed for 2.3% of our total sample.

[7] These are Sydney, Melbourne, Brisbane, Perth, Adelaide, Newcastle, Wollongong, Geelong, the central coast area of New South Wales, and the Gold Coast and Sunshine Coast areas in south-eastern Queensland.

country, with non-indigenous Australian-born persons comprising the reference category). And as previously mentioned, all models are estimated separately for men and women.

Regarding employment-related variables, we include controls for length of tenure with the current employer (specified as a quadratic), whether employed in the public sector, whether has supervisory responsibilities, whether works a schedule other than a regular day schedule, whether had experienced any unemployment in the past year, and membership of a trade union or employee association. In a second specification (results from which are reported in Figures A2 and A3 in the appendix) we additionally include controls for employment characteristics that are closely correlated with employment type. These are: working hours, represented by dummies for part-time work (less than 35 hours per week) and long hours (more than 45 hours), with a 35 to 45 hour week being the reference category; firm size, represented by dummy variables identifying firms with fewer than 20 employees, with 20 to 99 employees, and with 500 or more employees, and whether firm size information was not reported (with firms with 100 to 499 employees as the reference category); occupation, with seven dummies included to identify the eight major occupations groups within the Australian and New Zealand Standard Classification of Occupations; and industry, with 18 dummies included to identify the 19 major industry divisions within the Australian and New Zealand Standard Industrial Classification. For summary statistics for all variables included in the models, see Table A1.

4. Results

Table 1 summarises the average raw hourly wages for men and women by employment type within our sample. The results reflect the well-known gender wage gap, with women on average receiving A$25 per hour and men A$29. Women also earn less than men in every single employment type considered, although the difference is comparatively small among casual employees. When comparing wages across employment types, we see that, for both men and women, temporary agency workers receive the highest hourly wages, followed by fixed-term contract employees and permanent employees, but the differences between these categories of workers are relatively small and mostly statistically insignificant. Casual employees, in contrast, earn considerably lower wages on average than workers in the other three employment categories.

In order to investigate to what extent the raw wage differential is a consequence of observed and unobserved worker characteristics, we now turn to multivariate regression

models. Table 2 provides an overview of the wage effects from four types of models: (i) conventional pooled OLS (where the hourly wage is measured at its mean); (ii) unconditional quantile regression (where estimates are reported for seven selected percentiles); (iii) conventional fixed-effects, where the hourly wage is again measured at its mean; and (iv) unconditional fixed-effects quantile regression. All models are estimated separately for men (Panel A) and women (Panel B) using specification 1; i.e., after controlling for a range of socio-demographic and work-related characteristics but excluding potentially endogenous variables.

Wage gaps at the mean. Starting with the results from the conventional OLS model for men, we see that, relative to permanent employment, fixed-term contracts and temporary agency work are both associated with a significant wage premium at the mean, with this premium being much larger for temporary agency workers (about 15%) than for fixed-term contract workers (4%).[8] Casual work, in contrast, is associated with a small, but significant, wage penalty for men. Once we allow for individual fixed-effects (reported in the bottom half of Panel A of Table 2) the estimated wage premium for both fixed-term workers and temporary agency workers becomes smaller. Indeed, the premium for fixed-term contract workers disappears entirely. In contrast, the wage penalty for men in casual jobs becomes a modest 4% wage premium. These findings are consistent with the expectation that part of the observed raw wage differentials across employment contract types can be explained by differences in unobserved characteristics of workers, such as ability, motivation or personality traits. Less obvious, our results suggest that the effect of these unobservable characteristics vary markedly with employment type. Fixed-term contract and temporary agency workers appear to have unobservable traits that are associated with relatively high productivity, whereas casual employees tend to have traits associated with relatively low productivity.

The results for women (reported in Panel B) are very similar but with the notable exception that the wages of fixed-term contract workers do not differ significantly from permanent workers, neither in the OLS nor in the fixed-effects regression. For casual employment, as was found for men, a small wage penalty is suggested by the simple OLS model, which becomes a modest premium (5%) once individual fixed-effects are included. And again like men, we also find that both the OLS and fixed effects models suggest that, at

[8] Estimated wage differentials are derived from 100*exp(β)-1, where β is the estimated coefficient. Slightly different values would be obtained if we used the equally valid transformation, 100*exp(-β)-1.

the mean of the wage distribution, there is a premium for temporary agency work among women in the order of 8 to 9%.

Wage differentials across the distribution. Turning to the results from the quantile regressions, it becomes apparent that the mean regressions are hiding large differences in the wage effects of temporary employment across the distribution. Comparing the results from the 5th to the 95th percentile, we find a similar pattern for all three temporary employment types and for both genders: There is a wage penalty for temporary employees at the bottom of the wage distribution, which gradually turns into a wage premium towards the top of the distribution. The exception to this pattern is female fixed-term contract workers, who seem to experience a small wage penalty at the 75th percentile. Comparing the results for the conventional UQR and the fixed-effects UQR, the overall pattern persists but becomes less pronounced when controlling for unobserved heterogeneity. Most notably, the wage penalty at the bottom of the wage distribution decreases, particularly for casual employees. The wage premium at the top also decreases, at least among temporary agency workers and men on fixed-term contracts. In contrast, for casual employees of both genders, the wage premium at the top increases in the presence of fixed-effects.

We now consider the results for the fixed-effects UQR in more detail with a view to describing how these estimated wage differentials evolve across the whole wage distribution, rather than just at the selected quantiles presented in Table 2. Figure 1 and Figure 2 present results for separate estimations of the wage effects at all 99 different percentiles for men and women respectively.[9] Again, the estimation is based on specification 1.

Focussing first on the results for men, summarised in Figure 1, we can see that fixed-term contract workers have hourly wage outcomes that at almost all points in the wage distribution are little different from comparable permanent employees. There is only a small significant wage penalty at the very bottom of the distribution (a maximum of 6% at the 3rd percentile) and a small significant wage premium at the top (up to 5% at the 96th percentile). Very different are casual employees. Male casual employees at the bottom of the wage distribution receive a sizeable wage penalty (13% at the 1st percentile) which disappears quite quickly. At most points in the wage distribution casual employees receive a modest wage premium. Further, this premium rises with a worker's position in the wage distribution, reaching 13% at the 99th percentile. Nevertheless, at no point is this estimated premium as large as 20%, the loading that most employers were required to pay casual employees.

[9] The confidence intervals relating to these estimations can be found in Figure A1.

Different again are temporary agency workers. They receive a wage premium at almost all points in the wage distribution, but with that premium reaching very high levels at the top of the wage distribution: 46% at the 95th percentile and 111% at the 99th percentile.

The patterns of wage differentials for women, presented in Figure 2, look very similar to those found for men. Thus like men, the wages of female fixed-term contract workers do not differ significantly from those of permanent workers throughout most of the wage distribution. Also similar to men, the casual-permanent wage differential moves from a pronounced penalty at the bottom of the wage distribution to a sizeable premium at the top. Indeed, the slope in this relationship between the estimated wage differential and the hourly wage percentile is more pronounced for women than for men: There is both a larger wage penalty at the bottom (up to 21% at the 1st percentile) and a larger wage premium at the top of the distribution. Nevertheless, most female casual employees still do not receive hourly wage premiums in excess of the standard 20% award requirement. Only female casual employees in the top 5% of the wage distribution receive a premium of at least 20% (21% at the 95th percentile up to 46% at the 99th percentile). Female temporary agency workers also experience a wage penalty at the bottom of the distribution, but this is both less pronounced than for female casual employees and statistically insignificant. And like male agency workers they also attract large premiums at the top (up to 97% at the 99th percentile).

Overall, the results point to the presence of wage penalties for casual and temporary agency work at the bottom of the distribution but small premiums throughout most parts of the distribution, increasing to comparatively high levels near the very top. Yet gauging the extent to which workers are advantaged or disadvantaged by their employment contract type requires taking into account the chances of temporary workers being found at different points of the wage distribution. Such information is presented in Table 3. This table reports the distribution of workers in each quintile of the wage distribution by employment form, and shows that casual employees are overrepresented in the lowest quintiles of the distribution, and under-represented in the top quintiles. The number of casual workers benefiting from the wage premium at the top of the distribution is therefore rather small, while the number of workers experiencing the penalty at the bottom is larger. The pattern is slightly different for temporary agency workers: On the one hand, they also have a slightly increased likelihood to be found in the lowest quintile but on the other hand they are also considerably overrepresented in the top quintile. Fixed-term contract workers, in contrast, are spread fairly evenly across the wage distribution, but with a slight over-representation at the top.

Robustness checks. We re-analysed the data with several modified models to test the robustness of our results.[10] In a first step, we included additional control variables that we suspected to be closely linked with temporary employment. These were indicators for working hours, firm size, occupation, and industry (specification 2). Among men, the results for temporary agency workers hardly change, whereas the wage premium for casual workers disappears at most parts of the distribution. For fixed-term contract work, the analysis confirms the results of the previous specification 1, namely that there is no wage difference to permanent work. For women, the overall trajectories remain the same, yet the premiums for agency workers as well as casuals in the top third of the distribution are attenuated.

In order to investigate possible differences in the wage gap for full-time and part-time workers we conducted separate analyses for those who usually work less than 35 hours a week and those who work 35 hours or more. Temporary full-time workers were thus compared to permanent full-time workers and temporary part-time workers to permanent part-time workers. For male casual and agency workers, the overall pattern is similar for the full-time and the part-time group, although the trajectory of the wage gap is less even for male part-time workers due to the low case numbers. Male fixed-term part-time workers seem to receive a wage premium throughout most parts of the wage distribution compared to their permanent counterparts. The magnitude of this effect at the mean is both sizeable (around 10%) and statistically significant, but nevertheless is (due to small sample sizes) insignificant at most parts of the distribution. In contrast, no premium was found for fixed-term full-time workers. For women, the separate estimates by full-time and part-time status yield very similar results to the joint estimation.

Finally, the considerable wage premium for high-paid temporary agency workers gave reason to have a closer look at wage differences within the group of agency workers. Focussing on the top of the distribution, it turns out that the wage premium is by far the largest for agency workers employed on a fixed-term contract, followed by those employed on a casual basis. The wage premium for casual agency workers is in fact larger than the wage premium for other casual workers. In contrast, the wage premium for male permanent agency workers is much smaller than that for fixed-term and casual workers, and female permanent agency workers do not receive a wage premium at all compared to regular permanent workers.

[10] Results from specification 2 are reported in Figures A2 and A3. Results for the other additional estimations are not reported here, but are available on request from the authors.

5. Conclusion

Using a large nationally representative household panel dataset for Australia, this paper provides new evidence on the wage gap between permanent and temporary workers. In line with recent European studies, we estimate the size of the wage gap at different points in the wage distribution, and not just at the mean. We improve upon previous studies by the use of longitudinal unconditional quantile regression methods. We also depart from previous studies by distinguishing between fixed-term contract workers, casual workers and temporary agency workers.

The results emphasise the heterogeneous wage effects of different types of temporary employment. For casual employees, the largest group of temporary workers in Australia, the analysis revealed a wage penalty at the very bottom of the wage distribution, but an increasing wage premium towards the top of the wage distribution. Yet with the exception of (the few) casual women at the very top of the wage distribution, at no part of the distribution is the wage premium near the 20% specified in most industrial awards and agreements during the period covered by our data. In large part this simply reflects the fact that awards only specify minimum wages, and that non-casual employees are far more likely to be paid at rates above the relevant minimum award wage. Nevertheless, the marked penalty at the bottom of the wage distribution is suggestive of a considerable degree of non-compliance on the part of employers of low-wage casual labour.

Temporary agency workers appear to be in a better wage situation than casual workers. While the wage gap takes on a similar trajectory across the distribution, agency workers at the bottom of the distribution do not receive a wage penalty, and the wage premium at the top is more pronounced than that for casual employees. Among high-paid agency workers, we therefore see evidence for compensating wage differentials for the insecurity and flexibility associated with their employment. This is particularly true for agency workers employed on fixed-term contracts, who received by far the largest wage premium. It can be expected that these workers are highly specialised, high-demand workers who are hired out to companies for specific short-term projects. It was also found that the wage premium for agency workers employed on a casual basis is higher than that for other casual workers, suggesting it might be easier to enforce the pay loading with the help of a temporary employment agency.

In contrast, fixed-term contract workers of both genders receive very similar wages to permanent workers throughout the distribution. This result differs from European studies, which have found significant wage penalties for fixed-term workers at all points in the

distribution, and often very large penalties at the bottom of the distribution. We suspect that our finding reflects the specific configuration of temporary work in Australia, with casual work instead of fixed-term contracts being the major means of meeting fluctuations in demand.

Overall, the results have highlighted that a focus on the mean wage gap disguises important inequalities, not only between permanent and temporary workers but also within the group of temporary workers. For example, high-paid temporary agency workers succeed in turning their flexibility into an asset and achieve a wage premium on top of their higher wage. This particularly applies to fixed-term contract agency workers, who additionally are entitled to similar working conditions (including leave provisions) as permanent workers. In contrast, low-paid casual workers are at a multiple disadvantage. These workers, who are not entitled to paid leave, who are more likely to experience fluctuating earnings and involuntary job loss, and already earn a relatively low wage, are further disadvantaged by the wage penalty compared to similar permanent workers.

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TABLE 1

Average Hourly Wage by Employment Type and Gender: Pooled Sample, 2001-2014

	Men	Women
Hourly wages ($)		
Permanent employees	29.75	25.47
Fixed-term contract employees	30.85	26.08
Casual employees	23.25	22.73
Temporary agency workers	31.09	26.18
Total	29.10	25.02
Wage differences ($)		
Permanent vs fixed-term	-1.11*	-0.61
	(2.04)	(1.73)
Permanent vs casual	6.50**	2.74**
	(15.30)	(9.51)
Permanent vs temporary agency	-1.34	-0.71
	(1.17)	(1.00)
Fixed-term vs casual	7.61**	3.35**
	(12.33)	(7.84)
Fixed-term vs temporary agency	-0.23	-0.10
	(0.18)	(0.14)
Casual vs temporary agency	-7.84**	-3.45**
	(6.49)	(4.67)

NOTES: Estimates are population weighted and obtained using the cross-sectional responding person weights provided in the HILDA Survey dataset. Wages are in constant (2008/09 financial year) dollars. Figures in parentheses are the absolute values of the t-test of significance of wage differences. ** and * denote statistical significance at the .01 and .05 levels, respectively.

TABLE 2

Wage effects of Temporary employment: Comparison of Estimates from Conventional Mean OLS, Mean Fixed-effects, Conventional UQR and Fixed-effects UQR Models

Panel A: Men

		At the mean	UQR (percentile)						
			5th	10th	25th	50th	75th	90th	95th
No fixed effects	Fixed-term	0.04***	-0.05***	-0.00	0.01*	0.02*	0.06***	0.10***	0.11***
	Casual	-0.03***	-0.12***	-0.07***	-0.04***	-0.05***	-0.00	0.03***	0.05***
	Temporary agency	0.14***	-0.01	0.05***	0.08***	0.06***	0.14***	0.29***	0.49***
	N	*44533*	*44533*	*44533*	*44533*	*44533*	*44533*	*44533*	*44533*
	R^2	*0.27*	*0.05*	*0.08*	*0.16*	*0.23*	*0.19*	*0.12*	*0.08*
With fixed effects	Fixed-term	0.01*	-0.05**	0.01	0.01	0.01	0.02*	0.04**	0.05**
	Casual	0.04***	-0.02	0.01	0.05***	0.03***	0.05***	0.08***	0.09***
	Temporary agency	0.11***	-0.01	0.05*	0.07***	0.05***	0.10***	0.21***	0.38***
	N	*44542*	*44542*	*44542*	*44542*	*44542*	*44542*	*44542*	*44542*
	R^2 *(within)*	*0.10*	*0.02*	*0.02*	*0.04*	*0.06*	*0.05*	*0.03*	*0.02*
	R^2 *(between)*	*0.06*	*0.01*	*0.00*	*0.14*	*0.00*	*0.00*	*0.00*	*0.02*
	R^2 *(overall)*	*0.07*	*0.01*	*0.00*	*0.10*	*0.00*	*0.01*	*0.01*	*0.01*

Panel B: Women

		At the mean	UQR (percentile)						
			5th	10th	25th	50th	75th	90th	95th
No fixed effects	Fixed-term	-0.01	-0.04***	0.00	0.00	0.00	-0.03***	-0.01	0.04***
	Casual	-0.03***	-0.27***	-0.14***	-0.05***	-0.04***	0.02***	0.08***	0.13***
	Temporary agency	0.08***	-0.10***	-0.02	0.05***	0.06***	0.10***	0.19***	0.26***
	N	*44501*	*44501*	*44501*	*44501*	*44501*	*44501*	*44501*	*44501*
	R^2	*0.25*	*0.05*	*0.07*	*0.13*	*0.24*	*0.23*	*0.11*	*0.05*
With fixed effects	Fixed-term	0.01	0.00	0.02***	0.01**	0.01	-0.02	0.01	0.05**
	Casual	0.05***	-0.11***	-0.01	0.03***	0.05***	0.08***	0.13***	0.19***
	Temporary agency	0.09***	-0.03	0.02	0.08***	0.07***	0.08***	0.14***	0.20***
	N	*44513*	*44513*	*44513*	*44513*	*44513*	*44513*	*44513*	*44513*
	R^2 *(within)*	*0.06*	*0.01*	*0.01*	*0.03*	*0.04*	*0.04*	*0.03*	*0.02*
	R^2 *(between)*	*0.19*	*0.01*	*0.04*	*0.11*	*0.08*	*0.16*	*0.07*	*0.03*
	R^2 *(overall)*	*0.18*	*0.01*	*0.02*	*0.09*	*0.09*	*0.13*	*0.06*	*0.02*

NOTES: The reference category is permanent employment. While not reported, all models include a list of control variables as per specification 1. Pooled OLS models are estimated with cluster-robust standard errors; mean fixed-effects and conventional UQR models with bootstrapped standard errors; and fixed-effects UQR models with cluster-bootstrapped standard errors. ***, ** and * denote statistical significance at the .01, .05 and .10 levels, respectively.

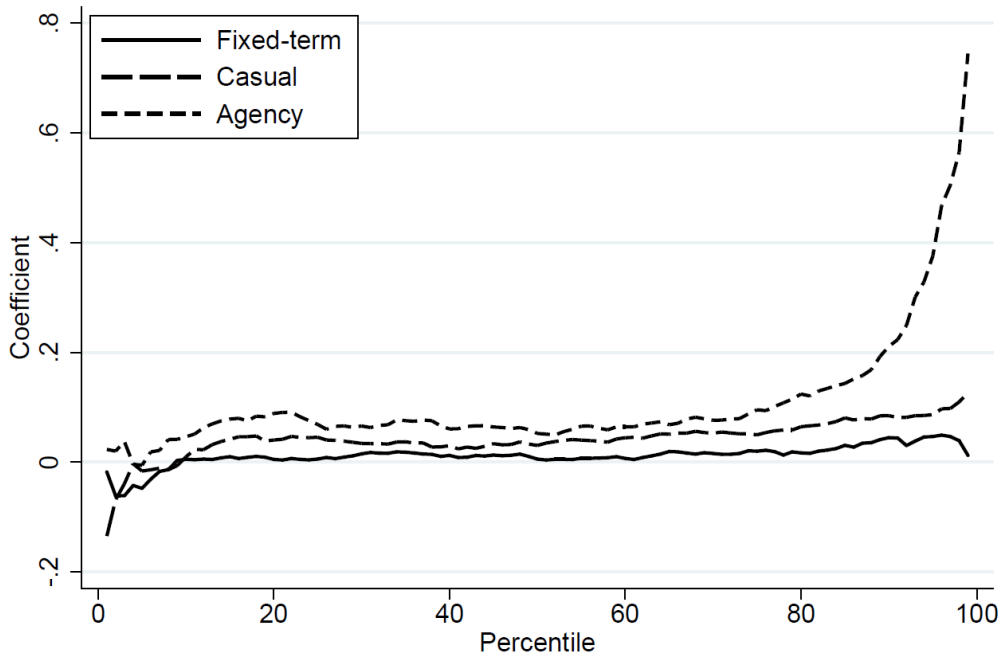
TABLE 3

Share of Workers in Different Quintiles of the Male and Female Wage Distribution by Employment Type (%)

	Men				Women			
Quin-tile	Perm-anent	Fixed-term	Casual	Temp. agency	Perm-anent	Fixed-term	Casual	Temp. agency
1	3.8	5.4	11.7	6.5	3.0	3.9	12.4	7.6
2	4.5	3.8	9.1	4.3	4.4	3.3	7.6	4.9
3	4.8	4.3	7.1	3.9	4.7	4.1	6.5	4.7
4	4.6	4.6	8.0	4.6	5.1	4.2	5.8	3.4
5	4.7	4.2	7.0	6.6	4.7	4.7	5.9	4.1
6	4.7	4.1	7.5	6.3	4.9	4.5	5.6	5.8
7	4.8	4.3	6.9	5.8	4.6	4.9	6.4	5.5
8	4.8	4.7	5.8	6.5	4.9	4.1	5.5	6.4
9	5.0	5.1	5.1	5.6	4.9	4.4	5.6	5.3
10	5.0	5.6	4.7	5.7	5.1	4.9	4.9	5.1
11	5.2	4.8	3.6	4.6	5.1	5.9	4.2	5.2
12	5.3	4.9	3.3	4.1	5.2	5.3	4.2	5.3
13	5.4	4.5	3.4	3.9	5.3	6.4	3.5	4.3
14	5.4	5.0	2.7	3.2	5.4	6.1	3.4	5.1
15	5.5	4.9	2.8	2.7	5.6	5.7	2.7	3.5
16	5.5	5.8	2.0	2.8	5.6	6.2	2.6	3.0
17	5.5	5.1	2.2	3.8	5.8	5.2	2.5	3.1
18	5.5	5.5	2.1	3.3	5.7	5.5	2.6	4.1
19	5.3	6.5	2.3	4.4	5.7	4.8	2.7	4.7
20	4.9	6.8	2.8	11.5	4.6	5.9	5.5	8.8

FIGURE 1

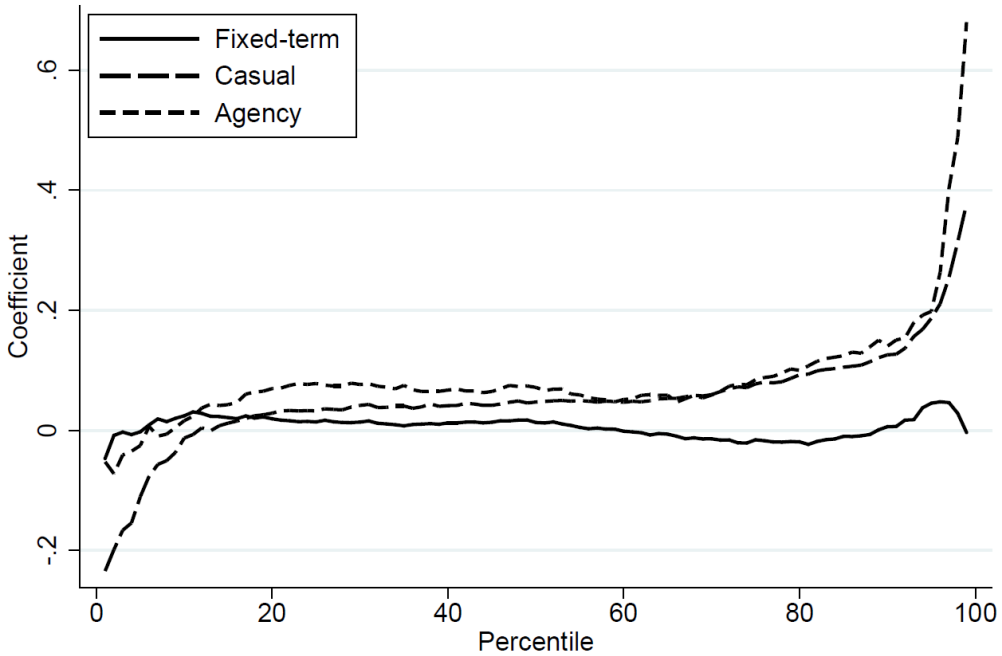
Effects of Temporary Employment on Log Hourly Wages of Men (Fixed-effects UQR)



NOTE: Reference category is permanent employment. Control variables according to specification 1.

FIGURE 2

Effects of Temporary Employment on Log Hourly Wages of Women (Fixed-effects UQR)



NOTE: Reference category is permanent employment. Control variables according to specification 1.

Appendix

TABLE A1

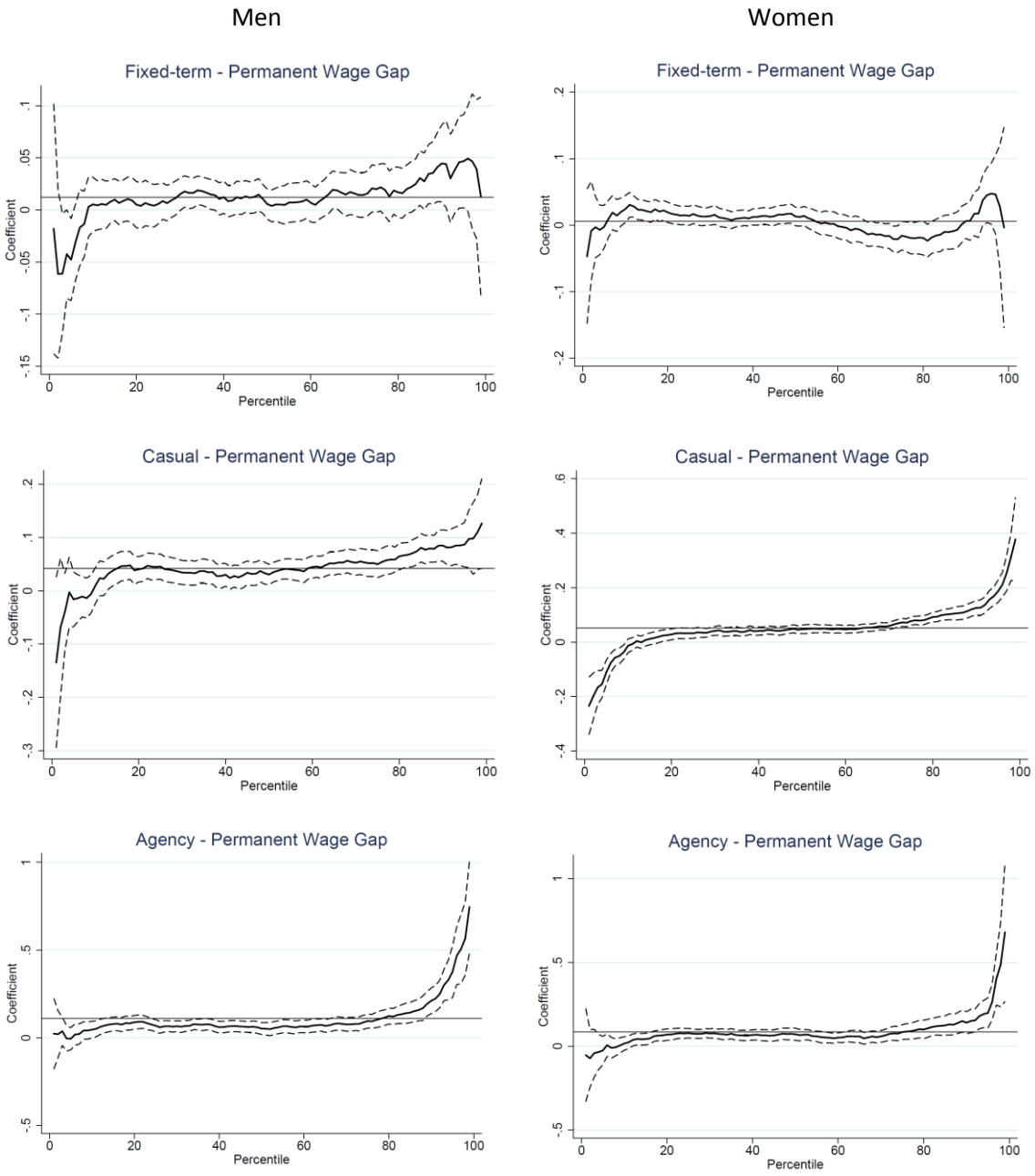
Summary Statistics

Variable	Men		Women	
	Mean	SD	Mean	SD
Hourly wage (A$)	29.35	15.68	25.34	12.44
Employment type				
Permanent employee	0.76	0.42	0.68	0.47
Fixed-term employee	0.09	0.28	0.10	0.30
Casual employee	0.12	0.33	0.20	0.40
Temporary agency worker	0.03	0.17	0.02	0.15
Age	39.27	11.58	39.93	11.58
Educational level				
Postgraduate: Masters or Doctorate	0.05	0.23	0.05	0.22
Graduate Diploma/Certificate	0.06	0.23	0.09	0.28
Bachelor or Honours	0.16	0.37	0.21	0.41
Advanced Diploma or Diploma	0.09	0.29	0.11	0.31
Certificate III or IV	0.29	0.46	0.17	0.38
Year 12	0.15	0.36	0.16	0.37
Year 11 or below	0.19	0.39	0.21	0.41
Full-time student	0.03	0.18	0.04	0.20
Living with partner	0.71	0.45	0.68	0.47
Living with own children below 15	0.34	0.47	0.34	0.47
Remoteness area				
Major city	0.69	0.46	0.69	0.46
Inner regional	0.20	0.40	0.20	0.40
Outer regional/ Remote	0.11	0.32	0.11	0.31
State or Territory				
New South Wales	0.29	0.46	0.29	0.46
Victoria	0.25	0.43	0.26	0.44
Queensland	0.21	0.41	0.21	0.41
South Australia	0.09	0.28	0.09	0.28
Western Australia	0.09	0.29	0.09	0.28
Tasmania	0.03	0.17	0.03	0.18
Northern Territory	0.01	0.10	0.01	0.10
Australian Capital Territory	0.03	0.16	0.02	0.15
Work-limiting long-term health condition	0.07	0.25	0.09	0.28
Origin				
Australia - non indigenous	0.77	0.42	0.78	0.42
Australia - indigenous	0.02	0.13	0.02	0.14
Overseas - main English-speaking country	0.10	0.30	0.09	0.28
Overseas - other country	0.11	0.31	0.11	0.32
Tenure	6.91	8.08	6.18	7.08
Public sector	0.23	0.42	0.33	0.47
Supervisory responsibilities	0.55	0.50	0.45	0.50
No regular day schedule	0.22	0.42	0.21	0.41
Unemployed within past 12 months	0.07	0.26	0.07	0.26
Union/employee association membership	0.29	0.45	0.29	0.45
Calendar year				
2001	0.07	0.25	0.06	0.25
2002	0.06	0.24	0.06	0.24
2003	0.06	0.24	0.06	0.24
2004	0.06	0.24	0.06	0.24
2005	0.06	0.24	0.06	0.24
2006	0.06	0.25	0.07	0.25

Variable	Men		Women	
	Mean	SD	Mean	SD
2007	0.06	0.24	0.07	0.25
2008	0.07	0.25	0.07	0.25
2009	0.07	0.25	0.07	0.25
2010	0.07	0.25	0.07	0.25
2011	0.09	0.28	0.09	0.29
2012	0.09	0.28	0.09	0.28
2013	0.09	0.28	0.09	0.28
2014	0.09	0.29	0.09	0.29
Working hours				
Part-time (less than 35 hrs per week)	0.12	0.32	0.46	0.50
Full-time (35-45 hrs per week)	0.59	0.49	0.45	0.50
Long hours (more than 45 hrs)	0.29	0.45	0.09	0.29
Occupation				
Managers	0.14	0.35	0.08	0.28
Professionals	0.22	0.41	0.30	0.46
Technicians and trades workers	0.21	0.40	0.04	0.19
Community and personal service workers	0.07	0.25	0.15	0.36
Clerical and administrative service workers	0.09	0.28	0.25	0.43
Sales workers	0.05	0.22	0.10	0.29
Machinery operators and drivers	0.12	0.32	0.01	0.11
Labourers	0.10	0.30	0.07	0.25
Industry				
Agriculture, forestry and fishing	0.03	0.16	0.01	0.09
Mining	0.04	0.19	0.01	0.08
Manufacturing	0.15	0.35	0.05	0.21
Electricity, gas, water and waste services	0.02	0.14	0.00	0.07
Construction	0.10	0.30	0.01	0.12
Wholesale trade	0.05	0.21	0.02	0.15
Retail trade	0.07	0.26	0.10	0.30
Accommodation and food services	0.04	0.19	0.06	0.23
Transport, postal and warehousing	0.07	0.26	0.02	0.14
Information media and telecommunications	0.03	0.16	0.02	0.15
Financial and insurance services	0.04	0.19	0.05	0.21
Rental, hiring and real estate services	0.01	0.10	0.02	0.12
Professional, scientific and technical services	0.07	0.26	0.07	0.25
Administrative and support services	0.02	0.14	0.03	0.17
Public administration and safety	0.10	0.30	0.07	0.25
Education and training	0.07	0.25	0.17	0.38
Health care and social assistance	0.05	0.22	0.25	0.43
Arts and recreation services	0.02	0.14	0.01	0.12
Other services	0.04	0.19	0.03	0.16
Firm size				
Less than 20 employees	0.20	0.40	0.19	0.40
20-99 employees	0.16	0.37	0.15	0.36
100-499 employees	0.14	0.35	0.12	0.33
500 or more employees	0.46	0.50	0.48	0.50
Firm size unknown/implausible	0.04	0.19	0.06	0.23

FIGURE A1

Estimated Wage Gaps and Confidence Intervals Across the Wage Distribution by Employment Type



NOTE: Curved lines designate coefficients from fixed-effects UQR with cluster-bootstrapped standard errors. Horizontal lines designate coefficients from fixed-effects regressions at the mean. Reference category is direct permanent employment. Control variables according to specification 1.

FIGURE A2

Effects of Temporary Employment on Log Hourly Wages of Men (Fixed-effects UQR)

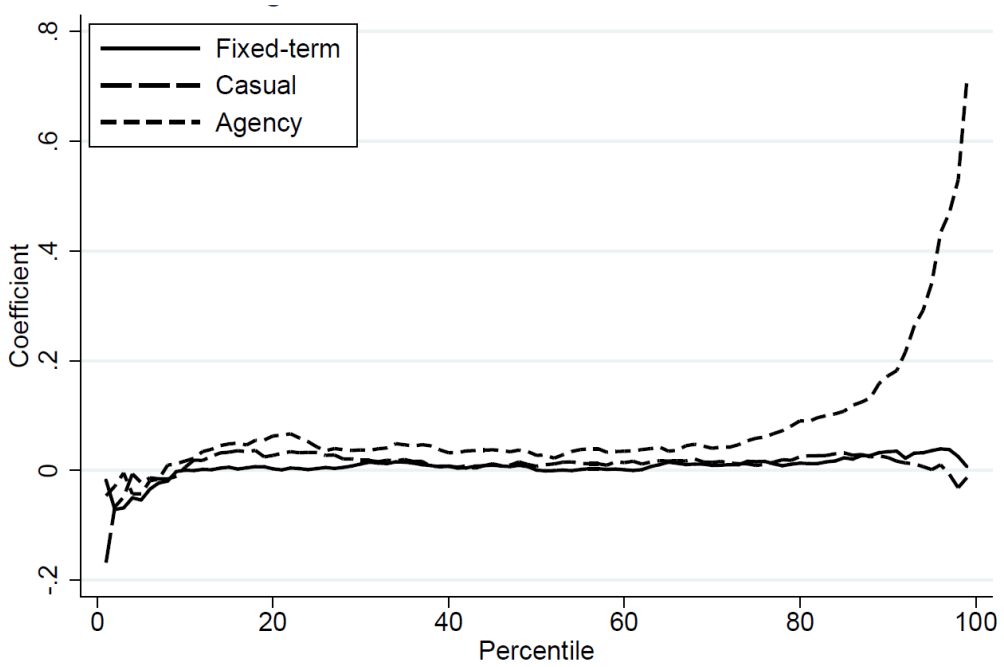
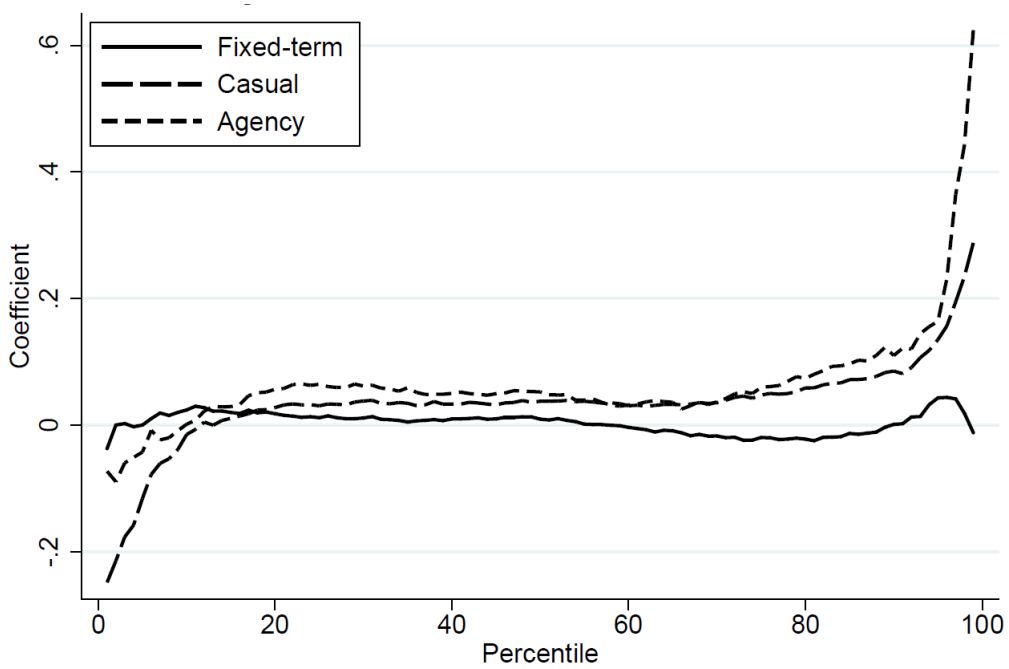


FIGURE A3

Effects of Temporary Employment on Log Hourly Wages of Women (Fixed-effects UQR)



NOTE: Reference category is direct permanent employment. Control variables according to specification 2.