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Decomposing the temporary-permanent wage gap in New Zealand

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Abstract

Recent years have seen a push for greater labour market flexibility, and an accompanying upsurge of interest in temporary employment and the negative outcomes often associated with such employment arrangements. This study focusses on the pay outcome and investigates the presence of wage discrimination against the temporary workforce in New Zealand. This country is a useful case study here, because of the very low levels of employment protection legislation afforded temporary workers, relative to the rest of the OECD. The temporary-permanent wage gap is assessed via two alternative methodologies: Oaxaca decomposition and propensity score matching (PSM). In the former of these we find that much of the wage difference is explained by observables. In contrast to this result, when we compare observably similar permanent and temporary workers (via PSM), we find evidence of a substantial pay penalty of between 12-17 percent, which varies substantially across different types of temporary employment.

Keywords: temporary work, compensating wage differential, propensity score matching

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1 Introduction

Much of the OECD has seen a rise in the temporary workforce (as a share of total employment) over the last two decades (OECD, 2002). Policy makers view encouragement of a range of temporary contracts as one of the potential routes towards greater labour market flexibility; and policy discussion on this front is often heightened at times of high unemployment. But there is also a plethora of empirical research citing numerous negative impacts or associated outcomes for individuals in temporary work. For instance Booth et al (2002) and Kahn (2007) show that pay and job satisfaction is lower in temporary jobs. Adverse effects on occupational health and safety have also been identified (see Quinlan (2003) and Francois and Lievin (2000)). Additionally, there is greater risk associated with temporary work due to poorer job security. Compensating wage theory could therefore be used to argue that temporary workers should earn a wage premium relative to comparable permanent workers, as compensation for the additional inherent risks. There is however no consistent empirical evidence of this being a feature of labour markets, with much past evidence pointing to temporary workers earning substantially less relative to permanent employees (Brown and Sessions, 2005). Of course, one could legitimately argue that past research has not been able to adequately compare permanent and temporary workers with similar profiles, due to the systematic differences in the demographic and occupational portrait of these two groups. This study aims to overcome this obstacle by employing propensity score matching to compare workers' wage levels between similar permanent and temporary workers. We also conduct this analysis for a diverse range of temporary workers (fixed term, casual, temporary agency, and seasonal) – as past research is explicit in its view that temporary employees cannot be treated as a homogenous group (See Silla et al, 2005).

A variety of reasons have been advanced to account for the rising numbers of temporary workers (see for example De Cuyper *et al.*, 2008). These reasons include free choice whereby workers choose temporary work because of the inherent and potentially preferable characteristics (for example, Morris and Vekker (2001) reported that one in four temporary workers wanted temporary work, as they needed flexibility, shorter hours, or due to childcare arrangements or other family reasons); whereas others end up in temporary employment because of a lack of suitable permanent employment opportunities; and many workers enter temporary employment hoping that it will eventually turn into a permanent contract. Burgess (1997) attributes rising levels of non-standard employment (where standard employment equates to full-time ongoing wage employment) to three drivers. First, structural shifts in the economy in terms of composition of industries and occupational categories. Second, demographic forces via a significant increase in female labour force participation, requiring a strong motivation for new working arrangements that are compatible with family responsibility (Hall et al, 1998). Third, cyclical reasons – particularly at times of high unemployment, when policy makers push for reduced labour market protection and rigidity. Times of recession can undermine the bargaining power of workers, resulting in a pool of unemployed and underemployed individuals, who are willing to accept employment under less favourable conditions, and in non-standard forms. From a labour demand perspective, it is not only responsiveness of employers to business cycles that has come to the forefront, but also the need to respond to growing globalisation, and more volatile international market

conditions – often forcing employers to be more flexible in a bid to remain competitive in the global economy (Brewster et al, 1997). As a consequence, employment protection legislation (EPL) permitting, employers have sought to respond to these pressures by introducing new technologies and reducing their reliance on full-time labour in favour of non-standard forms of labour that can be implemented on a just-in-time basis.

There has clearly been a concerted effort to loosen the rigidities that surround EPL across Europe, and much of the recent debate amongst researchers reflects the need to assess whether this has led to the development of a strata of workers locked into precarious or temporary employment. Standing (2011, p.31) for instance argues that "The pursuit of flexible labour relations has been the major direct cause of the growth of the global precariat". Standing also contends that the drive for flexibility is ongoing, with the push for more flexibility increasing at times of an economic downturn, resulting in an erosion of all forms of job security[1]. Given these sentiments, NZ presents as a very useful case study to assess the potential outcomes associated with low levels of EPL. Latest EPL index figures from the OECD (based on 2013 data) show that NZ ranks last in terms of strictness of employment protection for individual dismissals for temporary contracts[2]. While the majority of the deregulation occurred prior to 2000, there are still examples available of legislation aimed at increasing flexibility in recent years. For instance, the 90-day trial period was introduced in April 2011, which meant that an employer can dismiss a new employee within 90 calendar days, "without the employee being able to take a personal grievance for reasons of unjustified dismissal" (Department of Labour, 2015)[3]. Another recent example aimed at increasing labour flexibility involves political intervention by the central government in the Hobbit Film dispute, via the introduction of the Employment Relations (Film Production Work) Amendment Bill[4] in 2010. This bill was widely viewed as a deal required during negotiations between Warner Bros and the NZ government, to keep production of *The Hobbit* film in NZ. It essentially made film production workers independent contractors by default, rather than employees.

Given the very low levels of EPL in this country – if greater labour market flexibility is associated with greater levels of discrimination against the temporary workforce, we would expect that this would be more evident in the NZ case, relative to its OECD counterparts. This study therefore seeks to investigate the existence of discrimination against temporary workers in NZ, via assessment of the existence and magnitude of the temporary wage penalty. While we acknowledge the numerous other potential negative outcomes associated with temporary work, such as poorer health status, lack of access to tenure related benefits and job insecurity – this study is focussed only on the wage penalty and therefore presents insights into the wage gap that is prevalent between an average permanent employee and a temporary worker. To this end, we make use of pooled cross-sectional data from two waves of the Survey of Working Life (SoWL). We use two approaches to gain an understanding of the underlying reasons behind the wage gap. The first of these is fairly commonplace when assessing compensating wage differentials (although mostly employed when comparing

[1] Standing (2011) identifies seven forms of job insecurity – labour market, employment, job, work, skill, income, and representation security.
[2] See OECD (2015a)
[3] See http://www.dol.govt.nz/workplace/knowledgebase/item/1517. This trial period is voluntary and must be agreed to by both employer and employee when setting up the employment agreement.
[4] See Walker & Tipples (2011).

private and public sector pay rates, rather than permanent and temporary workers e.g. Lucifora & Meurs (2006)), and involves standard Oaxaca decomposition techniques. The second approach (propensity score matching) is new to this research space, but is commonly applied in health settings (such as randomized drug trials) or when investigating the impact of social policy interventions. To our knowledge, it has not been used to empirically assess the existence of a pay penalty (or premium for that matter) for temporary workers, relative to their permanent counterparts.

The remainder of this paper is set out as follows: Section 2 summarises the relevant theoretical and empirical literature on a temporary employment wage penalty; Section 3 provides details of the data employed and a descriptive portrait of temporary versus permanent workers in NZ; while Section 4 presents the empirical analysis and results. Conclusions follow.

2 Literature review

Theoretically

As indicated in the introduction, one theoretical argument for the existence of a wage difference between temporary and permanent workers is that of compensating wage differentials. The contention being that a competitive labour market will reward poor job security, and the other risks associated with a temporary job. However, one could also argue (with the aid of human capital theory) that the firm has to invest in greater levels of firm-specific training for temporary workers, and the wage penalty is a result of this additional cost.

Labour segmentation (or Dual Labour Market) theory has also been called upon to explain wage gaps between temporary and permanent workers. Reich et al (1973) was one of the early studies to define this concept and segregate the market into primary and secondary segments. Primary jobs are characterised with mostly permanent workers, who are well paid, with stable work environments, and the existence of job ladders. Whereas the secondary market is characterised by poorer working conditions, where temporary workers are, higher turnover, fewer job ladders, etc.

Another theory advanced to explain the temporary – permanent wage gap is the efficiency wage argument. Guell (2003) claims that contract renewal of a temporary contract could be used as a carrot to incentivise greater productivity from workers. Of course this signal only works if credible and firms follow through with non-renewal of poor performing temporary workers. Additionally, this method cannot be used long-term if EPL is against repeated renewal of fixed-term contracts. For instance, in NZ, the Employment Relations Act (2000) limits the use of fixed term contracts to instances where there are genuine reasons - like seasonal work, project work, or where the employee is filling in for a permanent employee on leave. Repeatedly “rolling over” of a fixed term employment agreement may well lead to the employee being deemed to be a permanent employee (MBIE, 2012)

It also seems key from the extant literature that employer costs are the motivation behind many of the reasons put forth for not only wage differentials between temporary and permanent workers, but also behind the growth of the temporary workforce. For instance, if firing costs are high, fixed term contracts may be employed as a screening device to help employers find appropriate employees. High firing costs also means that it is more efficient for a firm to have a pool of both temporary and permanent workers (even if they are relatively homogenous and can be treated as perfect substitutes), because the former can be treated as a buffer stock towards dealing with fluctuations in demand.

Empirical evidence of a wage penalty

The majority of previous empirical studies have focused on mean wage differentials (see OECD (2004) and Bentolila et al (1994)). Analysing explicitly the size and source of the wage gap can be found in just a handful of articles. For instance, Jimeno and Toharia (1993) compare fixed term workers with their permanent counterparts in Spain and find the former earn approximately 9-11% less than the latter group. In a German study also focussed on the wage effects of fixed-term contracts, Hagen (2002) finds a wage penalty of between 6-10%.

In general, much of the relevant literature has emanated from Europe. Although, there has been one NZ study to deal with this research topic – Dixon (2011). Using the first wave of the data that is employed in this study (Survey of Working Life, 2008), Dixon provides some preliminary insights on the temporary workforce portrait in NZ. She also estimates the gap in average hourly earnings between temporary and permanent workers and initially finds a gap of 21%, which can mostly be attributed to differences in demographic, occupation and industry characteristics. The only exception to this result was female casual workers, where even after adjusting for relevant covariates, this sub-group earned less than their counterparts in permanent jobs.

Another notable non-EU study is that by Segal and Sullivan (1997), who narrow in on the temporary help services industry in the United States. The authors show the raw percentage difference between temporary and permanent wages to be approximately 22% (although this varies substantially depending on which sub-group of workers the analysis focusses on – e.g. a raw difference of 13.4% for white collar workers, and a 29.4% difference for blue collar workers). After adjusting for the usual suspects, in terms of determinants of wages, the gap for the whole sample falls to just 3.1%. The determinants controlled for in these specifications include demographics (such as age, gender, ethnicity, and education), regional information, and job and occupational characteristics.

It is also important to recognise that wage penalties may not only be short term. Booth et al (2002) find evidence of a substantial wage growth penalty associated with the experience of temporary employment. Based on data from the British Household Panel Survey from 1991 to 1997, the authors highlight that men who start their careers with a fixed-term contract suffer a long term earnings loss compared to men who enter the workforce in permanent positions. A more recent study by McGinnity et al (2005) for Germany, also compare those who begin working life with a fixed term contract versus permanent job, and find that the unemployment rates of these two groups converge after five years. The authors argue that starting your working life in a temporary contract may not be a 'bad start' after all.

Scherer (2004) argues that labour (im)mobility is key to assessing wage penalties across countries. For example, she compared evidence between Germany, Great Britain, and Italy; and found distinct differences in the magnitude of wage penalties uncovered[5]. Great Britain exhibited the smallest penalties, potentially indicating less wage discrimination – and/or also reflecting less labour market rigidity and immobility, and greater transferability of skills and qualifications across professions.

More recently, three studies have examined the extent of wage discrimination against temporary workers at not just the aggregate level, but also across the entire wage distribution. This accounts for the relative importance of observed characteristics and skills at varying levels in the wage distribution. Comi and Grasseni (2012)use data from nine European countries – Austria, Greece, Hungary, Ireland, Italy, Poland, Portugal, Spain, and the UK – and find a permanent wage premium in almost all countries sampled. This result was also consistent across the wage distribution, and suggested widespread discrimination against temporary workers. Further weight was placed on this argument when it was also found that the wage gap appeared to increase, with greater levels of employment protection for permanent jobs. Bosio (2009) use Italian data from 2006 and also examine how the wage gap differs across the wage distribution, by employing quantile regressions. He finds a wider wage gap at the bottom of the distribution (of approximately 30%), which slowly decreases as movement is made toward the top of the wage distribution. A similar methodology was utilised in Mertens et al (2007) with both Spanish and German data. The results show the lack of generalizability of findings from one country to another. At odds with the result from the Italian study, Mertens et al (2007) show evidence of a relatively even wage penalty (for Spain) across the wage distribution.

What inferences can be drawn from the empirical evidence thus far? It is important to control for observable characteristics, including the usual host of covariates that often explain wage levels. Labour market institutions are important – and may play a mediating role in determining the existence and magnitude of wage discrimination against temporary workers. And finally, disaggregate analysis across the wage distribution is also necessary, in a bid to better understand whether the penalty varies across this distribution.

The following analysis will contribute to the growing empirical evidence on wage penalties on two fronts. First, previous work has made scant attempt to assess the wage penalty when comparing similar temporary and permanent workers. Most decomposition analysis overlays permanent worker characteristics onto temporary workers in a bid to attribute portions of the wage gap to endowments versus coefficients versus interactions. This study will employ propensity score matching (in addition to the standard Oaxaca decomposition) to compare like to like across the employment type spectrum, and reveal the wage gap that remains. Secondly, as almost all previous studies have shown – context is important. Therefore, investigating the potential incidence of wage discrimination against the temporary workforce in a country where EPL for temporary workers is extremely minimal, presents as a useful case study, with potential policy implications for those involved in debating the furtherance of loosening EPL across other OECD countries.

[5] Gebel (2010) compared Germany and Great Britain and also found similar results.

3 Data and Descriptive Statistics

This study makes use of pooled data from the two waves of Survey of Working Life (SoWL - 2008, 2012). These data are the first attempt in NZ to gather official statistics about the size of the temporary sector and a range of associated characteristics. In the one NZ study that examines the temporary – permanent wage gap, Dixon (2011) makes use of the first of these waves and presents important insights into the portrait of the temporary workforce in NZ. It is hard to fathom, but prior to Dixon's paper, there was very little, if any concrete information on how many of NZ's workforce were employed in a temporary job. Campbell and Brosnan (2005) in a comparison of the casual workforce between Australia and NZ, lament the lack of data on size and nature of casuals in NZ, indicating there is even limited case study research to fill the knowledge gaps. They rely on two phone surveys (in 1993 and 1997 by the Department of Labour) and their own workplace survey conducted in 1995 to arrive at a figure of around 11% of the workforce as 'occasional', 'temporary', and 'fixed-term'. Dixon (2011) finds a similar proportion for 2008 of approximately 10%.

The Survey of Working Life is carried out by Statistics NZ and was run as a supplement to the Household Labour Force Survey in 2008 and 2012. It collected information on a wide array of people's employment conditions, arrangements, and quality of working life (in terms of flexibility, training, and health and safety). Each employee was asked if they were employed on a permanent or temporary basis, and if it were the latter, they were then asked if their employment relationship could be classified as fixed-term, casual, or temporary employment agency. All workers were also asked if their job was seasonal, i.e. available only at particular times of the year.

As Table 1 illustrates the final sample size used in this study is 16,872, with just over 9% classified as temporary. Not shown in the table, just under half of the temporary workers were casuals, just under a third were fixed-term, around 13% were seasonal, and around 8% were temp agency workers. In general, as shown in the 4th column of Table 1, workers on a temporary contract were more likely to be female (62%), younger, of Maori or Pacific ethnicity (15%), have lower educational attainment, and be a sole parent. In terms of occupation characteristics, temporary workers were more likely to be sales workers or labourers, and less likely to be managers. They were concentrated more in agriculture, forestry, fishing; accommodation and food services; or education and training, and were also more likely to be working part-time (51%), and lack union representation. The asterisks in the 4th column of the table (the temporary sub-group) reflects whether there are significant differences in the means in that column, relative to the column to the right (the permanent sub-group). While many of the expected variables are significantly different across the two sub-groups, it is interesting to note that this does not appear to be the case for the indicators of educational attainment. Apart from post-school qualifications, none of the other three educational variables are significantly different between the temporary and permanent samples. A similar education profile between the subsample will aid the process of matching observably similar temporary and permanent workers in the forthcoming empirical analysis.

Table 1: Definitions and descriptive statistics: Pooled 2008 & 2012 SoWL

Variable	Definition	Mean (Stddev)		
		Full sample	Temporary=1	Temporary=0
Ln real hourly wage	Natural logarithm of average hourly earnings from main job (deflated by CPI)	3.036 (0.441)	2.856 (0.411)***	3.054 (0.440)
Temporary	Dummy variable: 1 = temporary employee; 0 = permanent employee	0.092 (0.289)	1.000 (0.000)	0.000 (0.000)
Personal characteristics				
Male	Dummy variable: 1 = Male; 0 otherwise	0.469 (0.499)	0.377 (0.485)***	0.478 (0.500)
Age	Age in years	40.595 (12.977)	36.569 (14.387)***	41.004 (12.755)
Pakeha	Dummy variable: 1 = Pakeha; 0 otherwise	0.784 (0.412)	0.754 (0.431)***	0.787 (0.410)
Maori	Dummy variable: 1 = Maori; 0 otherwise	0.112 (0.316)	0.137 (0.344)***	0.110 (0.313)
Pacific	Dummy variable: 1 = Pacific peoples; 0 otherwise	0.057 (0.232)	0.059 (0.236)***	0.057 (0.231)
Asian	Dummy variable: 1 = Asian; 0 otherwise	0.089 (0.285)	0.094 (0.292)***	0.089 (0.284)
Melaa	Dummy variable: 1 = Middle Eastern, Latin American or African; 0 otherwise	0.007 (0.083)	0.011 (0.104)***	0.007 (0.081)
Other ethnicity	Dummy variable: 1 = ethnicity not listed above; 0 otherwise	0.017 (0.128)	0.019 (0.138)***	0.016 (0.127)
Lower school	Dummy variable: 1 = highest educational attainment between no qualification and basic school qualifications such as NCEA[6]; 0 otherwise	0.249 (0.433)	0.251 (0.434)	0.249 (0.432)
Post school	Dummy variable: 1 = highest educational attainment is post school qualification such as a vocational or university certificate or diploma[7]; 0 otherwise	0.382 (0.486)	0.310 (0.463)***	0.390 (0.488)
University	Dummy variable: 1 = highest educational attainment is a university degree; 0 otherwise	0.143 (0.351)	0.154 (0.361)	0.142 (0.350)
Post grad	Dummy variable: 1 = highest educational attainment is a post graduate qualification; 0 otherwise	0.069 (0.254)	0.071 (0.258)	0.069 (0.253)
Immigrant - new	Dummy variable:1 = Not born in NZ & lived in NZ ≤ 5 years; 0 otherwise	0.075 (0.263)	0.077 (0.267)	0.074 (0.262)
Immigrant - intermediate	Dummy variable: 1 = Not born in NZ & lived in NZ > 5 years & ≤ 10 years; 0 otherwise	0.052 (0.222)	0.057 (0.231)	0.052 (0.221)
Immigrant – long term	Dummy variable: 1 = Not born in NZ & lived in NZ >10 years; 0 otherwise	0.116 (0.320)	0.103 (0.304)**	0.117 (0.321)
Sole parent	Dummy variable: 1 = sole parent; 0 otherwise	0.051 (0.220)	0.068 (0.251)***	0.049 (0.216)
Occupation characteristics (ANZSCO level 1)				
Dummy variables (8):	1 = Managers; 0 otherwise	0.129 (0.335)	0.054 (0.226)***	0.137 (0.344)
	1 = Professionals; 0 otherwise	0.199 (0.399)	0.176 (0.381)***	0.201 (0.401)
	1 = Technicians and Trades Workers; 0 otherwise	0.117 (0.321)	0.095 (0.293)***	0.119 (0.324)

[6] This category includes those whose highest qualification is a New Zealand school certificate, NCEA, primary proficiency, non-specified school qualifications, no qualification or who have an unspecified level of educational attainment.

[7] This category includes those with a university certificate or diploma, a teacher's certificate or diploma, a polytechnic certificate or diploma, a nursing certificate or diploma, a trade certificate, other post school qualifications and post school qualifications of an unspecified nature.

	1 = Community and Personal Service Workers; 0 otherwise	0.129 (0.335)	0.148 (0.355)	0.127 (0.333)
	1 = Clerical and Administrative Workers; 0 otherwise	0.153 (0.360)	0.161 (0.368)	0.152 (0.359)
	1 = Sales Workers; 0 otherwise	0.076 (0.265)	0.088 (0.284)***	0.074 (0.263)
	1 = Machinery Operators and Drivers; 0 otherwise	0.078 (0.268)	0.048 (0.214)***	0.081 (0.272)
	1 = Labourers; 0 otherwise	0.120 (0.326)	0.230 (0.421)***	0.109 (0.312)
Industry classifications (ANZSIC level 1)				
Dummy variables (19):	1 = Agriculture, forestry, fishing and hunting; 0 otherwise	0.043 (0.203)	0.101 (0.301)***	0.037 (0.190)
	1 = Mining; 0 otherwise	0.004 (0.062)	0.001 (0.036)**	0.004 (0.064)
	1 = Manufacturing; 0 otherwise	0.139 (0.346)	0.138 (0.345)*	0.139 (0.346)
	1 = Electricity, gas and water supply; 0 otherwise	0.008 (0.088)	0.004 (0.062)**	0.008 (0.091)
	1 = Construction; 0 otherwise	0.066 (0.248)	0.041 (0.199)***	0.068 (0.252)
	1 = Wholesale trade; 0 otherwise	0.050 (0.218)	0.031 (0.173)***	0.052 (0.222)
	1 = Retail trade; 0 otherwise	0.127 (0.333)	0.091 (0.287)***	0.131 (0.337)
	1 = Accommodation and Food Services; 0 otherwise	0.053 (0.223)	0.089 (0.285)***	0.049 (0.216)
	1 = Transport and storage; 0 otherwise	0.040 (0.197)	0.024 (0.154)***	0.042 (0.201)
	1 = Information Media and Telecommunications; 0 otherwise	0.016 (0.125)	0.012 (0.107)	0.016 (0.126)
	1 = Finance and Insurance; 0 otherwise	0.032 (0.177)	0.014 (0.115)***	0.034 (0.182)
	1 = Rental, Hiring and Real Estate Services; 0 otherwise	0.053 (0.224)	0.042 (0.202)*	0.054 (0.227)
	1 = Professional, Scientific and Technical Services; 0 otherwise	0.050 (0.219)	0.037 (0.190)***	0.052 (0.221)
	1 = Administrative and Support Services; 0 otherwise	0.041 (0.198)	0.093 (0.290)***	0.036 (0.186)
	1 = Public Administration and Safety; 0 otherwise	0.079 (0.270)	0.069 (0.253)***	0.080 (0.272)
	1 = Education and Training; 0 otherwise	0.072 (0.259)	0.120 (0.325)***	0.068 (0.251)
	1 = Healthcare and Social Assistance; 0 otherwise	0.097 (0.296)	0.066 (0.249)***	0.100 (0.300)
	1 = Arts and Recreation Services; 0 otherwise	0.009 (0.093)	0.012 (0.110)***	0.008 (0.091)
	1 = Other Services; 0 otherwise	0.020 (0.141)	0.015 (0.121)***	0.021 (0.142)
Other job related characteristics				
Union member	Dummy variable: 1 = union member; 0 otherwise	0.166 (0.372)	0.131 (0.337)***	0.170 (0.375)
Tenure	Tenure in current job (weeks)	303.193 (361.305)	124.125 (227.633)***	321.372 (367.356)
Part time	Dummy variable: 1 = working part time (less than 30 hours in main job); 0 otherwise	0.228 (0.419)	0.511 (0.500)***	0.199 (0.399)
Sample size		16,872	1,554	15,318

Notes: Standard deviations provided in parentheses. ***, ** and * reflect significance of the differences between the temporary and permanent subgroups, at the 1%, 5% and 10% level respectively.

5 Empirical analysis

Decomposing the temporary – permanent wage gap

As indicated in Table 1, temporary employees receive a lower average hourly wage than their permanent counterparts. Converting the real hourly wage (in natural log terms) back into dollars shows that the figure for an average temporary employee is $17.4, and for a permanent employee is $20.8.

Decomposing the raw wage gap can be done via the Blinder-Oaxaca procedure (Blinder, 1973; Oaxaca, 1973), which splits the wage differential into two components. These are the 'explained part' (i.e. the proportion of the raw wage gap that can be explained by observable covariates included in the model) and the 'unexplained part' (which is routinely used as a proxy for discrimination). We begin our analysis with trialling four separate models (labelled A – D in Table 2), each of which subsequently adds further covariates in a bid to investigate what happens to the explained proportion. Model A includes just personal characteristics, such as age, ethnicity, educational attainment, and immigrant status; Model B includes the covariates from Model A, and adds occupation characteristics; Model C adds industry dummies to the mix; and Model D includes all aforementioned variables, and includes other job related characteristics, such as union status, tenure, and a dummy for being a part timer. Occupational and industry classifications capture measures of both vertical and horizontal labour market segmentation respectively, by controlling for the particular distribution of temporary jobs across different occupations and sectors of the economy.

The two-fold decomposition can be expressed by the following equation:

$$\overline{w}_P - \overline{w}_T = (\bar{x}_P - \bar{x}_T)\hat{\beta}_P + \bar{x}_T(\hat{\beta}_P - \hat{\beta}_T) \quad (1)$$

Where $\overline{w}_P$ and $\overline{w}_T$ are the predicted means of log hourly wages for permanent and temporary workers respectively; the first part of the right hand side of equation (1) is the explained proportion of the wage differential ($\bar{x}_P$ and $\bar{x}_T$ are the average values of covariates for each category of worker and $\hat{\beta}_P$ and $\hat{\beta}_T$ are the estimated parameters); and the second part of the right hand side of equation (1) captures the unexplained proportion of the wage gap. A positive value for this second part will represent a temporary wage penalty. Ofcourse, we must also acknowledge that while this may represent wage discrimination against temporary workers, it may also reflect differences in unobserved or omitted characteristics for both categories of workers.

As Table 2 illustrates, the wage gap (regardless of the model employed) equates to approximately a 20-22% temporary wage penalty. This penalty was estimated using the *eform* command in stata. This permits the log wage difference to be converted into a percentage difference, which is more meaningful for policy purposes[8]. It is evident from Table 2 that moving from Model A through to D, results in an increasing proportion of the wage gap being

[8] Note, the mechanism for constructing these percentage differences is approximate in nature, and hence the converted terms for the explained and unexplained components may not sum exactly to the total pay penalty (See Kaiser (2015) for further information on the approximate nature of percentage differential in geometric means).

explained. At first, when only personal characteristics are controlled for (in model A), just 40% of the wage gap is explained (8.2% out of a 20.5% penalty[9]); and by time we arrive at Model D, where personal, occupation, industry, and other job characteristics are accounted for, the explained proportion rises to 92% (20.1% out of a 21.9% penalty). It is important to note that industry, occupation and other job-related characteristics account for a sizeable proportion of the gap – at just over 50%. This corresponds with the argument that it is segmentation across the labour market (both horizontal and vertical) that is driving wage differences between temporary and permanent workers, more so than individual characteristics.

Table 2: Oaxaca decomposition (pooled), dependent variable = ln real hourly wage

	Explained (%)	**Unexplained (%)**
Model (A): With only personal characteristics		
Total pay penalty = 20.5% = $3.61 per hour ***	8.2***	11.4***
Model (B): Model (A) + occupation characteristics		
Total pay penalty = 20.5% = $3.61 per hour ***	12.4***	7.3***
Model (C): Model (B) + industry characteristics		
Total pay penalty = 20.5% = $3.61 per hour***	13.8***	5.9***
Model (D): Model (C) + other job related characteristics		
Total pay penalty = 21.9% = $3.62 per hour***	20.1***	1.5

Note: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. *N = 16,872*

Table 2A illustrates that the results in general for all covariates in the full model (D) are in line with apriori expectations, based on the extant literature. For example, gender, age, union and part-time status, and tenure are all significant contributors. Additionally, the top tier of occupational categories and the bottom two classifications are significant in explaining the wage gap, which is predictable, given that vertical segregation between permanent and temporary jobs must be at their starkest at the two extremes of the occupational ladder.

Table 2A: Oaxaca decomposition (pooled), dependent variable = ln real hourly wage

Results for **Model (D)**:	**Explained**		**Unexplained**	
Variables	Coefficients (Std Error)			
Personal characteristics				
Male	0.013***	(0.002)	0.022***	(0.007)
Age	0.152***	(0.014)	0.357**	(0.138)
Age^2	-0.113***	(0.012)	-0.161**	(0.086)
Maori	0.001**	(0.000)	-0.012***	(0.003)
Pacific	0.000	(0.001)	-0.001	(0.002)
Asian	0.001	(0.001)	-0.010***	(0.004)
Melaa	0.000	(0.000)	-0.001	(0.001)
Other ethnicity	0.000	(0.000)	0.000	(0.001)
Lower school	0.000	(0.001)	-0.010*	(0.005)
Post school	0.001**	(0.001)	0.003	(0.007)
University	-0.002	(0.002)	0.001	(0.005)
Post grad	-0.001	(0.002)	-0.003	(0.004)
Immigrant - new	0.000	(0.000)	0.005	(0.003)
Immigrant - intermediate	0.000	(0.000)	0.001	(0.002)
Immigrant – long term	0.000	(0.000)	0.001	(0.003)
Sole parent	0.001**	(0.000)	-0.002	(0.002)
Occupation characteristics				
Managers	0.025***	(0.002)	-0.001	(0.003)
Professionals	0.007**	(0.003)	-0.027***	(0.007)
Technicians and Trades Workers	0.001***	(0.000)	-0.008***	(0.003)
Community and Personal Service Workers	0.000	(0.000)	-0.005	(0.004)
Sales Workers	-0.000	(0.000)	-0.001	(0.003)
Machinery Operators and Drivers	-0.001***	(0.000)	-0.004**	(0.002)
Labourers	0.011***	(0.001)	-0.020***	(0.005)
Industry classifications				
Agriculture, forestry, fishing and hunting	0.008***	(0.001)	-0.010***	(0.004)
Mining	0.001**	(0.000)	-0.000	(0.000)
Electricity, gas and water supply	0.001**	(0.000)	-0.001	(0.001)
Construction	0.000	(0.000)	0.001	(0.002)
Wholesale trade	0.000	(0.000)	-0.001	(0.002)
Retail trade	-0.007***	(0.001)	-0.007**	(0.004)
Accommodation and Food Services	0.007***	(0.001)	-0.002	(0.003)

Transport and storage	0.000	(0.000)	0.002	(0.001)
Information Media and Telecommunications	0.000	(0.000)	-0.000	(0.001)
Finance and Insurance	0.004***	(0.001)	-0.000	(0.001)
Rental, Hiring and Real Estate Services	0.001*	(0.000)	0.003	(0.002)
Professional, Scientific and Technical Services	0.001***	(0.001)	0.001	(0.002)
Administrative and Support Services	0.005***	(0.001)	0.003	(0.003)
Public Administration and Safety	0.000	(0.000)	0.001	(0.003)
Education and Training	0.005***	(0.001)	-0.001	(0.004)
Healthcare and Social Assistance	-0.002***	(0.001)	-0.005	(0.003)
Arts and Recreation Services	0.000	(0.000)	0.000	(0.001)
Other Services	-0.001*	(0.000)	0.001	(0.001)
Other job related characteristics				
Union member	0.001***	(0.000)	0.002	(0.004)
Tenure	0.053***	(0.004)	-0.008	(0.012)
Tenure^2	-0.009***	(0.002)	0.004	(0.004)
Part time	0.019***	(0.002)	-0.003	(0.009)

Decomposing differences between temporary=0 and temporary=1; sample size of 15,318 and 1,554 respectively. Reference categories are Pakeha, no school qualifications, Occupation = Clerical and Administrative workers, and Industry classification of Manufacturing. Robust standard errors are in parenthesis and *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

At this point it is important to note that temporary employment in NZ encompass a diverse range of jobs, with fixed term workers being very similar to permanent employees, and distinctly different to casual / temp agency, or seasonal workers. We therefore repeat the decomposition for the various categories of temporary worker versus permanent employment, and in doing so find no noticeable wage difference between the average fixed term contractor and permanent employee.

Table 3: Oaxaca decomposition (pooled), for different types of temporary employment
Dependent variable = ln real hourly wage

	Total pay penalty (%)	Explained (%)	Unexplained (%)
All temporary	21.9***	20.1***	1.5**
Fixed-term	-1.6	1.9	-3.4**
Casual	36.8***	31.4***	4.1***
Temporary agency	27.5***	21.9***	4.6
Seasonal	20.6***	22.5***	-1.5

Note: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

In contrast to the result for fixed term workers, there is a lot of variation across casual, temp agency, and seasonal workers, in terms of how much of the pay penalty can be explained by endowment level differences between temporary and permanent workers. For instance, more than 100% of the wage difference between seasonal and permanent workers are explained by observable characteristics, and if we focus on the temp agency subgroup – then adjusting those workers' endowment levels to the levels held by the average permanent worker, would increase their wages by 21.9%, with a wage penalty of 4.6% remaining unexplained.

Quantile Decomposition

In the previous section we relied on a standard Oaxaca decomposition to explore the wage penalty of temporary workers. However, the obtained estimates regarding the effect of temporary employment is not necessarily indicative of the magnitude of this penalty at the lower or upper ends of the wage distribution. It would seem plausible to hypothesize that the size of the wage penalty will vary across the wage distribution due to the possible existence of both "sticky floors" and "glass ceilings" (Albrecht et al, 2003; Arulampalam et al, 2007 and Carillo et al, 2014). This argument encompasses situations where the wage penalty for temporary workers is wider at the top (glass ceilings) and the bottom (sticky floors) of the wage distribution.

To investigate this further we performed a linear quantile regression using the estimator proposed by Koenker and Bassett (1978), monotonized using the re-arrangement method suggested by Chernozhukov, Fernandez-Val and Galichon (2007) to assess the conditional wage penalty at various points in the wage distribution [12.5, 25, 50, 75, and 87.5 percentile cutoffs] for temporary workers as a whole and for each of the sub categories of temporary employment. The resulting pointwise effects are provided in Tables 4 and 5.

Table 4: Oaxaca decomposition across the wage distribution – temporary wage penalty

	Overall(%)	Characteristics(%)	Coefficients(%)	Residuals(%)
Model D	21.9***	17.3***	1.2	1.5**
Percentile				
12.5	11.0***	14.3***	-0.2	-2.7***
25	17.8***	16.7***	1.9**	-1.0
50	27.4***	20.1***	4.4***	1.6***
75	31.2***	23.2***	5.3***	1.1***
87.5	27.5***	24.7***	5.2***	-2.9***

Note: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Oaxaca decomposition across the wage distribution – temporary wage penalty for different types of temporary employment

	All temporary		Fixed term		Casual		Temp agency		Seasonal	
	Overall(%)	Residuals(%)	Overall(%)	Residuals(%)	Overall(%)	Residuals(%)	Overall(%)	Residuals(%)	Overall(%)	Residuals(%)
Model D	21.9***	1.5**	-1.6	-3.4**	36.8***	4.1***	27.5***	4.6	20.6***	-1.5
Percentile										
12.5	11.0***	-2.7***	-0.5	-0.9	15.1***	-4.0**	9.3***	-7.6***	4.3**	-2.8
25	17.8***	-1.0*	-0.7	0.1	24.1***	-2.4***	19.8***	-2.8	11.1***	0.9
50	27.4***	1.6**	-1.0	1.4	41.6***	2.0***	33.0***	1.4	19.2***	2.3
75	31.2***	1.1	-3.3	-1.9	56.6***	5.5***	46.3***	4.4	28.7***	2.8
87.5	27.5***	-2.9*	-3.8	-3.0	59.7***	6.0**	51.5***	4.0	38.4***	5.0

Note: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Tables 4 and 5 show that the raw wage gap increases as we move up the wage distribution for all types of temporary employment, except fixed term workers. These results would therefore be in favour of the glass ceiling hypothesis, and not the sticky wage floor argument, since the wage gap is broadest at the top of the distribution. Even once we control for individual, occupation and industry characteristics, and narrow our attention towards the residuals (the unexplained wage gap), the evidence still rejects the "sticky floor" hypothesis – and the increasing gap at the top end of the distribution is more prevalent in the case of casuals, temp agency and seasonal workers.

How do these results compare with the limited international evidence on this front? Mertens et al (2007) found very little variation in wage penalty across the wage distribution, but they only compared fixed term contracts with permanent workers. If focussing on only the results for fixed term workers in Table 5, we also find no variation in wage penalty across the distribution, as all estimates are statistically insignificant.

The results for the other categories of temporary employment are in contrast to Bosio (2009) and Comi & Grasseni (2012). The former of these studies found wider wage gaps at the bottom of the wage distribution, which the author interpreted as "sort of discrimination" (p.27) against temporary workers. They posit that this 'discrimination' is against temporary employees at the lower end of the wage distribution, and less likely against fixed term workers. Comi & Grasseni gave two theoretical arguments for why they also find a greater wage penalty for temporary jobs at the bottom end of the wage distribution. They first use labour segmentation theory, and explain that because of the dual nature of the labour market more temporary workers are found at the lower end of the wage distribution, and therefore there is greater potential for a wage penalty at this end. They also use the insider / outsider argument – and claim that when temporary jobs are used as a default buffer stock of workers, this implicitly results in greater protection and bargaining power for the insiders. However, it is not clear that this would automatically translate into greater protection for insiders at the bottom end of the distribution? Infact, it would depend on how the buffer stock was utilised, and the extent to which different types of jobs in the wage ladder required such labour market flexibility.

Nevertheless, it would seem that the results in this study are at odds with what has been found thus far in European based analysis. Why might this be the case? What are the relevant features of the NZ labour market to consider here? We have already discussed the very loose EPL that is at play in NZ, meaning that the market is highly deregulated. However, this does not explain why we find greater wage penalties at the upper end of the wage distribution. Holmlund (2014) argues that EPL is just one of three key labour market institutions that shape labour market outcomes. The other two are minimum wages and unemployment insurance, and it is the former that may be playing a significant role in the NZ economy. The most recent statistics from the OECD (based on 2013) show that the minimum wage in NZ is 60% of the median wage of full time employees[10]. Only four other countries had a higher relative minimum wage ratio. For instance, if comparing NZ with the UK, since both labour markets are often compared due to similarly low levels of EPL, the comparable relative minimum wage ratio for the UK was 47% in 2013. At the low end of the scale was the United States, with a

[10] See OECD (2015b). Based on the minimum wage (sourced from Statistics NZ), and median wage = median usual weekly earnings of full time employees (sourced from the Household Economic Survey, Statistics NZ)

relative minimum wage of 37%. The high relative minimum wage ratio in NZ means that despite low EPL for temporary workers, employers have very little wiggle room at the bottom end of the wage distribution if attempting to discriminate against the temporary workforce. This may explain why the penalty seems to grow as we move up the wage distribution.

There is also evidence in Table 5 of a wage premium for temporary workers at the 12.5 and 25th percentiles for all categories of temporary workers, except fixed term employees. A possible rationale for this is that under NZ law certain categories of worker, particularly those employed on a casual basis can receive their holiday entitlement as a "pay as you go" payment of 8 percent of their usual wage. Hence to such a worker it may appear that their hourly rate is 8 percent higher than it actually is.

Propensity score matching

Besides decomposing the wage difference between temporary and permanent workers, another method to assess the likelihood of wage discrimination against temporary workers is to be able to compare like with like. However, as natural experiments are unavailable, economists are increasingly relying on propensity score matching (PSM). This involves simulating a randomized experiment, and matching observations in the treated group (in this case, the temporary workers) with the control group (the permanent workers), such that matched individuals are as alike as possible. This provides a valid counterfactual – such that we can ask the question, if worker A, had no change in characteristics (i.e. no change in education, age, etc.), and moved from permanent to temporary work, would there be a wage penalty involved in this move?

Similarity in matched individuals is captured by the propensity score which Rosenbaum and Rubin (1983) define as the conditional probability of receiving a treatment given certain determining characteristics:

$$e(X) = \Pr(D = 1|X = x) = E[D|X = x] \qquad (2)$$

Where X is a set of relevant observed characteristics and D is a binary variable with D= 0 indicating non-treatment and $D = 1$ treatment. Calculation of the propensity score is, while crucial, not enough to allow identification of "similar" cases. To do this one of a number of methods is employed with Radius and Kernel matching being amongst the most popular (Guo and Fraser, 2014).

Having identified similar cases a number of measures may be calculated with the most common being ATT - the conditional expectation of the difference in treatment effects for treated units only.

$$ATT = E(Y(1) - Y(0)|D = 1) = E(Y(1)|D = 1) - E(Y(0)|D = 1) \qquad (3)$$

With $Y(0)$ being the value of the untreated (permanent) observation and $Y(1)$ the value of the treated observation (temporary)

Alternative measures include ATU (the conditional expectation of the difference in treatment effects for untreated units only) and ATE (the average treatment effect for the overall target population or sample). Based on the research question at hand, estimating ATT, rather than

ATE or ATU is most appropriate here. As we are interested in evaluating the effect of temporary employment status on wages, ATT will provide evidence of the effect for those persons that were subject to temporary employment. If temporary employment became the general form of employment across the whole population, then ATE would become more appropriate.

Table 6 portrays the average treatment effects on the treated (ATT) using two methods – Kernel and Radius matching[11]. 100 bootstrap replications were conducted to produce the relevant standard errors and t-statistics. In all cases, the balancing property (which is necessary for ensuring matching is done with appropriate counterfactuals) is satisfied. It should also be noted that all the estimates for the temporary wage penalty are based on matching workers on the same set of personal, occupational, industry and job characteristics, as defined in Table 2A – with the only difference being that it was necessary to collapse occupational classification into three categories (upper, middle and lower[12]) and collapse industry categories also into three groupings (primary, secondary, tertiary[13]).

The temporary wage penalty for the full sample ranges from 12.9% to 17.1%, depending on the method used, and in both cases is significant at the 1% level. This result is at odds with the Oaxaca decomposition results, which appeared to indicate that once observables from the permanent worker are overlayed on the average temporary worker, the unexplained wage gap leftover is minimal in nature. So, why the difference? While both methods are attacking the same research question in similar ways (attempting to control for the impact of observables to delineate the pure role of employment status), the propensity score matching process may be getting closer to the heart of comparing observably similar individuals.

As with the Oaxaca method, propensity score matching comes with the caveat that there may be unobservables at play that are not in the regression model and result in systematic wage differences between the temporary and permanent sub-samples – and this caveat card is often played by opponents of researchers that label the wage penalty as a proxy for discrimination.

[11] Trade-offs with regards to bias and efficiency of ATT estimates for each of the method utilised are provided in Caliendo and Kopeinig (2008).

[12] Upper equates to Managers and Professionals; Middle encompasses Technicians and Trade Workers, and Clerical and Administrative Workers; while Lower covers the Community and Personal Service Workers, Machinery Operators and Drivers, and Labourers.

[13] Based on the industry classifications listed in Table 1, primary is the first two categories, secondary covers the third through to fifth industry category, and tertiary encompasses the remaining industries.

Table 6: Propensity score matching estimates of the temporary wage gap

	All		Temp agency		Casual		Fixed term		Seasonal	
	Kernel	Radius	Kernel	Radius	Kernel	Radius	Kernel	Radius	Kernel	Radius
Number treated	1,872	1,872	150	150	885	885	525	525	270	270
Number of matched controls	18,291	18,291	16821	16821	18024	18024	18165	18165	18252	18252
Balancing property satisfied	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Average treatment effect (ATT)	-0.138	-0.188	-0.225	-0.226	-0.228	-0.282	0.013	0.014	-0.158	-0.169
Bootstrap standard error	0.010	0.01	0.03	0.035	0.014	0.013	0.019	0.02	0.023	0.019
t-statistic	-13.682	-18.651	-7.487	-6.513	-16.791	-21.719	0.692	0.688	-6.97	-9.128
Significance level	***	***	***	***	***	***	Not	Not	***	***
Temporary wage penalty (%)	-12.9	-17.	-20.2	-20.2	-20.4	-24.6	1.3	1.4	-14.6	-15.5

Notes: The average treatment effect on the treated (ATT) is based on log wages, while the percentage pay penalty for temporary workers is estimated as $100 * (e^{ATT} - 1)$.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 6 also repeats the propensity score matching analysis for the different types of temporary employment. As expected we find no evidence of wage discrimination for fixed-term workers. In contrast, casual workers appear to bear the largest burden, relative to comparable individuals in permanent jobs – their wage penalty ranges from 20.4% to 24.6%. Comparing temp agency workers and seasonal workers to their most appropriate permanent counterparts, yields wage penalties of approximately 20% and close to 15% respectively. These are sizable wage differentials, and further evidence that the Oaxaca decomposition methods may be underestimating the level of wage discrimination against the temporary workforce. It is also difficult to compare these findings to the extant literature, as none of the comparable studies have undertaken PSM to ascertain the temporary wage penalty. The most relevant studies (in terms of being recent enough and closest to separating out the influence of observables on the wage differential) are Bosio (2009) and Comi & Grasseni (2012) and the wage penalties found for casual, temp agency and seasonal workers in NZ clearly appear to be higher than wage differentials estimated in these European papers.

6 Conclusion

In this paper, we employ a barrage of techniques to investigate the wage gap between the temporary and permanent workforce, using NZ micro data. Beginning with the standard Oaxaca decomposition we initially show that once relevant observables (in terms of personal, occupational, industry and other job characteristics) are controlled for, and in essence these particular endowments of temporary workers are raised to the levels held by permanent workers, the majority of the wage gap disappears. Casual and temp agency workers stood out as the only two sub-groups to have more than 10% of the total pay penalty unexplained after all observables are accounted for. Interestingly we also found that labour market segmentation accounted for more of the wage gap, compared to personal characteristics of the worker, indicating the importance of which occupation and industry an individual's job is located within.

The wage gap was also decomposed via quantile regression and results here pointed to a number of distinct features of the NZ labour market: (i) Estimates of both the unconditional and conditional wage gap are in favour of the glass ceiling hypothesis, and reject the sticky wage floor argument, based on the increasing gap at the top end of the wage distribution. This trend is clearly more prominent for casuals, temp agency and seasonal workers. This result may be indicative of the relatively high minimum wage in NZ (relative to the median wage), which offers employers less room at the bottom end of the wage distribution to discriminate against the temporary workforce. (ii) Evidence of a wage premium for all temporary workers (except those on fixed term contracts) at the 12.5 and 25th percentile – potentially due to 8% holiday pay being built into usual hourly wage rates.

The final set of analysis is a significant contribution to the literature on the debate around wage discrimination of temporary workers – as it attempts to compare as closely observably similar as possible workers in temporary versus permanent employment. Regardless of the method of matching employed, there is evidence of atleast a 12.9% (and at most a 17.1%) wage penalty, for the average worker engaged in temporary work. This penalty varies greatly between different categories of temporary work, from being economically small and

statistically insignificant for fixed term workers, to hovering between 20 and 24% for casual workers.

These findings highlight the importance of sub-sample analysis, and that discrimination against temporary workers seems to be greatest for the casual workforce. Also important to recognise here is that we are essentially assuming that similar levels of qualifications, skills, and tenure should equate to similar outputs in terms of worker productivity. However, it could be argued that casual workers lack the requisite organizational specific knowledge and firm-specific social capital, and that this results in lower productivity relative to observably similar permanent workers. Also, permanent workers could have higher levels of unobserved quality that also results in higher productivity levels for this group, relative to the temporary sub-group. However, it seems unlikely that these reasons could account for all or even most of the sizable temporary wage penalties estimated. Future research that utilises linked employer-employee data could extract worker quality via fixed effects at the employee-level, for the purposes of holding constant in any wage differential analysis.

Finally, the propensity score estimates in this paper have substantial policy implications if we take the stance that these penalties loosely equate to wage discrimination against temporary workers, and that this is therefore not a positive sign for proponents of further deregulation and loosening of employment protection legislation for these workers.

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