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The Rising Public Sector Pay Premium in the New Zealand Labour Market

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Abstract

This note reports propensity score matching estimates of the public sector pay premium in New Zealand for each year from 2003 until 2007. Comparing with observably similar private sector workers shows that public sector workers have received a pay premium that has grown in each year, from almost zero in 2003 to 22 percent in 2007. Unless there have been unmeasured changes in the attributes of public sector jobs that give rise to compensating pay differentials, this rising public sector pay premium is most plausibly attributed to an increase in non-competitive rents.

Keywords

compensating differentials

propensity score matching

public sector

wages

JEL Classification

J31, J45

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I. Introduction

The rising public sector wage bill is a key feature of the New Zealand economy over the last decade. This rising wage bill reflects not only the growth of the public sector,[1] but also improvements in average remuneration for public sector workers. According to the Quarterly Employment Survey (QES), the ratio of average private sector pay to public sector pay has fallen by more than five percentage points over the last decade.[2]

These higher salaries reflect a premium for public sector jobs that is not explained by either differences in average characteristics of public and private sector workers or different attributes of the jobs that they do. Specifically, when propensity score matching (PSM) methods are used to compare observationally similar (in terms of age, education, gender, ethnicity, marital status and location) public sector and private sector workers, the premium for public sector work is estimated as 13% (Gibson, 2007). When job attributes (whether the job is secure, interesting, improves skills, causes stress or exhaustion, is dangerous, and so on) are included, so that the comparison is of observationally similar workers doing observationally similar jobs, the estimated premium for public sector jobs is 21%.

However this matching evidence is restricted to a single year, since data on job characteristics is only available from the 2005 wave of the International Social Program (ISSP).[3] Possibly the public sector pay premium in New Zealand has always been high, since top public sector jobs may have remuneration set in an international market that pays much more than local private sector jobs. Indeed, comparisons using ISSP data for 15 OECD countries in the early 1990s show that New Zealand had the third highest public sector pay premium, of 12% (Gregory and Borland, 1999).[4]

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[1] According to Statistics New Zealand's *Labour Market Statistics 2007* there were 47,000 more full-time public sector employees in March 2007 than in March 2000. Details are at: http://www.stats.govt.nz/analytical-reports/labour-market-statistics-07.htm

[2] These averages are for ordinary time hourly earnings of both sexes combined (INFOS codes: EESQ.SASG9A (public) and EESQ.SASH9A (private)) and are reported in Grimmond (2007).

[3] Other ongoing surveys of workers, such as the Income Survey and the Household Economic Survey lack information on both the sector of employment and job characteristics so cannot be used for such analyses.

[4] These estimates are based on OLS regression and so cannot account for endogenous choice of job sector. They also use the basic ISSP data which does not have information on job attributes, so the estimated public sector pay premium is conditional only on age, schooling, gender, union membership, and seniority.

Therefore the goal of this note is to use matching methods to estimate the public sector pay premium in New Zealand for each year over 2003-2007, to examine whether there is any upward trend. The data available over this five year period cover the characteristics of workers but not their jobs. Hence I can account for one possible source of rising relative salaries in the public sector, which is that there may have been a change in skill demand that is reflected in higher average productivity-related characteristics of public sector workers (Bender and Elliott, 2002). But I cannot test the hypothesis that the balance between the positive and negative features of public sector jobs that gives rise to compensating pay differentials has changed over time. Nevertheless, testing even one hypothesis is useful since the main alternative, of non-competitive rents accruing to public servants (Grimmond, 2007), has public policy implications that are likely to be controversial.

II. Data and Methods

Data come from two sources: the New Zealand component of the 2003, 2004, 2005 and 2006 ISSP surveys, and a special survey conducted by the author in late 2007 which is designed to match the main features of the ISSP. This survey was needed because there is typically a two year lag between the fielding of an ISSP survey and the availability of the public use data. All of the data are from nationwide postal surveys, using simple random samples drawn from the electoral rolls. The ISSP sends out 2250 questionnaires while the 2007 survey sent out 1650 questionnaires. Response rates are between 40-60 percent and responses are weighted to ensure that they are nationally representative of the population aged 18 years and over.[5] The sector of employment is based on answers to the question: "Which one of these categories best describes who you work for?" with "Pubic Sector (i.e. Central or local government)" given as one option. The analysis here is restricted to respondents who were working for pay, in jobs of at least 15 hours work per week.

According to the descriptive statistics reported in Table 1, the raw pay gap between the public and private sector is statistically significant (at $p<0.02$) and averages 9%.[6] There also are large and statistically significant differences in characteristics, with public sector workers being much more likely to be female, somewhat less likely to be married, more likely to be living in Wellington, and having an average of 1.5 years more education.

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[5] Details on the ISSP fieldwork are available from the Department of Marketing at Massey University, who conduct the survey each year. Details of the 2007 survey are reported in Gibson, Hector and Le (2008).

[6] This is calculated from the difference in the logarithm of annual earnings (10.634-10.552=0.082). The percentage difference is then: 100×[exp (0.082) – 1] = 8.58%.

Table 1: Characteristics of the Public Sector and Other Workers in the Pooled Sample

	Public Sector Workers		Other Workers		*p*-value for equal means
	Mean	Standard Deviation	Mean	Standard Deviation	
Age	42.509	11.294	41.917	12.027	0.276
Years of education	15.135	2.635	13.671	2.758	0.000
Male	0.344	0.475	0.564	0.496	0.000
European/Pakeha	0.614	0.487	0.601	0.490	0.564
Married or de facto	0.622	0.485	0.672	0.470	0.020
Region: Auckland	0.250	0.433	0.275	0.446	0.223
Region: Wellington	0.179	0.384	0.111	0.314	0.000
Region: Canterbury	0.125	0.331	0.132	0.338	0.650
Pre-tax annual earnings (log)	10.634	0.694	10.552	0.703	0.010
Sample size (% of total)	592	(19.1)	2512	(80.9)	

Source: ISSP data for New Zealand, 2003-2006 survey waves, and author's survey for 2007; respondents currently employed for pay and working at least 15 hours per week. Earnings are in 2007 values, where the Labour Cost Index is used to inflate values from earlier years to 2007 terms.

Since public sector workers differ from other workers in so many ways, a method has to be used to account for these differences before estimating the premium that would accrue to a given worker moving from the private sector to the public sector. A simple approach is ordinary least squares (OLS) regression on a pooled sample of public sector and private sector employees (Gregory and Borland, 1999):

$$\ln(w_i) = \beta X_i + \delta S_i + u_i \quad (1)$$

where w_i is earnings, X_i is a vector of productivity-related worker characteristics and S_i is the employee's sector, while β and δ are the returns to the employee's characteristics and sector of employment.

More generally this OLS regression can be thought of as a treatment effects estimator. When assignment to the treatment group is random, S_i can be considered as exogenous, and OLS is consistent. But if assignment to the treatment group is non-random, which is likely since workers should choose the employment sector where their characteristics will be most rewarded, selection bias in estimating δ can occur because u_i and S_i are correlated:

$$E(u_i \mid S_i, X_i) \neq 0 \text{ and } E(\ln w_i \mid S_i, X_i) \neq \beta X_i + \delta S_i. \quad (2)$$

While a Heckman estimator exists for this treatment effects problem, it needs exclusion restrictions where a variable that affects a worker's choice of employment sector does not

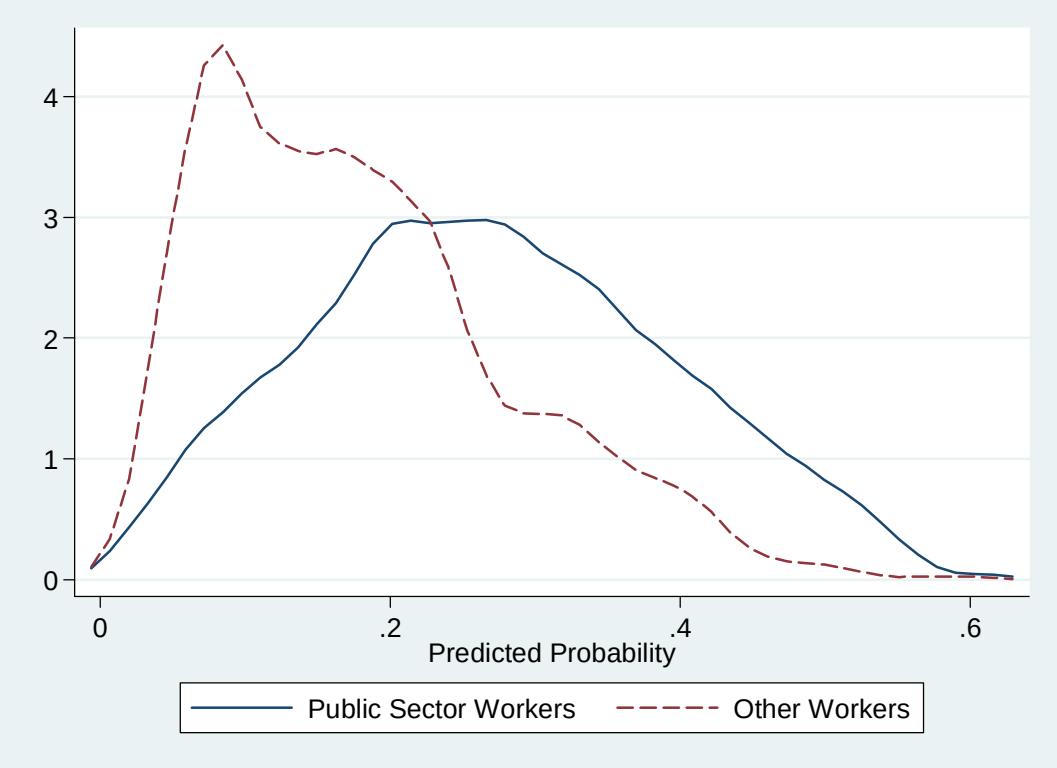
otherwise influence their earnings. Such variables are hard to find so economists are increasingly turning to propensity score matching (PSM) which does not require exclusion restrictions. With PSM one estimates treatment effects by simulating a randomized experiment, matching observations in the treatment group with observations in the control group that are as alike as possible – based on observable factors. It is then assumed that matched observations would have no systematic differences in response to the treatment so they provide a valid counterfactual. Proponents claim that PSM can replicate experimental benchmarks when used appropriately (Dehejia and Wahba, 2002).

To implement the PSM estimates of the public sector pay premium, allowing for differences in productivity-related characteristics, probit equations were estimated separately for each year in the sample. In each case the dependent variable was an indicator variable for whether the worker was employed in the public sector and the personal characteristics of the worker used as explanatory variables are those listed in Table 1. The resulting propensity scores were checked to ensure that they satisfy the balancing property, where within sub-intervals of the propensity scores the means of each characteristic are the same for public and private sector workers. The treatment effects were then estimated by *kernel* matching where a weighted average of the *j* control group neighbours is taken, with the weights proportional to the closeness of propensity scores between the treated observation *i* and each control group observation *j*.

III Results

Figure 1 illustrates the propensity scores for public sector and private sector workers, which for the purpose of uncluttered illustration are estimated after pooling the data over all years. It is apparent that while some private sector workers have characteristics like those of public sector workers many others do not, given that the highest frequency of propensity scores for private sector workers occurs around 0.1, while the propensity scores for the majority of public sector workers are above 0.25. Therefore in all of the results that follow, estimation of the average treatment effects is restricted to the area of common support, where the two distributions overlap. In other words, those private sector workers whose characteristics are quite unlike public sector workers are not used in the matched comparisons.

Figure 1: Smoothed Densities of Propensity Scores for Public Sector and Other Workers



The results of the year-by-year propensity score estimation and the calculation of the average treatment effects on the treated (ATT) are reported in Table 2. The ATT is the estimated gain in log pay for a given worker moving from the private sector to the public sector, based on a kernel matching procedure where the log pay of each public sector worker is compared with the weighted average log pay of those private sector workers with the closest propensity scores. Since there are no analytical standard errors for these ATT estimates, 100 bootstrap replications are run to numerically derive the standard errors and *t*-statistics that are reported in Table 2. The other statistics reported in the table are the results of tests of the balancing property, which is required for matching to provide valid counterfactuals. This property holds in each year, when the variables used in the propensity score estimation are those listed in Table 1.

There is a clear upward trend in the estimated public sector pay premium. In 2003 and 2004 the premium was only 4.2% and 6.6%, and in both years it was statistically indistinguishable from zero. But since 2004 the pay premium has grown by between four and seven percentage points per year, to 11.2% in 2005 and 15.3% in 2006. By 2007 a worker moving from the private sector to the public sector could expect a pay gain that averages 22.4%. Moreover, the estimates of the ATT are always statistically significant in each year from 2005 onwards, in contrast to the earlier years.

Table 2: Propensity Score Matching Estimates of the Public Sector Pay Premium

Year	Number treated	Number of matched controls	Balancing property satisfied?	Average treatment effect (ATT)	Bootstrap standard error	*t* statistic on ATT	Percent pay premium
2003	98	416	Yes	0.041	0.078	0.53	4.2%
2004	139	608	Yes	0.064	0.070	0.91	6.6%
2005	135	594	Yes	0.106	0.054	1.98	11.2%
2006	125	560	Yes	0.142	0.065	2.17	15.3%
2007	94	250	Yes	0.202	0.100	2.02	22.4%

Source: Author's calculations from 2003-06 ISSP data for New Zealand and author's survey for 2007. The number treated is the number of public sector workers in each year's estimation sample, and the number of matched controls is the number of other workers, within the range of common support where the distributions of propensity scores overlap. The average treatment effect on the treated (ATT) is based on log income, while the percentage pay premium is estimated as 100×[exp(ATT)-1].

It should be noted that these estimates of the average pay premium rely on matching workers only according to their personal characteristics. In 2005, which is the only year when ISSP data have information on job attributes, the public sector pay premium was almost eight percentage points higher once job attributes were also included in the matching, so that the comparison was of similar workers doing similar jobs (Gibson, 2007). That job attributes could cause the unexplained pay premium for public sector workers to rise suggests that public sector jobs are in some sense `better' (e.g. being less of a dead-end, less physically demanding, etc) so *ceteris paribus*, public sector wages would be expected to be lower according to compensating differentials. If the effect of job attributes is roughly constant over time, the public sector pay premium estimates in Table 2 are likely to be a considerable underestimate, and it is possible that by 2007 the total public sector pay premium was as high as 30%.

IV. Conclusions

This note has reported propensity score matching estimates of the rising public sector pay premium in New Zealand over 2003-2007. The available data only allow worker characteristics to be used for the matching of public sector and private sector workers. Hence the rise in the estimated premium from almost zero to over 22% represents a growth in pay for public sector workers that is not due to an improvement in their average productivity-related characteristics relative to changes in worker characteristics occurring in the private sector.

There are two remaining explanations for rising relative public sector pay in New Zealand, which future research may test. First there may have been a change in the balance between the positive and negative features of public sector jobs that give rise to compensating pay differentials. Second there may have been an increase in the non-competitive rents which public sector workers capture through collective bargaining and other union action, at a cost to taxpayers and private sector employers.

References

Bender, K, and Elliott, R. (2002) "The role of job attributes in understanding the public-private wage differential" *Industrial Relations* 41(3): 407-421.

Dehejia, R. and Wahba, S. (2002) "Propensity score matching methods for non-experimental causal studies" *Review of Economics and Statistics* 84(1): 151-161.

Gibson, J. (2007) "The public sector pay premium and compensating differentials in the New Zealand labour market" *New Zealand Journal of Employment Relations* 32(3): 56-68.

Gibson, J., Hector, C., and Le, T. (2008) "The distributional impact of KiwiSaver incentives" *Working Paper* 08/02 Department of Economics, University of Waikato. http://ideas.repec.org/s/wai/econwp.html

Gregory, R., and Borland, J. (1999) "Recent Development in Public Sector Labor Markets." In *Handbook of Labor Economics,* Ashenfelter, O. and Layard, R. (editors) Amsterdam, North Holland, pp. 3573-3630.

Grimmond, D. (2007) "Generous to a fault" *Dominion Post* October 4, 2007.