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**The Public Sector Pay Premium and
Compensating Differentials
in the New Zealand Labour Market**

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Abstract

In this note, propensity score matching (PSM) methods are applied to data from the 2005 International Social Survey Program Work Orientations (ISSP-WO) survey to examine the public sector pay premium in New Zealand. Taking account of a wide range of worker characteristics and attitudes, job attributes, and the effects that jobs have on workers and their family life, there appears to be a pay premium from working in the public sector of 17 to 21 percent.

Key Words

compensating differentials
propensity score matching
public sector

JEL Classification

J31; J45

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I. Introduction

The rising public sector wage bill is a key feature of the New Zealand labour market. This reflects not only the growth of the public sector,¹ but also improvements in remuneration for public sector workers. For example, according to the Quarterly Employment Survey (QES), for the decade prior to the current Labour Government's election in 1999 average private sector wages were at least 80% of those in the public sector. Since then there has been a steady decline in pay parity, with average private sector wages being below 75% of public sector wages since 2005.² There have also been improvements in non-wage benefits for the public sector, including the State Sector Retirement Savings Scheme which since 2005 has provided 3% matching employer contributions to employee retirement savings; well before and well above the level of employer contributions for other workers under KiwiSaver.

Some analysts have suggested that this rising remuneration for public sector workers reflects an asymmetry in employment relations between the public and private sectors. Since governments have statutory power to raise taxes, with large tax surpluses in the recent New Zealand case, they may not face the same financial pressures that inhibit wage rises in many private firms. This asymmetry also reflects the difficulty for taxpayers, who are the ultimate employer of public servants, to ensure that they are well represented in the wage negotiation process (Grimmond, 2007). Moreover, bureaucrats may have both a supply and demand role since they can influence the size of public sector employment, and hence face less of a trade-off between wage increases and employment than do other workers (Dahlberg and Mörk, 2006). Finally, since many public sector services are essential, an inelastic product demand contributes to inelastic labour demand, providing more scope for union activity to raise public sector pay. Therefore, it is unsurprising that unions have higher membership rates in the public sector than the private sector (Gregory and Borland, 1999).

However, improvements in the relative pay of public sector workers may also reflect changes in skill demands and job attributes between public and private sectors. These differences in job attributes have been found to account for much of the pay difference

¹ According to Statistics New Zealand's *Labour Market Statistics 2006* there were 45,000 more full-time public sector employees in March 2006 than in March 2000. This growth of 24.7 percent compares with 22.7 percent in the private sector. The details can be found at: <http://www.stats.govt.nz/analytical-reports/labour-market-statistics-06.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).

between public and private sectors in the U.K. (Bender and Elliott, 2002). However, other studies find that fringe benefits, such as holiday allowances, job security and pension schemes, are more generous for public sector workers (e.g., Poterba and Rueben, 1998), and that overall job satisfaction is higher (Demoussis and Giannakopoulos, 2007) so compensating differentials would imply lower public sector wages to offset these more favourable job conditions.

Since workers may choose to work in the sector that best suits their mix of observable and unobservable characteristics, any evaluation of the net advantages of public sector employment also needs to take such selection into account. For example, Bellante and Link (1981) find that public sector employees are more risk averse than their private sector counterparts. Therefore statistical methods used to estimate the public sector pay premium should compare public sector workers only with similar workers from other sectors. Such a comparison also should control for differences in productivity-related characteristics and in the positive and negative features of jobs that give rise to compensating pay differentials.

In this note, propensity score matching (PSM) methods are applied to data from the 2005 International Social Survey Program Work Orientations (ISSP-WO) survey to examine the public sector pay premium in New Zealand. These PSM methods involve matching public sector workers to similar workers in other sectors to estimate the public sector pay premium once worker and job characteristics are controlled for. The ISSP-WO data are uniquely suited to this purpose since in addition to recording sector of employment and standard characteristics like age, education, gender and ethnicity they also record job attributes such as stress, insecurity, and interference with family life. The other main surveys for studying workers in New Zealand (the Income Survey, formerly known as the Income Supplement to the Household Labour Force Survey, and the three-yearly Household Economic Survey) do not record sector of employment and have no details on job characteristics.

II. Data

ISSP Work Orientations Survey

The ISSP surveys are carried out each year in approximately 30 countries, with a common set of questions asked of a probability-based, nationwide sample of adults. The topics of the survey change each year, with work orientations previously studied in 1989 (when New Zealand did not participate) and in 1997 (when the coding for sector of employment appeared

to be different to other years).³ In each participating country, samples of between 1000 and 2000 adults are collected, with 1309 respondents in the New Zealand survey. While the ISSP data are often used for labour market studies (for example, see Sousa-Poza and Henneberger (2002)) they have not previously been used in New Zealand. Moreover, the results from the 2005 ISSP-WO have only recently become available to researchers.

Descriptive Comparisons of Public Sector Workers and Job Attributes

The ISSP-WO data include detailed information on the characteristics of respondents and their general attitudes to work. For those working for pay, their job attributes and the effect of their main job on the respondent and their family life are also recorded. The attitudinal and job attribute variables are recorded using five-point Likert scales. A description of these four sets of characteristics for public sector workers and other workers is reported in Table 1. The sample is restricted to those respondents that were working for pay at the time of the survey and had non-missing values for all of the variables in Table 1 (n=786).

There are a number of differences between public sector workers and other workers in both observable characteristics and attitudes. The public sector workers are more highly educated (by 1.3 years on average), are more likely to be female (70% versus 46%) and to reside in the Wellington region. They are also more likely to believe that an important feature of a job is that it is useful to society. However, contrary to previous overseas findings (for example, Bellante and Link (1981)), there is no significant difference across sectors in workers' attitudes to job security.

The attributes of jobs and their effects on workers and their family life also differ significantly between sectors. Public sector workers are more likely to find that their jobs are interesting, helpful to others and useful to society (in each case as evaluated by the worker themselves) and are less likely to do hard physical work. Offsetting these positive attributes of jobs, public sector workers report that they are less able to work independently, are more likely to find that their jobs are stressful and that their work interferes with family life.⁴

³ Specifically, in the New Zealand component of the 1997 survey, 58% of those currently employed are given a code of "Not Available" for the question on sector of employment.

⁴ This interference with family life does not appear to stem from any difference in work hours, with the mean work week reported as 37 hours by respondents in both sectors.

	Public Sector Workers		Other Workers		<i>p</i> -value for equal means ^a
	Mean	Standard Deviation	Mean	Standard Deviation	
Personal characteristics					
Age	43.430	12.091	42.496	13.225	0.421
Years of education	15.289	2.518	13.969	2.804	0.000
Male	0.296	0.458	0.536	0.499	0.000
European/Pakeha	0.800	0.401	0.808	0.394	0.833
Married or de facto	0.644	0.480	0.667	0.472	0.623
Reside in Auckland region	0.200	0.401	0.287	0.453	0.025
Reside in Wellington region	0.178	0.384	0.086	0.281	0.008
Job attributes (1=strongly agree, 5=strongly disagree)					
My job is secure	2.193	1.096	2.316	1.046	0.160
My job is interesting	1.867	0.853	2.077	0.850	0.005
I can work independently	2.148	0.943	1.880	0.816	0.003
In my job I can help others	1.659	0.693	2.071	0.855	0.000
My job is useful to society	1.630	0.751	2.298	0.954	0.000
Job helps improve my skills	1.956	0.929	2.077	0.905	0.110
Effect of work on the respondent (1=always, 5=never)					
Come home exhausted	2.667	0.898	2.799	0.872	0.125
Do hard physical work	3.859	1.094	3.498	1.276	0.002
Find work stressful	2.704	0.865	2.998	0.864	0.000
Face dangerous conditions	3.867	1.132	3.952	1.179	0.309
Interferes with family life	3.237	0.940	3.421	0.976	0.037
Job is just a way to earn money	3.615	1.113	3.496	1.151	0.258
Job security is important to me	1.652	0.746	1.688	0.679	0.443
Job helping others is important	1.896	0.756	1.994	0.708	0.127
Job that is useful to society is important	1.785	0.651	2.098	0.776	0.000
Pre-tax annual income (log)	10.580	0.634	10.476	0.769	0.099
Sample size (% of total)	135	(17.2)	651	(82.8)	

The survey also asks respondents to report their own pre-tax yearly income from all sources (using ten income brackets), with an additional question on their household income. While there is no question on earnings, for the respondents who are currently working most of their annual personal income should come from labour earnings. The logarithm of annual income is therefore used as the proxy measure of pay in this study. This same proxy is used

in New Zealand studies based on Census data (e.g. Maani, 1996) and is also used in international comparative studies using ISSP data (e.g., Blanchflower, 1996). According to this proxy, the raw premium for working in the public sector is approximately 11%.⁵

III. Propensity Score Matching Estimates of the Public Sector Pay Premium

Public sector workers differ from other workers in many observable and unobservable ways, so simple comparisons of mean earnings are unlikely to provide an unbiased estimate of the premium that would accrue to a given worker moving from the private to the public sector. While ordinary least squares (OLS) regression is a method that can control for differences in average characteristics, many studies show that this method is less successful at dealing with the sample selection problem that occurs when subjects in non-experimental studies cannot be randomly assigned to “treatment” and “control” groups. Such problems are relevant to attempts to measure the public sector pay premium since workers may choose their employment sector according to where their various talents will be most rewarded.

Propensity-score matching (PSM) is an increasingly popular non-experimental evaluation method, with proponents claiming that it can replicate experimental benchmarks when appropriately used (Dehejia and Wahba, 2002). Using PSM to estimate the public sector pay premium requires first estimating a probit equation for the probability of a worker being in the public sector. The resulting propensity score then allows each public sector worker to be matched only to those private sector workers whose characteristics give them similar predicted probabilities of being in the public sector. A comparison of the two matched samples then gives an estimate of the “average treatment effect” which in this case is the premium that would accrue to a given worker moving from the private to the public sector. In other words, PSM offers a way of structuring non-experimental data to look like experimental data, where for every subject in the “treated” group, the researcher finds comparable subjects in the “control” group. Several matching approaches are available, including matching each treated observation, i to the *nearest neighbour* (or neighbours) from the control group, and *kernel* matching where a weighted average of the j control group neighbours is taken with weights proportional to the closeness of propensity scores for i and j .

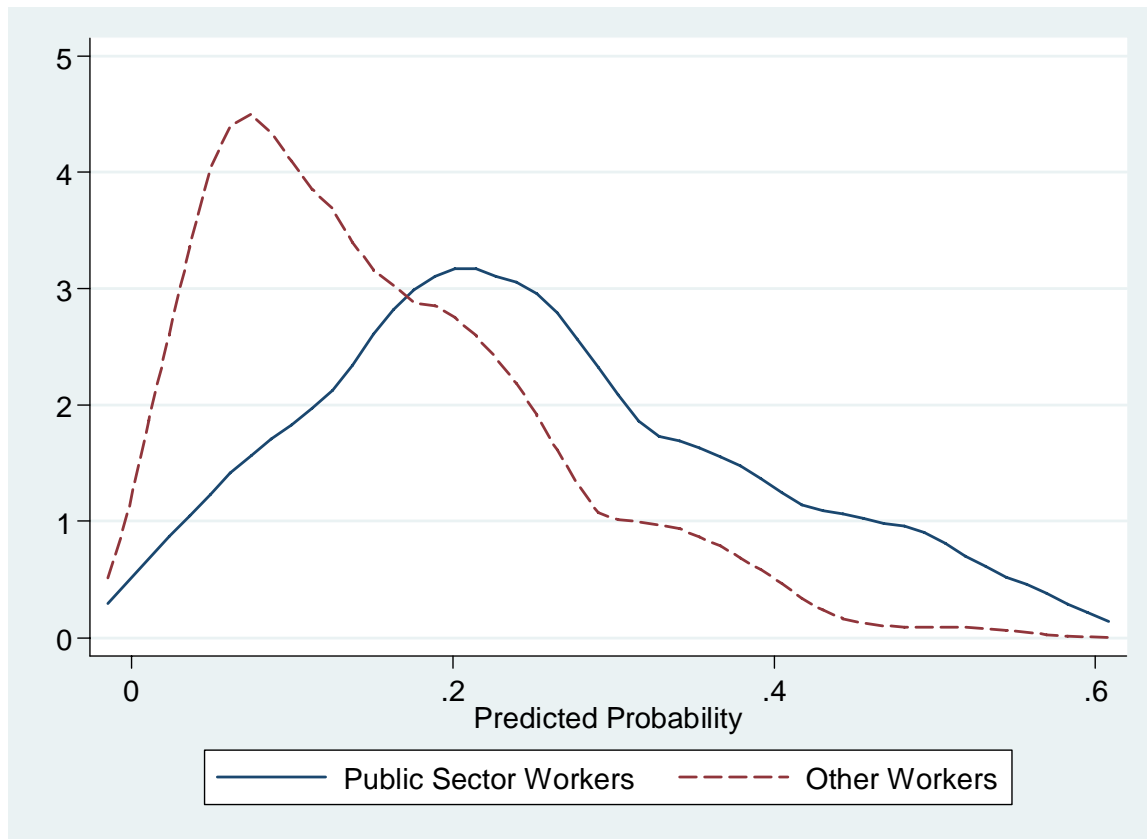
⁵ This is calculated from the difference in the logarithm of pre-tax annual incomes (10.580-10.476=0.104). The percentage difference is then: $100 \times [\exp(0.104) - 1] = 10.96\%$.

To implement the PSM estimates of the public sector pay premium, allowing for differences in productivity-related characteristics and the positive and negative features of jobs that give rise to compensating pay differentials, a series of probit equations were estimated. In each case the dependent variable was an indicator variable for whether the ISSP-WO respondent was working in the public sector. The first probit equation explained this choice of employment sector using only the personal characteristics of the worker listed in Table 1. The resulting propensity score and matching estimates of the public sector pay premium therefore are only able to control for worker characteristics. The second probit equation includes job attributes along with personal characteristics and so gives a way of seeing how the estimated pay premium changes once the most obvious sources of compensating differentials are accounted for. The third probit equation includes the effects of the job on the worker and their family, which may give another source of compensating differentials. The fourth probit equation includes worker attitudes along with personal characteristics, while the fifth includes all four sets of variables (i.e., all of those described in Table 1).

Results

The propensity scores for public sector workers from the first probit equation, which controls for personal characteristics, range from 0.027 to 0.567. The propensity scores for other workers range from 0.002 to 0.552, and have a much lower mean. Figure 1 illustrates these in the form of kernel densities. It is apparent that there 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 effect is restricted to the area of common support, where the two distributions overlap. Thus, private sector workers who are quite unlike public sector workers are not used in the comparisons.

Figure 1: Propensity Scores for Public Sector and Other Workers



The estimates of the average treatment effect, which is the gain in log income accruing to a given worker moving from the private to the public sector, are reported in Table 2.⁶ These come from a kernel matching procedure where the log income of each public sector worker is compared with a weighted average of the log incomes of those private sector workers whose propensity scores are similar. To interpret the results it is useful to recall that the raw premium for working in the public sector is approximately 11% (based on a difference in log income of 0.104).

When age, education, gender, ethnicity, marital status and location are accounted for, the premium for working in the public sector is estimated as 13%. This is derived from a treatment effect for log income of 0.122. Since this is slightly larger than the raw premium it implies that the pay gap between the public and private sector is not due to differences in the average level of productivity related characteristics for the workers in each sector.

⁶ The results of the underlying probit equations used to generate the propensity scores are in Appendix A.

Table 2: Propensity Score Matching Estimates of the Average Treatment Effect of Public Sector Employment on (log) Annual Income

Control Variables	Average Treatment Effect	Bootstrapped Standard Error	95% Confidence Interval
Personal characteristics only (age, education, gender, ethnicity, marital status, location)	0.122	(0.058)	0.002 – 0.233
Personal characteristics + job attributes (job is: secure; interesting; improves skills; helps others; useful to society; allows independent work)	0.188	(0.084)	0.003 – 0.338
Personal characteristics + effects of the job on the worker (come home exhausted; hard physical work; stressful; dangerous; interferes with family life)	0.122	(0.064)	-0.003 – 0.226
Personal characteristics + worker attitudes (important for job to: be secure; to help others; be useful to society; job just a way to earn money)	0.128	(0.074)	-0.001 – 0.283
Personal characteristics + job attributes + effects of the job on the worker + worker attitudes	0.158	(0.072)	0.005 – 0.295

Source: Author's calculations from 2005 ISSP data for New Zealand.

The estimated public sector pay premium is considerably larger, at 21%, when job attributes are also controlled for. Thus the public sector premium does not appear to be due to compensating differentials. Public sector workers benefit from having jobs that are more interesting, skill-augmenting, useful to society and helpful to others (as evaluated by the worker), so compensating differentials would require them to be paid less not more. Since they are paid more, accounting for job attributes makes the unexplained premium for working in the public sector even larger.

Neither the effect of jobs on the worker nor worker attitudes make much difference to the estimated treatment effect. Specifically, the estimated public sector pay premium is almost unchanged, at 13% and 13.7%, when these two sets of variables are used to calculate the

propensity scores in addition to personal characteristics. When all four sets of variables are included, the average treatment effect is 0.158, which implies that the pay premium for working in the public sector is 17%. Since this estimate is based on comparisons only with private sector workers who have similar characteristics and attitudes, and similar job attributes and effects, it should be a valid estimate of what a given worker would gain when moving from the private to the public sector.

Conclusions

This note has used data from the 2005 International Social Survey Program Work Orientations (ISSP-WO) survey to examine the public sector pay premium in New Zealand. Recent commentary has highlighted the improvement in relative remuneration in the public sector compared with the private sector. However, such changes might just reflect changing skill composition and job attributes for the public and private sector so they are not a reliable estimate of the pay premium that would accrue to a given worker moving to the public sector.

Therefore it is necessary to use micro data on worker characteristics and job attributes and an estimation method that can identify the public sector pay premium even when there is self-selection of workers into public or private sectors. The ISSP-WO data and propensity score matching techniques used here should provide reliable estimates of the public sector pay premium. Taking account of a wide range of worker characteristics and attitudes, job attributes, and the effects that jobs have on workers and their family life, there appears to be a pay premium of 17-21%, which is not due to compensating differentials.

References

- Bellante, D. and Link, A. (1981) "Are Public Sector Workers More Risk Averse Than Private Sector Workers?" *Industrial and Labor Relations Review* 34(3): 408-412.
- Bender, K. and Elliott, R. (2002) "The role of job attributes in understanding the public-private wage differential" *Industrial Relations* 41(3): 407-421.
- Blanchflower, D. (1996) "The role and influence of trade unions in the OECD" *Discussion Paper* no. 310 (Centre for Economic Performance, London School of Economics).
- Dahlberg, M. and Mörk, E. (2006) "Public employment and the double role of bureaucrats" *Public Choice* 126(3): 387-404.
- Dehejia, R. and Wahba, S. (2002) "Propensity score matching methods for non-experimental causal studies" *Review of Economics and Statistics* 84(1): 151-161.

- Demoussis, M., and Giannakopoulos, N. (2007) "Exploring job satisfaction in private and public employment: empirical evidence from Greece" *Labour* 21(2): 333-359.
- 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.
- Maani, S. (1996) "Private and Social Rates of Return to Secondary and Higher Education in New Zealand: Evidence from the 1991 Census" *Australian Economic Review* 113(1): 82-100.
- Poterba, J., and Rueben, K (1998) "Fiscal institutions and public sector labor markets" Working Paper 6659, Cambridge, Mass.: National Bureau of Economic Research.
- Sousa-Poza, A, and Henneberger, F. (2002) "An empirical analysis of working-hours constraints in twenty-one countries" *Review of Social Economy* 60(2): 209-42

Appendix A

Probit Estimation Results Used to Construct Propensity Scores

	Personal character- istics (PC)	PC + Job attributes	PC + Effect of Work	PC + Worker Attitudes	All variables
Years of education	0.120 (5.37)**	0.119 (4.80)**	0.110 (4.46)**	0.135 (5.48)**	0.129 (4.60)**
Age	0.052 (1.74)+	0.048 (1.44)	0.049 (1.48)	0.061 (1.96)+	0.053 (1.61)
Age squared	-0.000 (1.29)	-0.000 (1.07)	-0.000 (1.06)	-0.001 (1.59)	-0.000 (1.19)
Male	-0.586 (5.08)**	-0.561 (4.28)**	-0.668 (5.20)**	-0.559 (4.55)**	-0.601 (4.26)**
Married	-0.164 (1.27)	-0.023 (0.16)	-0.141 (1.03)	-0.129 (0.97)	0.014 (0.09)
Pakeha	-0.143 (0.98)	-0.075 (0.46)	-0.113 (0.72)	-0.100 (0.65)	0.041 (0.23)
Auckland	-0.358 (2.54)*	-0.427 (2.68)**	-0.383 (2.57)*	-0.341 (2.37)*	-0.530 (3.05)**
Wellington	0.261 (1.52)	0.355 (1.92)+	0.280 (1.55)	0.298 (1.69)+	0.393 (1.94)+
My job is secure					
<i>Disagree</i>		-0.312 (1.96)+			-0.357 (2.21)*
<i>Neither agree nor disagree</i>		-0.195 (0.94)			-0.197 (0.86)
<i>Agree</i>		-0.352 (1.51)			-0.491 (1.96)*
<i>Strongly agree</i>		-0.063 (0.18)			-0.340 (0.91)
My job is interesting					
<i>Disagree</i>		-0.399 (2.16)*			-0.480 (2.50)*
<i>Neither agree nor disagree</i>		-0.601 (2.25)*			-0.737 (2.68)**
<i>Agree</i>		-0.395 (1.06)			-0.566 (1.36)
<i>Strongly agree</i>		0.175 (0.29)			0.925 (1.69)+
I can work independently					
<i>Disagree</i>		0.571 (3.13)**			0.597 (2.94)**
<i>Neither agree nor disagree</i>		1.170 (4.48)**			1.128 (3.76)**
<i>Agree</i>		1.432 (5.25)**			1.477 (5.06)**
In my job I can help others					
<i>Disagree</i>		-0.005 (0.03)			-0.005 (0.02)
<i>Neither agree nor disagree</i>		-0.171 (0.57)			-0.298 (0.92)
<i>Agree</i>		-0.276 (0.61)			-0.353 (0.86)

My job is useful to society		
<i>Disagree</i>	-0.756 (3.80)**	-0.654 (2.78)**
<i>Neither agree nor disagree</i>	-1.282 (5.12)**	-1.057 (3.36)**
<i>Agree</i>	-1.676 (4.49)**	-1.356 (3.43)**
My job helps improve my skills		
<i>Disagree</i>	0.214 (1.19)	0.192 (1.11)
<i>Neither agree nor disagree</i>	0.305 (1.26)	0.259 (1.00)
<i>Agree</i>	0.899 (2.96)**	1.106 (3.20)**
<i>Strongly agree</i>	-0.328 (0.47)	-0.356 (0.47)
Come home exhausted		
<i>Often</i>	-0.084 (0.32)	-0.171 (0.61)
<i>Sometimes</i>	-0.302 (1.14)	-0.319 (1.07)
<i>Hardly ever</i>	-0.137 (0.44)	-0.076 (0.22)
<i>Never</i>	-0.368 (0.73)	-0.436 (0.81)
Do hard physical work		
<i>Often</i>	0.351 (0.92)	0.204 (0.54)
<i>Sometimes</i>	0.712 (1.92)+	0.754 (2.02)*
<i>Hardly ever</i>	1.094 (2.85)**	1.124 (3.06)**
<i>Never</i>	0.950 (2.42)*	1.110 (2.90)**
Find work stressful		
<i>Often</i>	-0.519 (1.82)+	-0.600 (1.89)+
<i>Sometimes</i>	-0.517 (1.84)+	-0.570 (1.82)+
<i>Hardly ever</i>	-0.498 (1.59)	-0.523 (1.47)
<i>Never</i>	-1.206 (2.22)*	-1.655 (3.09)**
Face dangerous conditions		
<i>Often</i>	-0.031 (0.08)	-0.179 (0.41)
<i>Sometimes</i>	-0.161 (0.47)	-0.387 (0.95)
<i>Hardly ever</i>	-0.303 (0.87)	-0.447 (1.07)
<i>Never</i>	-0.728 (2.07)*	-0.805 (1.94)+

Job interferes with family life

<i>Often</i>	0.272 (0.68)	0.005 (0.01)
<i>Sometimes</i>	0.322 (0.83)	0.147 (0.36)
<i>Hardly ever</i>	0.372 (0.92)	0.249 (0.60)
<i>Never</i>	0.147 (0.34)	-0.162 (0.35)

Job is just a way to earn money

<i>Agree</i>	0.142 (0.47)	0.020 (0.06)
<i>Neither agree nor disagree</i>	0.564 (1.84)+	0.388 (1.15)
<i>Disagree</i>	0.166 (0.59)	0.027 (0.09)
<i>Strongly disagree</i>	0.168 (0.56)	-0.135 (0.41)

Job security is important to me

<i>Agree</i>	-0.108 (0.87)	-0.148 (1.05)
<i>Neither agree nor disagree</i>	-0.323 (1.25)	-0.591 (1.66)+
<i>Disagree</i>	-0.410 (0.99)	-0.299 (0.66)
<i>Strongly disagree</i>	0.744 (0.83)	-0.093 (0.11)

Job helping others is important

<i>Agree</i>	-0.010 (0.06)	0.081 (0.43)
<i>Neither agree nor disagree</i>	0.352 (1.58)	0.394 (1.57)

Job useful to society is important

<i>Agree</i>	-0.211 (1.25)	-0.133 (0.72)
<i>Neither agree nor disagree</i>	-0.714 (3.24)**	-0.453 (1.79)+

Constant	-3.525 (5.23)**	-3.089 (3.93)**	-3.308 (3.57)**	-3.881 (5.09)**	-2.985 (2.95)**
Zero-slopes test (chi squared)	61.7**	177.5**	115.4**	100.0**	194.2**
Pseudo R-squared	0.101	0.248	0.160	0.140	0.316

Notes:

Robust z statistics in parentheses; + significant at 10%; * significant at 5%; ** significant at 1%. $N=786$.

The dependent variable is an indicator for whether the worker is employed in the public sector. With the exception of age and education, all other explanatory variables are dummy variables. Excluded category for each variable measured with a Likert scale is the response coded "1", which is typically "strongly agree" or "always" depending on the context. Dummy variables are dropped from the estimation if they perfectly predict the dependent variable.