

# **Where is the Warm Glow? Donated Labour in the Health & Social Work Industries<sup>1</sup>**

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*The “Warm Glow” theory of worker motivation in nonprofit organisations predicts that wages will be lower in the voluntary sector than for equivalent workers in the private and public sectors. Empirical findings, however, are mixed. Focussing on the Health & Social Work industries, we examine differences in levels of unpaid overtime between the sectors to test for the existence of a warm-glow effect. Although levels of unpaid overtime are significantly higher in voluntary sector, we find that this is insufficient to explain the wage premiums earned in this sector.<sup>3</sup>*

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Nonprofit Introduction

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## **Introduction**

In this paper we compare working hours between the private, public and voluntary sectors. Specifically, we investigate the role of unpaid overtime as “donated labour”.

Traditional warm-glow analysis uses wage differences between the private, public and voluntary sectors as a measurement of donated labour. This, however, does not control for differences in effort between the sectors. Here we test for differences in hours worked between the sectors. Our contribution in this paper is to provide a more robust exploration of nonprofit wage differentials, as well as adding an additional explanation to the literature on unpaid overtime.

This paper uses ten years of pooled cross-sectional data from the UK Quarterly Labour Force Survey (LFS) in order to examine levels of unpaid overtime at a disaggregated industry level in industries where voluntary sector concentration is relatively high. The rotating-panel structure of the UK LFS allows us to estimate a fixed effects model to control for unobserved worker heterogeneity. We focus on the Health & Social Work industries for two reasons: firstly, to reduce the unobserved heterogeneity between organisations and jobs by narrowing the activities undertaken; secondly, to examine the caring industries where theory predicts that warm glow should be strongest.

We begin by examining whether there are significant levels of donated labour observed in the voluntary sector, expressed as hours of unpaid overtime. Next, we test whether donated labour explains the voluntary sector wage premium found in the caring industries. Evidence is found of donated labour through significantly higher levels of unpaid overtime for voluntary sector workers at all industry detail levels. Wage equations are estimated with wages adjusted for these additional hours of unpaid work, showing that for female workers there is a significant warm-glow wage discount even after controlling for unobserved worker heterogeneity.

## **Empirical Literature on Sector Differentials and Donated Labour**

There is an extensive literature on the apparent wage premium earned by workers in the public sectors (see Bender (1998) for a review). The stylised facts from this

literature are that there is a public sector premium, it is greatest for women and minorities, but it has generally been decreasing over time. Disney & Gosling (1998) used the General Household Survey (GHS) and British Household Panel Survey (BHPS) to estimate the public sector premium in the UK after taking worker characteristics into account. They found that for men the premium fell from 5% in 1983 to only 1% by the mid-1990's. However, for women the public sector premium increased over the same period from 11% to 14%.

Relatively little empirical work has been done where the voluntary sector is examined separately as a third sector. There has been some past research attempting to estimate nonprofit or voluntary sector wage differences as a measure of warm glow, primarily using US data. Weisbrod (1983) examined wage differences between lawyers employed by nonprofit and for-profit firms, and found evidence of a nonprofit wage discount of ~20%. His analysis of a job choice equation suggested that lawyers in the nonprofit sector held different preferences to those employed in the private sector.

Preston (1989) conducted an analysis of the nonprofit sector wage differential for white-collar workers using Current Population Survey (CPS) in the US, and found a significant nonprofit sector discount of 18% even after controlling for differences in human capital and other worker and job characteristics. She found a larger differential for male workers than female workers. It is suggested that a selectivity bias might be present, and this is tested for using a two-stage sector choice model, and also analysing a limited sector switching model. She concludes that a "donative labour" hypothesis is supported by the findings, but that the presence of unobserved heterogeneity in worker characteristics that might affect their productivity has not been completely ruled out.

Leete (2001) used US census data for 1990 and found little evidence of a difference between the private and voluntary sectors overall. However, she did find some significant differences at the disaggregated industry level. Although the industry categories used in Leete's paper differ from those in the UK LFS, it is possible to identify some that are relevant to the industry classifications examined in this paper.

<b>Industry</b>	<b>Nonprofit Premiums (t-statistic)</b>	<b>% Nonprofit (Sample Size)</b>
Nursing & Personal Care Facilities	2.22% (3.5)	19.40% (60,120)
Hospitals	5.02% (18.87)	43.70% (171,612)
Day-care services	6.72% (6.54)	35.40% (21,505)

*Figure 1 – Estimated Nonprofit Wage Premiums from US Census 1990  
(Source: (Leete, 2001))*

Figure 1 shows that Leete found significant nonprofit sector premiums of between 2.2% - 6.7% in caring industries in the US. The table also shows that these were in industries with a relatively high concentration of nonprofit organisations. Examining similar sectors, Mocan & Tekin (2003) used employer-employee matched data on child care workers in the USA, and found evidence of a nonprofit wage premium of between 6% - 15%.

Ruhm & Borkoski (Ruhm & Borkoski, 2003) undertake both a cross-sectional and longitudinal analysis of nonprofit compensation using the 1994-88 Current Population Survey Outgoing Rotation Groups. They find little evidence of wage differentials, with industry and worker heterogeneity playing a larger role. They conclude that nonprofit wages are set primarily by competitive markets, with little evidence of donated labour observed in wages.

These papers produce contradictory results – two provide evidence of a nonprofit wage discount, while the others support a wage premium in the health and care industries where most nonprofits operate. We are unaware of any empirical work examining unpaid overtime in the voluntary sector. The conflicting findings in the empirical warm-glow wage differentials literature, as outlined in the previous above, mean that the industry-specific differences in sector wage differentials remain unexplained. In particular, there is often a significant voluntary sector wage premium found in the caring industries such as health and social work.

We focus here on the health and social work industries to examine unpaid overtime and wage differences at the industry level.

## **The Economics of Overtime Pay**

Overtime hours are defined ‘as actual hours of work in excess of the standard contractual hours’ (Hart, 2004). Commonly these hours are paid for at a higher rate

than basic working hours. However, a more recent literature has begun to explore the phenomenon of reported unpaid overtime. Workers may work either paid or unpaid overtime in addition to their contracted hours, or they may work a combination of both, or neither.

The total weekly hours  $H_i$  for a worker  $i$  are therefore shown below, where  $h_b$  are the usual contracted hours,  $h_{po}$  are the hours of paid overtime and  $h_{uo}$  are the hours of unpaid overtime.

$$H_i = h_b + h_{po} + h_{uo} \quad (1)$$

The total weekly pay  $W_i$  received by a worker  $i$  is shown below, where  $w_b$  is the basic hourly wage rate, and  $\pi$  is the overtime premium.

$$W_i = w_h h_b + \pi w_h h_{po} \quad (2)$$

The overtime literature suggests that the term ‘unpaid overtime’ is a misnomer. Although there is no explicit contractual payment for hours of unpaid overtime worked, the question that the literature address is: how is the worker compensated for these hours?

Bell & Hart (2003) use the 1998 British New Earnings survey to investigate the relationship between basic hourly pay and overtime premiums. They show that there is a significant negative relationship, with higher overtime premiums being associated with lower basic hourly wages. They suggest that overtime premiums are driven by custom and practice within an industry, and are not related to the length of overtime worked. Firms therefore can use the variable premium to maintain a competitive effective wage. This supports an implicit contract between firms and workers over the effective hourly wage that will be paid, for a given mix of basic and overtime hours.

Bell & Hart (1999) propose five explanations for the existence of unpaid overtime:

- uncertainty over task completion times;
- auctions for task allocation;
- regulate team performance;

- gift exchange;
- compensating differentials.

Firstly, unpaid overtime could permit the adjustment of contracts where there is uncertainty on behalf of both the employer and the worker about the time required to undertake a task. With some probability, the worker will undertake additional hours unpaid to fulfil a contract.

Secondly, employers may allocate work tasks on the basis of 'bids' from workers as to task completion times. Workers have an incentive to understate their task completion time in order to win the contract, and then work additional hours unpaid to fulfil it, if the payment from contracted hours still outweighs their outside option.

Thirdly, teams of workers may use unpaid overtime as a regulation device to allow lower productivity workers additional time to complete tasks where the same wage is paid to all team members. Effectively, the unpaid overtime allows the informal adjustment of hourly wage within the team.

Fourthly, employers and workers may enter into an implicit contract, where workers 'gift' extra effort in return for a higher basic wage. This extra effort could be in the form of additional hours unpaid, holding work intensity constant. Although the exchange is not explicitly contracted over, it is enforced through workplace norms.

Lastly, if wage bargains regarding overtime premiums are reached outside the level of the relationship between employer and worker, there may be welfare improvements from negotiating a lower, local rate. This could be reached through an implicit agreement to undertake a mix of paid and unpaid overtime hours.

The fourth explanation has significance in the nonprofit literature, and could be relevant in the analysis of sector differences. Bell & Hart find evidence of gift exchange through the association of unpaid overtime with higher wages. They did not however find evidence of unpaid overtime being used to adjust rigidities in paid overtime rates, tested by examining the link between undertaking both paid and unpaid overtime.

Pannenberg (2005) explores the long-term effects of unpaid overtime using data from the German Socio-Economic Panel. Pannenberg finds evidence of increased real wage growth for male workers who work unpaid overtime, robust to the estimation of a fixed-effects model, but little evidence of a similar significant effect for women. This supports the role of unpaid overtime as an investment, with a positive expected value, at least for male workers.

We propose an additional explanation for unpaid overtime: if wages are rigid within industries across sectors, then the effective wages of workers in mission-motivated organisations are adjusted by working additional hours of unpaid overtime.

The traditional warm-glow model suggests that workers gain utility from both their wage and the intrinsic motivation of engaging in a mission-motivated activity. The utility function  $U_i$  of a worker has three arguments: the total wages earned ( $W_i$ ), the level of intrinsic utility derived from working in a mission-motivated activity ( $G_i$ ), and the hours of leisure time ( $L_i$ ).

$$U_i = (W_i(w_i, h_i), G_i(H_i), L_i) \quad (3)$$

This makes the assumption that warm glow utility is related to the level of participation in the mission-motivated activity, rather than the worker receiving a ‘lump sum’ utility from working in the sector rather than outside it. This is consistent with Andreoni’s concept of warm glow, where the level of utility gained is a function of the size of donation to the public good. Warm-glow utility arises from the workers’ participation in the provision of the public good, rather than solely from the public good itself.

This suggests two competing explanations for sector differences in unpaid overtime. Workers who receive a warm glow from their work could engage in unpaid overtime, which would lower their effective salary, whilst apparently receiving the same compensation as other workers. Alternatively unpaid overtime can form part of an implicit bargain between worker and employer, where additional hours of unpaid overtime are expected and compensation is paid through a higher hourly wage for the “official” paid hours of work.

We investigate sector wage differences to test between these two explanations for unpaid overtime in the voluntary sector.

**Warm Glow Hypothesis:** Workers engage in additional hours of unpaid work due to the intrinsic utility of working in the mission-oriented sector. The compensation for the hours of unpaid overtime is received in warm-glow utility.

**Gift Exchange Hypothesis:** Workers in the voluntary sector engage in implicit contracts, where additional hours of unpaid work ‘gifted’ to employers are rewarded with higher basic wages. The compensation for the hours of unpaid overtime is received through the higher level of the basic wage.

It should be noted that we are examining sector differences between sectors within industries. It is reasonable to think that there could be a level of job satisfaction arising from working within the caring industries independent of the legal structure of the employer. We are looking at differences in warm glow *given* that the workers are employed in the caring industries.

Bell & Hart suggest a method of controlling for the effect of unpaid overtime on final compensation, by calculating an adjusted wage which is then used as the explanatory variable in a wage equation. First, we test for the existence of a sector difference in unpaid overtime. Second, we test its impact in an adjusted-wage equation on the warm-glow sector difference.

## **The Dataset**

This paper uses the UK Quarterly Labour Force Survey (UK LFS) between 1998 and 2007 to create a pooled cross-section dataset with a large enough voluntary sector sample size to permit detailed analysis. The UK LFS is a quarterly rotating panel survey of 60,000 households per year in the UK, conducted on a random sample and carried out by the UK Office of National Statistics (ONS). Each household is followed for one year, with five quarterly observations, collecting a wide range of data on wages, job characteristics, education, employers and household make-up.

## Unobserved Heterogeneity

A recurring problem in estimating differences between sectors is accounting for unobserved heterogeneity. Are observed sector wage differences explained by differences between organisational form, or sector selection by workers? There are two main sources of unobserved heterogeneity that could affect our analysis:

- Heterogeneity in jobs;
- Heterogeneity in workers;
- Unobserved heterogeneity in organisations.

We control for unobserved heterogeneity between jobs by restricting the sample to detailed industry classifications to allow comparison between similar job activities and roles. In this paper we estimate sector wage equations at the detailed industry level, coded using the UK Standard Industrial Classification Of Economic Activities (SIC(92)).<sup>4</sup> The industry classification analysed is SIC(92) N 85 Health & Social Work.

This broad industry classification includes:

- Human health activities: Hospitals, Nursing Homes, Dental practices, opticians, etc.
- Veterinary activities: Vets and veterinary hospitals
- Social work activities: Social work services with and without accommodation, as detailed above

This reduction to more detailed job classification comes at a cost of reduced sample size.

We control for unobserved heterogeneity between workers by estimating a fixed effects model using two observations on each worker. This allows us to include an individual specific fixed effect in the regressions.

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<sup>4</sup> SIC(92) is a hierarchical 5-digit Industry Classifications code that conforms with and corresponds directly to the European Community Classification of Economic Activities (NACE) Version 1 codes

## Exploring a Three Sector Workforce

Since the mid-1990's the questions asked in the LFS allow the identification of organisations which operate in the Voluntary sector, permitting an analysis of a three sector model.<sup>5</sup>

Although the voluntary sector as a whole accounts for only around 4% of the UK workforce, 60% of the sector operates within the industry classification SIC(92) "85 Health & Social Work". In contrast, 29% of the Public Sector and 5% of the Private Sector is engaged within this industry classification. Table 1 below shows the industry sample size by sector and gender. It shows that although the voluntary sector makes up a significant proportion of the industry, the private and public sectors are both still major players within each category.

Sector	MALE		FEMALE	
	Freq.	Percent	Freq.	Percent
Private	461	0.150	3057	0.246
Public	2203	0.716	8028	0.646
Voluntary	413	0.134	1351	0.109
TOTAL	3077		12436	

*Table 1: Sample by Sector and SIC(92)*  
(Source: UK Quarterly Labour Force Survey 1998 – 2007)

Mean values of a selection of key individual and job characteristics are shown in Table 2 below.

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<sup>5</sup> See Appendix One for more detail on sector classifications in the UK LFS

SAMPLE MEANS

	MALE				FEMALE			
	Private	Public	Voluntary	ALL	Private	Public	Voluntary	ALL
Age (years)	41.23	41.75	43.35	41.88	40.13	41.69	42.20	41.36
Tenure (years)	4.81	10.10	5.14	8.66	5.05	9.85	5.14	8.15
Part-time (%)	0.08	0.04	0.16	0.06	0.38	0.38	0.41	0.38
Temp. Job (%)	0.02	0.07	0.10	0.07	0.02	0.04	0.08	0.04
Unpaid Overtime (hours)	2.81	3.65	5.00	3.71	1.55	2.40	3.68	2.33
Paid Overtime (hours)	5.37	4.45	1.63	4.21	3.83	2.96	1.97	3.07
Total Overtime (hours)	8.18	8.10	6.63	7.91	5.38	5.36	5.65	5.40
Total Work Hours (hours)	45.29	46.14	41.10	45.34	36.22	36.38	35.27	36.22
Hourly Wage (£)	8.96	13.22	11.13	12.30	7.08	10.33	9.15	9.40

Table 2: Sample Means by Sector and gender  
(Source: UK Quarterly Labour Force Survey 1998 – 2007)

Wave 5	Wave 1	Private		Public		Voluntary	
		Freq.	Percent	Freq.	Percent	Freq.	Percent
Private	Male	285	0.10	60	0.02	67	0.02
	Female	2,262	0.20	187	0.02	209	0.02
Public	Male	77	0.03	2,042	0.71	20	0.01
	Female	346	0.03	7,447	0.64	82	0.01
Voluntary	Male	28	0.01	31	0.01	265	0.09
	Female	84	0.01	78	0.01	900	0.08
TOTAL	Male	2,875					
OBSERVATIONS	Female	11,595					

Table 3: Sample by Sector in Wave 1 and Wave 5  
(Source: UK Quarterly Labour Force Survey 1998 – 2002)

In order to control for unobserved worker heterogeneity we also estimate a panel model using two observations on each worker, one year apart. Due to data constraints we estimate this model using a smaller sample based on worker observations between 1997 and 2002.

Table 3 above shows the panel sample by sector in wave 1 and wave 5. Workers observed for at least one wave in the voluntary sector make up 14% (411 observations) of the male sample and 12% (1,353 observations) of the female sample.

### Overtime Data

In the UK LFS respondents are asked about their working hours and overtime. Respondents are asked to estimate the number of weekly hours of paid and unpaid overtime that they undertake in their main job.

Table 4 below shows the sample tabulated by participation in the two types of overtime hours. It shows that most workers work only either one type of overtime or the other. About 13% work no overtime, and 11% report working at least some of both paid and unpaid overtime.

<b>COUNT</b>	<b>No Paid Overtime (<math>h_{po}=0</math>)</b>	<b>Paid Overtime (<math>h_{po}&gt;0</math>)</b>	<b>TOTAL</b>
<b>No Unpaid Overtime (<math>h_{uo}=0</math>)</b>	2,001	5,905	7,906
<b>Unpaid Overtime (<math>h_{uo}&gt;0</math>)</b>	5,850	1,757	7,607
<b>TOTAL</b>	7,851	7,662	15,513

*Table 4: Breakdown of sample by overtime hours*

Figure 2 below shows histograms of the hours of paid and unpaid overtime by sector for workers with overtime working greater than zero. This shows clearly the higher levels of paid overtime in the private sector

# HISTOGRAMS OF OVERTIME HOURS BY SECTOR

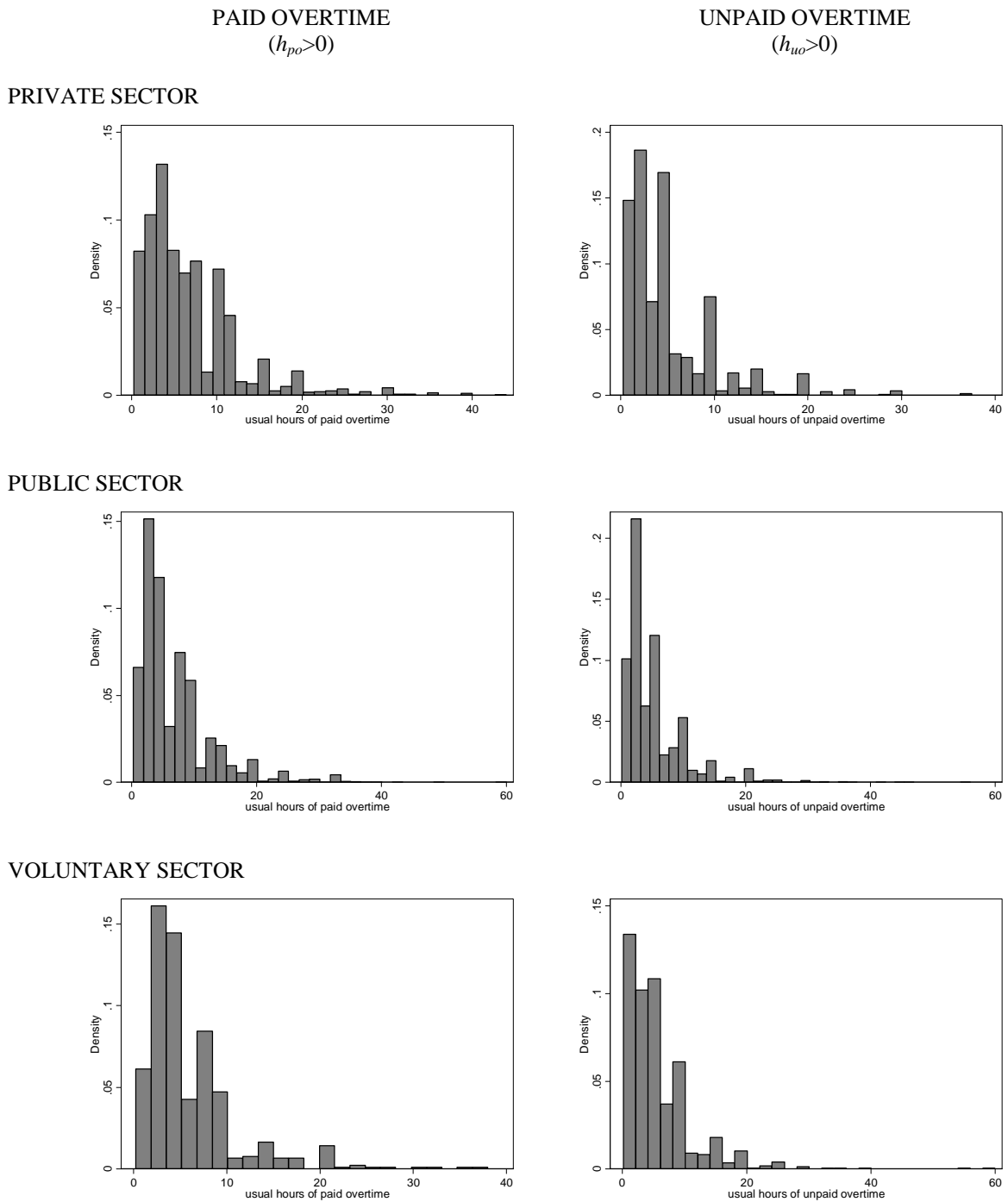


Figure 2: Histogram of Hours of Overtime by Sector  
 (Source: UK Quarterly Labour Force Survey 1998 – 2007)

## Estimating Working Hours Equations

In order to investigate this, working hours equations (Bell & Hart, 1999) were estimated to attempt to explain the observed unpaid overtime. Data on unpaid overtime, paid overtime, total overtime and total working hours were used to estimate sector differences, conditioning on a range of explanatory variables.

The overtime data contains many observations censored at zero, as it is not possible to observe negative overtime. Many workers in the sample worked only one type of overtime, or no overtime at all. In order to control for this, overtime working is modelled with an underlying propensity to undertake overtime,  $h_i$ . The overtime hours are observed when  $h_i$  is greater than zero, but zero overtime is observed when  $h_i$  is less than zero. This is estimated with a Tobit model:

$$\text{if } h_i > 0 \rightarrow \text{hours}_i = \beta_0 + \beta_{PUB}PUB_i + \beta_{VOL}VOL_i + \beta_x X_i + \varepsilon_i \quad (4)$$

$$\text{if } h_i \leq 0 \rightarrow \text{hours}_i = 0$$

Where:

PUB	Sector Dummy for Public Sector workers
VOL	Sector Dummy for Voluntary Sector
$X_i$	Education variables (level of highest qualification held); Characteristics of jobs e.g. organisation size, FT/PT, permanent/temporary, length of tenure; Characteristics of the workers e.g. age, experience; Time Dummies for year and quarter

Following Bell & Hart, a proxy for income is included in the estimation of the hours equations. In order to avoid the endogeneity problem of the joint determination of wages and hours,  $w^*$  is the predicted hourly wage from a basic Mincer wage equation, rather than the observed hourly wage.

$$\ln(w_i^h) = \beta_0 + \beta_Z Z_i + u_i \quad (5)$$

$$\ln(w_i^*) = \ln(\hat{w}_i^h) = \beta_0 + \beta_Z Z_i \quad (6)$$

The coefficients on the sector dummies for the public and voluntary sector relative to the private sector are shown below in Table 5. Columns one to four show the hours

equations for unpaid overtime, paid overtime, total overtime and total hours respectively.

These estimates suggest that male workers work slightly more unpaid overtime in the voluntary sector than the private by about 2 hours per week. We find that female workers work an extra 2.7 hours of weekly unpaid overtime in the voluntary sector. Levels of paid overtime are also significantly lower in the voluntary sector for both male and female workers. Male workers in the voluntary sector work significantly fewer total hours of overtime and total weekly hours of work than those in the private sector. For female workers there is no significant difference in total overtime, and evidence of only slightly shorter total weekly hours in the voluntary than the private sectors.

Although this indicates that there are higher levels of unpaid overtime in the voluntary sector, controlling for individual and organisational characteristics, it does not control for unobserved worker heterogeneity. In order to address this we estimate hours equations on a panel, with two observations on each worker. We estimate two different specifications: a fixed effects OLS regression, and a random effects Tobit regression.

Model (a): Fixed Effects

$$hours_{it} = \beta_i + \beta_{PUB}PUB + \beta_{VOL}VOL + \beta_x X + \varepsilon_{it} \quad (7)$$

Model (b): Random Effects Tobit

$$if\ hours_{it} > 0 \rightarrow hours_{it} = \beta_i + \beta_{PUB}PUB + \beta_{VOL}VOL + \beta_x X + \varepsilon_{it} \quad (8)$$

$$if\ hours_{it} \leq 0 \rightarrow hours_{it} = 0; \beta_i \sim N(0, \sigma^2)$$

Model (a) is the simplest specification, but it does not account for the censoring of the hours variable at zero. Model (b) adds this Tobit structure, but at the cost of imposing a random effects structure to the individual effects. The significant number of zeroes in the working hours data means that Model (b) is preferred, but both models have been reported for comparison. Differences in the estimates from the two models are found mainly in magnitude and statistical significance, but not in the sign of the estimated effect.

The panel data sample results are shown in Table 6 and Table 7 below. Columns 1(a) to 4(a) show the fixed effects hours equations for unpaid overtime, paid overtime, total overtime and total hours respectively. Columns 1(b) to 4(b) show the random effects tobit hours equations for unpaid overtime, paid overtime, total overtime and total hours respectively.

Both the fixed effects and the Tobit models find that female voluntary sector workers work more hours of unpaid overtime, although only the Tobit is significant. The Tobit estimate of over two hours per week is in-line with the cross-section estimates. The Tobit model also finds significantly lower levels of paid overtime in the voluntary sector, with no significant difference in total overtime and only a small difference in total working hours.

The results for male voluntary sector workers are broadly similar, but with bigger estimated differences between the private and voluntary sectors. Male voluntary sector workers also work a significant two hours fewer per week than those in the private sector. This is also in line with the estimates from the cross-sectional model.

These results appear to support a donated labour theory – workers in the voluntary sector are providing additional hours of work unpaid, compared to those in the private sector. This is the case even after controlling for unobserved worker heterogeneity. To what extent can this be seen as evidence of a “warm glow”?

The literature on unpaid overtime offers an alternative explanation. Workers can use additional hours of unpaid work to adjust rigid wage contracts. Workers need only care about the number of hours they work, and the total that they get paid, and not about exactly how this is recorded. A contract with a low wage and fixed hours could be equivalent to a contract with a higher wage, but where additional hours unpaid are an implicit part of the contract. As voluntary sector workers in the HSW industries are paid a premium, this could in part be explained by the additional hours worked unpaid. Is there still a sector difference after accounting for these additional hours?

This can be tested by calculating an “Adjusted” hourly wage for each worker based on the wage per actual hour worked. Calculating this wage for each worker and then using it as the dependent variable in the wage equations will provide a test for the

presence of a “warm glow” through additional unpaid hours a drop in the estimated sector premium if these hours are unrewarded through basic pay.

OVERTIME EQUATIONS: CROSS-SECTIONAL DATA

	MALE				FEMALE			
	(1) Unpaid $h_{uo}$	(2) Paid $h_{po}$	(3) Total OT $h_b + h_{po} + h_{uo}$	(4) Total Hours $h_b + h_{po} + h_{uo}$	(1) Unpaid $h_{uo}$	(2) Paid $h_{po}$	(3) Total OT $h_b + h_{po} + h_{uo}$	(4) Total Hours $h_b + h_{po} + h_{uo}$
model								
Public Sector	-1.217 (0.557)**	-0.809 (0.612)	-1.602 (0.438)***	-2.097 (0.480)***	0.397 (0.165)**	-0.793 (0.215)***	-0.475 (0.148)***	-1.219 (0.173)***
Voluntary Sector	2.302 (0.658)***	-6.887 (0.840)***	-2.466 (0.548)***	-3.853 (0.600)***	2.770 (0.216)***	-3.280 (0.321)***	0.213 (0.206)	-0.976 (0.241)***
$\ln(w_i^*)$	17.58 (0.738)***	-12.30 (0.838)***	3.627 (0.560)***	4.733 (0.614)***	9.553 (0.271)***	-7.368 (0.370)***	1.555 (0.245)***	3.683 (0.287)***
Age (years)	0.214 (0.255)	1.200 (0.298)***	0.475 (0.201)**	1.439 (0.220)***	-0.131 (0.105)	1.270 (0.149)***	0.483 (0.0967)***	0.754 (0.113)***
Age <sup>2</sup> /100	-69.67 (28.99)**	-100.6 (35.62)***	-49.25 (23.26)**	-152.9 (25.44)***	5.880 (12.56)	-165.0 (18.65)***	-58.73 (11.73)***	-106.0 (13.75)***
Tenure (years)	-0.333 (0.0651)***	0.239 (0.0811)***	-0.0556 (0.0542)	-0.0234 (0.0594)	-0.0890 (0.0234)***	-0.0148 (0.0333)	-0.0755 (0.0222)***	-0.0547 (0.0260)**
Tenure <sup>2</sup> /100	0.691 (0.202)***	-0.491 (0.262)*	0.0722 (0.171)	-0.00552 (0.187)	0.137 (0.0765)*	0.213 (0.112)*	0.240 (0.0741)***	0.219 (0.0869)**
Part-Time Working	-1.536 (0.818)*	-1.422 (0.907)	-2.035 (0.627)***	-19.44 (0.682)***	-2.640 (0.139)***	-0.837 (0.190)***	-2.838 (0.128)***	-17.24 (0.150)***
Temp. Job	1.264 (0.702)*	2.714 (0.873)***	2.843 (0.603)***	4.579 (0.662)***	0.833 (0.302)***	-0.519 (0.467)	0.613 (0.298)**	0.581 (0.350)*
_cons	-41.34 (4.432)***	8.861 (4.866)*	-6.524 (3.354)*	13.88 (3.667)***	-18.05 (1.655)***	-2.986 (2.239)	-4.942 (1.480)***	24.80 (1.733)***
sigma								
_cons	8.227 (0.158)***	9.943 (0.195)***	7.681 (0.105)***	8.513 (0.109)***	5.672 (0.0555)***	8.098 (0.0807)***	6.008 (0.0421)***	7.157 (0.0454)***
<i>N</i>	3077	3077	3077	3077	12436	12436	12436	12436
<i>AIC</i>	12610.4	13485.5	19939.0	21986.5	45230.2	50781.9	72311.0	84318.6

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Models 1-4: Tobit if  $h_i > 0 \rightarrow hours_i = \beta_0 + \beta_{PUB}PUB_i + \beta_{VOL}VOL_i + \beta_x X_i + \varepsilon_i$ ; if  $h_i \leq 0 \rightarrow hours_i = 0$

Total OT = Unpaid OT + Paid OT; Total Hours = Basic Hours + Total OT;  $\ln(w_i^*) = \beta_0 + \beta_z Z_i$

Additional control variables not listed in the table above include experience, marital status, number of children, organization size, region and year and quarter dummies.

Table 5: Overtime Equation Estimation Results

(Source: UK Labour Force Survey 1998 – 2007)

## OVERTIME EQUATIONS: PANEL DATA FEMALE WORKERS

### Hours Equations: xtobit : LFS Panel : Female

	(1a) FE Unpaid OT $h_{uo}$	(1b) RE Tobit Unpaid OT $h_{uo}$	(2a) FE Paid OT $h_{po}$	(2b) RE Tobit Paid OT $h_{po}$	(3a) FE Total Overtime $h_{po} + h_{uo}$	(3b) RE Tobit Total Overtime $h_{po} + h_{uo}$	(4a) FE Total Hours $h_b + h_{po} + h_{uo}$	(4b) RE Tobit Total Hours $h_b + h_{po} + h_{uo}$
Public Sector	0.176 (0.337)	0.331 (0.167)**	-0.640 (0.397)	-0.672 (0.234)***	-0.465 (0.498)	-0.297 (0.155)*	-0.352 (0.585)	-0.227 (0.186)
Voluntary Sector	0.574 (0.373)	2.232 (0.222)***	0.0457 (0.439)	-3.612 (0.362)***	0.620 (0.551)	-0.149 (0.220)	0.945 (0.647)	-0.494 (0.263)*
$\ln(w_i^*)$	0.660 (0.737)	7.244 (0.249)***	0.596 (0.867)	-5.880 (0.382)***	1.256 (1.089)	1.822 (0.238)***	1.373 (1.280)	2.749 (0.287)***
Age (years)	0.431 (0.840)	0.0898 (0.0533)*	-0.354 (0.988)	0.130 (0.0744)*	0.0767 (1.241)	0.0795 (0.0488)	-0.958 (1.459)	-0.165 (0.0589)***
Age <sup>2</sup> /100	-0.382 (0.344)	-0.0578 (0.0644)	-0.123 (0.405)	-0.230 (0.0913)**	-0.505 (0.509)	-0.102 (0.0595)*	-0.194 (0.598)	0.191 (0.0717)***
Tenure (years)	0.0945 (0.0607)	-0.00503 (0.0245)	0.0197 (0.0714)	-0.00393 (0.0380)	0.114 (0.0896)	-0.0245 (0.0240)	0.132 (0.105)	0.0268 (0.0288)
Tenure <sup>2</sup> /100	-0.347 (0.234)	-0.0398 (0.0859)	-0.147 (0.275)	-0.0385 (0.138)	-0.494 (0.346)	0.0105 (0.0852)	-0.639 (0.406)	-0.0992 (0.103)
Part-Time Working	-0.755 (0.241)***	-2.440 (0.128)***	-1.047 (0.284)***	-0.527 (0.190)***	-1.802 (0.357)***	-2.403 (0.123)***	-9.956 (0.419)***	-16.92 (0.150)***
Temporary Job	-0.0419 (0.377)	0.268 (0.286)	0.230 (0.444)	0.0657 (0.456)	0.188 (0.557)	0.450 (0.288)	-0.282 (0.655)	-0.258 (0.341)
_cons	-9.926 (30.99)	-14.68 (1.048)***	17.45 (36.46)	8.343 (1.425)***	7.525 (45.79)	0.807 (0.939)	75.93 (53.81)	38.58 (1.132)***
<i>N</i>	11596	11596	11596	11596	11596	11596	11596	11596
<i>R</i> <sup>2</sup>	0.022	-	0.019	-	0.036	-	0.185	-
<i>AIC</i>	38319.2	42117.8	42090.3	43360.2	47374.2	64441.7	51119.0	76500.0

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Model (a): Fixed Effects  $hours_{it} = \beta_0 + \alpha_i + \beta_{PUB}PUB_{it} + \beta_{VOL}VOL_{it} + \beta_x X_{it} + \varepsilon_{it}$

Model (b): Random Effects Tobit if  $hours_{it} > 0 \rightarrow hours_{it} = \beta_0 + \alpha_i + \beta_{PUB}PUB_{it} + \beta_{VOL}VOL_{it} + \beta_x X_{it} + \varepsilon_{it}$ ; if  $hours_{it} \leq 0 \rightarrow hours_{it} = 0$ ;  $\alpha_i \sim N(0, \sigma^2)$

Total OT = Unpaid OT + Paid OT; Total Hours = Basic Hours + Total OT;  $\ln(w_i^*) = \beta_0 + \beta_z Z_i$

Additional control variables not listed in the table above include organisation size, region, and time dummies.

Table 6: Overtime Equations: Fixed Effects linear regression and Random Effect Tobit models

(Source: UK Labour Force Survey 1998 – 2002)

## OVERTIME EQUATIONS: PANEL DATA MALE WORKERS

	(1a) FE Unpaid OT $h_{uo}$	(1b) RE Tobit Unpaid OT $h_{uo}$	(2a) FE Paid OT $h_{po}$	(2b) RE Tobit Paid OT $h_{po}$	(3a) FE Total Overtime $h_{po} + h_{uo}$	(3b) RE Tobit Total Overtime $h_{po} + h_{uo}$	(4a) FE Total Hours $h_b + h_{po} + h_{uo}$	(4b) RE Tobit Total Hours $h_b + h_{po} + h_{uo}$
Public Sector	0.642 (0.814)	-0.560 (0.583)	-1.249 (1.093)	1.596 (0.761)**	-0.607 (1.279)	0.269 (0.506)	-1.321 (1.302)	-0.392 (0.527)
Voluntary Sector	0.301 (0.863)	2.919 (0.701)***	-0.883 (1.158)	-5.997 (1.069)***	-0.582 (1.356)	-0.843 (0.644)	-1.056 (1.381)	-2.376 (0.667)***
$\ln(w_i^*)$	1.770 (1.494)	13.52 (0.685)***	0.755 (2.005)	-9.256 (0.944)***	2.525 (2.348)	5.168 (0.586)***	3.284 (2.391)	6.510 (0.624)***
Age (years)	-1.520 (1.939)	0.240 (0.172)	0.630 (2.602)	0.136 (0.206)	-0.889 (3.047)	-0.0391 (0.137)	0.173 (3.102)	0.0314 (0.145)
Age <sup>2</sup> /100	-0.211 (0.799)	-0.237 (0.197)	0.703 (1.072)	-0.326 (0.241)	0.492 (1.255)	-0.0378 (0.159)	0.628 (1.278)	-0.136 (0.168)
Tenure (years)	-0.0129 (0.160)	-0.172 (0.0739)**	0.0769 (0.215)	-0.135 (0.101)	0.0640 (0.252)	-0.165 (0.0652)**	-0.120 (0.256)	-0.138 (0.0692)**
Tenure <sup>2</sup> /100	0.0743 (0.507)	0.334 (0.242)	-0.481 (0.680)	0.607 (0.336)*	-0.407 (0.797)	0.424 (0.215)**	-0.0476 (0.811)	0.316 (0.228)
Part-Time	-1.942 (1.082)*	-1.876 (0.798)**	-0.962 (1.452)	-2.122 (0.999)**	-2.904 (1.700)*	-2.222 (0.658)***	-9.636 (1.731)***	-17.86 (0.685)***
Temporary Job	-0.202 (0.754)	0.845 (0.698)	1.999 (1.012)**	3.683 (0.970)***	1.798 (1.185)	3.028 (0.647)***	2.664 (1.206)**	4.582 (0.667)***
_cons	66.38 (73.15)	-31.31 (3.518)***	-35.05 (98.18)	16.89 (4.035)***	31.33 (114.9)	-1.164 (2.705)	23.61 (117.0)	33.28 (2.864)***
<i>N</i>	2875	2875	2875	2875	2875	2875	2875	2875
<i>R</i> <sup>2</sup>	0.054	-	0.024	-	0.030	-	0.077	-
<i>AIC</i>	11002.8	12108.1	12695.0	11801.1	13601.6	18302.1	13705.3	20046.6

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Model (a): Fixed Effects  $hours_{it} = \beta_0 + \alpha_i + \beta_{PUB}PUB_{it} + \beta_{VOL}VOL_{it} + \beta_x X_{it} + \varepsilon_{it}$

Model (b): Random Effects Tobit if  $hours_{it} > 0 \rightarrow hours_{it} = \beta_0 + \alpha_i + \beta_{PUB}PUB_{it} + \beta_{VOL}VOL_{it} + \beta_x X_{it} + \varepsilon_{it}$ ; if  $hours_{it} \leq 0 \rightarrow hours_{it} = 0$ ;  $\alpha_i \sim N(0, \sigma^2)$

Total OT = Unpaid OT + Paid OT; Total Hours = Basic Hours + Total OT;  $\ln(w_i^*) = \beta_0 + \beta_z Z_i$

Additional control variables not listed in the table above include organisation size, region, and time dummies.

Table 7: Overtime Equations: Fixed Effects linear regression and Random Effect Tobit models  
(Source: UK Labour Force Survey 1998 – 2002)

## Estimating the Wage Equations

In Figure 3 below the mean hourly wages can be seen by sector over the sample period.

In all three industries the public sector wages are the highest, followed by the voluntary sector, and with wages lowest in the private sector. There appears to be a significant gap between the private sector wages and the other two sectors, while the public and voluntary sector wages seem broadly similar.

Although this does not take account of differences in individuals' characteristics, such as age, education and experience, this suggests that there could be a voluntary sector premium paid to workers in this sector when compared to the private sector.

We also test the robustness of the findings after controlling for unobserved worker heterogeneity by estimating a model using the limited panel structure of the LFS. This allows us to control for potential bias arising from worker selection between sectors.

The adjusted hourly wage, taking account of unpaid overtime, is calculated as follows:

$$w_a = \frac{w_h \cdot h_b + \pi \cdot w_h \cdot h_{po}}{(h_b + h_{po} + h_{uo})} \quad (9)$$

Where  $w_a$  is the Adjusted Hourly Wage,  $w_h$  is the contracted hourly wage,  $h_b$  is the contracted basic hours per week,  $h_{po}$  is the number of hours of paid overtime,  $h_{uo}$  is the number of hours unpaid overtime, and  $\pi$  is the premium paid for overtime working. As the Labour Force Survey does not provide data on wages for paid overtime an average premium of  $\pi=1.28$  was used as per the findings of Bell & Hart (2003) from the British New Earnings Survey.

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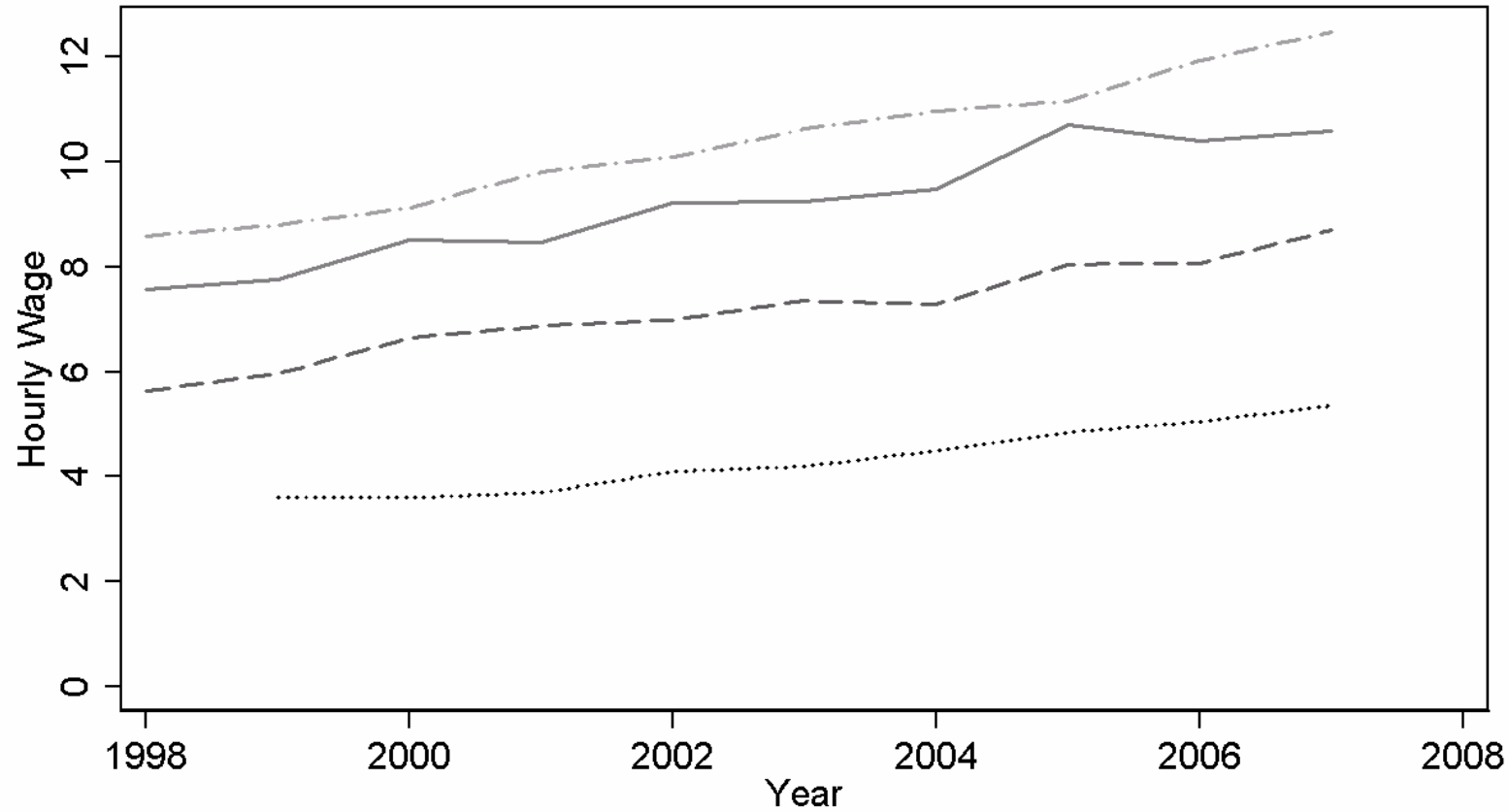


Figure 3 - Average Gross Hourly Pay by Sector & Industry between 1998 – 2007  
(Source: UK Quarterly Labour Force Survey 1998 – 2007)

The adjusted wage was calculated, and the wage equations estimated. The effect of the additional unpaid overtime was estimated using standard Mincer Wage Equations (see (Heckman, Lochner, & Todd, 2006) for a review). Separate equations were estimated for male and female workers, regressing log hourly pay on a range of explanatory variables with sector dummies for the public and voluntary sectors.

The first model is estimated using the pooled cross-section:

$$\ln(w_i^h) = \beta_0 + \beta_{PUB}PUB_i + \beta_{VOL}VOL_i + \beta_x X_i + \varepsilon_i$$

(10)

The wage equation coefficient estimates for the Male and Female workers in the pooled cross-section are shown in Table 8. The first and third columns show the wage equations with the log of the basic hourly wage as the dependent variable. The second and third columns show the wage equations with the log of the adjusted wage as the dependent variable. Coefficients for public sector, voluntary sector, age, experience, tenure, and job status are reported. Also included in the regressions, but not reported in the table, are education, occupation, organisation size, region and year and quarter dummy variables.

In the basic wage equation specification (models 1 and 3) significant wage premiums are found for male and female workers in both the public and voluntary sectors. Estimating the adjusted wage equations (models 2 and 4) reduces the wage premium for male and female workers in the voluntary sector, but has no significant effect on wage premiums in the public sector.

The second model is estimated using the panel dataset:

$$\ln(w_{it}^h) = \beta_0 + \alpha_i + \beta_{PUB}PUB_{it} + \beta_{VOL}VOL_{it} + \beta_x X_{it} + \varepsilon_{it}$$

(11)

Table 9 shows the estimates from the fixed effects wage equations on the panel dataset. As before, columns one and three contain the wage equations for the basic hourly wage, while columns two and four contain the adjusted hourly wage equations. Coefficients for public sector, voluntary sector, age, experience, tenure, job status and

organisation size are reported. Also included in the regressions, but not reported in the table, are education, occupation, region and year and quarter dummy variables.

The basic model estimation (columns 1 and 3) with individuals fixed effects removes the public and voluntary sector wage premiums found in the pooled cross-section, suggesting that these are due to unobserved worker heterogeneity.

Estimating the adjusted wage model (columns 2 and 4), to control for overtime working, now leaves the male voluntary sector wage difference unchanged. However, female workers have significantly lower effective wages in the voluntary sector than the private sector. No significant differences between effective wages in the private and public sectors are found for either male or female workers.

## WAGE EQUATIONS: POOLED CROSS-SECTION

	MALE		FEMALE	
	(1)	(2)	(3)	(4)
	Basic Wage	Adjusted Wage	Basic Wage	Adjusted Wage
Public Sector	0.139 (0.0193) <sup>***</sup>	0.144 (0.0184) <sup>***</sup>	0.147 (0.00739) <sup>***</sup>	0.140 (0.00720) <sup>***</sup>
Voluntary Sector	0.0534 (0.0240) <sup>**</sup>	0.0121 (0.0229)	0.0861 (0.0102) <sup>***</sup>	0.0382 (0.00995) <sup>***</sup>
Age (years)	-0.000428 (0.00892)	0.00469 (0.00854)	0.0187 (0.00479) <sup>***</sup>	0.0239 (0.00467) <sup>***</sup>
Age <sup>2</sup> /100	3.507 (1.025) <sup>***</sup>	2.608 (0.981) <sup>***</sup>	0.701 (0.584)	-0.269 (0.569)
Experience (years)	0.0109 (0.00451) <sup>**</sup>	0.00825 (0.00431) <sup>*</sup>	-0.00149 (0.00247)	-0.00498 (0.00241) <sup>**</sup>
Experience <sup>2</sup> /100	-7.131 (0.839) <sup>***</sup>	-6.401 (0.803) <sup>***</sup>	-4.072 (0.499) <sup>***</sup>	-2.959 (0.486) <sup>***</sup>
Tenure (years)	0.0145 (0.00232) <sup>***</sup>	0.0149 (0.00222) <sup>***</sup>	0.0160 (0.00106) <sup>***</sup>	0.0148 (0.00103) <sup>***</sup>
Tenure <sup>2</sup> /100	-0.0291 (0.00743) <sup>***</sup>	-0.0302 (0.00711) <sup>***</sup>	-0.0301 (0.00363) <sup>***</sup>	-0.0280 (0.00354) <sup>***</sup>
Part-Time Working	-0.0893 (0.0270) <sup>***</sup>	-0.0878 (0.0259) <sup>***</sup>	-0.0255 (0.00590) <sup>***</sup>	-0.00942 (0.00575)
Temporary Job	-0.0907 (0.0264) <sup>***</sup>	-0.0814 (0.0253) <sup>***</sup>	-0.00316 (0.0147)	-0.0180 (0.0144)
_cons	1.613 (0.155) <sup>***</sup>	1.546 (0.148) <sup>***</sup>	1.231 (0.0760) <sup>***</sup>	1.166 (0.0741) <sup>***</sup>
<i>N</i>	3077	3077	12436	12436
<i>R</i> <sup>2</sup>	0.629	0.582	0.615	0.577
<i>AIC</i>	2100.8	1830.8	5474.1	4842.5

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Model 1,3:  $\ln(w_i^h) = \beta_0 + \beta_{PUB}PUB_i + \beta_{VOL}VOL_i + \beta_x X_i + \varepsilon_i$

Model 2,4:  $\ln(w_i^a) = \beta_0 + \beta_{PUB}PUB_i + \beta_{VOL}VOL_i + \beta_x X_i + \varepsilon_i$

(Additional control variables not listed in the table above include Education, Occupation, Organisation Size, Region, and Time Dummies.)

*Table 8: Estimated Sector Wage Differences*

WAGE EQUATIONS: FIXED EFFECTS MODEL

	(1) Male: Basic	(2) Male: Adjusted	(3) Female: Basic	(4) Female: Adjusted
Public Sector	0.00611 (0.0469)	-0.0228 (0.0476)	0.0185 (0.0251)	0.00638 (0.0256)
Voluntary Sector	-0.0352 (0.0483)	-0.0395 (0.0491)	-0.0393 (0.0271)	-0.0680 (0.0277)**
Age (Years)	0.0429 (0.0397)	0.0530 (0.0404)	0.127 (0.0220)***	0.122 (0.0225)***
Age <sup>2</sup> /100	-0.0115 (0.0459)	-0.00731 (0.0466)	-0.0855 (0.0256)***	-0.0742 (0.0262)***
Tenure (Years)	0.0284 (0.00914)***	0.0241 (0.00928)***	0.00102 (0.00437)	-0.00133 (0.00447)
Tenure <sup>2</sup> /100	-0.0792 (0.0290)***	-0.0713 (0.0294)**	0.000393 (0.0174)	0.00621 (0.0177)
Part-Time Working	0.0427 (0.0607)	0.0741 (0.0617)	0.0825 (0.0174)***	0.0816 (0.0178)***
Temporary Job	-0.112 (0.0434)***	-0.0917 (0.0441)**	0.0287 (0.0280)	0.0194 (0.0286)
OrgSize: 1-10	<i>Reference category</i>			
OrgSize: 11-24	-0.0194 (0.0424)	-0.0352 (0.0430)	-0.000377 (0.0216)	0.00277 (0.0221)
OrgSize: 25-49	-0.0142 (0.0503)	-0.0411 (0.0511)	-0.0287 (0.0250)	-0.0198 (0.0255)
OrgSize: 50+	0.0332 (0.0470)	-0.0105 (0.0478)	-0.0209 (0.0239)	-0.0111 (0.0244)
_cons	0.525 (0.855)	0.0345 (0.869)	-1.730 (0.472)***	-1.769 (0.483)***
<i>N</i>	2875	2875	11596	11596
<i>R</i> <sup>2</sup>	0.057	0.064	0.062	0.065
<i>AIC</i>	-5357.0	-5268.3	-21847.0	-21333.3

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

$$\text{Model 1,3: } \ln(w_{it}^h) = \beta_0 + \alpha_i + \beta_{PUB}PUB_{it} + \beta_{VOL}VOL_{it} + \beta_x X_{it} + \varepsilon_{it}$$

$$\text{Model 2,4: } \ln(w_{it}^a) = \beta_i + \alpha_i + \beta_{PUB}PUB_{it} + \beta_{VOL}VOL_{it} + \beta_x X_{it} + \varepsilon_{it}$$

(Additional control variables not listed in the table above include Education, Occupation, Region and Time dummies.)

Table 9: Fixed Effects Wage Equations

A comparison of the wage premiums from the Basic Wage and Adjusted Wage models for male workers is shown in Table 10. The sector coefficients  $\beta_{VOLS}$  and  $\beta_{PUB}$  have been converted from log coefficients to percentages using the equation below as per Halvorsen & Palmqvist (1980).

$$\beta_{VOLS}^{percent} = e^{\beta_{VOLS}} - 1$$

(12)

The first two columns for each sector show the estimated percentage sector wage differences from the wage equations. The third column for each sector shows the difference between these estimates.

MODEL	Public			Voluntary		
	Basic	Adjusted	Difference	Basic	Adjusted	Difference
<b>Female XS</b>	15.8%	15.0%	-0.8%	9.0%	3.9%	-5.1%
<b>Female Panel</b>	1.9%	0.6%	-1.3%	-3.6%	-6.4%	-2.8%
<b>Male XS</b>	14.9%	15.5%	0.6%	5.5%	1.2%	-4.3%
<b>Male Panel</b>	-0.1%	-2.8%	-2.7%	-3.0%	-3.4%	-0.4%

Table 10: Differences in Sector Premiums

For female workers, both models suggest that controlling for hours of overtime has a significant effect on the sector wage differentials. Controlling for individual unobserved heterogeneity accounts for the voluntary sector wage premium, but the addition of overtime then leads to the estimation of a voluntary sector wage discount of around 6%.

Although controlling for overtime reduces the voluntary sector wage premium for male workers in the pooled cross-section model, in the fixed effects model we find no effect from overtime hours on the sector wage differential.

### Tests of Robustness

Once concern in this analysis is whether we have adequately controlled for unobserved job heterogeneity. If there are still significant unobserved differences in the jobs that workers are employed in between the sectors then this could account for some or all of the sector differences. To tackle this we have repeated the cross-

sectional estimations for two more detailed sub-industry classifications: Social Work<sup>6</sup>, and Social Work with Accommodation.<sup>7</sup> Although the sample size is small at the most detailed industry level, the results were robust in both sign and significance. The sample size at this level was too small to permit a panel estimation.

The second concern is the role of part-time working, as this is prevalent in the voluntary sector, and affects the number of contracted hours. The model was re-estimated using only those workers who are on full time contracts, restricting the panel sample to 2,668 male observations and 6,537 female observations. This has no effect on the sign or significance of the estimated effects. Furthermore, it increases the estimated voluntary sector wage discount to 10% below the private sector wage for female workers. The increased warm-glow estimate also supports the formulation of warm glow utility as being related to effort rather than merely participation: the size of this effect is bigger for workers working longer hours in the mission-motivated organisation.

The one-year panel structure of the UK LFS is too short to be able to test for sector differences in future job rewards resulting from overtime. The fixed effects wage equations were estimated interacting tenure with the sector dummies, to test for sector differences in the returns to tenure, and these coefficients were small and not statistically significant. This does not lend support to a link between sector differences in unpaid overtime and later within-firm rewards.

Overall, these findings suggest that there are differences in levels of unpaid overtime between the sectors. Furthermore, for female workers the hours of unpaid overtime support a warm-glow donated labour hypothesis, where additional hours are worked without pay. The same is not true however for male workers. Although there are also significant levels of unpaid overtime in the voluntary sector, controlling for these hours does not affect the sector difference in effective hourly wage.

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<sup>6</sup> SIC Code 85.3, A sub-category of Health & Social Work

<sup>7</sup> SIC Code 85.31, a sub-category of Social Work

## Discussion

This paper has examined working hours and wage data from the UK Labour Force Survey disaggregated by Industry to examine sector differentials within Health and Social Work services, where the majority of voluntary sector workers are employed. The empirical analysis found strong evidence of higher levels of unpaid overtime amongst voluntary sector workers, for both males and females. The basic hours wage equations showed a public and voluntary sector premium for both male and female workers. This is broadly in line with the findings of Leete (2001) using US data. Controlling for unobserved individual heterogeneity with a fixed effects model accounts for the public and voluntary sector wage premiums.

The findings of this paper make two main contributions:

- The apparent nonprofit sector wage premiums in health & social work industries are explained by unobserved worker heterogeneity;
- There are significant differences in overtime working between the sectors, and this has an effect on sector wage differences, providing evidence of warm glow for female workers.

Previous analysis of nonprofit wage differentials using cross-sectional data has shown a variety of wage effects dependent on industry. The caring industries are consistently found to have wage premiums in the voluntary and public sectors, compared to the private sector. The analysis here shows that this can be explained through controlling for unobserved worker heterogeneity.

Our analysis of working hours and overtime in both cross-section and panel models supports the assertion that workers in the voluntary sector work higher levels of overtime unpaid, while those in the private sector work more paid overtime. Two alternative explanations for this were suggested. The first – the warm glow hypothesis – draws on the nonprofit literature to explain higher levels of unpaid overtime in the voluntary sector as being rewarded through intrinsic utility received from participation in a mission-motivated activity. Therefore workers are compensated for their ‘unpaid’ efforts through warm-glow utility.

The second – the gift exchange hypothesis – comes from the unpaid overtime literature and Akerlof's gift exchange model, suggesting that higher basic wages in the voluntary sector compensate for the unpaid overtime. This overtime is not explicitly contracted for, but forms part of the wage bargain and is enforced through organisational norms. This explanation does not require any difference in the intrinsic motivation of workers between sectors. Instead it relies on different types of employment contract being written between the sectors to explain both the differences in overtime patterns and basic wages.

Our findings for female workers support the warm-glow hypothesis, by showing that effective hourly wages are lower than the private sector once unpaid overtime is controlled for. As most workers in the voluntary sector are female, and the majority work in the health & social work industries, this finding would explain why little evidence of female sector wage discounts is found in studies of nonprofit wage differentials in the wider economy. Both unobserved worker heterogeneity and unpaid overtime must be controlled for to examine sector differences in effective hourly wages.

However the findings for male workers differ markedly. A small and statistically insignificant voluntary sector wage discount is found for men, and this sector wage difference is unaffected by controlling for overtime. This would support the second explanation – the gift exchange hypothesis – for wage-setting for male workers. Wages for men in the voluntary sector are not significantly lowered when unpaid overtime is controlled for.

How can we explain this apparent gender difference? It should be noted that the voluntary sector workforce is predominantly female. As with other industries men are disproportionately found in management roles, while the front-line care staff are more likely to be female. This gender difference could then reflect differences in the wage contracts written for management versus service workers. Pannenberg (2005) also found gender differences in the compensation of unpaid overtime, with only male workers reaping the long-run benefits of unpaid overtime. Those findings support the assertion that male and female workers have different motives for undertaking unpaid overtime.

This paper provides some evidence for warm glow in the voluntary sector. In particular, it shows the presence of warm glow amongst female workers, a finding absent in many other studies. It also shows the role that unpaid overtime can play in effective wage differences. This highlights the importance of effort as a largely unobserved variable in usual analysis of wage differentials. Hours of unpaid overtime provide one proxy measure for effort, but more detailed study at the micro-level would be necessary to unpick this relationship.

There is a limit to the extent that we can test hypotheses about wage contracts when we only observe data at the individual worker level. We suggest that there is evidence here of a difference in wage contracts by sector, but further exploration would require the analysis of a matched employer-employee database to capture accurately differences at the organisational level. This is the challenge for voluntary sector research: gathering this level of detailed data on a relatively small sector is not a trivial task. However, the recent growth of the sector, and its increasing role in the provision of public services make it all the more important that these research questions are addressed.

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