THE UNIVERSITY of ADELAIDE

School of Economics

Working Papers

ISSN 2203-6024

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Working Paper No. 2018-2
March 2018

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ABSTRACT

Empirical studies have documented the existence of the public-private pay differentials in both developed and developing countries. The implementation of policies aiming to reduce this gap has however been mitigated or inconclusive. This paper exploits the Single Spine Pay Policy (SSPP) in Ghana as a natural experiment to examine the effectiveness of wage policies in developing countries. The SSPP was implemented in 2010 by the Government of Ghana to address the public-private sector wage gap and improve productivity in the public sector. Using a quantile treatment effect approach based on a Difference-In-Difference (DID) estimation, we show that the SSPP has yet to reduce the wage gap between the public and private sectors across the entire distribution of earnings in Ghana. The improvement observed is only at the lower tail of the distribution of earnings. However, the SSPP has a larger effect on the earnings of female workers than that of males in the education and health services sector, suggesting that the policy was successful in reducing the gender-wage gap in that sector. Moreover, the SSPP has decreased the productivity of workers across the distribution of earnings, mainly due to a decrease in the effort of female public sector workers. Nevertheless, the SSPP has had some successes and could be improved by putting in place a good managerial quality in the government' agencies. In addition, it is important that the Government pays much attention to various macroeconomic factors that have challenged the success of the SSPP.

Key words: Public sector; Efficiency wage theory; Quantile treatment effect model; DID estimation.

JEL classification: C31, G15, J24, J31, J45.

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I Introduction

The implementation of policies aiming to reduce the public-private sector wage gap have received considerable attention in recent years, especially in developed countries (Lausev 2014). Bregn (2013) finds that 80 percent of employers in the OECD economies have either implemented such a wage policy or intended to do so, with the purpose of not only addressing the wage differential but also to increase workers' productivity (Bajorek & Bevan 2015). Their success, however, has been mitigated or inconclusive. While some studies found that adopting a wage policy increases earnings in the public sector (Hasnain & Pierskalla 2012), their effects on productivity have not been addressed. Bryson et al. (2012), Lucifora & Origo (2015) argued that wage policies increase workers' productivity marginally, but their studies remain silent on how such policies correct wage disparities between sectors. Most studies on wage gap often focus on the private sector and little attention is usually paid to the public sector; e.g. (Prentice et al. 2007). Despite the progress made by many countries in recent years to close the public-private sector wage gap, the realisation of this goal remains a challenge especially in developing economies. The few developing countries that implemented wage policies, such as Ghana, have no clear scientific measure of their success.

This study aims to fill this gap by using the Single Spine Pay Policy (SSPP) in Ghana as a natural experiment to examine the effects of wage policies in developing countries. In particular, we investigate whether such a policy reduces the public-private sector wage gap, while achieving maximum productivity. Using the private sector as a control group, we employ a quantile treatment effect approach based on a Difference-In-Difference (DID) estimation to show that the SSPP has yet to reduce the public-private sector wage gap across the entire distribution of earnings in Ghana. The improvement observed is only at the lower tail of the distribution of earnings. Nevertheless, the SSPP has a larger effect on the earnings of female workers than that of males in the public sector, suggesting that the policy was successful in reducing the gender-wage gap in the public sector. Moreover, the policy has decreased the productivity of workers across the effort distribution, mainly due to a decrease in the effort of female public sector workers.

Our findings are similar to Damiani et al. (2016) who estimate a positive policy effect across the quantiles of earnings and productivity of Italians firms. While, Damiani et al. (2016) find a

positive U-shaped curve, we find a (near) U-shaped distributional policy effect on earnings but a downward distributional effect on workers' productivity. When considering gender differences, we find that the SSPP has a positive and near U-shaped effect on earnings of females workers but a downward distributional effect on that of males. In addition, the SSPP has a downward effect on the productivity of female workers, while its effect on that of male workers is an inverted W-shape.

Overall, our findings do not align with the literature on efficiency wage theory that postulates an increase in workers' productivity after the implementation of wage policies. The efficiency wage theory assumes that a higher wage will result in increased effort, thus leading to an increase in productivity. The reasons for such a relationship are that, first, high-paid workers would not shirk knowing the opportunity cost of being fired or losing their wages (Shapiro & Stiglitz 1984, Alexopoulos 2002). Second, as a form of showing appreciation and gratitude to employers, employees will respond positively to an increase in wages with an increase in effort, thus leading to higher productivity (Akerlof 1982, 1984). Lastly, if workers perceive a given wage as fair, there is a high chance they will increase their effort, which in turn will increase their productivity (Akerlof & Yellen 1990).

Our results are in line with the literature on economics of vocation which states that it is costly to pay more to workers in a vocation-intensive sector like education and health services given they have an internal desire to provide their services (Heyes 2005). However, when workers do not perceive their work as a vocation, their intrinsic motivation for the work is far less than the external incentives in the form of salary given to them (Frey 1993). When workers are motivated by external incentives like surviving and the desire to satisfy their everyday needs, there is less morale to increase their effort even with an increase in earnings.

By emphasizing on identifying the causal effect of wage policies, our study contributes to the existent literature on efficient wage policies, and also shed a new light on the disparity between developed and underdeveloped countries on this topic. To the best of our knowledge, this study is the first to empirically examine the effect of wage policies in sub-Saharan countries using the novel causal quantile treatment effect approach recently proposed by Powell (2016), along with the DID estimation. First, by conditioning on workers' unobservable characteristics, we are able to identify the causal effect of the wage policy, despite the presence of other confounding factors

which may have contributed to changes in earnings during the period. Second, most studies of wage policies in the public sector have been limited to workers in the health and education sectors (Makinson 2000, Prentice et al. 2007). By contrast, our analysis of the wage policy effectiveness covers the whole public sector. Third, by distinguishing heterogeneous sub-groups of workers, our results show that the effect of the SSPP is not uniform across these sub-groups. In particular, while women and low-income workers benefited from the policy, males and high-income workers did benefit less, which indicates clearly that the mean-type regression analysis, as often done in the literature, may not be an appropriate way to investigate this type of policies. Moreover, from a methodological viewpoint, an interesting contribution of our study is the use of pseudo panels. The absence of genuine panel data covering all areas in Ghana makes it difficult to have individual observations on workers over time. Following Deaton (1985), we construct a panel data with individual time-invariant characteristics such as year of birth, gender, and ethnic composition of workers.

The remainder of the paper is organised as follows. Section II presents the background and a brief description of the SSPP. Section III introduces the data and the variables used in the study. Section IV details our empirical strategy. Section V discusses the findings and we present some robustness checks in Section VI. Section VII concludes.

II The Single Spine Pay Policy in Ghana

Ghana is a West African country with a population of about 27.4 million, with around 49.75 percent of the population being men (World Bank 2017). The economy of Ghana was predominantly agrarian but recent developments have seen the services and other sectors contributing largely towards its development. The contribution of the agricultural sector to total GDP (Figure 1a) has decreased from 49.92 percent in 1965 to 19.60 percent in 2013, while the share of the services sector has increased from 28.79 to 52.24 percent during the same period (World Bank 2017).

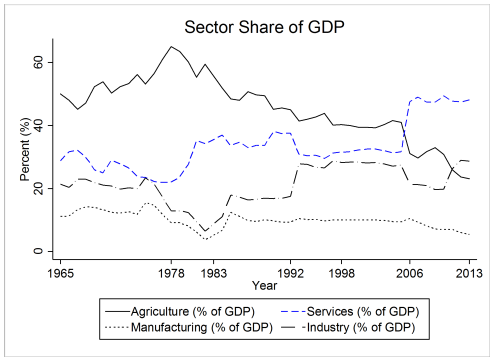
The introduction of democratic rule in 1992, along with subsequent economic reforms, have spurred the expansion of new enterprises, mostly in the private sector. While this rapid development of the private sector has improved earnings for workers, as most private sector employers pay higher wages, the same is yet to be materialized in the public sector. Several studies have found that the public-private pay differential was between 15 to 20 percent prior to 2010 (Glewwe

1991, Verner 1999, Baah & Reilly 2009). This differential was worse for workers on the lower tail of earnings' distribution. Several wage negotiations to address this issue fell through, leading to numerous strikes and a fall in workers hours of work and productivity. Baah & Reilly (2009) evidenced that the hazard rate of strikes is positively related to the strike durations in Ghana. More precisely, their results indicate a higher rate of strikes lasting as long as 30 days (Figure 1b). In addition, they also found that between 1980 and 2004, the public sector had lost on average 5.8 days of work per year as a result of strikes compared to 3.3 days per year in the private sector.

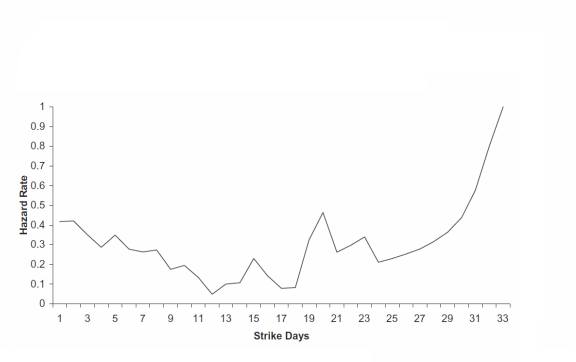
Over decades of failed attempts to address the public-private pay gap and improve workers' productivity in the public sector, the Government of Ghana introduced the Single Spine Pay Policy (SSPP) and implemented it on January 1, 2010. In addition to addressing the public-private sector wage gap, the SSPP aimed not only to reduce the strikes in the public sector and the frequency of wage negotiations, but also to retain skilled workers in the public sector (FWSC 2009). To the government, achieving these objectives were a probable way of containing the cost of the public sector wage bill and ensuring that public sector workers productively spend 8 hours a day and 40 hours a week.

The issue of rising wage bill brings to mind how the Government of Ghana intended to finance the SSPP. In 2007, the Government of Ghana discovered new oil fields on the coast of the Western region. Extraction and large scale sale of the new oil started in 2010 raining in oil rents for the government. Figure 1c shows the GDP growth of Ghana and the share of oil rents to total GDP. The average oil rents share to total GDP was about 0.05 percent during the period 2002 to 2010, but bounced to 4.88 percent in 2011. The late receipt of the rents saw the government paying off arrears to the public sector workers from 2011. However, while well–intentioned, the SSPP may not have a significant impact on the earnings in the public sector due to the expansionary trend in the GDP per capita since 1992 (Figure 1d). This increase may be attributed to many factors such as the establishment of new enterprises (as mentioned earlier). Therefore, the rising earnings may be a reflection of the increasing trend in the performance of the economy, rather than the impact of new oil discoveries which facilitated the implementation of the policy. This study aims to clarify this issue by proposing an econometric strategy to identify the causal effect of the SSPP.

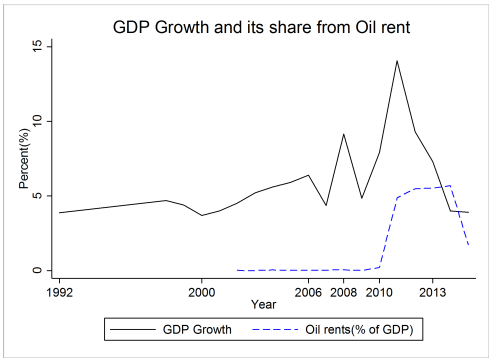
FIGURE 1: Economic Indicators and Strikes Duration in Ghanaian



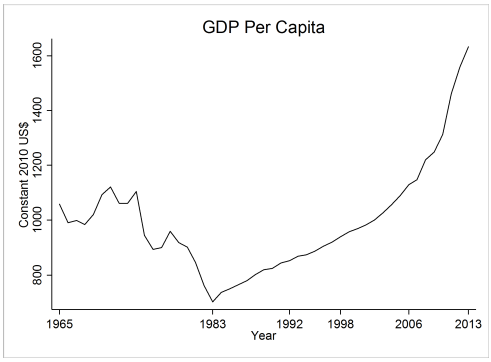
(a) Sector Share of GDP



(b) Hazard rates of strike duration in Ghana from Baah & Reilly (2009).



(c) GDP Growth in Ghana



(d) GDP per capita at 2010 constant US prices

III Data

We use data from the Ghana Living Standard Survey (GLSS), rounds 4,5 and 6 conducted in 1998, 2006 and 2013 respectively. This means there are two pre-policy (1998, 2006) and one post-policy (2013) data points. This is a national representative and one of the largest repeated cross-section dataset with 5998 households in 1998, 8687 in 2006, and 16772 in 2013, surveyed across the 10 regions of Ghana (Ghana Statistical Service 2016)[1]. The data include household socioeconomic characteristics and a roster of members in the household, their employment status, their sector of work, their earnings, their hours of works, their ages and educational attainment, ethnic composition and other demographic variables. We restrict our sample to only respondents

[1]The GLSS has a wider coverage than the Ghana Household Urban Population Survey which is a panel and covers only the urban cities in Ghana.

above 15 years[2] and employed.

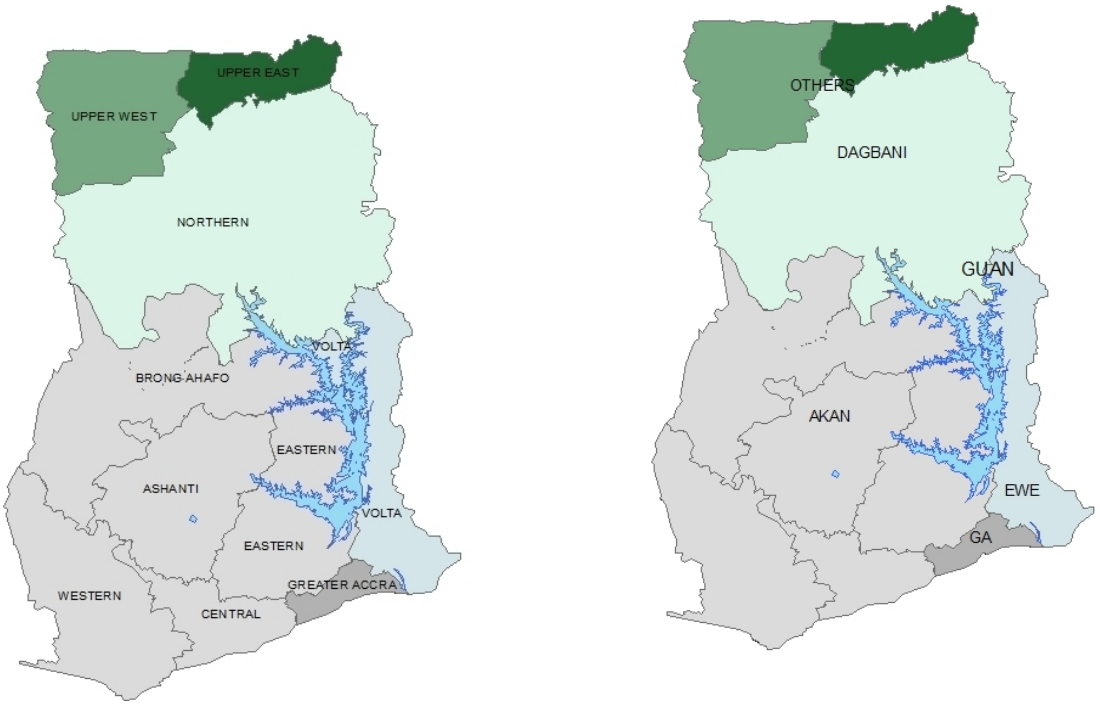
As the GLSS is a repeated cross-section data, the unavailability of a panel form makes it difficult to follow the respondents over time. We tackle this challenge by constructing a pseudo panel (Deaton 1985). The approach is such that respondents are grouped into cohorts according to the same time invariant characteristics that identify them. We then compute averages of continuous time-varying variables for each cohort across each survey and used them as observations. Discrete time varying variables like marital status and household status (head or not) are, however, used as reported because they are considered to be rid of errors (Deaton 1985). The individual fixed effect which identifies the unobserved heterogeneity in a panel data is then referred to as a cohort fixed effect. Though this is not necessarily following individuals over time but rather cohorts, it makes it possible to infer individuals' behavior from a group with similar characteristics. In the literature, the widely used time-invariant characteristics to construct cohorts have been the birth year and gender. We use these variables for the reasons that they depict the *life-cycle* and existing wage differentials between and among workers. The well-known Mincer (1974) wage equation considers age (experience) as an important determinant of earnings, and this was proven to be the case in Ghana (Glewwe 1991). Glewwe (1991) found that the age-earning profile depicts the experience and earning profile of workers, and that even within the same age-earning profile, there exists a pay differential by gender. Various studies, Newell & Reilly (1996), Cohen & Huffman (2007) and Aizer (2010) also found that the gender wage gap exists in both developed and developing countries, mostly in favor of men.

In addition to year of birth and gender, we also construct cohorts using the ethnic composition of the respondents. The use of the ethnic composition to construct cohorts is inspired by Easterly & Levine (1997), who investigated the effect of ethnic diversity on economic development in both developed and developing countries. They found that diversity of ethnic backgrounds in most countries (developed and developing) influences the differences in income and productivity. Easterly & Levine (1997) argue that these differences arise from various innate capabilities that characterise each ethnic group, making ethnicity an important factor to consider when estimating earnings and productivity.

The Ghanaian population is very diverse with different ethnic groups. This diversity affect

[2]This is because by the International Labour Law, working at age below 15 years is a child labour.

FIGURE 2: Regions and Distribution of Major Ethnic Groups in Ghana



their upbringing and this is reflected in their years of education, choice of work, and their earnings (Easterly & Levine 1997, Le 1999, Swee 2015). Across Ghana, the ethnic groups are widely dispersed in the regions. However, each region is very well represented by a major ethnic group and this affects the economic activity of the people in that region. The majority of the population belong to the Akan ethnic group and this is clearly seen in Figure 2[3]. The Dagbanis and the Ewes are the next most populous ethnic groups followed by the Ga-Adamgbes who are mostly found in the Greater Accra region. The northern part of Ghana is mostly occupied by minor ethnic groups with similar cultural orientation. The Dagbanis, Gonjas, and the Guans make up the majority of the population in the Northern part of Ghana. Other ethnic groups like the Gursi and Gurma are mostly found in the Upper East and West of Ghana. These groups and other minor ones are widely dispersed in the 3 northern regions.

In forming cohorts, it is necessary to ensure that there is enough heterogeneity in the groups.

[3]These proportions are estimated using the 3 surveys. Figures A.1 and A.2 in the Appendix show the distribution of earnings per ethnic group and the distribution of ethnic groups in the public sector respectively in our sample.

This requirement calls for larger cohort size and groups. The restriction on the available data makes it difficult to ensure these two requirements are satisfied, which usually leads to a trade-off between efficiency and bias. This is because a larger cohort size will reduce the number of groups (thus rendering the estimates efficient but biased), whereas a small cohort size and a larger number of groups will result in less efficient estimates but rid of bias. Verbeek & Nijman (1992) note that the main problem of cohort fixed effect is that it is time-varying, unobserved and very likely to be correlated with the averages of the variables. With the average cohort effect varying over time, treating them as random will result in inconsistent estimates, and treating them as fixed will lead to identification problems unless the variation of the cohort effect over time can be neglected. However, with cohorts sizes of at least 100, there is a chance of having the errors resulting from averaging the variables being neglected, and the estimates being consistent (Verbeek & Nijman 1992).

We form the cohorts, first, by combining all ethnic groups with less than 1,000 respondents as "Others." This group together with the Akan, Ewe, Ga-Adamgbe, Guan and Mole-Dagbani make up 6 ethnic groups. We then form the year of birth cohort by using different year intervals (25, 16, 6) so as to have an equal proportion (16 percent) of respondents in each cohort. Using equal year intervals will leave some year cohorts with fewer respondents. We finally form the cohorts from 6 ethnic groups, 6 birth years and 2 gender groups giving us 72 groups[4] in each survey. Sixteen (16) percent of the total created cohorts have less than 100 respondents; this is tolerable from the literature on pseudo panel construction.

IV Empirical Strategy

To identify the effect of the SSPP, we use a quantile treatment approach along with a Difference-In-Difference (DID) estimation. Section A details the specification used, while Section B discusses briefly the identification issues related to this type of models.

[4] Other groups were also constructed but most of the cohorts size were less than 100 and had less heterogeneity in them. Details of the variables used are included in Tables A.1-A.4 of the Appendix.

A Model specification

We consider the following quantile treatment effect framework (Powell 2016):

$$\overline{Y}_{ct} = (PUB \times POL)'\beta(U_{ct}) + \overline{X}'_{ct}\gamma(U_{ct}) + a_t(U_{ct}) + r_c(U_{ct}) + s_c(U_{ct}) \quad (1)$$

$$U_{ct} = f(A_c, V_{ct}), \quad (2)$$

where $\overline{Y}_{ct}$ refers to the average of the outcome variables—log of monthly labour earnings or log of weekly hours of work (effort)—of cohort c at time t; $(PUB \times POL)$ is our variable of interest—PUB and POL are indicators for public sector and period after the SSPP—with coefficient of interest $\beta(U_{ct})$ measuring the effect of the SSPP on monthly earnings or effort of workers; $\overline{X}_{ct}$ is a vector of covariates—years of education, years of experience and demographic factors—and its coefficient γ measures the effect of a change in these covariates on log of monthly earnings or log of weekly hours of work; a_t, r_c and s_c are year, regional, and industry-specific fixed effects respectively, that address any potential endogeneity in the variable of interest, $(PUB \times POL)$. U_{ct} denotes time-invariant and time-varying characteristics, modelled as a function of the cohort fixed effects A_c and the idiosyncratic shocks V_{ct}. It is worth noting that the policy effect, $\beta(U_{ct})$ is time-varying as U_{ct} incorporates time-varying characteristics.

The monthly earnings used in the regressions only cover the work done within a month (in both the private and public sector). In the survey, respondents were asked to report their earnings from both the main and secondary jobs. We use only the earnings from the main job for two reasons. First, there are many missing observations in the secondary jobs data, and second, the main job earnings suffice to achieve our objectives. The underlying assumption is that for $PUB \times POL$ to be exogenous, there should not be any information provided about U_{ct} conditional on $\overline{X}_{ct}$, i.e $U_{ct}|PUB \times POL, \overline{X}_{ct}$ has zero τ quantile. This means that, changes in $PUB \times POL$ and $\overline{X}_{ct}$ are uncorrelated with changes in U_{ct} when the cohort effects are controlled for. This implies that the structure of the rank is conditionally stable and yields the distribution of $\overline{Y}_{ct}|(PUB \times POL), \overline{X}_{ct}$. The function U_{ct} is often called the rank variable and it indicates the variation in the coefficients $\beta(U_{ct})$ and $\gamma(U_{ct})$ at the τ-quantile of $\overline{Y}_{ct}$. Therefore, U_{ct} indicates how these coefficients are to be interpreted in the quantile regression. The rank structure is useful in defining the distribution of the potential outcomes, thus workers with high quantiles have high

value of U_{ct} which is a function of their cohort and idiosyncratic effects. The assumption on the rank structure is commonly used in the literature, and allows for recovering the joint distribution from the marginal ones. Each observation is assumed to maintain its rank in the distribution of earnings and effort regardless of the treatment status so that the estimated effect is the treatment effect for observations at the quantile of the potential outcome distributions (Melly & Wüthrich 2016). This rank assumption is different from that with additive fixed effects. While the former yields the estimation of the distribution of $\overline{Y}_{ct}|PUB \times POL, \overline{X}_{ct}$, the latter approach only yields the estimation on the distribution of $(\overline{Y}_{ct} - U_{ct})|PUB \times POL, \overline{X}_{ct}$. This means that in the latter, individuals at the bottom of the distribution $(\overline{Y}_{ct} - U_{ct})|PUB \times POL, \overline{X}_{ct}$ may be closer to the top of the distribution $\overline{Y}_{ct}|PUB \times POL, \overline{X}_{ct}$, thus contradicting the rank assumption. Interestingly, Powell (2016) methodology of estimating the quantiles of $\overline{Y}_{ct}|PUB \times POL, \overline{X}_{ct}$ yields consistent estimates even for short T ($T = 3$ in this study), which is an advantage over quantile regressions with additive fixed effects that require large T.

Conditioning on covariates like educational attainment and years of experience matters in the determination of earnings and productivity; e.g., Mincer (1974), Glewwe (1991), and Adamchik & Bedi (2000). Other factors like marital status, household head status, and father's working status also influence earnings (Le 1999). Ignoring these variables will result in a misspecified model, thus leading to imprecise estimates (Powell 2016).

The year fixed effects help in capturing various economic and political happenings that have evolved over time. Ignoring the activities of government which could in a way influence the earnings of workers will affect the identification of the policy effect. One interesting factor that made it possible for the implementation of the policy was the availability of an extra source of funding for the government as a result of an oil discovery in 2007. A new source of funding was needed as the government did not have stored up funds to embark on such a huge expenditure. The performance of the economy prior to the SSPP implementation, as noted by the World Bank, was declining with an annual growth rate averaging 6 percent. The growth rate increased from 5 percent in 2010 to 14 percent in 2011 (Figure 1c, Section 2) and declined to 9 percent the following year World Bank (2017). This shock could be attributed to the discovery and extraction of new oil fields from 2010. This discovery may make the policy endogenous and not accounting for this may result in an inefficient estimation of the policy effect. One way to

address this, is to have a time dummy for the period of the oil discovery. The data available does not allow to have a different time dummy for the period after oil discovery and the pay policy. However, the inclusion of the year fixed effect helps to address this problem. Another way is the inclusion of regional effects which will account for the economic activities that evolved after the oil discovery.

The inclusion of the cohort fixed effect and industry-specific fixed effect is of essence as this helps in not attributing the effect of time invariant traits to the policy.

The literature on efficiency wages considers working hours as a measure of effort. (Katz 1986, Campbell 2006). Effort, according to the literature, is positively related to the level of productivity of a firm or an individual. In Ghana, workers are by law[5] required to work 8 hours a day and 40 hours a week for a full time work. This is admonished in the public sector and it was a reason for the government agreeing to a new pay policy. The believe is that, effectively working within this stipulated hours will result in higher level of productivity and result in a cut in employment in the public sector. This institutional setting renders it possible to measure the effort of workers, thus their level of productivity, through hours of work. Considering the unavailability of a better measure of productivity from the individual data, and more importantly the underlying theory, we use hours of work as an '*indirect*' measure of productivity. We propose two approaches in measuring effort. First, we use log of weekly hours of work. This approach is deemed appropriate as it is easier to capture a possible change in effort on average and also at the quantiles. Next we use a dummy that takes 1 if an individual works at least 40 hours a week (more productive worker) and 0 otherwise (less productive worker).

We estimate the DID model using the Generalized Methods of Moments(GMM) approach by Powell (2016) with two moment conditions. The first is the within transformation of the data which ensures that the within cohorts comparison is used for identification. The second moment condition ensures that, on average, the expected probability of each cohort is equal to the quantile function. The two moment conditions can be written formally as:

$$E\left\{\frac{1}{2T^2}\sum_{t=1}^{T}\sum_{s=1}^{T}(Z_{ct}-Z_{cs})\left[\mathbb{1}(\overline{Y}_{ct}\leq q(D_{ct},\tau))-\mathbb{1}(\overline{Y}_{cs}\leq q(D_{cs},\tau))\right]\right\} = 0 \tag{3}$$

$$E\left[\mathbb{1}(\overline{Y}_{ct}\leq q(D_{ct},\tau))-\tau\right] = 0, \tag{4}$$

[5]See Ghanian Labour Act 2003, Section on hours of work.

where Z_{ct} and Z_{cs} are instruments in cohort c at time t and s, D is the treatment variable, $PUB \times POL$, τ is the τ-quantile of $\overline{Y}_{ct}$, and $q(D_{cs}, \tau)$ is a strictly increasing function of τ. The GMM estimator obtained by using the two moments conditions in (1)–(2) may be difficult to compute. Powell (2016) proposes to use the following equivalent moment conditions:

$$E\left[\frac{1}{T}\sum_{t=1}^{T}(Z_{ct}-\overline{Z}_c)\left[\mathbb{1}(\overline{Y}_{ct}\leq q(D_{ct},\tau))\right]\right] = 0 \tag{5}$$

$$E\left[\mathbb{1}(\overline{Y}_{ct}\leq q(D_{ct},\tau))-\tau\right] = 0, \tag{6}$$

where $\overline{Z}_c = \frac{1}{T}\sum_{t=1}^{T} Z_{ct}$. The GMM estimator of $\beta(\tau)$ and $\gamma(\tau)$ in (1)–(2) solves the minimization problem

$$\min_{b\in\mathcal{B}} Q(b): \; Q(b) = m(b)'W(b)m(b), \tag{7}$$

$$m(b) = \frac{1}{N}\sum_{c=1}^{N} m_c(b), \quad m_c(b) = \begin{bmatrix} \frac{1}{T}\sum_{t=1}^{T}(Z_{ct}-\overline{Z}_c)\left[\mathbb{1}(\overline{Y}_{ct}\leq D_{ct}'b)\right] \\ \frac{1}{T}\sum_{t=1}^{T}\mathbb{1}(\overline{Y}_{ct}\leq D_{ct}'b)-\tau \end{bmatrix},$$

where $\mathcal{B} = \left\{b: \; \tau - \frac{1}{N} < \frac{1}{N}\sum_{c=1}^{N}\mathbb{1}(\overline{Y}_{ct}\leq D_{ct}'b) \leq \tau \;\text{ for all } t\right\}$, $b \equiv [\beta(\tau)', \gamma(\tau)']'$, $W(b)$ is a weighting matrix, and N is the size of cohorts. Restricting the parameters to $\mathcal{B}$ guarantees that the condition $\overline{Y}_{ct} \leq D_{ct}'b$ holds for (approximately) $100\tau\%$ of the observations in each time period. We use the Markov Chain Monte Carlo algorithm (MCMC) to solve the optimization problem, as suggested by Powell (2016).

B Threat to Identifying a Significant Policy Effect

The source of a policy variation needs to be understood better in order to avoid making erroneous inferences (Besley & Case 2000). A change in the monthly earnings and weekly hours of work could be as a result of series of factors but not necessarily the policy. Also, an important factor to consider is the control group with which the treated group is being compared to. The private sector is an equally viable option for public sector workers provided they find their efforts not to be rewarded accordingly. We use the private sector as a control group because there is a fear that the government will lose its workers to this sector, but not the other way around (FWSC 2009). Although there is job security in the public sector, the monetary gain is a clear cut for

workers to move to the private sector (Adamchik & Bedi 2000). From that perspective, we are interested in the existence of factors that could result in changes in monthly earnings and effort in favour of either the public or private sector.

TABLE 1: Pre-Policy Descriptive Statistics

Variables	Total	Private Sector	Public Sector	Diff	P-Value
Log of Monthly Earnings	3.907***	4.066***	3.747***	0.318	0.244
	(0.061)	(0.009)	(0.114)	(0.274)	
Log of Hours of Work	3.807***	3.816***	3.798***	0.017	0.617
	(0.014)	(0.027)	(0.001)	(0.035)	
Years of Education	7.572***	7.374***	7.769***	0.394	0.591
	(0.037)	(0.023)	(0.579)	(0.733)	
Experience	10.602	10.535	10.789	0.254	0.133
	(6.176)	(6.197)	(6.119)	(0.411)	
Square of Experience/100	1.505	1.494	1.538	0.045	0.308
	(1.596)	(1.602)	(1.581)	(0.209)	
Married Workers	0.630	0.545	0.715	0.170	0.212
	(0.487)	(0.522)	(0.451)	(0.369)	
Male Workers	0.556**	0.538	0.572	0.033	0.808
	(0.272)	(0.519)	(0.495)	(0.371)	
Formally Employed Father	0.192	0.077	0.306	0.229	0.073
	(0.369)	(0.277)	(0.461)	(0.358)	
Observations	12,321	5,433	6,888		

Notes: Figures reflect averages prior to the policy. Monthly earnings are the earnings reported by the respondents to the question "What is the amount received for the work done". The frequency (daily, weekly, monthly, yearly) to which this amount was paid is also reported. As most workers in Ghana are paid monthly, we use this unit of measurement. Years of education refers to the average years of formal education completed. Experience refers to the number of years of actively being working. Married worker is a dummy variable taking the value of 1 if the respondent is married and 0 otherwise, and similarly for Male workers. Formally employed Father is a dummy variable taking the value 1 if the respondents' father has/had a white collar job. Standard errors are in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 1 shows the mean differences in the monthly earnings, weekly hours of work among other explanatory variables of both sectors, prior to the implementation of the SSPP. The public sector workers seem, on average, to be more educated and highly experienced than those of the

private sector, but such differences are statistically insignificant to contribute to any change in the monthly earnings and weekly hours of work. A closer look at the income and effort of workers reveal the story about unfolding. Figure 3 depicts the earnings of workers before and after the policy. There is an increase in the earnings of the public sector but their weekly hours of work have decreased marginally after the SSPP was implemented. The distribution of the earnings in these two sectors, as depicted show that the public sector earnings are concentrated around the mean after the policy was introduced, with a reduction in the distribution towards the lower tail. This indicates homogeneity in the earnings of most workers in that sector, and similarly for the private sector. Regarding the weekly hours of work in Figure 4, the distribution did not change much for both sectors but a large fraction of workers have their weekly hours of work close to the mean after the SSPP was implemented. This, however, may not be enough in establishing the absence of selections on unobservable factors. We thus conduct placebo tests, as well as other robustness checks in section B to ensure the estimates are well identified.

FIGURE 3: Distribution of Monthly Earnings

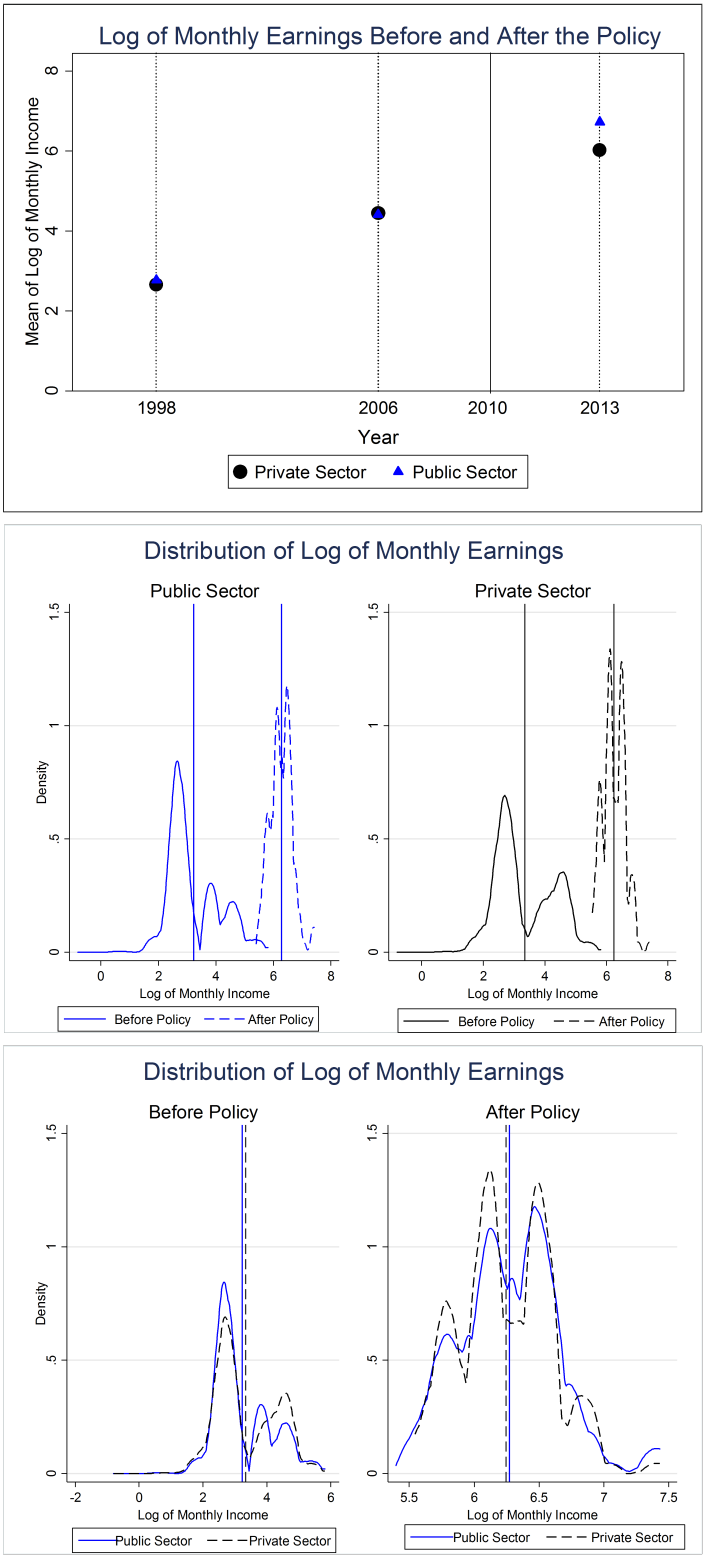
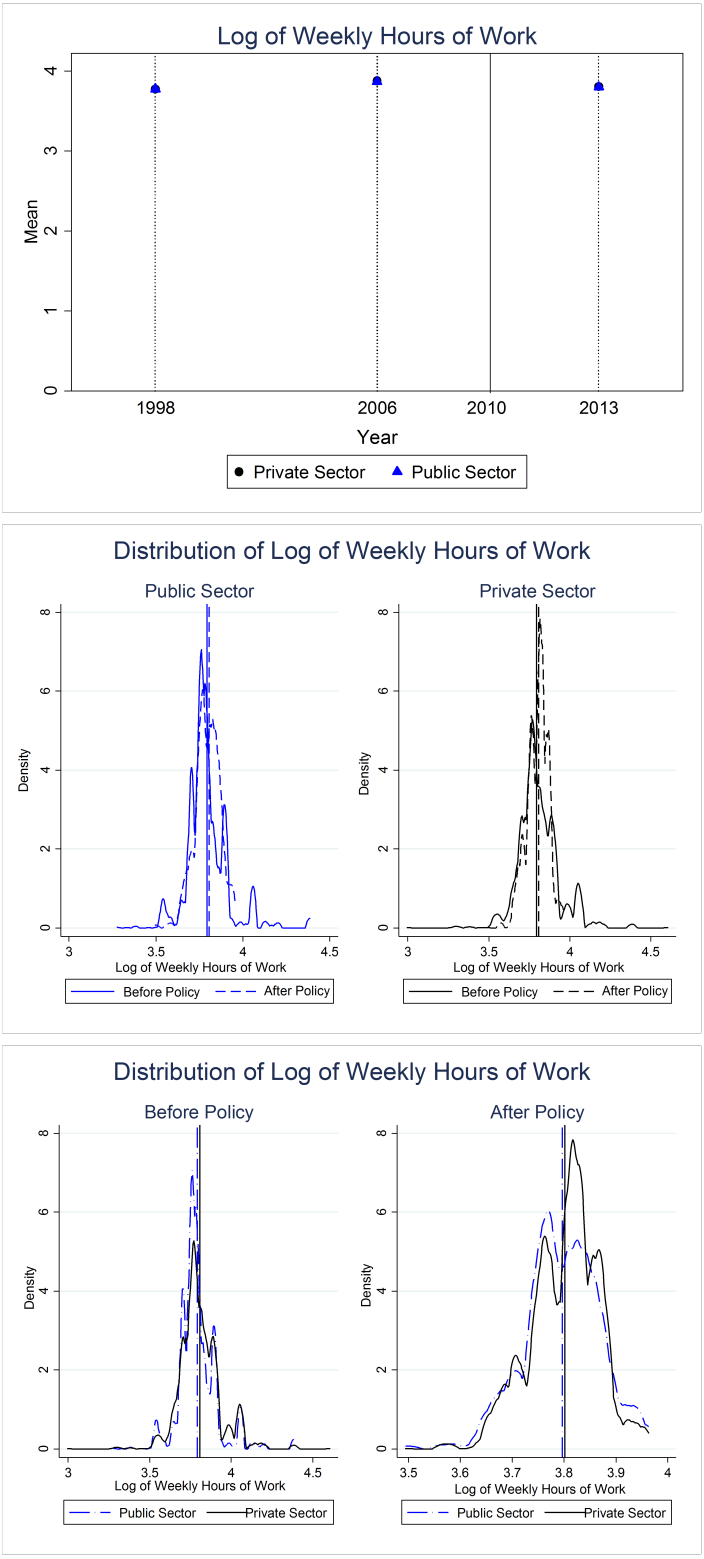


FIGURE 4: Distribution of Weekly Work Hours



V Results

For clarity, we present the effects of the SSPP on *earnings* and *effort* on separate sections.

A Policy Effect on Earnings

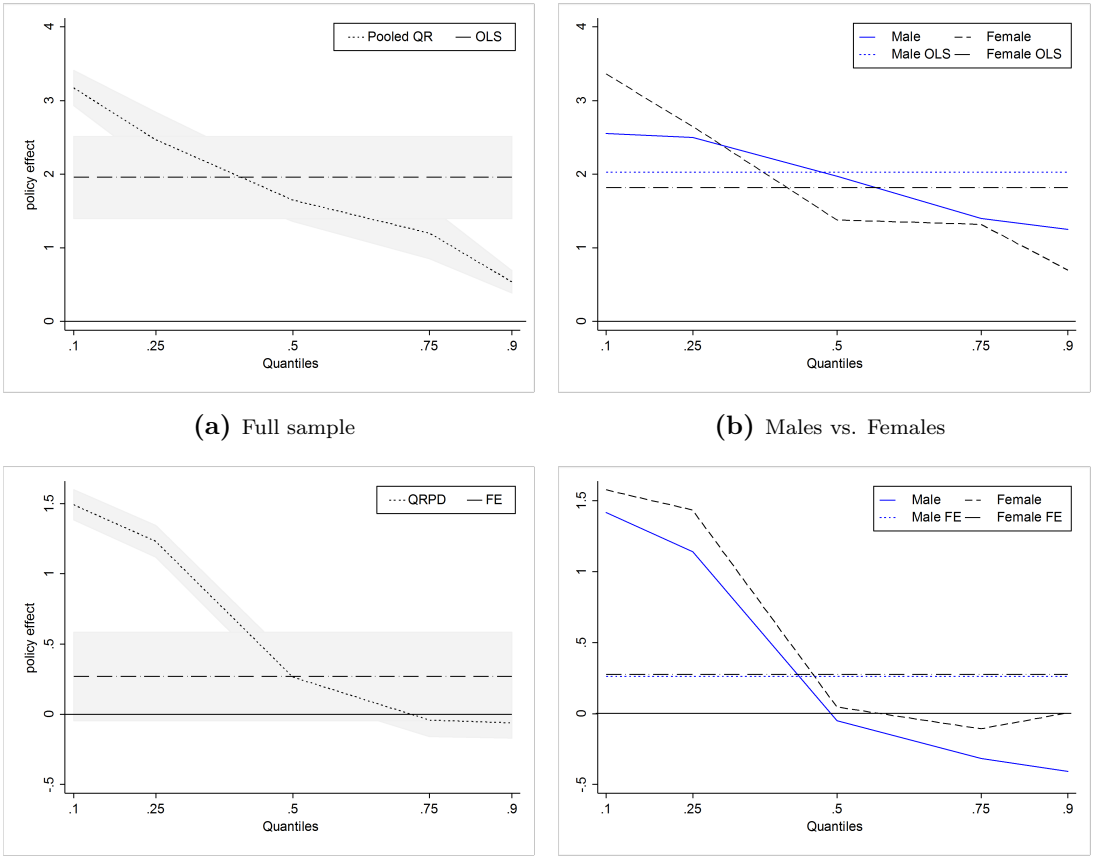
Table 2 shows the estimates of the policy effect on log of monthly earnings. The OLS and pooled quantile estimates based on Koenker & Bassett Jr (1978) are presented in Table 2.I and Table 2.II, whereas Table 2.III shows the quantile fixed effect (QRPD) estimates using the approach by Powell (2016). The estimates in Table 2.I with no individual controls and cohort effects suggest the SSPP has a positive and statistically significant effect on average, and also across the earnings distribution, except at the 90^{th} quantile. Including controls for workers' education, years of experience, marital status, presence of union at place of work, household status (head or not), and fathers' choice of work (white collar job or not), reduces the policy effect on average and also across quantiles of the distribution (Table 2.II). The reduction in the effect of the SSPP after the inclusion of control variables indicates the role individual factors play in determining earnings. Across the quantiles of the log of monthly earnings, the SSPP had its highest effect at the lower tail of the distribution and the impact decreases gradually as the quantiles increase. Figure 5 shows the graphs of the estimates in Table 2.II. The DID estimates are on the y-axis and the quantiles of log of monthly earnings on the x-axis. The effect of the policy is significantly above and below the average effect (OLS), indicating the heterogeneous nature of the policy on the monthly earnings in the public sector.

These effects, however, reduces with the inclusion of the cohort fixed effects as shown in Table 2.III and in Figure 5. The inclusion of the cohort fixed effect indicates that omitting the unobserved heterogeneity arising from the year of birth, the gender and ethnic composition, will bias the effect of the SSPP upwards. Another significant result is that the effect of the SSPP is positive on average but negative and significant beyond the median quantile; indicating a negative effect on the earnings of public sector workers. Whereas the SSPP increased the monthly earnings of public sector workers at the 10^{th} quantile by 21.45 and 13.24 percentage points for workers at the 25^{th} quantile, it reduced the monthly earnings of public sector workers at the 75^{th} quantile by 0.56 and 0.48 percentage points for those at the 90^{th} quantile.

Table 2 also shows the public-private earnings gap in the absence of the SSPP. The first row of

every panel shows the public sector workers, on average, earn less than their private counterparts, and also at every quantile of the earnings distribution. Though not statistically significant on average, these wage gaps are significant at the lower tails of the earnings distribution, with or without controls. The true effect of the SSPP is obtained as the sum of the public-private wage gap and the DID estimate in Table 2.III. We see that although the effect of the SSPP is positive, its objective of addressing the earnings gap was not realised as the public sector earn between 30 to 90 percent less across the quantiles.

FIGURE 5: DID estimates of the policy effect on monthly earnings



(a) Full sample

(b) Males vs. Females

(c) Full sample

(d) Males vs. Females

Many studies on this topic often use hourly labor earnings from the main job in order to control for the number of hours worked. We have estimated the model using hourly labor earnings as outcome variable and the results are presented in Table 3 and Figure 6. As seen, the results are similar to the one reported in Table 2 and Figure 5. In particular, We observe an

TABLE 2: DID estimate of policy effect on Log of Monthly earnings

I-Pooled QR with no controls	OLS	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
Public Sector	-1.120	-2.221***	-1.261***	-0.799	-0.742	-0.012
	(0.324)	(0.425)	(0.499)	(0.654)	(0.191)	(0.646)
Public X Policy	2.107***	3.286***	2.489***	1.938***	1.525***	0.418
	(0.326)	(0.436)	(0.496)	(0.651)	(0.200)	(0.649)
Individual controls	No	No	No	No	No	No
Cohort fixed effect	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,473	24,473	24,473	24,473	24,473	24,473
II-Pooled QR with controls						
Public Sector	-1.628	-2.520***	-1.960***	-1.380***	-1.139**	-0.659***
	(0.283)	(0.119)	(0.186)	(0.155)	(0.188)	(0.076)
Public X Policy	1.931	3.173***	2.465***	1.655***	1.205***	0.542***
	(0.283)	(0.122)	(0.191)	(0.149)	(0.182)	(0.077)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,415	24,415	24,415	24,415	24,415	24,415
III-QRPD	FE	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
Public Sector	-1.191	-1.520***	-1.249***	-0.416	-0.035	-0.012
	(0.186)	(0.007)	(0.003)	(0.009)	(0.008)	(0.003)
Public X Policy	0.095	1.498***	1.201***	0.265***	-0.041***	-0.061***
	(0.187)	(0.122)	(0.191)	(0.011)	(0.008)	(0.004)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,579	24580	24,639	24,639	24,639	24,639

Notes: We follow Koenker & Bassett Jr (1978) to estimate the pooled quantile regression of parts I and II, and Powell (2016) for III. Individual controls include workers' education, years of experience, marital status, presence of union at place of work, household status (head or not) and fathers choice of work (white collar job or not). Bootstrapped Standard errors with 1000 replications in parentheses for parts I and II and MCMC algorithm for III. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

insignificant effect of the policy on average but a significant downward effect across the quantiles with the overall policy effect being negative. As in the monthly earnings regressions, we see

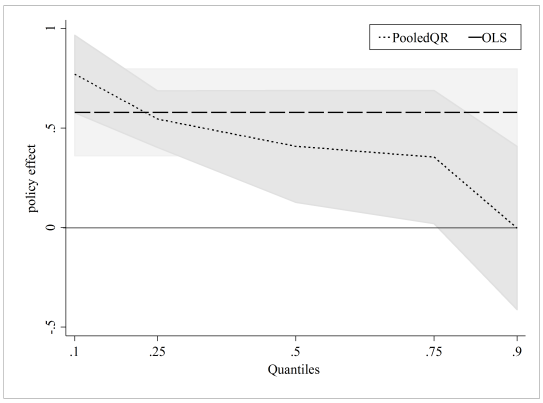
that females workers are more affected by the policy than males across the quantiles of hourly earning's distribution (see Figure 5d).

TABLE 3: DID estimate of policy effect on Log hourly earnings

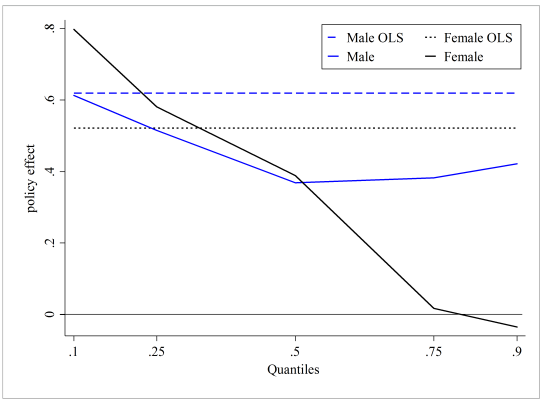
I-Pooled QR with no controls	OLS	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
Public Sector	0.579***	-0.549***	-0.296**	-0.434**	-0.226	-0.063
	(0.111)	(0.048)	(0.117)	(0.192)	(0.180)	(0.231)
Public X Policy	2.107***	0.839***	0.643***	0.742***	1.525***	0.123
	(0.326)	(0.051)	(0.116)	(0.192)	(0.180)	(0.230)
Individual controls	No	No	No	No	No	No
Cohort fixed effect	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,473	24,473	24,473	24,473	24,473	24,473
II-Pooled QR with controls						
Public Sector	-0.315	-0.595***	-0.372***	-0.253*	-0.289*	-0.050
	(0.095)	(0.098)	(0.072)	(0.143)	(0.170)	(0.206)
Public X Policy	0.428***	0.771***	0.545***	0.408***	0.354**	-0.003
	(0.096)	(0.099)	(0.072)	(0.143)	(0.171)	(0.209)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,415	24,415	24,415	24,415	24,415	24,415
III-QRPD	FE	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
Public Sector	-0.0271	-0.328***	-0.271***	-0.0289***	0.00845***	0.00215***
	(0.0364)	(0.000193)	(0.000341)	(0.00142)	(0.000657)	(0.000452)
Public X Policy	0.0223	0.324***	0.265***	0.0232***	-0.0110***	-0.00538***
	(0.0374)	(0.000178)	(0.000373)	(0.00132)	(0.000585)	(0.000501)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,579	24580	24,639	24,639	24,639	24,639

Bootstrapped Standard errors with 1000 replications in parentheses for parts I and II and MCMC algorithm for III. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

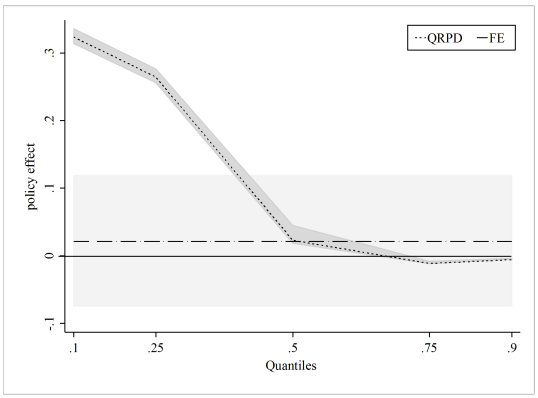
FIGURE 6: DID estimates of the policy effect on hourly earnings



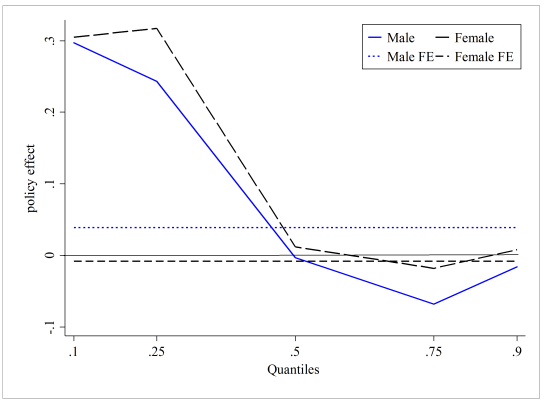
(a) Full sample



(b) Males vs. Females



(c) Full sample



(d) Males vs. Females

B Policy Effect on Effort

We examine the effect of the SSPP on the effort of public sector workers. The estimates using the log of hours of work as outcome variable is presented in Table 4. As before, the OLS and pooled quantile estimates based on Koenker & Bassett Jr (1978) are presented in (Table 4.I) and (Table 4.II) respectively, whereas Table 4.III shows the fixed effect QRPD estimates using the approach by Powell (2016). The DID estimates with no individual controls and cohort fixed effects are positive and significant on average and also at the 10^{th} quantile, but negative and significant at the 90^{th} quantile of weekly hours. This indicates a fall in the effort of public sector workers after the implementation of the SSPP.

The inclusion of individual controls reduces the effect of the wage policy on public sector effort on average and also at the 10^{th} quantile. The effect, however, is negative from the median and only statistically significant at the 90^{th} quantile (Table 4.II). Moreover, the SSPP effect on the effort of public sector workers reduces and turn negative on average and also beyond the median after including the cohort fixed effect (Table 4.III). Figure 7 shows the SSPP effect on the effort of workers. There is a significant effect of the SSPP below and above the average indicating that the heterogeneous effect across the quantiles is informative as an average estimate will disregard the reduction in effort of workers at higher tails of the effort distribution.

Like in the case of monthly earnings, the SSPP did not achieve its objective of ensuring an increase in the effort and in turn the productivity in the public sector. The public-private effort gap, without the policy, is significantly positive on average and also at the 90^{th} quantile (Table 4.III). The public sector reduced their effort by 0.4 percent on average and between 0.1 and 0.3 percent across the quantiles after the implementation of the SSPP.

An alternative approach to test for the effectiveness of the SSPP on effort is to use a dummy variable taking a value of 1 if an individual works 40 hours or more a week, and 0 otherwise. We find that the SSPP has, on average, insignificantly reduced the effort of public sector work by around 10 percent (Table A.6).

TABLE 4: DID estimate of the SSPP effects on weekly hours of work

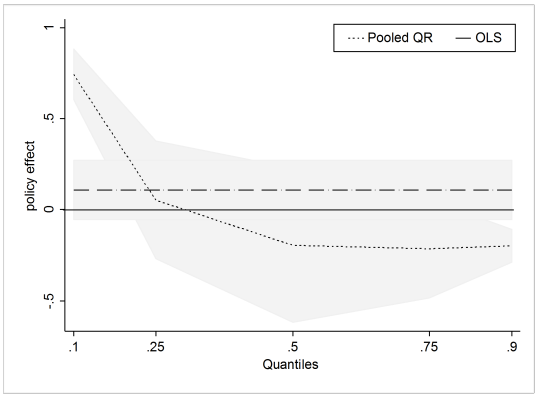
I-Pooled QR with no controls	OLS	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
Public Sector	-0.137	-0.588***	-0.154	-0.134	-0.056	0.125
	(0.082)	(0.100)	(0.125)	(0.155)	(0.144)	(0.124)
Public X Policy	0.144*	0.927***	0.154	0.093	0.150	-0.279**
	(0.083)	(0.114)	(0.126)	(0.158)	(0.145)	(0.127)
Individual controls	No	No	No	No	No	No
Cohort fixed effect	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	23,981	23,981	23,981	23,981	23,981	23,981
II-Pooled QR with controls						
Public Sector	-0.160**	-0.621***	-0.087***	0.087***	-0.013	0.047***
	(0.082)	(0.068)	(0.164)	(0.214)	(0.137)	(0.043)
Public X Policy	0.117*	0.744***	0.054	-0.195	-0.214	-0.198***
	(0.083)	(0.071)	(0.165)	(0.216)	(0.138)	(0.046)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	23,927	23,927	23,927	23,927	23,927	23,927
III-QRPD						
Public Sector	0.051***	-0.049	-0.004	0.027	0.041	0.104**
	(0.014)	(0.000)	(0.000)	(0.028)	(0.003)	(0.043)
Public X Policy	-0.055***	0.048***	0.0005	-0.028***	-0.041**	-0.108***
	(0.014)	(0.003)	(0.007)	(0.009)	(0.005)	(0.005)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,579	24580	24580	24580	24580	24580

Individual controls and cohort fixed effects are the same as in Section A. Bootstrapped standard errors with 1000 reps. are in parentheses for parts I and II and the MCMC ones for III. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

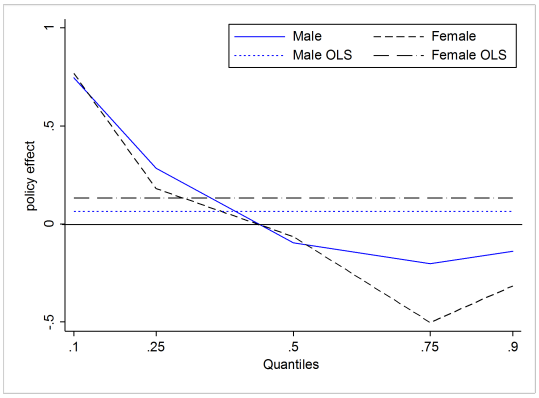
C Heterogeneity across gender

The heterogeneity of the effect of the SSPP is not observed only along the distribution of earnings and effort, but also across gender. Tables 6.1 and 6.2 present the DID estimates of the policy on earnings and effort for males (Table 6.1) and females (Table 6.2). The results suggest that

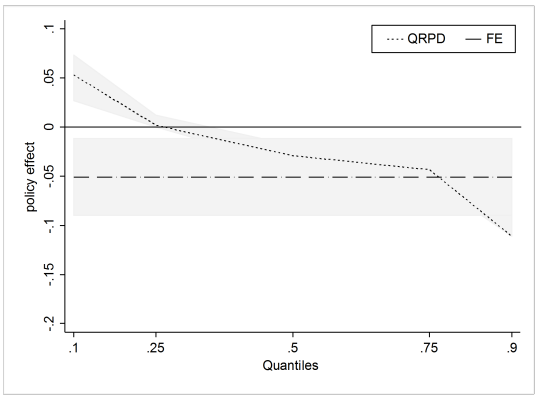
FIGURE 7: Pooled and QRPD DID estimates of the policy effect on weekly hours of work



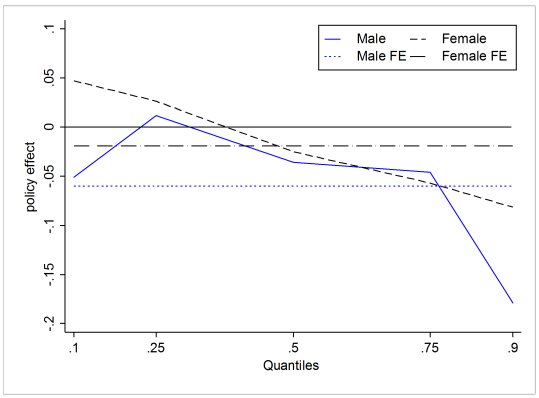
(a) Full sample



(b) Males vs. Females



(c) Full sample



(d) Males vs. Females

the effect of the SSPP on earnings are mainly driven by males. As it is positive and significantly higher for females, especially at the tails of the distribution of earnings, male public sector workers experience a negative and significant decrease of their earnings beyond the median of the distribution.

The magnitude of the public-private pay differential shows that female workers in the public sector were paid less relative to males workers, and that the policy has provided a mechanism to resolve this gender-pay gap. The overall effect, however, is negative on average and also across the distribution of earnings for both males and females, after accounting for the public-private wage differential. On average, the public-private wage differential is about 14 percent, and between 4 to 19 percent across the distribution of earnings. Nevertheless, males in the public sector are worse of than females after the implementation of the SSPP.

The effect of the SSPP on effort, however, is negative on average for both males and females, but positive and significant for females at the 10^{th} and 25^{th} quantiles. At the 90^{th} quantile, the effect of the SSPP on effort is a higher negative for males than females. In addition, while the effect of the SSPP is downward sloped for females along the distribution of effort, that of males is inverted W-shaped (Figure 7-(**d**)).

TABLE 6.1: Policy effect on earnings and effort for Males

			Male			
Log of monthly earnings	FE	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
Public Sector	-0.410	-1.447***	-1.201***	-0.267***	0.181**	0.313***
	(0.223)	(0.002)	(0.006)	(0.021)	(0.003)	(0.002)
Public X Policy	0.261	1.387***	1.113***	0.0684***	-0.252**	-0.360***
	(0.224)	(0.002)	(0.007)	(0.022)	(0.003)	(0.002)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,744	13,744	13,744	13,744	13,744	13,744
Effort						
Public Sector	0.065**	0.060***	-0.012***	0.037***	0.046**	0.181***
	(0.025)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Public X Policy	-0.062**	-0.051***	0.012***	-0.036***	-0.046**	-0.179***
	(0.032)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,744	13,744	13,744	13,744	13,744	13,744

Bootstrapped standard errors with 1000 reps. are in parentheses for FE and the MCMC ones for QRPD. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The objective of the policy to simultaneously reduce the public-private pay and effort gaps may not be completely unattainable but more work needs to be done to shape the policy in that direction. For example, the inability of the current form of the SSPP to catch up with rising earnings in the private sector may be due to the rigid nature of the pay system in the public sector. Most private sector employers adjust their employees' earnings to changing macroeconomic

TABLE 6.2: Policy effect on earnings and effort for Females

			Female			
Log of monthly earnings	FE	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
Public Sector	-0.337	-1.611***	-1.312***	-0.577***	0.109***	-0.154***
	(0.210)	(0.001)	(0.006)	(0.006)	(0.002)	(0.002)
Public X Policy	0.276***	1.593***	1.279***	0.470***	0.0554***	0.127***
	(0.192)	(0.001)	(0.006)	(0.006)	(0.002)	(0.001)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,835	10,836	10,836	10,836	10,836	10,836
Effort						
Public Sector	0.014*	-0.053***	-0.029***	0.024***	0.056**	0.075***
	(0.020)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
Public X Policy	-0.019**	0.049***	0.023***	-0.025***	-0.056**	-0.082***
	(0.020)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,835	10,836	10,836	10,836	10,836	10,836

Bootstrapped Standard errors with 1000 reps. are in parentheses for FE and the MCMC ones for QRPD. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

performance such as inflation and living standard, which is not the case in the public sector.

D Disaggregated control and treated groups

The public sector representing our treated group can be defined in three ways: (i) the public administration, (ii) public administration plus public enterprises (state-owned companies), and (iii) public administration plus public enterprises plus public education and health-care. Until now, the analysis pooled all these subgroups together but it is possible that the effect of the SSP differs across them, even if the industry fixed effect is controlled for. We thus estimate the model separately for: (a) education and health services workers, (b) public administration and public enterprises workers (due to insufficient data on workers in the public enterprises, we could not estimated the model for them separately).

Table 7 shows a positive and significant overall policy effect on the earnings of workers in the education and health services at lower quantiles, but a negative effect at higher quantiles. This positive overall effect is likely due to the positive increase in the earnings of female workers in education and health services sector. However, the effect of the policy on earnings of workers in the public administration (see the second part of Table 7) is mostly negative across the distribution of earnings. Nevertheless, males workers in the public administration sector are largely better off than females across the quantiles of earnings. These results show that the SSP was successful in reducing the gender wage-gap in the education and health services sector, but male workers have benefited more from the policy in the public administration sector.

On the other hand, the total effect of the policy on effort is positive and significant across the distribution of earnings for male workers in the education and health services sector. However, the policy has reduced the effort of female workers in this sector (see Table 8). In the public administration sector, the policy has reduced the effort of both female and male workers but the reduction is less for females compared to males workers.

An other issue is the break down the control group (here private sector. In the private-public wage gap literature some studies divide workers in the private sector into two comparison groups for public workers: (i) private employees and (ii) self-employed individuals. This allows investigating whether there are systematic differences in the wage gap between public workers and these two groups of private workers. To address this issue, we estimate the model separately for the two control groups.

Table 9 presents the results. First, we see a significant positive policy effect across the distribution of earnings when *private employed individuals* is used as control group, while the policy has a negative effect at the 10^{th} (insignificant), 25^{th}, 75^{th} and 90^{th} quantiles of the distribution of earning when *self-employees* is used as control group. Second, the overall policy effect (sum of the estimated coefficients on *Public Sector* and *Public X Policy* in the table) is positive with *self-employees* as control group, but its overall effect is negative with *private employed individuals* as control group. However, the positive effect of the policy observed with *self-employees* as control group is very weak at the lower quantiles of the distribution of earnings. These results mean that the SSP has reduced the private-public wage gap in comparison with *self-employees* but only at the higher quantiles of the distribution of earnings, while the policy has

TABLE 7: DID estimate of policy effect on Log monthly earnings of workers

	FE	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
			Education and Health Services			
Full sample						
Public Sector	0.0496	0.103***	0.115***	0.0478***	0.0181**	0.0875***
	(0.0505)	(0.00502)	(0.00347)	(0.00325)	(0.00654)	(0.00497)
Public X Policy	-0.0411	-0.0452***	-0.106***	-0.0754***	-0.0548***	-0.113***
	(0.0509)	(0.00424)	(0.00391)	(0.00190)	(0.00562)	(0.00581)
Observations	1194	1194	1194	1194	1194	1194
Male						
Public Sector	0.0220	-0.00333	0.0444***	0.0125***	-0.0786***	-0.0147
	(0.0848)	(0.00587)	(0.00204)	(0.00236)	(0.0109)	(0.00999)
Public X Policy	0.00505	-0.0313***	-0.0703***	-0.0262***	0.0286*	-0.116***
	(0.0940)	(0.00733)	(0.00517)	(0.00295)	(0.0141)	(0.00962)
Observations	639	639	639	639	639	639
Female						
Public Sector	0.0619	0.0660***	0.0711***	0.03589	0.0153*	-0.0115
	(0.0696)	(0.00477)	(0.00181)	(0.00266)	(0.00769)	(0.00747)
Public X Policy	-0.0833	0.000171	-0.0651***	-0.06968	-0.0451***	-0.00640
	(0.0732)	(0.00366)	(0.00195)	(0.0029)	(0.00589)	(0.00995)
Observations	555	555	555	555	555	555
			Public administration			
Full sample						
Public Sector	0.000317	-0.0353***	-0.0187***	-0.0214***	-0.00799***	0.0332***
	(0.00306)	(0.00133)	(0.000307)	(0.000839)	(0.000806)	(0.00154)
Public X Policy	0.175	0.159***	0.00117	-0.214***	-0.343***	-0.509***
	(0.285)	(0.00294)	(0.00230)	(0.00361)	(0.00451)	(0.00571)
Observations	2286	2286	2286	2286	2286	2286
Male						
Public Sector	0.0000930	-0.00466***	-0.00586***	0.00158*	0.00483***	0.00979***
	(0.00346)	(0.000327)	(0.000538)	(0.000680)	(0.000353)	(0.000504)
Public X Policy	0.373	-0.0874***	-0.0485***	0.125***	-0.267***	-0.112***
	(0.321)	(0.00358)	(0.00461)	(0.00332)	(0.00692)	(0.00152)
Observations	1696	1696	1696	1696	1696	1696
Female						
Public Sector	0.000274	0.0129***	0.0120***	0.0151***	0.00336***	0.0341***
	(0.00606)	(0.00355)	(0.000691)	(0.000790)	(0.000620)	(0.00311)
Public X Policy	-0.424	-0.169***	-0.0257***	-0.884***	-0.757***	-0.580***
	(0.432)	(0.00949)	(0.00432)	(0.0116)	(0.00585)	(0.00599)
Observations	590	590	590	590	590	590
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

deepened this gap across the entire distribution of earnings in comparison with *private employed individuals*. The positive policy effect in comparison with *self-employees* may be explained by the fact most self employed individuals in Ghana operate on a small scale, thus there are more

TABLE 8: DID estimate of policy effect on Effort of workers

	FE	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
			Education and Health Services			
Full sample						
Public Sector	0.0350**	0.0184***	0.0336***	0.0416***	0.0222***	0.0112***
	(0.0108)	(0.000849)	(0.00114)	(0.000811)	(0.00203)	(0.000944)
Public X Policy	-0.0341**	-0.0152***	-0.0310***	-0.0414***	-0.0291***	-0.00862***
	(0.0110)	(0.000496)	(0.000515)	(0.000390)	(0.00242)	(0.000791)
Observations	1194	1194	1194	1194	1194	1194
Male						
Public Sector	0.0155	0.00420**	0.00182	0.00516***	-0.0944***	0.0231***
	(0.0195)	(0.00140)	(0.00152)	(0.000651)	(0.00147)	(0.00265)
Public X Policy	-0.0134	0.0322***	0.00239	-0.00678***	0.0956***	-0.0209***
	(0.0205)	(0.00151)	(0.00140)	(0.000778)	(0.00112)	(0.00250)
Observations	639	639	639	639	639	639
Female						
Public Sector	0.0290**	0.0342***	0.0311***	0.0513***	0.0326***	0.0157***
	(0.00979)	(0.000927)	(0.000534)	(0.000195)	(0.000440)	(0.000835)
Public X Policy	-0.0296**	-0.0328***	-0.0331***	-0.0521***	-0.0365***	-0.0294***
	(0.0108)	(0.000780)	(0.000661)	(0.000192)	(0.000521)	(0.00113)
Observations	555	555	555	555	555	555
			Public Administration			
Full sample						
Public Sector	0.000893	-0.00267***	-0.00467***	-0.00579***	-0.00137***	0.00161***
	(0.00108)	(0.000213)	(0.000208)	(0.000116)	(0.000401)	(0.000212)
Public X Policy	0.0333	-0.0525***	-0.0705***	-0.0229***	-0.0300***	-0.0513***
	(0.0754)	(0.000335)	(0.000771)	(0.000784)	(0.00166)	(0.000853)
Observations	2286	2286	2286	2286	2286	2286
Male						
Public Sector	0.000893	-0.00267***	-0.00467***	-0.00579***	-0.00137***	0.00161***
	(0.00108)	(0.000213)	(0.000208)	(0.000116)	(0.000401)	(0.000212)
Public X Policy	0.0333	-0.0525***	-0.0705***	-0.0229***	-0.0300***	-0.0513***
	(0.0754)	(0.000335)	(0.000771)	(0.000784)	(0.00166)	(0.000853)
Observations	1696	1696	1696	1696	1696	1696
Female						
Public Sector	0.000281	-0.00513***	0.00147***	0.00215***	0.00102*	0.00137***
	(0.00122)	(0.000756)	(0.000290)	(0.000100)	(0.000466)	(0.000351)
Public X Policy	-0.0504	-0.0548***	-0.0205***	-0.0161***	-0.0186***	0.0356***
	(0.0310)	(0.00160)	(0.000659)	(0.000357)	(0.00153)	(0.00296)
Observations	590	590	590	590	590	590
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

uncertainty affecting their source of earnings. Also, most self employed workers in Ghana have inconsistent earnings mostly affected by the general demand for goods and services, and this demand is partly influenced by macroeconomic factors. Finally, we observe that the SSP has reduced the effort of workers in the public sector in both sub control groups, a finding in line

with our previous analysis.

TABLE 9: DID estimate of policy effect with different control groups

	FE	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
			Self-employees			
Log of monthly earnings						
Public Sector	0.268***	0.0158***	0.0653***	0.150***	0.281***	0.726***
	(0.0441)	(0.000555)	(0.000439)	(0.000631)	(0.00122)	(0.00147)
Public X Policy	-0.226*	-0.00290	-0.0145**	0.0453***	-0.0144**	-0.575***
	(0.0891)	(0.00328)	(0.00460)	(0.00265)	(0.00539)	(0.00567)
Effort						
Public Sector	0.0130*	0.000611***	-0.00140***	0.00260***	0.0156***	0.0268***
	(0.00595)	(0.000100)	(0.000100)	(0.000141)	(0.000205)	(0.000435)
Public X Policy	-0.0257	0.0132***	-0.00668***	-0.00820***	-0.0121***	-0.0310***
	(0.0139)	(0.000421)	(0.000591)	(0.000371)	(0.00308)	(0.00189)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7284	7284	7284	7284	7284	7284
			Private employed individuals			
Log of monthly earnings						
Public Sector	-0.511***	-0.120***	-0.252***	-0.893***	-1.218***	-0.929***
	(0.0567)	(0.00121)	(0.000429)	(0.000485)	(0.00161)	(0.00120)
Public X Policy	0.475***	0.0483***	0.175***	0.827***	1.125***	0.794***
	(0.0535)	(0.00197)	(0.00120)	(0.000596)	(0.00212)	(0.00113)
Effort						
Public sector	0.00893	-0.0319***	-0.0269***	-0.0404***	-0.0356***	-0.111***
	(0.00697)	(0.000142)	(0.0000412)	(0.0000897)	(0.0000535)	(0.000311)
Public X Policy	-0.0139	0.0289***	0.0199***	0.0358***	0.0347***	0.117***
	(0.00801)	(0.000263)	(0.000130)	(0.0000482)	(0.0000921)	(0.000362)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8772	8772	8772	8772	8772	8772

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

VI Robustness Checks

A Instrumental Variable Estimation of Policy Effect

An important threat to identifying the effect of the SSPP is that it may not be exogenous, thus resulting to the previous estimates being inaccurate. The activities of trade unions in the public sector has contributed largely to the implementation of the SSPP. Therefore, we use the presence of *unions* at the work place in public sector as an instrumental variable for the SSPP. The classical IV-diagnostic tests (Table A.8) indicate clearly that this IV is not poor, so we proceed with the QRPD-IV estimation. The QRPD-IV estimates are shown in Table 10, and Figures 8 & 9 present

TABLE 10: Instrumental variable estimates

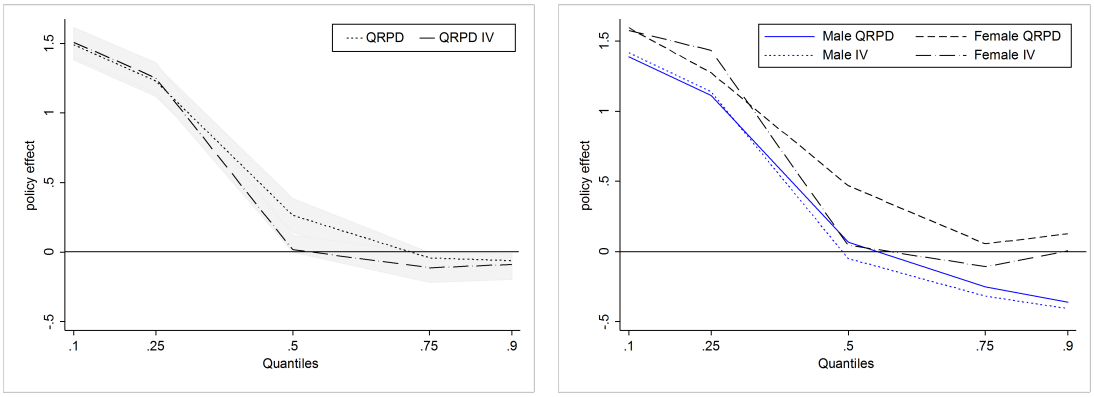
Log of monthly earnings	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
Public Sector	-1.530***	-1.294***	-0.057***	0.104***	0.076***
	(0.003)	(0.004)	(0.002)	(0.003)	(0.003)
Public X Policy	1.508***	1.252***	0.0185***	-0.112**	-0.088***
	(0.003)	(0.005)	(0.002)	(0.003)	(0.003)
Individual controls	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes
Observations	24639	24639	24639	24639	24639
Effort					
Public Sector	-0.044***	-0.0009	0.036***	0.045**	0.114***
	(0.0012)	(0.0006)	(0.0005)	(0.0005)	(0.0003)
Public X Policy	0.040***	0.0007	-0.0341***	-0.044***	-0.115***
	(0.0012)	(0.0007)	(0.0006)	(0.0005)	(0.0004)
Individual controls	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes
Observations	24639	24639	24639	24639	24639

The instrument for the $PublicXPolicy$ is the presence of *unions* in the public sector. Standard errors from the MCMC method are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

the graphs of the resulting DID estimates along the quantiles of *monthly earnings* and *effort*,

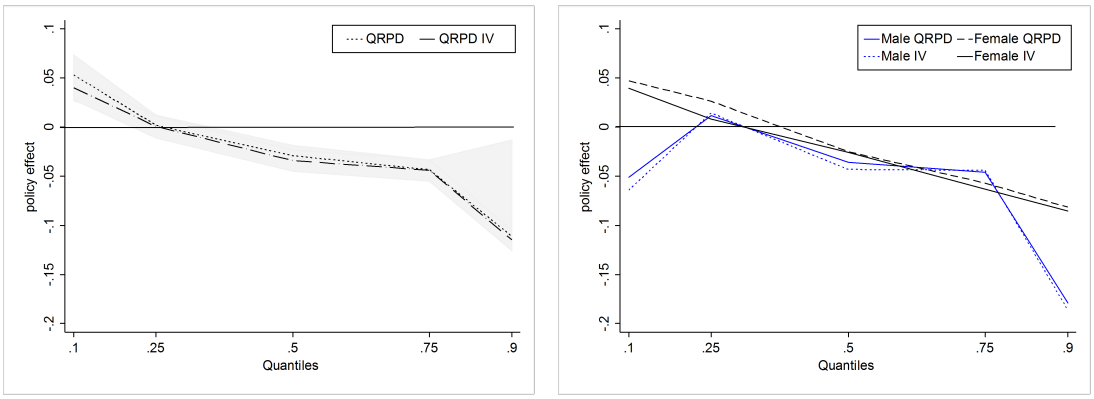
both the full sample [Subfigures **(a)**] and the subsamples of males and females [Subfigures **(b)**]. The results align qualitatively with our previous analysis in Section V. Quantitatively, the SSPP has a smaller effect on monthly earnings at higher tail of the distribution compared with the results of Section V. Regarding *effort*, the difference between the QRPD-IV estimates in Figure 9 and that of the standard QRPD estimates in Section II are quite similar.

FIGURE 8: DID estimates of the SSPP effect on monthly earnings



(a) Full sample **(b)** Males vs. Females

FIGURE 9: DID estimates of the SSPP effect on effort



(a) Full sample **(b)** Males vs. Females

B Placebo Tests and Other Robustness Checks

The identification of the policy effect depends on the validity of the underlying assumptions. One of this assumption is that there are no *confounding factors* other then the SSPP that could

actually affect earnings and effort in the public sector, once the observed heterogeneity of workers is controlled for. To explicitly test this assumption, We use a placebo test with fictitious year 2006 as a falsification strategy. We use 2006 as the year after which the policy was implemented and test the effect of the SSPP across the quantiles of earnings and effort. If earnings and effort in the public sector were significantly increasing or decreasing as compared to the private sector, then the policy effect would be wrongly attributed. We thus expect this pseudo policy not be

TABLE 11: Placebo test

Log of monthly earnings	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
Public Sector	-0.041	-0.041	-0.036	-0.040	-0.041
	(0.028)	(0.062)	(0.035)	(0.032)	(0.511)
Public X Policy_{2006}	-0.094	0.029	0.134	0.170	0.178
	(0.159)	(0.101)	(0.620)	(0.166)	(1.344)
Individual controls	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes
Observations	12,321	12,321	12,321	12,321	12,321
Effort					
Public Sector	-0.006	-0.011	-0.009	-0.013	-0.018
	(0.01)	(0.013)	(0.011)	(0.019)	(0.015)
Public X Policy_{2006}	0.006	0.015	0.067	0.079	0.081
	(0.715)	(0.0267)	(0.452)	(0.524)	(0.441)
Individual controls	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes
Observations	12,321	12,321	12,321	12,321	12,321

We use 2006 as a fictitious year rather than 2013 as the year after the policy was implemented. Standard errors from the MCMC algorithm are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

significant. As shown in Table 11, our expectation is met as the estimates are not significant across the distribution of both the *monthly earnings* and *effort*.

The literature on earnings and productivity argues that earnings and productivity should increase after a training program (Heckman & Smith 2004, De Grip & Sauermann 2013, Konings

& Vanormelingen 2015). In our case, a significant coefficient for a training program after the implementation of the policy will bias the estimates attributed to the SSPP. To investigate this, we consider workers who undertook a training program for a month or more after the SSPP was implemented. This information is available in our data. Table 12 presents the QRPD

TABLE 12: Other robustness test

Log of monthly earnings	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
Public X Policy	1.502***	-1.201***	0.199*	-0.039	-0.031
	(0.100)	(0.125)	(0.109)	(0.195)	(0.131)
Training X Policy	-0.0301	-0.0276	0.00056	-0.004	0.039
	(0.026)	(0.023)	(0.022)	(0.019)	(0.0257)
Individual controls	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes
Observations	24,579	24,580	24,580	24,580	24,580
Effort					
Public X Policy	0.048*	-0.001	-0.031*	-0.043	-0.110 ***
	(0.026)	(0.019)	(0.017)	(0.031)	(0.031)
Training X Policy	-0.002	-0.008	-0.008	-0.001	0.008
	(0.005)	(0.021)	(0.022)	(0.001)	(0.005)
Individual controls	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes	Yes	Yes
Observations	24,579	24,580	24,580	24,580	24,580

Standard errors from the MCMC method are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

estimates. The effect of the training program is insignificant across the quantiles of both the *monthly earnings* and *effort*, thus suggesting that our analysis in Section V is likely not impacted by confounding factors.

VII Policy implications and concluding remarks

In this study, we examine the effect of the Single Spine Pay Policy (SSPP) implemented in 2010 by the Government of Ghana. The SSPP objectives were to: (i) address the public-

private wage gap, and (ii) increase the productivity in the public sector. Using a quantile treatment effect approach based on a Difference-In-Difference (DID) estimation, we show that the SSPP has yet to reduce the public-private sector pay differentials across the whole distribution of earnings in Ghana. The improvement observed is mostly at the lower tail of the distribution of earnings. Nevertheless, the SSPP was successful in reducing the gender-wage gap in the education and health services sector, but the policy has also decreased the productivity of workers, mainly due to a decrease in the effort of males workers in the public sector. Our findings are supported by a number of robustness checks, and the quantile approach adopted shows that examining a policy effect at the averages may not always be the appropriate way as noted by Firpo (2007).

The reduction in the effort after the implementation of the policy, especially by female workers in the public sector, requires more attention. Indeed, females public sector workers have seen a major reduction in their hours of work after 2010. The backward bending nature of their supply curve is mostly seen beyond the 25^{th} quantile of the distribution of hours of work. Our understanding of this phenomena is that most females in the public sector with hours of work beyond the 25^{th} quantile are married and have children. The young and unmarried women are mostly those willing to spend 8 hours a day at work, as they have less family responsibilities. For example, Heath (2017) found in urban Ghana that women are likely to reduce their hours of work when they have children, except if they are self-employed. Another factor that could also explain the fall in effort in the public sector is the increasing number of strikes after the implementation of the SSPP. Most public sector workers were critical of this policy, and this was accentuated by their increase participation in unions'activities.

Furthermore, the discrepancies associated with late payments of wages and the possibility that some workers will not be paid in full, has resulted in a far more severe strikes in the public sector. This late payments mostly stem from the inconsistencies in the rents from the oil sale. As shown in Figure 1c, the fall in the contribution of oil rents to total GDP along with the over-dependence on the gains from a volatile source have introduced a lot of uncertainties in the pay of public sector workers. This volatile nature of the oil rents raises the question of whether the SSPP can be sustained. It is fair to say that the ability of the Government to sustain this policy will largely depend on how it cautiously manages its expenditure, and more importantly

the allocation of its resources towards more diverse productive areas.

Other macroeconomic factors have impacted the success of the SSPP. In particular, the continuous rise in inflation and daily depreciation of the local currency do not align with a policy that is revised only at the end of a calendar year. In the private sector, most firms have policies or measures that facilitate the revision of wages within a year to account for changing environment and living costs. This is quasi-nonexistent in the public sector, which does not favor a policy like the SSPP to have its desired impact. Nevertheless, the SSPP has had some successes. In particular, this policy has reduced the gender-wage gap in the education and health services sector, and it could be improved by putting in place a good managerial quality in the government' agencies. Also, our econometric analysis of the effect of this policy has some challenges. For example, the availability of data does not make it possible to measure the effect of the policy over a longer time period. We hope that future research could be done in that perspective once data become available.

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A Appendix

A Construction of pseudo panels

TABLE A.1: Survey years

Year	Frequency	Percentage
1998	5,433	22.05
2006	6,888	27.96
2013	12,318	49.99
Total	**24,639**	**100.00**

TABLE A.2: Respondents by gender

Year	Frequency	Percentage
Males	13,774	55.90
Females	10,865	44.10
Total	**24,639**	**100.00**

TABLE A.3: Year cohorts

Year Cohorts	Frequency	Percentage
1930-1955	4,001	16.24
1956-1962	3,772	15.31
1963-1968	4,156	16.87
1969-1975	4,176	16.95
1976-1982	4,197	17.03
1983-1999	4,337	17.60
Total	**24,639**	**100.00**

TABLE A.4: Ethnic cohorts

Year Cohorts	Frequency	Percentage
Akan	13,589	55.15
Ga-Dangme	2,309	9.37
Ewe	3,916	15.89
Guan	1,203	4.88
Dagbani	1,876	7.61
Others[1]	1,746	7.09
Total	**24,639**	**100.00**

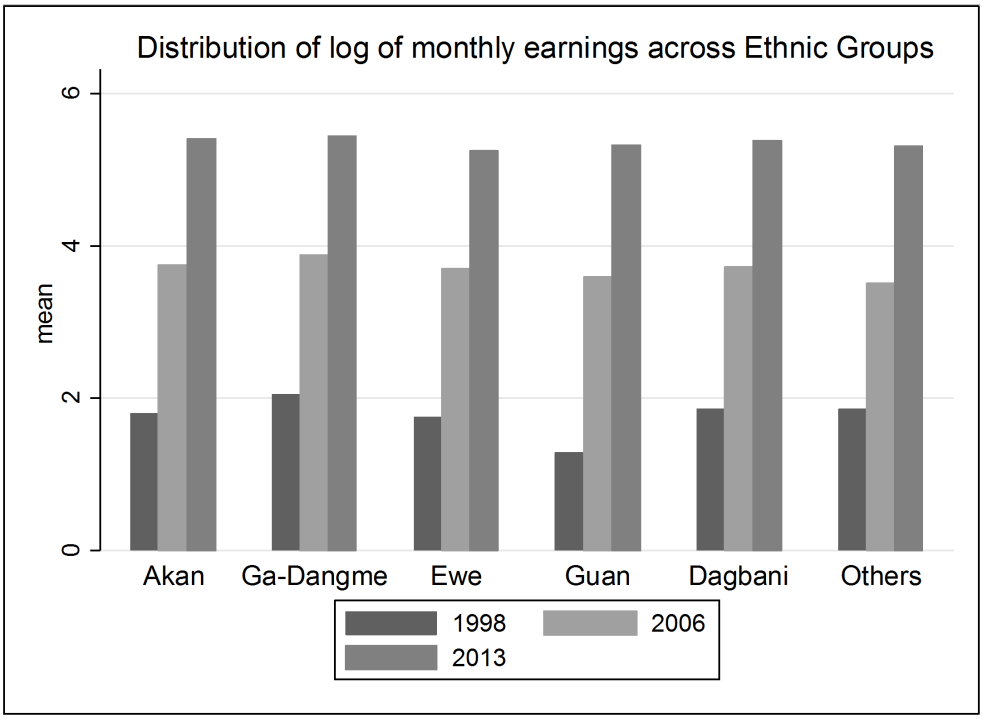


FIGURE A.1

TABLE A.5: Descriptive statistics

	Before Policy				After Policy			
	Total	Private Sector	Public Sector	Diff(Pr-Pu)	Total	Private Sector	Public Sector	Diff(Pr-Pu)
Log of Monthly Income	3.907***	4.066***	3.747***		6.217***	6.210***	6.274***	***
	(0.061)	(0.009)	(0.114)		(0.003)	(0.003)	(0.011)	
Log of Hours of Work	3.807***	3.816***	3.798***		4.786***	4.785***	4.796***	***
	(0.014)	(0.027)	(0.001)		(0.06)	0.006	(0.002)	
Years of Education	7.572***	7.374***	7.769***		7.642***	7.223***	11.641***	***
	(0.037)	(0.023)	(0.579)		(0.015)	0.012	0.023	
Experience	10.602	10.535	10.789		10.741***	10.723***	10.89***	
	(6.176)	(6.197)	(6.119)		(0.096)	(0.1023)	(0.2782)	
Square of Experience/100	1.505	1.494	1.538		2.287***	2.22***	2.29***	
	(1.596)	(1.602)	(1.581)		(0.039)	(0.043)	(0.107)	
Married Workers	0.630	0.545	0.715		0.679***	0.676***	0.703***	**
	(0.487)	(0.522)	(0.451)		(0.004)	0.004	0.012	
Male Workers	0.556**	0.538	0.572		0.546***	0.538***	0.615***	***
	(0.272)	(0.519)	(0.495)		(0.004)	(0.005)	0.013	
Formally Employed Father	0.192	0.077	0.306		0.404***	0.389***	0.526***	***
	(0.369)	(0.277)	(0.461)		(0.004)	(0.005)	(0.014)	
Observations	12,321	5,433	6,888		12,318	7,532	4,786	

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$

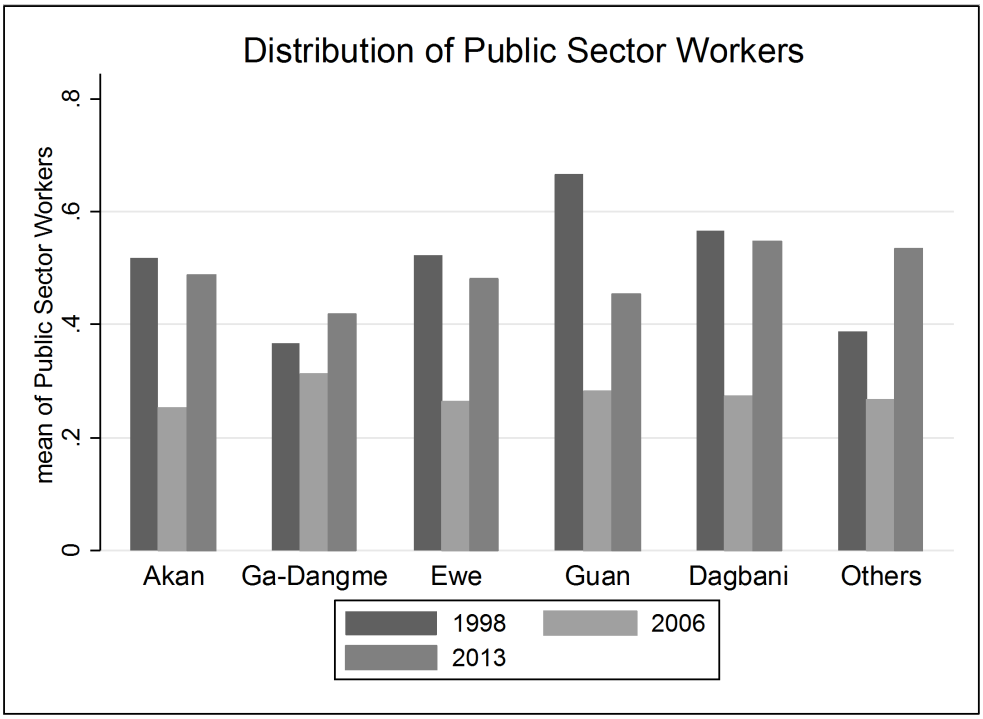


FIGURE A.2

FIGURE A.3: Pooled sample

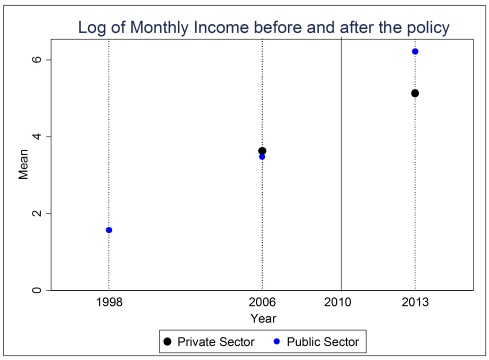


FIGURE A.4: Pseudo panel

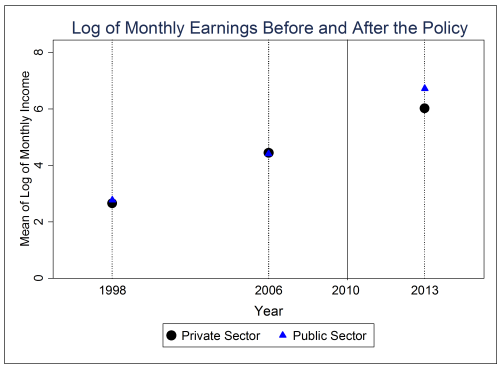


FIGURE A.5: Pooled sample

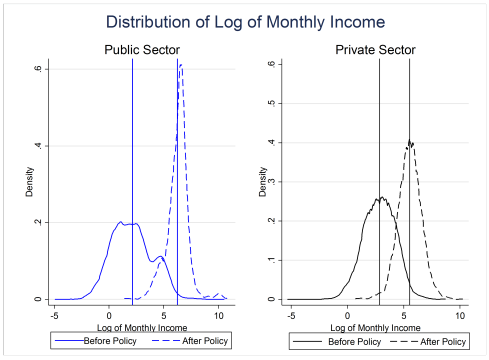


FIGURE A.6: Pseudo panel

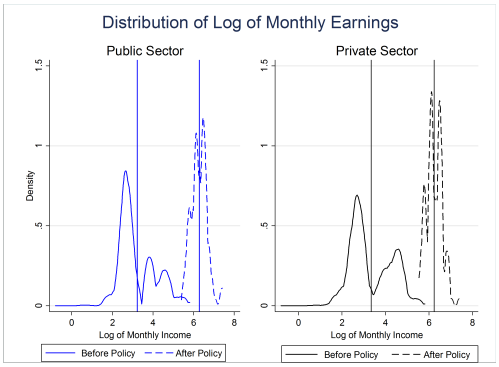


FIGURE A.7: Pooled sample

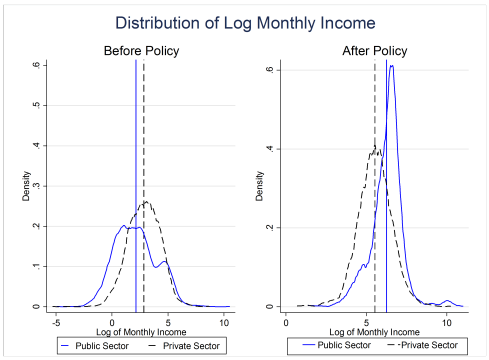


FIGURE A.8: Pseudo panel

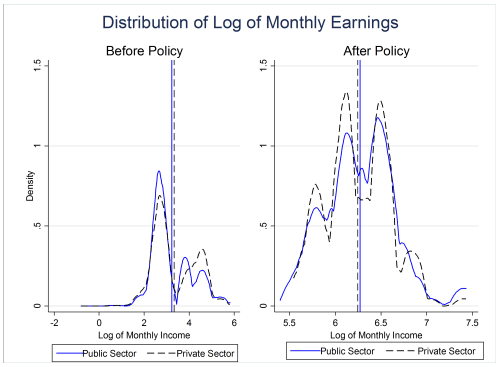


FIGURE A.9: Pooled sample

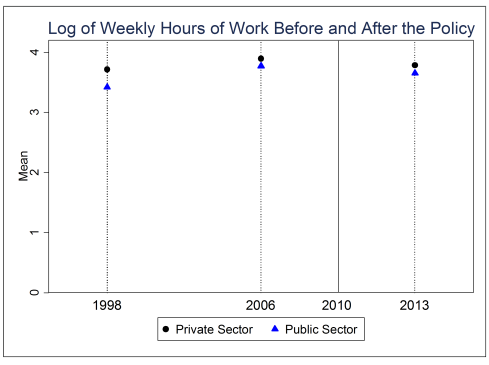


FIGURE A.10: Pseudo panel

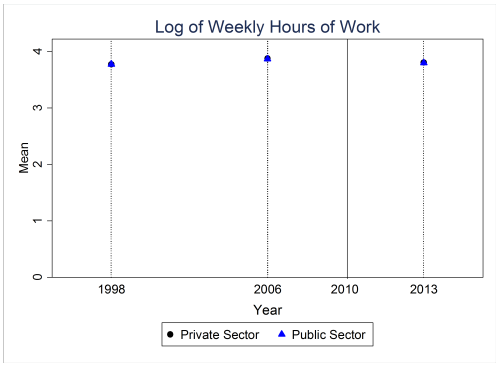


FIGURE A.11: Pooled sample

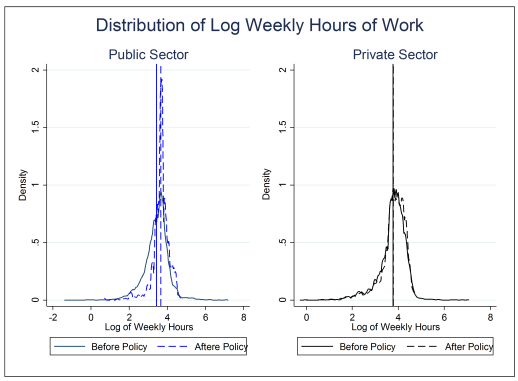


FIGURE A.12: Pseudo panel

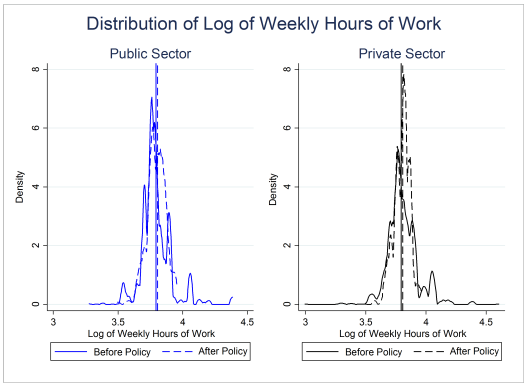


FIGURE A.13: Pooled sample

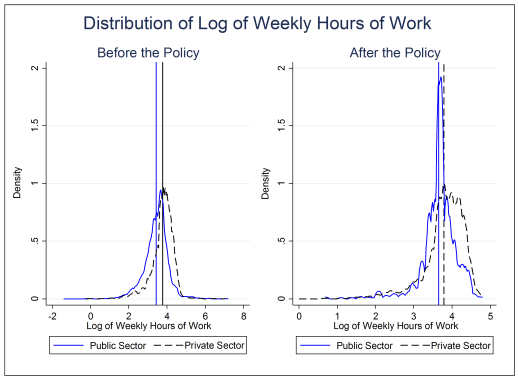
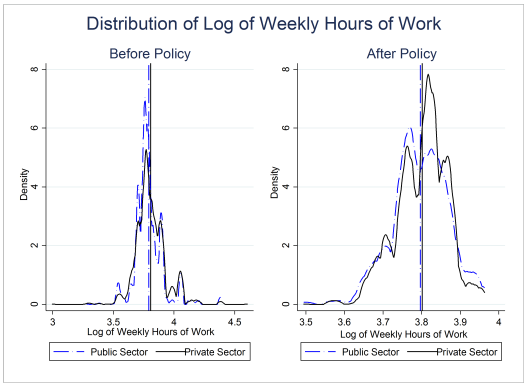


FIGURE A.14: Pseudo panel



B Other estimations and IV diagnostics

TABLE A.6: Alternative measure of effort

$Effort \geq 40hrs/week$	Full Sample	Male	Female
Public Sector	0.0692	-0.149	-0.019
	(0.151)	(0.217)	(0.215)
Public X Policy	-0.109	-0.200	-0.011
	(0.157)	(0.223)	(0.220)
Constant	0.039	-0.095	0.217
	(0.163)	(0.226)	(0.254)
Individual controls	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Regional effects	Yes	Yes	Yes
Industry-Specific effects	Yes	Yes	Yes
Observations	24639	13,774	10,865

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE A.7: DID estimate of policy effect for *new hires*

	FE	0.1 Quantile	0.25 Quantile	0.5 Quantile	0.75 Quantile	0.9 Quantile
Log Monthly Earnings						
Public Sector	-0.0726	-1.584***	-1.276***	0.0662**	0.0773***	0.0740***
	(0.193)	(0.000765)	(0.00287)	(0.00260)	(0.00173)	(0.00237)
Public X Policy	0.0833	1.590***	1.254***	0.0344***	-0.0827***	-0.0898***
	(0.203)	(0.000799)	(0.00293)	(0.00329)	(0.00279)	(0.00247)
Public X Policy X Entrants	-0.109***	-0.0845***	-0.0743***	-0.0455***	-0.0301***	0.00389***
	(0.0240)	(0.000216)	(0.000349)	(0.000346)	(0.000751)	(0.000646)
Observations	24579	24580	24580	24580	24580	24580
Effort						
Public Sector	0.0563***	-0.0460***	0.00221***	0.0291***	0.0444***	0.112***
	(0.0161)	(0.000639)	(0.000404)	(0.000966)	(0.000289)	(0.000734)
Public X Policy	-0.0545***	0.0401***	-0.00413***	-0.0248***	-0.0431***	-0.113***
	(0.0155)	(0.000589)	(0.000396)	(0.00104)	(0.000327)	(0.000763)
Public X Policy X Entrants	0.00161	0.00606***	0.00202***	-0.00789***	-0.00937***	-0.00284***
	(0.00438)	(0.000155)	(0.0000698)	(0.000187)	(0.0000957)	(0.000114)
Observations	24579	24580	24580	24580	24580	24580

Entrants are workers with less than 2 years tenure. Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

TABLE A.8: First-stage IV diagnostics

	Statistic	**P-value**
Weak identification test		
Cragg-Donald statistic	14.981	
Kleibergen-Paap statistic	10.918	0.001
Stock-Yogo critical values		
5% maximal IV relative bias	16.38	
10% maximal IV relative bias	8.96	
20% maximal IV relative bias	6.66	
30% maximal IV relative bias	5.53	

The IV is the presence of a trade union at the work place in the public sector.