Earnings Inequality and Wage Policy in Kyrgyzstan: Evidence from Household Surveys, 2010-2016

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I.   Introduction

Background

In April 2010, the government of Kurmanbek Bakiyev was overthrown in the second revolution in Kyrgyzstan since independence in 1991. The causes of this revolution were similar to the causes of the Tulip Revolution in 2005: corruption, favoritism for family and friends in government, and "rigged elections." The trigger for the massive protests in the mountain and northern oblasts was a large increase in the price of electricity and the imposition of additional mobile phone charges by the President's brother, Maxim. The government was a "family controlled business." The state's financial situation reached a critical level after the overthrow of the Bakiyev government. In addition, the economic and political instability particularly in the rural south precipitated renewed ethnic conflict between Uzbek and Kyrgyz nationals in June 2010. Over 400 thousand people were displaced in the ensuing violence; Uzbeks were the majority of victims of loss of life and property. The new government sought to develop a strategy of reconciliation in the south; inclusive governance, gender equality, and a more inclusive education were three recommendations of the Kyrgyzstan Inquiry Commission (2010).

The violence lessened in the southern oblasts over the summer, but the economic situation in the south was difficult. In early December 2010, teachers in Osh and Jalalabad oblasts went on strike demanding higher salaries, better working conditions, and compensation for the rapidly rising utility charges. At this time and particularly in the rural southern communities, teachers were among the lowest paid public employees in the country. The average monthly salary was about $30-40 a month, and $20 in some communities. Teachers worked extended hours to increase their pay, but many left the profession or migrated to Russia for better jobs. Inflation in food and energy depleted most of the monthly salary of teachers who did not move. These teachers demanded an increase in salary to $200-250 a month (about the average wage in 2010) and discounts on utility costs. The government was "cash-strapped," rejected these demands as unaffordable, but offered a phased-in improvement in teacher compensation. The teachers rejected this plan, and the strike spread nationwide. (Najibullah 2010) In April 2011, the government introduced a new compensation plan for teachers and health care and social service workers that addressed many of their demands. Teachers received their new compensation in the fall 2011 semester.

The purpose of this paper is to examine the 2011 wage reform policy and measure its impact on the relative wages and hours of work of teachers and other affected workers in Kyrgyzstan. The wage reform policy potentially had an important impact on the gender pay gap because these occupations were comprised of mostly women workers. Anderson, Esenaliev, and Lawler (2016) showed that one of the more important reasons for gender wage inequality in Kyrgyzstan was the gender gap in occupation. Women were better educated than men on average but were more likely to work in lower paying service or government occupations. A national policy that increased the wages received by a large share of women workers should reduce the gender wage disparity throughout the country. We determine whether this wage reform had this effect on wage inequality.

Recent labor policy policies

We interviewed representatives of the Ministry of Labor and Social Development, former officials, and representatives of international organizations and NGOS in 2013 and later. We discussed labor policy in Kyrgyzstan since the 2010 revolution and the relative position of women in the labor market. Four important facts about labor policy and the Kyrgyzstan labor market were apparent from these discussions.

First, the Ministry was underfunded and unable to provide social assistance and retraining for the unemployed. Funding for job inspections was slashed after 2010, and the labor code was not enforced; job quality and safety deteriorated, and women were increasingly employed in low quality jobs.

Second, wages were low. The minimum wage was 12-13% of Value-Added per worker -- the equivalent of $8/month in 2007 and $16/month in 2013 (World Bank 2015a) and was not enforced in the private sector. The minimum wage and social benefits levels are so low today that few people bother to apply for benefits even if they qualify.

Third, the quality of education deteriorated, and the rural-urban gap in education widened. Teachers and health care professionals were paid low wages, and corruption in both professions was rampant. Few students who completed pedagogical degrees (even with government support) entered teaching (about 25%), and the dropout from these professions over time was significant. In rural areas, pensioners were recruited as teachers, and alumni without professional degrees comprised a large percentage of the teaching staff (UNICEF 2011). The deterioration in education has serious negative implications for long run economic growth.

Fourth, no major labor legislation was implemented to address gender wage inequality until the wage reform in 2011. Incentives were also given in 2011 to recent graduates with degrees in teaching or health care to encourage them to work in rural areas. The policy changed in 2012 in response to concerns about the size of the government budget, and the salary increases in the 2011 legislation were adjusted downwards. The impact of wage regulations from 2011-present on the overall gender gap in compensation is not known.

In 2016, Kazakhstan implemented a similar law that adjusted upwards the wages of civil servants. The policy increased the salaries of civil servants; the salaries of healthcare workers increased up to 28%, the salaries of education workers increased up to 29%, and the salaries of other civil servants increased up to 40%. The size of the increase depends on the category of worker. For example, main personnel (Block B workers) such as doctors, teachers, and social workers receive a different increase in salary from principal administrators (Block A workers), administrative personnel (Block C workers), and auxiliary and technical workers (Block D workers). One million civil servants are "teachers, doctors, workers of cultural, social sphere and others." Many of these, mostly professional workers are paid well below the average monthly wage and should experience a significant upgrade in their income as a result of the policy, if it is enforced. Because the policy has only been in effect for two years, we have no evidence on its effectiveness. (MLSP 2017)

Uzbekistan's civil servants are also relatively low paid, especially professional workers. Recent work by Mirkasimov (2017) showed that teachers and health care workers were highly educated (most with post-secondary education) but low paid. In 2015, teachers were paid on average a monthly salary that was 50% of the average monthly salary of workers in manufacturing, and health care workers were paid 45% on average of the salary of workers in manufacturing.   Both teachers and health care workers were classified by Mirkasimov (2016) as "overeducated" and (as in Kyrgyzstan and Kazakhstan) mostly female. To our knowledge, no wage policy has been implemented in Uzbekistan to redress the wage gap in this sector of the labor market.

Tajikistan appears to be an outlier in the region with regards to public sector wage payments. About 28% of workers in formal jobs work in the public sector (women 32%; men 26%), and wages on average are above the formal private sector wage. Women earn about $9.90 more per month in government jobs, and men earn $6.70 more relative the average job in the formal private sector. The education level of teachers, health care workers, and other government workers is higher than in the private sector. (Strokova and Ajwad 2017) To our knowledge, there is no policy in Tajikistan to increase the wages of civil servants relative to private sector wages.

II.	Literature review: gender wage inequality

The literature on gender wage gaps is large, but there is a very thin literature on wage gaps in Central Asia. Table 1 presents a summary of nine papers on gender and wages that include analysis of at least one Central Asian country.   Five papers include Kazakhstan, four include Kyrgyzstan, four include Tajikistan, and one includes Uzbekistan. Seven of the papers use earnings data obtained from household surveys; two of the papers (Linz and Chu 2013; Linz and Shemykina 2009) use data on employees from convenience samples of firms.   The most commonly used sources of data for the household studies are Living Standards Measurement Surveys (Kazakhstan, Kyrgyzstan, Tajikistan). The wage outcome is either monthly or hourly earnings of employees on the main job.   The models are versions of the Mincer human capital model and include measures of education, experience, region, and ethnicity. Extended versions of the models include hours of work, occupation or industry, and in a few cases marriage and family structure.

The mean gender earnings gap from household surveys varies across country and time. Anderson and Pomfret (2003) find that the gender gap fell from a 40-50% male advantage in 1993 to a 15% male advantage in 1997. The gap in Tajikistan also fell from 25% in 2003 to 18% in 2009. These estimates are comparable to the pooled estimates of about 18% in Goraus and Tyrowicz (2013) and Ñapo, Daza and Ramos (2012). The estimated gender gap in Kazakhstan ranged from 20% in 1996, 11% in 2001 to 19% in 2009. The two firm level studies found that women received 12 to 18% lower wages than men in Kazakhstan and Kyrgyzstan.

Four of the five studies that use household data decompose the wage gap into parts explained by differences in the measurable characteristics of men and women and a residual. In only one study (Johnes (2002)) does the explained gap dominate the unexplained in the Oaxaca-Blinder or Ñopo decompositions. The modal outcome is that the differences in characteristics of men and women

through the earnings function model explain less than 10% of the difference in the wages of men and women. Gender differences in occupation and/or industry comprise a major component of this 10% explained gap. Women are more likely to work in service or government jobs which, in the region, tend to pay less than other jobs with the same educational requirements (Anderson and Pomfret 2003). The residual gap could be due to market discrimination or the influence of unmeasurable ability, tastes or cultural characteristics.

This review of the literature on the gender wage gap in Central Asia suggests that human capital and occupational/industrial sorting are important determinants of the relative wages of men and women. None of these papers includes an analysis of the effect of any labor market policy on the wage gap although several papers highlight important changes in the responsiveness of market wages to worker characteristics over time.

III.   Education policy

Public education in Kyrgyzstan is low quality, unequal, and inefficient. Government expenditure on education comprised about 6% of GDP in 2010, one of the highest rates in the region. The OECD average is 5.2% for expenditures on all educational institutions and services (NCES 2018). The high level of spending on education overall has not produced good results for many children. Kyrgyzstan ranked last in math, science and reading on the 2006 and 2009 PISA exams (Hou 2011), and children who attended Kyrgyz or Uzbek language schools scored about 40 percentage points lower than children who attended Russian language schools (World Bank 2014). The lowest quality education is concentrated in rural and high elevation regions of the country. The return to each year of education has remained at 7% for many years, but the returns are more likely to accrue to children in the capital city, Bishkek, and other large urban centers. Spending per pupil is low (about 700 dollars, purchasing power parity, 2005) and not equitably spread. The school system is inefficient with excessive expenditures on energy and food in comparison to other countries in the region and insufficient monitoring of performance. Teachers are paid well below the median for the country. Procurement costs are high, and the non-teaching staff in most schools is large and inefficient. (World Bank 2014)

Low teacher salaries are a main reason why rural areas had difficulty hiring qualified teachers before 2011. A secondary school graduate can teach preschool or grades K-4 but only if she receives 3-4 years of training in specialized schools. The state requires teachers who teach grades 5-11 to have at least a college or university degree (4-5 years of post-secondary education) (UNESCO 2010/11). Women are more likely to enroll and attend college than men, and they are overrepresented in education (80% women) and health care (70%) (Khitarishvili 2016). However, only 25% of graduates with a degree in education work as teachers or school administrators; other graduates usually choose occupations with better compensation and working conditions. Rural areas in particular are unable to attract enough teachers in math, science, and some languages; these courses are not offered which widens the achievement gap between rural and urban children. Teachers in rural schools have little incentive to change their teaching methods or invest in additional training because the rewards for improvement are low (UNESCO 2010/11). Poor teaching, corruption in education, and teacher absence have long run

negative consequences for economic development (Chaudhury et al. 2006; Bold et al. 2017; Chetty, Friedman and Rockoff 2014).

Performance incentives and monitoring of performance can improve the quality of teaching and long run academic outcomes of students (Duflo, Hanna, and Ryan 2012; Muralidharan and Sundararman 2011). The 2011 Kyrgyzstan wage reform for workers in education, health care, and social services was not a performance based system, but the policy increased the compensation for teachers and added awards for teachers who work in more remote areas. Teachers are also awarded for additional training and education. To discourage retirement, teachers receive bonuses for long years of service in teaching. The standard teacher salary before 2011 was based on education and experience with some additional compensation (5-95%) for teaching in high elevation communities. The basic payment was increased, and teachers are paid per unit of instruction (usually one hour). The table below outlines the terms of the compensation scheme after 2010.[1]

Education of teachers	May 2011	September 2015	Additional payments
Secondary professional	40.0	60.0	10 categories
BA degree	45.0	67.5	
MA degree	50.0	75.0	
Any teacher of primary grades		81.0	

The compensation for experience is: 10% bonus for 5 years; 20% bonus for 10 years; and 30% bonus for 15 years or more. Teachers receive an additional 600 soms monthly if they earn a Ph.d. degree and 300 soms for a Candidate of Science degree.

The reform lowered the hours of work requirement to six per week to encourage primarily women to work as part-time teachers particularly in rural areas that experienced serious teacher shortages. The reform also adjusted the wages of health care professionals and social workers. We do not have the details of the wage reforms for health care and social service workers. These workers were also given bonus payments for working in rural and higher elevation regions.

The wage increase after 2010 was large especially in rural areas. However, the reform was expensive, and the share of GDP that was spent on education increased from 6 to 7.1% over the first year of the policy. The higher expenditure on salaries was not offset with reductions in unnecessary non-teaching staff, inefficient procurement of school supplies, or corruption. The large increase in total expenditure on education was not sustainable, and the government had to adjust other expenditures or reduce teacher compensation after 2012.

To our knowledge, the only evaluation of the economic impact of the 2011 wage reform was by Jenish (2015). Jenish (2015) estimated that these changes in compensation over the first year of the

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[1] A teacher who works 40 hours per week at 40 soms per hour receives 1600 soms in wages. This is about $20 per week at the current exchange rate with the US dollar. The monthly wage of $80 is significantly higher than the average wage before the 2011 reform

policy reduced the labor shortage of teachers by 14.5 percent and the labor shortage of health care workers by 11.4 percent between 2010 and 2011 in cities. The increases in labor supply were the result of increases in hours of work by teachers and health care workers. However, the salary increases had little effect on labor shortages in rural areas. Jenish did not examine the impact of the reform on wages or gender differences in compensation.

Our research builds on Jenish's study, but we expand the evaluation period through 2016. We focus on compensation by gender and region (rural-urban), and we update Jenish's evaluation of hours of work. We expect to find a large positive impact of the policy on wages in 2011 and 2012 but a decline in 2013. With the adjustments in compensation in 2015, we expect wages for affected workers to increase again in 2016. The reduction in the minimum hours of work required in teaching may lower overall hours of work, but the increase in compensation per hour could encourage teachers, health and social service workers to work longer hours and increase their participation in this sector of the labor market.

IV.   Descriptive statistics from the Labor Force Surveys of the Kyrgyz Republic

Figure 1 presents data on labor force participation (LFP) in Kyrgyzstan from the 2009 – 2016 Labor Force Surveys (LFS) of households. Labor force participation is lower for women than men in the recorded data. Earlier data (World Bank 2018) showed that the participation gap was about 13 percentage points at the end of the Soviet period and narrowed in the 1990s. The LFP gap jumped in 2004 to 24 percentage points and stayed at that level through 2016; less than half of eligible women had a job or were looking for work after 2012.

Figure 1. Labor force participation rate for men and women, national estimates, 2009-2016.
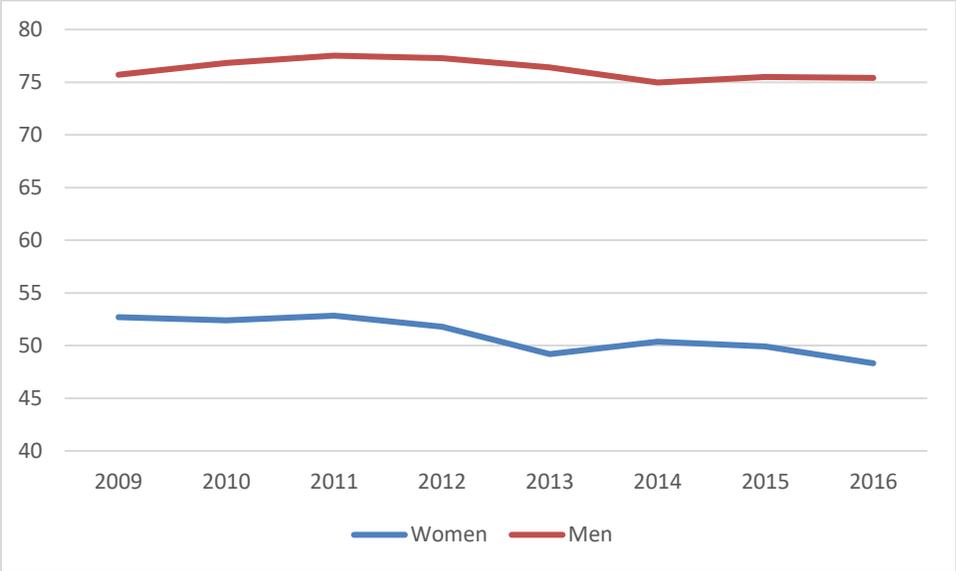
Source: World Development Indicators, World Bank, 2018.

Figure 2 presents data on monthly earnings from the Kyrgyzstan Labor Force Surveys, 2009-2013. All workers are included in these calculations. Earnings are the product of the hourly wage and

hours of work per month. Data on hours of work per week from the Labor Force Surveys indicate that the gap in hours of work (men – women) was 2 hours per week in 2009 and increased to 3 hours in 2013. The earnings gap peaked in the 2008 recession year (not shown in Figure 2) but fell significantly after 2008; working women received about 73% of the monthly earnings of working men on average in 2013. The 2011 wage law for teachers, health care workers, and social service workers may have affected the wage gap. The monthly wages of men and women increased in the third quarter of 2011 when the law went into effect; the increase in the wages of women was larger than the increase in the wages of men. Women earned 65 percent of the wages of men in 2010; this ratio increased to 79 percent for 2011, but the ratio fell after 2012. Women on average earned 77 percent of the wages of men in 2012 and 73 percent in 2013. Figure 3 indicates that the largest changes in male and female wages were among teachers and health care workers.

Figure 2. Average monthly earnings of men and women, 2009-2013, by quarter.
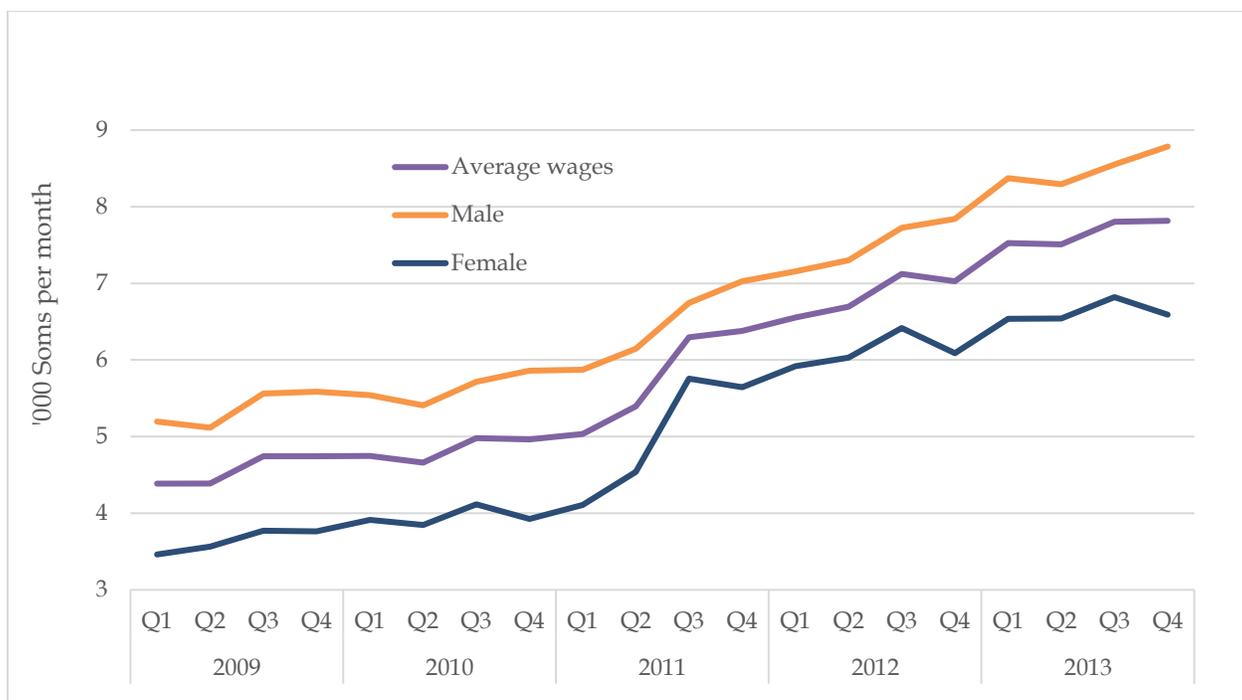
Source: Labor Force Surveys, Kyrgyz Republic, 2009-2013.

Figure 3. Average monthly earnings for education and health care workers, men and women, 2009-2013, by quarter.

The trends illustrated from the Labor Force Surveys strongly suggest that the 2011 wage policy had a large effect on the wages of education and health care workers and narrowed the overall gender wage gap after 2010. We have not matched at this time the Labor Force Survey data to the household surveys (Kyrgyzstan Integrated Household Surveys) and, therefore, cannot use the LFS to model these dynamic changes in the wages of men and women. A multivariate evaluation of the wage policy using the matched LFS-KIHS data is part of our future research plan for this project.

V.   Descriptive Statistics from the Life in Kyrgyzstan data

We examine data from the 2010-2016 waves of the "Life in Kyrgyzstan" household survey (LIK) and compare to the LFS. Households were selected from all seven oblasts and Bishkek, the capital city, based on stratified two-stage random sampling, and the survey was designed to be representative at the national, urban/rural, and north/south regional levels. Our sample includes only persons who report positive earnings during the interview, are not self-employed, and are not employed in agriculture or mining. Our sample members have at least completed secondary education and are between the ages of 23 and 65. We make these selections in order to increase the comparability of workers in the jobs directly affected by the wage reforms and other jobs. Our final sample includes 3026 employees (6620 panel observations); 1527 (3527 panel observations) are women, and 1499 (3093 panel observations) are men. We omit the self-employed because the wage policy only affected wage labor. We also drop all persons who have less than completed secondary education because they do not qualify to hold professional jobs in education or health care. We drop workers in agriculture and industry because

occupations in these industries are not likely to offer alternative jobs for sample members who could be teachers, health and social service workers. The average wage and hours of work and the estimates of the gender gaps in wages and hours are likely to differ from the LFS numbers because of our differential sample selection with the two sets of data.

Our construction of variables is described below, and the descriptive statistics for the pooled sample are given in Appendix Tables A1 (all workers and by gender) and A2 (affected workers and workers in other jobs). Summary statistics for women and men in each year are available on request. The characteristics of men and women in education, health and social services (EHS) jobs are different from men and women in other jobs. EHS workers are more likely to be female and live in rural, high elevation areas particularly in the South. They are also more likely to have a college education, and they have more experience on their current job than other workers. They are slightly older than other workers. We do not model selection into EHS work in this paper.

To measure the effect of the policy on the wages of men and women, we create a dummy variable that indicates whether a worker is employed as a white collar, skilled, or professional employee in the education, health care, or social work sector in each year. We cannot more narrowly define whether the employee was affected by the policy because the occupation and industry categories in the LIK are broad. Figure 4 shows how the average nominal monthly wage differed between high skilled workers in the EHS sector and other workers in each year of the panel, and Figure 5 shows the ratio of women's to men's monthly wages in the two types of jobs. The patterns shown in Figures 4 and 5 are similar to the patterns in Figures 2 and 3. The monthly wage of skilled employees in the EHS sector was 64% of the wage received by other workers in 2010 and increased to 93% in 2011, the first year of the policy.[2] The average wages in the two sectors maintained this ratio through 2016. The change in relative wages over time, however, varied by gender. Women received 67% of the monthly wage of men in the EHS sector in 2010, but women experienced a sharp relative increase in their wage in 2011 (83%). The gender gap in the affected sector continued to narrow through 2016 (96%). In 2010, women in other jobs received 77% of the average monthly wage of men, but the relative wage of women to men in the other sector changed little from 2011-2016.

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[2] The survey was conducted in October 2010 and 2011, October-November 2012, and December-January 2013 and 2016.

Figure 4. Average nominal monthly wage in affected (EHS) and other jobs, 2010-2016, LIK.
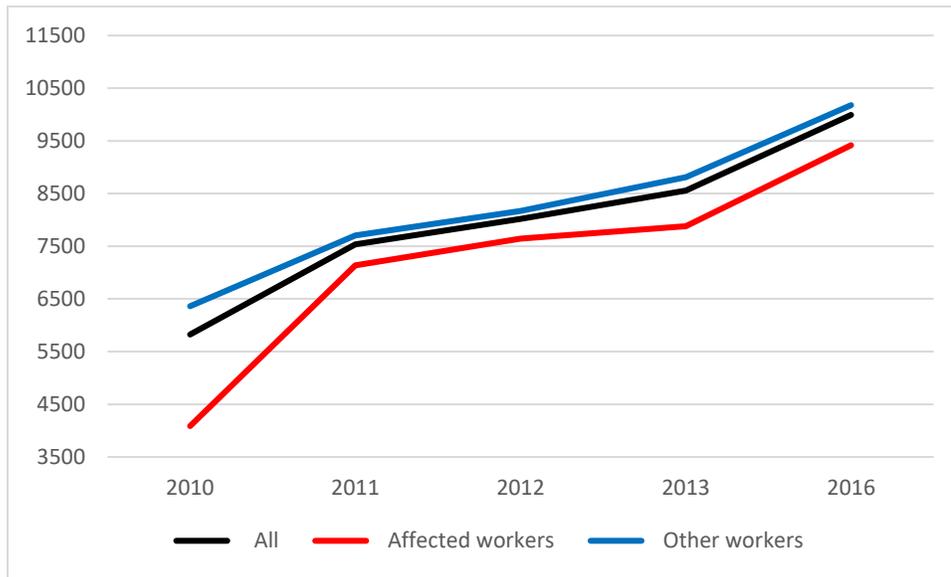
Notes: The wage is measured in soms per month. The exchange rate with the US dollar is approximately $1=70 soms.

Figure 5. Gender differences in average monthly earnings, affected (EHS) and other jobs, 2010-2016.
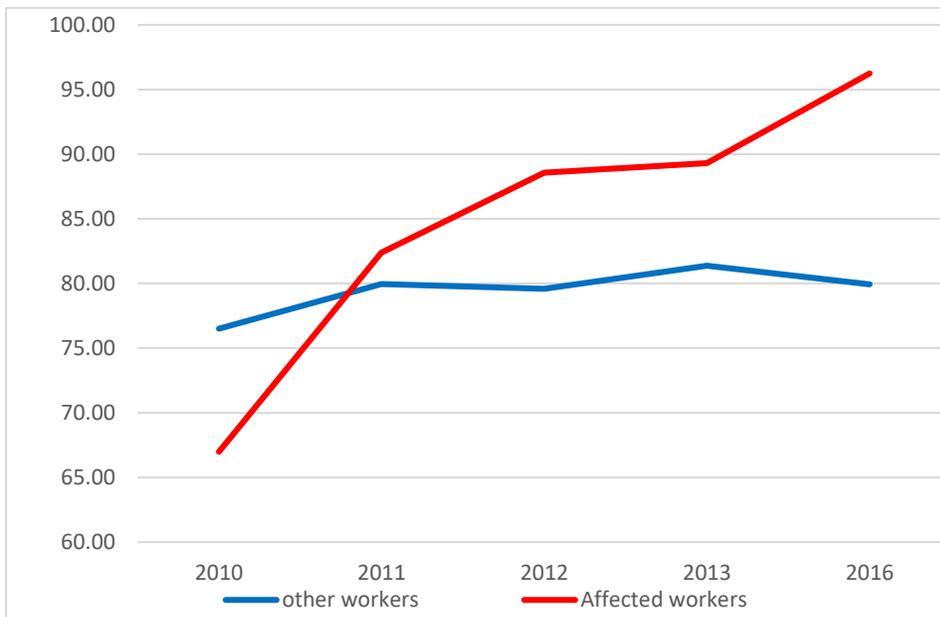
Note: The vertical axis shows the ratio of women's to men's monthly wages in percentage terms.

To see if these changes in monthly wages reflected changes in hours of work, we calculated the mean weekly hours of work by year and gender. The change in hours of work of women relative to men over time was very small. On average, women worked 37-39 hours per week and men worked 41-44

hours. Both men and women worked fewer hours (35-36) if they held a job in education, health or social services. Men worked 41-45 hours per week and women worked 40-43 hours in the other sector.

The sharp increase in monthly wages in affected jobs after 2010 and the small change in hours of work in each sector suggest that hourly wages followed the same pattern over time as monthly wages. Figure 6 shows the average hourly wages in EHS and other jobs over time, and Figure 7 shows the gender gap in hourly wages. The patterns in Figures 4-5 and 6-7 are similar. There was a large spike in hourly wages in 2011 in the education, health and social services sector especially for women, and the ratio of women's to men's wages continued to increase through 2016.

Figure 6. Nominal hourly wages for workers in affected (EHS) jobs and workers in other jobs, 2010-2016.
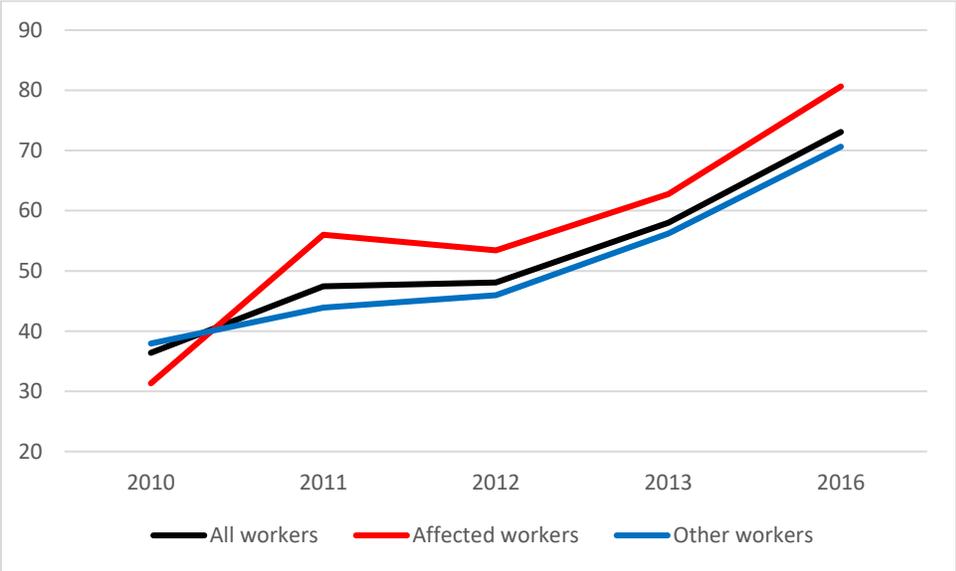
Notes: The wage is measured in soms per month. The exchange rate with the US dollar is approximately $1=70 soms.

Figure 7. Ratio of women to men's nominal hourly wage, percentage, by job type, 2010-2016.
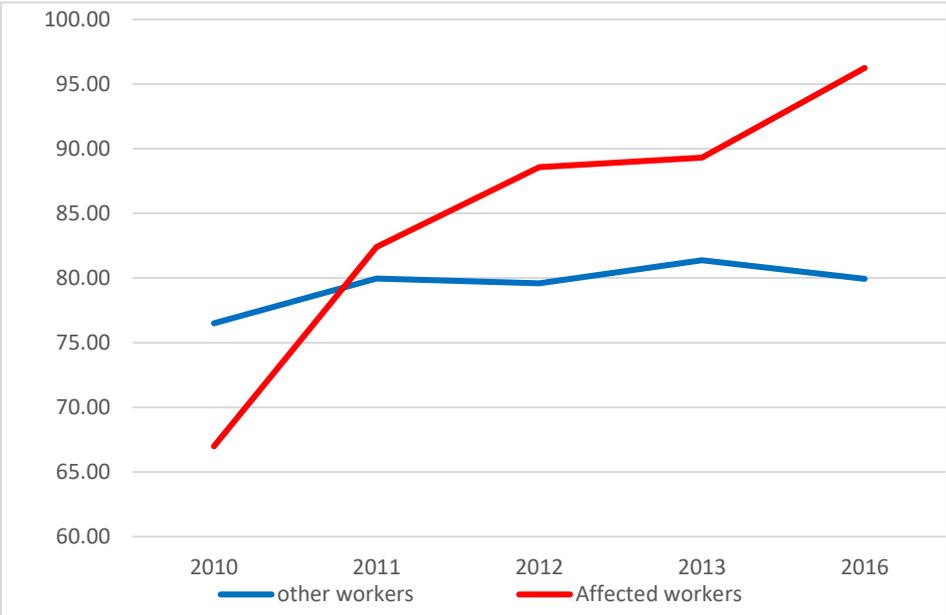
Notes: The vertical axis shows the ratio of women's to men's hourly wages in percentage terms.

One primary goal of the wage reform was to reduce the rural-urban gap in wages. Figure 8 shows the ratio of the nominal monthly wage among rural workers to the nominal monthly wage among urban workers over time in EHS and other jobs. Rural wages were 75% of urban wages in education, health and social services in 2010, but rural wages were about 90% of urban wages in other jobs in this year. Rural wages increased with the reform and were 96% of urban wages in this sector in 2011. After 2011, the rural to urban ratio dropped to 80% by 2016. The overall rural improvement in EHS jobs was short-lived. Rural wages were 90% of urban wages on average in other jobs; there was a slight change in this ratio through 2013, but from 2013-2016 the ratio dropped to 75%. The rural-urban gap was worse in other jobs in 2016 than in the education, health and social services sector.

Figure 8. Ratio of rural to urban nominal monthly wage, percentage, by job type, 2010-2016.
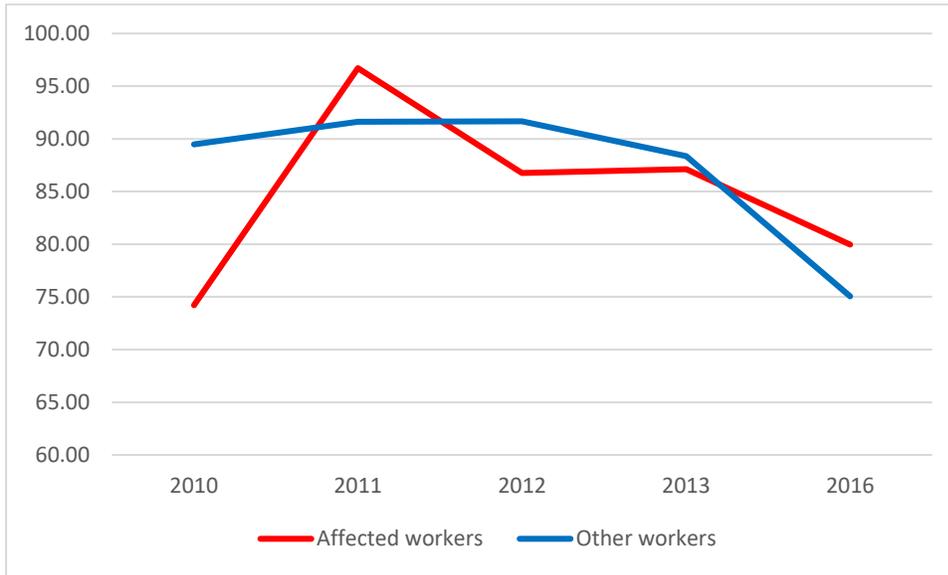
The descriptive statistics from the LIK and the LFS suggest that the wage reform of 2011 had a significant impact on monthly and hourly wages of workers in education, health and social services. The policy seemed to raise rural wages relative to urban wages although the change in the longer run was not large. The policy was also associated with a decline in the gender gap in monthly and hourly wages that persisted through 2016. The summary statistics do not control for other characteristics of workers that may have changed over time or the impact of specific time period shocks. We provide evidence in the next section from multivariate models of wages and hours of work that control for changes in other characteristics of workers over time that affected the distribution of wages.

VI.   Multivariate models

We develop a model of wage determination for men and women. We build on the standard Mincer (1974) human capital earnings function and model log earnings as an additive function of a vector of individual-level characteristics. The earnings function for individual i is given in equation (1) below:

$$\ln w_i^g = \alpha^g + \beta^g X_i^g + \varepsilon_i \qquad (1)$$

where ln w is natural log of outcome w for person i, α is a constant term, X is the vector of other individual characteristics for i, and $g \in \{M, F\}$ serves as an indicator for the individual's gender. We pool the data across years and estimate a panel regression (random effects and fixed effects) for all workers and separately for men and women; we cluster on the rayon.[3]

We look at three outcomes: nominal monthly wages, hours of work per week, and nominal hourly wages. The policy variable (P) is a dummy variable indicating if the worker is employed in the

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[3] A rayon is an administrative division within each large oblast. It is similar to a county in the United States. Several households are found in each rayon in the sample.

affected sector (skilled jobs in education, health, or social services) or not. We include four dummy variables (Y_t) for year (t=2011, 2012, 2013, and 2016 relative to the pre-policy year, 2010), and interactions between year (Y_t) and sector (P) to measure differential effects of the policy reform over time. Because the wage reform targeted rural workers, we include a dummy variable for rural residence (R=1 if residence in a rural area), interactions between rural residence and year (R*Y_t), and a triple interaction between holding an EHS job (P), year (Y_t), and rural residence (R).

β_p is the coefficient on the job dummy variable (P); β_r is the coefficient on the rural residence dummy variable (R); β_t is the coefficient on the year t dummy variable (Y_t where t=2011, 2012, 2013, and 2016); β_{pt} is the coefficient on the interaction of P and Y_t; β_{rt} is the coefficient on the interaction of R and Y_t; and β_{prt} is the triple interaction of P, R, and Y_t. X is a set of control variables. The complete model is given in (2) for men and women (g=m,w).

$$\ln w_i^g = \alpha^g + \beta_p^g P_i^g + \beta_r^g R_i^g + \Sigma \beta_t^g Y_{ti}^g + \beta_{pr}^g P_i^g R_i^g + \Sigma \beta_{pt}^g P_i^g Y_{ti}^g + \Sigma \beta_{prt}^g P_i^g R_i^g Y_{ti}^g + \beta_i^g X_i^g + \varepsilon_i$$

(2)

We expect the wage policy to have different effects on rural and urban residents and across time for workers in the affected jobs relative to other jobs. We summarize the effects of P, R, and Y below:

(a) *Pre-policy (2010)*
   Urban workers, in other jobs: α^g
   Rural workers, in other jobs: $\alpha^g + \beta_r^g$
   Urban workers in EHS jobs: $\alpha^g + \beta_p^g$
   Rural workers in EHS jobs: $\alpha^g + \beta_p^g + \beta_r^g$

(b) *Policy year and later (t= 2011-2016)*
   Urban workers, in other jobs: $\alpha^g + \beta_t^g$
   Rural workers, in other jobs: $\alpha^g + \beta_r^g + \beta_t^g$
   Urban workers in EHS jobs: $\alpha^g + \beta_p^g + \beta_t^g + \beta_{pt}^g$
   Rural workers in EHS jobs: $\alpha^g + \beta_p^g + \beta_r^g + \beta_t^g + \beta_{pr}^g + \beta_{pt}^g + \beta_{prt}^g$

The treatment effects are calculated for urban and rural workers in each year, pre- and post-policy reform. The treatment effect for each group (urban in year t; rural in year t) is the percentage difference in the expected outcome if the individual holds an EHS job and the expected outcome if the individual holds another type of job. For example, the policy effect for urban workers in 2010 is β_p^g; the policy effect for rural workers in year t is $\beta_p^g + \beta_{pr}^g + \beta_{pt}^g + \beta_{prt}^g$. We convert the treatment effects from a semi-log model into changes in *w* for each group in (a) and (b).[4] (Gertler et al. 2014)

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[4] For example, the treatment effect for urban workers in 2010 = $\exp(\beta_p^g) - 1$.

We include control variables (X) that we expect would affect wages and hours of work. Workers in the both sectors were rewarded for higher levels education and experience. To measure these effects, we include dummy variables for completion of post-secondary vocational training and completion of higher education (relative to completed secondary) and a variable equal to the years of experience on this job (quadratic form). We also control for ethnicity (Uzbek, Russian, or Other ethnicity relative to Kyrgyz), region (Mountain oblasts, Southern oblasts, Northern oblast (Chui) excluding Bishkek, relative to Bishkek, the capital city), and whether the community was above the median altitude for Kyrgyzstan. We include a dummy variable for whether the interview took place in December or January (2013, 2016) or in the fall (2010-2012). The interview date potentially affected wage payments particularly in other jobs because these months were post-harvest.[5]

We expect wages and hours of work to differ by gender across ethnic groups. Kyrgyz comprise over 60% of the population. The Uzbek population is the most heavily Muslim in Kyrgyzstan (Fletcher and Sergeyev 2002), and this difference in religious practice and culture has significant implications for the status of Uzbek women and their access to employment outside the home. During Soviet rule Russians were typically given better opportunities for education, jobs, and health care than ethnic Central Asians, and historically Uzbeks have been better off than the Kyrgyz (Handrahan 2001; Esenaliev and Steiner 2016). Conflict between Kyrgyz and Uzbeks was very important in the 2010 revolution particularly in the Southern oblasts. The Uzbek population is much smaller than the Kyrgyz population and plays a lesser role in public policy. Many Russians left the country after independence, and the population of Russians is quite different from the population of Russians in 1990; there is less economic advantage to Russian ethnicity today. We expect to find ethnic differences in wages and work, but the direction of these effects is uncertain.

The panel estimation is reported in Tables 3 (nominal monthly wages), 4 (hours of work), and 5 (nominal hourly wages). We also ran the model for real monthly and hourly wages adjusting the nominal wage for the oblast level consumer price index. The results are similar and mostly differ in the fixed year effects. We performed Hausman tests; the results suggested that the fixed effects model is the preferred specification. However, the fixed effects models depends on within person variation in the key variables in the model, and there is little change in either occupation or residence over time.[6] We focus on the random effects results in the discussion below.

VII.   Results

The panel model in Table 3 provides evidence that the wage policy of 2011 affected the relative nominal monthly wages of teachers and the gender earnings gap. Women in the pooled gender model earned about 30% less than men after accounting for differences in other characteristics. Survey year, job type, and the interactions were all important to the monthly wage in this first model. The monthly wage was significantly lower in EHS jobs, rural areas, and at higher elevation. These direct effects vary

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[5] We estimated models with interactions between elevation, affected job, and years. None of these interactions was statistically significant; only the direct effect of elevation had an impact (negative) on wages. We excluded the interactions with elevation from the models.

[6] 87 percent of sample members who entered the panel in 2010 did not change their job type (P) through 2016.

over time. EHS jobs experienced about a 20% higher wage in 2011-2013 in urban areas in comparison to 2010 and a larger increase in 2016; these effects of time compensated for the negative effect of employment in the EHS sector. Workers in EHS jobs experienced a larger boost in wages in the rural sector than other workers in 2011-2016. The largest increase in pay in this sector was in 2011 as expected. The patterns are as expected from the description of the policy reform; both random and fixed effects models show the same pattern of wage change over time.

Monthly wages also increased over time for both men and women, but clearly the major impact of the 2011 policy was on women. The gender gap in wages shrank in response to the wage policy.

To illustrate the magnitude of these policy changes, we calculated the expected monthly wages in each year in both EHS and other jobs, in rural and urban areas, by gender. We assume that all X variables are fixed at 0.[7] Figures 9a and 9b illustrate the monthly wage changes in EHS and other jobs over time for men and women in urban and rural areas. Figure 9c illustrates how the gender gap changed over time in EHS and other jobs in rural and urban areas. The gender gap is the ratio of women's wages to men's wages in percentage terms. The solid lines illustrate the gender gap for EHS workers in the urban (red) and rural (blue) regions; the dotted lines illustrate the changes in other jobs.

The figures show the large impact in both rural and urban areas of the wage reform. Women and men earned less in 2010 in EHS jobs than in other jobs, but the wage increase in EHS jobs was so large that teachers, health and service workers earned more than other workers in 2011-2013 among women and earned about the same as other workers in 2011-2012 among men. By 2016, the wages in the two sectors for men and women were comparable. In the urban areas, wages in both sectors increased significantly in 2010, but the differences were small for women. For urban men, the wages in the two sectors were similar except in 2013 when men in the EHS sector experienced a nominal wage decline. In both urban and rural areas, the gender gap narrowed for workers in education, health and social services. Rural women in EHS jobs received 77% of the wages of men in this sector in 2010, 105% in 2013, and 89% in 2016. The ratio of women to men's wages in EHS rose from 58% in 2010 to 86% in 2016 in urban areas. By 2016, the gender ratio among workers in education, health and social services was comparable across urban and rural areas on average.

In other jobs, the gender difference in wages between urban and rural workers was comparable in every year, but the gender wage ratio was lower in rural areas. By 2016 the wage ratio for EHS workers was equal to the wage ratio for other workers at 86%. The gender wage ratio was higher for EHS workers in comparison to other workers in rural areas by 2016 – 89% for EHS workers and 81% for other workers. Over time in both sectors and regions, the gender gap in wages narrowed. In comparison to men, women's compensation clearly improved relative to men's compensation after the wage reform.

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[7] The base group includes persons who lived at low elevation in Bishkek, completed secondary education, were Kyrgyz, and were interviewed in the fall. The effects of most of the variables are significant but do not work through P, R or Y_t. Persons with higher education, more experience, residence in Bishkek and at low elevation earned higher wages than other persons. Ethnic differences were not significant in most of the models.

Figure 9a. Predicted nominal monthly wages in affected (EHS) and other jobs in rural areas, men and women, 2010-2016.
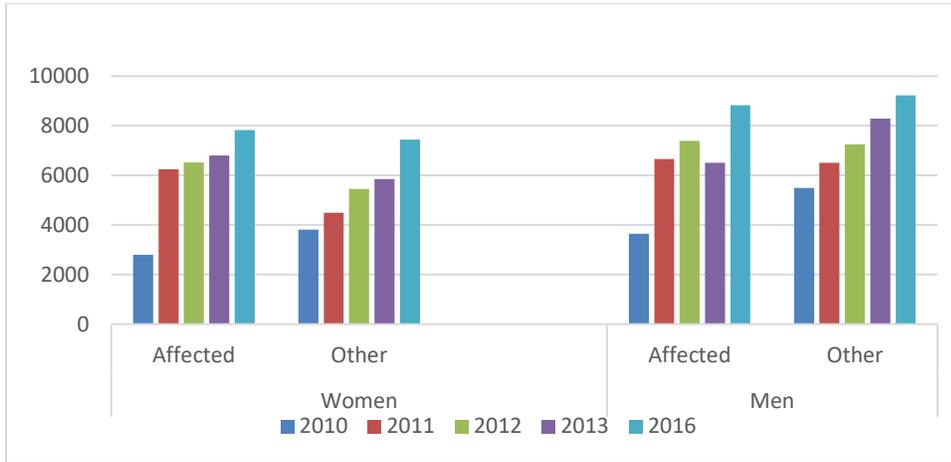
Figure 9b. Predicted wages in affected (EHS) and other jobs in urban areas, men and women, 2010-2016.
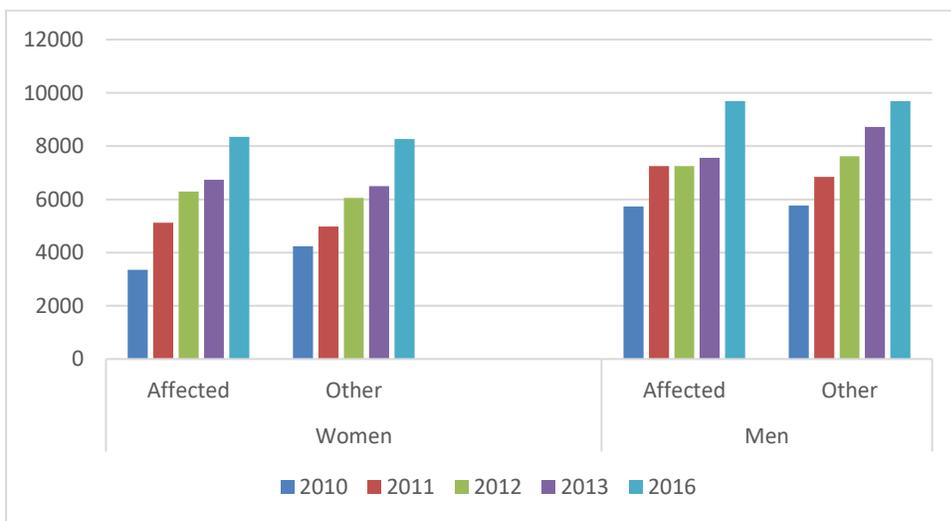
Figure 9c. Ratio of the wages of women to men in affected (EHS) and other jobs (%), rural and urban, 2010-2016.
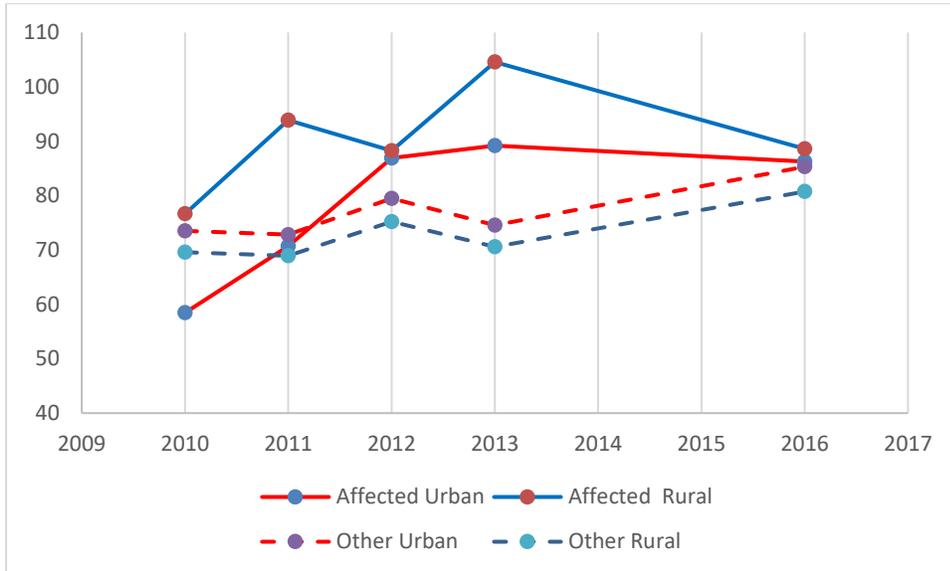
We see improvement in nominal hourly wages as well. Hourly wages are affected by the nominal wage changes and any changes in hours of work. Hours of work were lower in EHS jobs in comparison to other jobs in both urban and rural areas and among men and women; only in 2016 the hours of work of women in education, health and social services exceeded the hours of work of women in other jobs. The monthly wage patterns over time are similar to the hourly wage patterns. Figures 10a-10c show the hourly wage changes in rural and urban areas and the gender gaps in EHS and other jobs. In the rural area, the hourly wage more than doubled for women and men workers in education, health and social services in 2011; the changes in nominal hourly wages for women and men in other jobs in 2011 were positive but modest. Among women and men, the hourly wage in EHS jobs stayed at 40 soms or higher after 2010. Workers in other jobs received slightly more than workers in EHS jobs in 2010, but by 2016 there was no difference in the wages for women in the two sectors. Men in education, health or social services received higher compensation than men in other jobs in the rural areas in 2016. In the urban areas, there was little difference in the wages of workers in these two sectors, men or women.

Figure 10c illustrates the change in the gender gap in hourly wages over time. The gap in urban and rural areas among education, health and social services workers narrowed about 20 percentage points between 2010 and 2011. From 2011-2013, there was no difference in the wages of men and women in EHS jobs in rural areas, and women in urban EHS jobs received 80 percent of what men were paid per hour. The gender gap changed very little in other jobs in urban or rural areas. By 2016, the gender ratio was about 85-88% in both sectors, urban and rural.

Figure 10a. Predicted nominal hourly wages in affected (EHS) and other jobs in rural areas, men and women, 2010-2016.
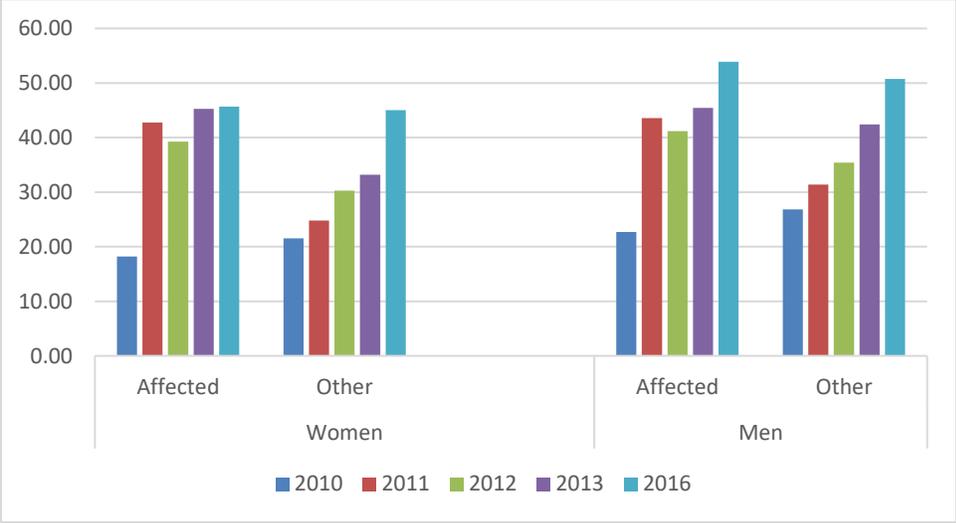
Figure 10b. Predicted nominal hourly wages in affected (EHS) and other jobs in urban areas, men and women, 2010-2016.
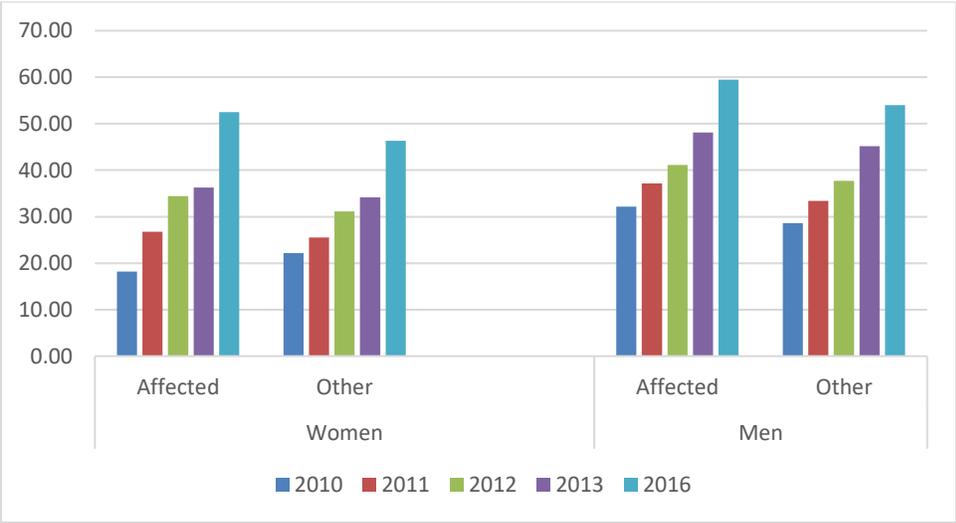
Figure 10c. Ratio of the nominal hourly wages of women to men in affected and other jobs (%), rural and urban, 2010-2016.
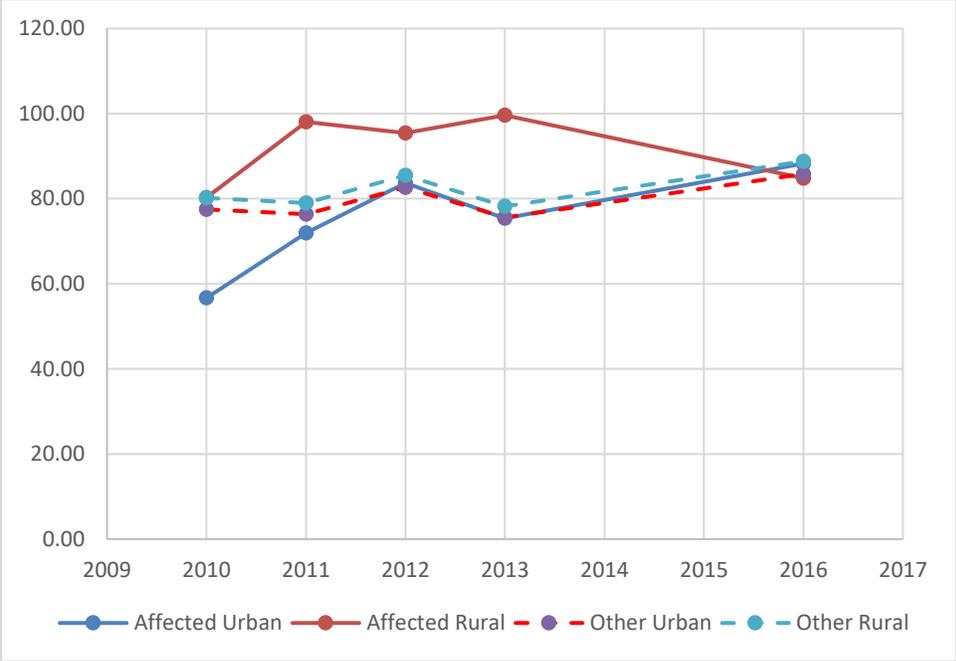
The treatment effects derived from these figures are presented in Tables 6-8. The analysis of workers in the LIK from 2010 (pre-reform) through 2016 suggests that the policy met many of its goals. Wages in education, health and social services jobs increased relative to wages in other jobs, rural areas experienced the larger changes in compensation, and the gender gap in wages narrowed in education, health and social services jobs. Because these EHS jobs comprised a large part of the overall employment of women, improvement in the relative compensation of women in this sector is reflected in the labor market as a whole. The policy achieved most of its goals.

VI. Conclusions

The earnings of women workers in Central Asia have been lower than the earnings of men workers for generations. Women were paid less than men for many reasons. Historically women were less educated and skilled for market work than men, but women today in most countries in the region are more educated than men but less experienced. The decline in state support for child care and, in many cases, the increase in traditional cultural and religious norms incentivized women to work less. Working women on average clustered in different sectors of the economy and in smaller firms, and these sectors tended to pay less than male dominated sectors such as manufacturing and construction. (World Bank 2015b)

Teachers and health care professionals are highly skilled public sector workers, but in Kyrgyzstan, Kazakhstan, and Uzbekistan, these workers are paid significantly less than the average worker and are more likely to be female. Underpayment of educators and health care workers can have

important negative social consequences; the quality of education and health care suffer, and corruption in both sectors has been a long-standing problem.

To redress gender wage inequality and improve the salaries of these highly skilled public sector workers, the government of Kyrgyzstan in 2011 implemented a wage adjustment policy that focused on the wages of teachers, health care workers, and social service workers. Data from the government's Labor Force Surveys and the Life in Kyrgyzstan surveys show a sharp increase in the wages of these workers following the implementation of the policy; the quarterly LFS data pinpoint the sharp increase in the fall of 2011, at the start of the academic calendar. We explore in this paper the impact of the policy by estimating earnings functions for men and women, and we control for demographic, human capital, and regional differences in our earnings models. Predictions from our multivariate panel models support the descriptive graphical evidence. Wages sharply increased for workers in the targeted jobs in 2011-2016, and the major impact of the policy was to increase the wages of women workers on average relative to men. The effects on hours of work were smaller but slightly positive in urban and rural areas as found in Jenish's (2015) study of the first year under the reform. Women and men worked fewer hours in the EHS jobs than in other jobs, but the gap in hours between the two sectors fell over time.

An important outcome of the wage reform is its impact on the quality of teaching and health care. The LIK data have no direct information on the worker quality. However, we looked at two indicators of human capital that may reflect the quality of teachers and health professionals: has a higher education degree and speaks/writes Russian. Mean differences over time in these characteristics are reported in Table 9. The changes over time in higher education are significant for women and men but suggest that the share of EHS workers with higher education declined over time; quality declined. However, the share of workers in EHS jobs who speak and write Russian increased for women but not men. Since the patterns for these indicators go in opposite directions, it is hard to draw conclusions about the change in the overall quality of EHS labor. However, the analysis of PISA scores indicated that students taught in Russian language schools outperformed other students in math, science, and language. The upward trend in teachers who speak and write Russian is a positive sign that the quality of schooling may be improving. More research on teacher quality is needed with better data than are available in the LIK or national household surveys.

Overall, the wage policy of 2011 was a powerful tool to redress the significant gap in earnings of skilled wage workers in EHS and reduce gender and regional wage inequality. It is unfortunate that the government is not committed to maintenance of the policy in the future; consistency in compensation reduces the risk of entering this sector and could improve the quality of worker in education and health care. Education and health care expenditures today comprise an unsustainable share of GDP, but if the government focused on improving efficiency in both sectors, worker compensation could be maintained at the median level or higher, and the EHS sector could potentially attract better teachers and health care professionals to these important occupations. The World Bank (2014) and others offer guidelines on how to achieve these sectoral efficiencies without compromising the compensation paid to their most important employees.

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Table 1. Literature on gender wage gaps in Central Asia.

	Year(s) of Data	Countries	Data	Log Wage	Method	Male premium	Explained gap	Decomp Method
Anderson and Pomfret, 2003	1993, 1997	Kyrgyzstan	LSMS	monthly	OLS, Heckman	1993:40% 1997: 15%	Yes: <0 (1997) JMP: 7%	OB, JMP
Arabsheibani and Mussurov, 2007	2001	Kazakhstan	HBS	monthly cash	OLS, IV; Wooldridge selection	All: 11% Married: 22%	No	none
Blunch, 2010	2009	Kazakhstan, Tajikistan, 4 others	UNDP Social Exclusion Survey	net monthly income	Robust OLS	19.4% KZ; 18% TJ	Yes: <0% KZ; 1% TJ	OB, 4 other methods
Goraus and Tyrowicz, 2013	KG: 1993, 1996-98 TJ: 1999, 2003, 2009	Kyrgyzstan, Tajikistan, 4 others	KG, TJ: LSMS	hourly	OLS, FE	18%	3%	Ñopo
Johnes, 2002	1999	Tajikistan	LSMS	hourly	IV	32%	Yes: 60%	Oaxaca-Ransom
Linz and Chu, 2013	KZ: 2005 KG: 2007, 2008	Kazakhstan, Kyrgyzstan, 4 others	employee surveys	monthly	OLS, FE	KZ: -12%[a] KG:-13%	female variable	none

Linz and Semykina, 2009	2005	Russia, Armenia, Kazakhstan	employee surveys	monthly (main and all jobs)	OLS	KZ: -18%[a]		female variable	none
Newell and Reilly, 2001	KZ: 1996 UZ: 1995	Kazakhstan, Uzbekistan, 9 others	KZ:LSMS UZ: EUI	TJ: hourly UZ: monthly	OLS	KZ:20% UZ:22%		TJ: <0% UZ: 0%	OB, quantile regression
Ñopo, Daza, Ramos, 2012	KG: 1997 TJ: 2003	Kyrgyzstan, Tajikistan, 62 others	KG & TJ: LSMS	hourly	matching	ECA: 18% TJ: 25%		ECA: <0% TJ: 5%	Ñopo matching method

Notes: Data sources [LFS=labor force survey; LSMS=Living Standards Measurement Survey (World Bank); HBS=Household Budget Survey; IPUMS=Integrated Public Use Microdata Series, Census data; EUI=European University Institute & Essex University Survey]. Decomposition methods [OB=Oaxaca-Blinder; JMP=Juhn, Murphy and Pierce]. Methods [OLS=ordinary least squares regression; IV=instrumental variables model; FE=fixed effects]

[a]Approximate decline in earnings if female.

Table 2a. Average monthly wages by job type, gender, and year.

	All Years	2010	2011	2012	2013	2016
Employed with wage						
All	7950	5824	7537	8020	8554	9993
Men	9141	7167	8787	9138	9646	11098
Women	6905	4687	6442	7038	7545	9035
Women/Men	0.755	0.654	0.733	0.770	0.782	0.814
Sample size	6620	1315	1422	1457	1166	1260
Teachers, health & social service workers						
All	7251	4086	7137	7643	7879	9417
Men	8527	5925	8882	8538	8608	10823
Women	6892	3529	6679	7397	7652	9039
Women/Men	0.808	0.596	0.752	0.866	0.889	0.835
Sample size	1773	310	418	418	320	307
Other workers						
All	8205	6361	7704	8171	8810	10178
Men	9229	7336	8773	9230	9809	11132
Women	6913	5268	6258	6776	7474	9033
Women/Men	0.749	0.718	0.713	0.734	0.762	0.811
Sample size	4847	1005	1004	1039	846	953

Table 2b. Average hours of work, job type, and monthly wages by gender and year.

	All Years	2010	2011	2012	2013	2016
Employed with wage						
All	40.9	41.4	41.7	41.1	40.8	39.5
Men	43.0	43.9	44.3	43.2	42.3	41.3
Women	39.1	39.4	39.4	39.2	39.4	38.0
Women/Men	.909	.897	.880	.907	.931	.920
Sample size	6451	1232	1403	1457	1099	1260
Teachers, health & social service workers						
All	35.3	34.6	35.3	36.0	34.9	35.6
Men	35.0	34.5	35.9	36.1	32.0	35.4
Women	35.4	34.7	35.1	36.0	35.8	35.4
Women/Men	1.011	1.006	.978	.997	1.118	1.000
Sample size	1726	289	411	418	301	307
Other workers						
All	43.0	43.5	44.4	43.1	43.0	40.8
Men	44.2	45.2	45.6	44.3	43.9	42.0
Women	41.4	41.7	42.8	41.6	41.8	39.4
Women/Men	.937	.923	.939	93.9	.952	.929
Sample size	4725	943	992	1039	798	953

Notes: The gender hours gap is statistically significant for other workers in every year; the gap for teachers is only significant in 2013, in favor of women.

Table 3. Panel models of nominal monthly earnings, by gender.

Variables	All Workers		Female Workers		Male Workers	
	RE	FE	RE	FE	RE	FE
Intercept	**8.669**	**8.543**	**8.352**	**8.453**	**8.66**	**8.685**
Affected job (=1)	**-0.195**	**-0.154**	**-0.236**	**-0.278**	-0.007	0.001
Rural (=1)	**-0.068**	-0.165	**-0.105**	**-0.282**	-0.05	-0.08
Year: 2011	**0.17**	0.14	**0.162**	**0.127**	**0.171**	**0.149**
Year: 2012	**0.314**	0.29	**0.356**	**0.329**	**0.278**	**0.257**
Year:2013	**0.421**	0.396	**0.4276**	**0.39**	**0.413**	**0.401**
Year:2016	**0.585**	0.561	**0.668**	**0.64**	**0.519**	**0.505**
Interactions:						
Job * Rural	**-0.169**	**-0.241**	-0.076	**-0.213**	**-0.402**	**-0.343**
Job*2011	**0.213**	**0.211**	**0.263**	**0.26**	0.064	0.043
Job*2012	**0.242**	0.244	**0.276**	**0.269**	-0.043	-0.032
Job*2013	**0.195**	**0.183**	**0.272**	**0.256**	-0.136	**-0.163**
Job*2016	**0.25**	**0.231**	**0.246**	**0.216**	0.006	-0.038
Interaction: Job*Rural*Year						
Job*Rural*2011	**0.372**	**0.431**	**0.38**	**0.452**	**0.367**	**0.43**
Job*Rural*2012	**0.26**	**0.323**	**0.216**	**0.302**	**0.472**	**0.503**
Job*Rural*2013	**0.187**	**0.244**	**0.19**	**0.254**	**0.302**	**0.359**
ob*Rural*2016	**0.153**	**0.219**	**0.116**	**0.188**	**0.36**	**0.441**
Female (=1)	**-0.322**					
Elevation > median	**-0.147**	**-0.260**	**-0.161**	**-0.335**	**-0.123**	-0.168
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample Size: all years	6220		3527		3093	
Sample Size: persons	3026		1527		1499	

Notes: RE=random effects; FE=fixed effects. Boldface if statistically significant at < 10% level. Robust standard errors.

Table 4. Panel models of hours of work per week, by gender.

Variables	All Workers		Female Workers		Male Workers	
	RE	FE	RE	FE	RE	FE
Intercept	**3.866**	**3.706**	**3.793**	**3.592**	**3.866**	**3.859**
Affected job (=1)	**-0.096**	-0.091	-0.08	-0.05	**-0.13**	**-0.139**
Rural (=1)	-0.024	-0.137	**-0.081**	0.029	0.017	-0.339
Year: 2011	0.024	0.01	0.033	0.006	0.013	0.013
Year: 2012	0.014	0.012	0.029	0.02	0	0.005
Year:2013	-0.019	-0.019	0.012	0.001	**-0.051**	-0.035
Year:2016	**-0.087**	-0.072	-0.047	-0.009	**-0.125**	**-0.127**
Interactions:						
Job * Rural	-0.087	0.022	-0.044	0.018	-0.125	0.02
Job*2011	0.058	0.099	0.048	0.099	0.07	0.045
Job*2012	0.017	0.036	0.011	0.034	-0.017	-0.063
Job*2013	0.041	0.056	0.044	0.058	-0.055	-0.099
Job*2016	-0.007	-0.014	-0.044	-0.097	0.032	0.041
Interaction: Job*Rural*Year						
Job*Rural*2011	**-0.137**	**-0.172**	**-0.138**	**-0.168**	-0.14	**-0.123**
Job*Rural*2012	0.044	0.032	0.026	0.011	0.122	0.186
Job*Rural*2013	-0.077	-0.077	-0.07	-0.063	-0.039	-0.001
Job*Rural*2016	**0.176**	0.169	**0.2**	0.205	0.113	0.102
Female (=1)	**-0.079**					
Elevation > median	**-0.040**	0.021	-0.015	-0.036	**-0.062**	-0.081
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample size: all years	6451		3435		3016	
Sample size: persons	2996		1511		1485	

Notes: RE=random effects; FE=fixed effects. Boldface if statistically significant at < 10% level. Robust standard errors.

Table 5. Panel models of nominal hourly wages, by gender.

Variables	All Workers		Female Workers		Male Workers	
	RE	FE	RE	FE	RE	FE
Intercept	**3.351**	**3.383**	**3.098**	**3.386**	**3.353**	**3.392**
Affected job (=1)	**-0.131**	-0.088	**-0.195**	-0.155	-0.007	0.001
Rural (=1)	-0.042	-0.041	-0.028	-0.326	-0.05	-0.08
Year: 2011	**0.152**	**0.13**	**0.141**	**0.129**	**0.171**	**0.149**
Year: 2012	**0.305**	**0.275**	**0.34**	**0.314**	**0.278**	**0.257**
Year:2013	**0.446**	**0.409**	**0.432**	**0.394**	**0.413**	**0.401**
Year:2016	**0.678**	**0.632**	**0.738**	**0.66**	**0.519**	**0.505**
Interactions:						
Job * Rural	**-0.047**	**-0.241**	0.027	**-0.199**	**-0.402**	**0.001**
Job*2011	**0.174**	**0.13**	**0.243**	**0.176**	0.064	0.042
Job*2012	**0.248**	0.233	**0.296**	**0.26**	-0.043	-0.032
Job*2013	**0.18**	**0.155**	**0.256**	**0.22**	-0.136	**-0.163**
Job*2016	**0.282**	**0.268**	**0.32**	**0.337**	0.006	-0.038
Interaction: Job*Rural*Year						
Job*Rural*2011	**0.477**	**0.581**	**0.469**	**0.595**	**0.367**	**0.431**
Job*Rural*2012	**0.177**	**0.264**	**0.133**	**0.257**	**0.472**	**0.503**
Job*Rural*2013	**0.225**	**0.298**	**0.222**	**0.3**	**0.302**	**0.359**
Job*Rural*2016	**-0.058**	**0.024**	**-0.138**	**-0.055**	**0.36**	**0.441**
Female (=1)	**-0.242**					
Elevation > median	**-0.108**	**-0.251**	**-0.145**	**-0.276**	-0.062	**-0.209**
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample size: all years	6451		3435		3016	
Sample size: persons	2996		1511		1485	

Notes: RE=random effects; FE=fixed effects. Boldface if statistically significant at < 10% level. Robust standard errors.

Table 6. Treatment effects from the random effects model of nominal monthly wages, by gender and rural-urban location, 2010-2016.

	Urban			Rural	
	Women	Men		Women	Men
2010	-21.02	-0.70		-26.80	-33.57
2011	2.74	5.87		39.24	2.22
2012	4.08	-4.88		19.72	2.02
2013	3.67	-13.32		16.18	-21.57
2016	1.01	-0.10		5.13	-4.21

Note: Treatment effect is the difference in the predicted wage in ETS and other jobs, in percentage terms.

Table 7. Treatment effects from the random effects model of weekly hours of work, by gender and rural-urban location, 2010-2016.

	Urban			Rural	
	Women	Men		Women	Men
2010	-7.69	-12.19		-11.66	-22.51
2011	-3.15	-5.82		-19.27	-27.75
2012	-6.67	-13.67		-8.33	-13.93
2013	-3.54	-16.89		-13.93	-29.46
2016	-11.66	-9.34		3.25	-10.42

Note: Treatment effect is the difference in the predicted wage in ETS and other jobs, in percentage terms.

Table 8. Treatment effects from the random effects model of nominal hourly wages, by gender and rural-urban location, 2010-2016.

	Urban			Rural	
	Women	Men		Women	Men
2010	-17.72	12.52		-15.46	-15.55
2011	4.92	11.29		72.29	38.82
2012	10.63	9.20		29.82	16.30
2013	6.29	6.61		36.34	7.04
2016	13.31	10.19		1.41	6.18

Note: Treatment effect is the difference in the predicted wage in ETS and other jobs, in percentage terms.

Table 9. Indicators of labor quality among workers in education, health care, and social services.

	2010	2011	2012	2013	2016	Sig.
Completed higher education (%)						
Affected workers, men	75	73.56	67.78	70.67	63.49	Yes
Affected workers, women	69.33	61.33	65.24	61.25	59.83	Yes
Speaks Russian						
Affected workers, men	86.11	85.06	84.44	81.08	87.69	No
Affected workers, women	80.67	87.34	87.5	83.65	91.21	Yes

Appendix

Table A1. Summary statistics, by gender.

	All	Women	Men
Nominal monthly wage	7949.679	6904.715	9141.269
	(5597.866)	(4863.775)	(6118.665)
Nominal hourly wage	52.290	48.473	56.637
	(55.240)	(54.385)	(55.890)
Hours of work/week	40.932	39.074	43.048
	(11.800)	(11.906)	(11.315)
Policy:			
Affected job (=1)	0.268	0.392	0.126
Rural (=1)	0.467	0.454	0.481
Elevation >50%tile	0.396	0.397	0.395
Ethnicity:			
Kyrgyz	0.689	0.688	0.690
Uzbek	0.077	0.061	0.095
Russian	0.152	0.178	0.123
Other	0.082	0.073	0.092
Region:			
Bishkek	0.320	0.327	0.311
Chui (North)	0.152	0.144	0.161
Mountain	0.144	0.160	0.126
South	0.384	0.369	0.402
Education:			
Secondary	0.395	0.327	0.472
Vocational	0.187	0.199	0.173
University	0.418	0.474	0.355
Age	40.056	40.900	39.093
	(11.317)	(11.244)	(11.325)
Years on the job	8.744	9.356	8.047
	(8.973)	(9.066)	(8.815)
Sample size	6620	3527	3093

Notes: Means with standard deviations in parentheses.

Table A2. Summary statistics, by type of job.

	Teachers, Health & Social Work	Other Jobs
Nominal monthly wage	7251	8205
	(4325)	(5976)
Nominal hourly wage	56.807	50.640
	(53.820)	(55.665)
Hours of work/week	35.332	42.977
	(11.848)	(11.100)
Policy:		
Rural	0.561	0.432
Elevation > median	0.517	0.352
Female	.780	.442
Ethnicity:		
Kyrgyz	0.804	0.646
Uzbek	0.056	0.085
Russian	0.089	0.176
Other	0.051	0.093
Region:		
Bishkek	0.217	0.356
Chui (North)	0.098	0.172
Mountain	0.190	0.128
South	0.495	0.344
Education:		
Secondary	0.140	0.488
Vocational	0.215	0.177
University	0.645	0.335
Age	41.580	39.498
	(11.440)	(11.221)
Years on the job	13.307	7.076
	(10.797)	(7.546)
Sample size	1773	4847

Notes: Means with standard deviations in parentheses.