

# DO DIFFERENTIATED WAGES IMPROVE POLYCLINIC PERFORMANCE IN KAZAKHSTAN?

*by*

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A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Arts

Economics

at

NAZARBAYEV UNIVERSITY -

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES

2017

# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Literature review</b>	<b>2</b>
<b>3</b>	<b>Data</b>	<b>4</b>
<b>4</b>	<b>Methodology</b>	<b>7</b>
<b>5</b>	<b>Results and discussion</b>	<b>10</b>
<b>6</b>	<b>Robustness analysis on self-selection</b>	<b>12</b>
<b>7</b>	<b>Future research</b>	<b>14</b>
<b>8</b>	<b>Conclusion</b>	<b>15</b>

### **Abstract**

This paper evaluates the impacts of a differentiated wage system on polyclinics performance in Kazakhstan. The government introduced this new system in order to improve health care provided by polyclinics. I use data for 259 polyclinics for 2014 and based on their efficiency scores, comparing their performance with polyclinics that did not implement the differentiated payment system. The efficiencies of polyclinics are measured by using Data Envelopment Analysis (DEA) with bootstrapping method. Inputs in the DEA method are number of physicians and number of nurses. DEA outputs are number of polyclinic visits and number of home visits. Using inputs and outputs I estimate efficiency scores for each polyclinic. After estimating the efficiency score, Tobit regression is used to determine which environmental factors may affect polyclinic performance. The results suggest that on average, wage differentiation has a negative effect on efficiency scores.

**Keywords:** polyclinics performance, DEA bootstrapping method, efficiency scores, Tobit model.

### **Acknowledgments**

I would like to express my sincere gratitude to my thesis advisor Dr. Galiya Sagyndykova for her continuous support during my research, for her patience, enthusiasm, and motivation. Her guidance helped me in the process writing of this thesis. I would also like to thank Dr. Jozef Konings, Dr. Charles Becker, for their encouragement and valuable comments. Finally, I would like to thank my family for their spiritual support.

# 1 Introduction

Questions related to the development, improvement, and of retaining of human capital resources are among the most discussed topics in recent years. According to labor economics theory (Borjas, 2012) employees with higher human capital tend to be more productive at work. Therefore, companies are making alterations in their human capital management using creative, unique, and unconventional methods to develop fair reward and recognition practices. Such approaches are considered to be viable tools to motivate employees and to ensure workers' efficiency, engagement, and integrity (Limaye et al., 2013).

Gerhart et al. (1995) argued that one of the key determinants of the efficient control of human capital is the employee compensation system. In order to obtain reasonable income and health security, employees are dependent on wage levels. "For employers, compensation decisions influence their cost of doing business and thus, their ability to sell at a competitive price in the product market" (Gerhart et al., 1995). Depending on the company type, structure and organizational unit, employee pay practices differ on several dimensions (Heneman and Schwab, 1979; Milkovich and Newman, 1993). In this paper, I discuss the impact of performance-related or differential wage practices within the context of the health care system of Kazakhstan.

The essence of a differentiated wage system (DWS) of remuneration is the introduction of a direct, personal, piece-rate wage forms, taking into account the coefficients of complexity of the work and the results of labor (Altman, 2000). In healthcare, the wages of employees do not only depend on the qualitative results, but also are determined by the actual amount of time worked. Hence, it follows that the remuneration system should create an incentive for medical professionals in the final results of their work, providing a balance between the level of their economic motivation

and the results of professional activity.

Until 2011, the salaries of health workers did not have a sufficient incentive feature to improve the medical performance of polyclinics in Kazakhstan. To improve the health care system of the country, in 2011, the Government of Kazakhstan adopted a state program called "Salamatty Kazakhstan" (Healthy Kazakhstan). One of the mechanisms for the implementation of this program was to introduce differentiated payment in the activities of medical institutions and thus to promote the outcomes of professional activities of health workers. Depending on the magnitude and the quality of the care provided by medical workers, the program aims to improve the quality of medical care by increasing the efficiency of the medical staff and the polyclinics (a clinic or a hospital dealing with various diseases) as a whole. Thus, the salary of medical workers increased from 50 to 500 US dollars on average, and in January 2014 the Government has spent 98 million KZT tenge equivalent to 630 thousand US dollars under the differentiated salary system (Health Care Statistical Yearbook, 2015).

This paper estimates the relative impact of differentiated salary payment in the polyclinics performance of Kazakhstan by computing their relative efficiency scores. Hence, the aim is to establish whether polyclinics with a differentiated wage system are more efficient than those that did not introduce this system. The results show that the differentiated wage system has a negative and significant effect on the polyclinic efficiency scores.

## **2 Literature review**

The rationale for the differentiated salary system is to motivate individuals to obtain a higher performance level (Banker et al., 2001, Heneman and Werner, 2005). Consequently, different

forms of differential wage plans have emerged that vary with performance level and methods of allocating awards to employees (Park and Sturman, 2009). A number of studies (e.g., Banker et al., 1996, Bonner and Sprinkle, 2002) have found empirical evidence that performance level compensation helps to achieve greater efficiency at the individual level and company level.

A study by Park and Sturman (2009) analyze the different effects of compensation the system that simultaneously affects employees' productivity, and find that the most important indicator of salary rewards is the individual performance. They conclude that the performance levels were closely related to the reward for different performance plans, implying that the pay-for performance plans are effective(Park and Sturman, 2009).

Another research by Lucifora and Origo (2012) analyze the impacts of switching from fixed wages to performance related pay on firms' productivity in Italy. The authors find that the implementation of new payment schemes resulted in a three to five per cent increase in productivity of the firms. They also conclude that the efficiency gains may vary significantly depending on the firm size, type of the industry, and the number of workers.

In their studies Kahn and Sherer (1990), Heneman and Werner (2005), show that a differentiated wage system has little or no significant effect on firms' performance. For example, Braakman (2008) looked at the productivity of the firm by estimating sales divided by the number of workers across German companies. He concludes that there is no significant effect due to introduction of a differentiated payment scheme.

In addition, despite the variety of studies on impacts of pay-for-performance on the firm and the individual levels, there is only a little research that examines the impacts of differentiated wages on the health care system in particular. Liu and Mills (2005) explore the effects of a performance related payment system on hospital revenue and productivity in China and analyzed whether pay-

ments were associated with the provision of unnecessary care. They find little evidence that the performance related pay impacts on the productivity of the hospitals and no evidence on the provision of unnecessary care.

A lot of work has been done on differentiated wage system. The results of these studies are inconclusive. Some suggest that a differentiated wage system has a positive and significant impact on productivity of the firms. On other hand, other studies show that there is no significant effect of the differentiated wage system on firm's performance. In this paper, I argue that the introduction of a differentiated wage scheme negatively affects the performance of polyclinics of Kazakhstan. In my analysis of the effect of differentiated wage system on polyclinics performance I will include characteristics of polyclinics as well as the workers' job performance. This paper contributes to the existing literature and is the first one that examines the impact of the DWS on polyclinics efficiency scores.

### **3 Data**

In Kazakhstan, the national health policy is developed by the Ministry of Health and Social Development of Kazakhstan, which carries out planning through the adoption of strategic development plans. Provision of medical care and its financing mechanisms are the jurisdiction of the regional executive authorities and their subordinate regional offices of public health. Administrative functions of care management and the governance of inpatient and outpatient organizations are performed by fourteen regional offices of public health, as well as Astana and Almaty.

Since 2010, the country implemented the Integrated Health Information System (IHIS) operated by the Republican Center for Health Development, with the aim of improving the availability

of health services for the population as well as the efficiency of the health system. The IHIS is a software system that performs the collection, storage and analysis of information, and the personalization of medical data on every citizen. This system identifies the doctor and the clinic where patients are treated.

The data from each polyclinic have been routinely collected and submitted to the Republican Center for Health Development who provided it for the study. Also, the study was conducted with the agreement and support from the Republican Center for Health Development. I use data from IHIS for 2014 for a total of 259 polyclinics. The study focused on the sixteen region (oblast) polyclinics of Kazakhstan. The research design provides an estimate for efficiency scores by contrasting polyclinics with differentiated wages and non-differentiated wages. Out of 259 polyclinics, 115 implemented a differentiated payment scheme each one at different time. Out of this 115, 13 polyclinics are private, and 102 are public. In total, 348 doctors out of 1126 received a differentiated payment, and 462 nurses out of 1514. The average monthly amount of differentiated salaries amounted to 1 doctor - 53,7 thousand tenge, and per 1 nurse - 31.8 thousand tenge. Table 1 shows the averages of key variables per polyclinics with and without a differentiated wage system. In order to characterize polyclinics and assess the differences between those with a differentiated and a non-differentiated wage system, I begin with presenting descriptive statistics. Table 1 shows that on average polyclinics with a differentiated wage system have more physicians and nurses than polyclinics without the system. Furthermore, the number of visitors is higher in polyclinics with a differentiated wage than a non-differentiated wage. Generally, in all of these key indicators, except for the number of disabled people, the averages of polyclinics with the system are more than other polyclinics. However, these differences are not statistically significant. The descriptive statistics suggest that polyclinics with and without the system are the same almost in all their characteristics.

A number of studies (e.g. Simar and Wilson, 2007, Bernet et al., 2008) have reported an application in the health care area using the DEA bootstrapping method. Inputs in the DEA method are the number of physicians and the number of nurses. DEA outputs are the number of polyclinic visits and the number of home visits. According to Farrell's definition the technical efficiency can be seen from input as well as from output perspective. In this study the output orientation is assumed, which means that "measures keep input constant and explore the proportional expansion in output quantities that are possible" (Jacobs, Smith, and Street, 2006). There is an assumption that the polyclinics have no control over inputs; however, it is possible to generate different level of outputs by given inputs. There is no exact way to determine which variables to include in the DEA model (Jacobs et al, 2006); however, in this study the choice of variables was intentional. The main resource categories available for primary polyclinics are human resources (medical staff), capital (an equipment, a building, etc.), and pharmaceuticals. Among these possible input variables, capital and pharmaceuticals could not be included, because of data limitations; and these two categories are not common among the polyclinics included in the study. The capital (for example, equipment) as a resource item differs from one polyclinics to another. The pharmaceuticals as a resource are too complex variable for inclusion in the DEA model, which means, that organizations under the study are homogeneous. Considering this fact, pharmaceuticals were not included in the study. The same principle with outputs - variables should be common for all polyclinics to make it possible to compare them to each other and create relative efficiency scores (Jacobs et al, 2006). Also, it is believed that selected outputs directly influenced by selected inputs (Jacobs et al, 2006), and they captured both preventive and curative services of the polyclinics. The descriptive statistics of the variables are shown in (Table 1).

## 4 Methodology

In order to determine the effects of the DWS and other environmental factors on polyclinics performance Tobit regression is used. In this regression model the dependent variable is efficiency scores which are calculated by using DEA bootstrapping method. I choose the Tobit model because the dependent variable efficiency score is censored from below 0 and above 1. The independent variables are differentiated wage, location, people with disabilities, health budget, and capacity. The differentiated wage is the dummy variable and results of the regression analysis show significance of differentiated wage system on polyclinics efficiency. In this study I test the hypothesis if the polyclinics with the DWS are more efficient rather than polyclinics without the DWS. In order to answer this question I will use the following Tobit model:

$$Y_i = \begin{cases} Y_i^*, & \text{if } Y_i^* > 0 \\ 0, & \text{if } Y_i^* \leq 0 \end{cases} \quad (1)$$

$$Y_i^* = \alpha_0 + \beta DWS_i + \gamma X_i + \epsilon_i \quad (2)$$

where:

$Y_i^*$  is the efficiency scores for polyclinic  $i$ , and is estimated by data envelopment analysis;  $DWS_i$  is the treatment dummy variable which indicates 1 if the polyclinic implemented the differentiated wage system or 0 otherwise;  $X_i$  is the vector of variables which contain location, capacity, health budget, type, and people with disabilities.

This study tests for differentiated wages versus non-differentiated wage system differences in the efficiency scores of polyclinics in Kazakhstan. The null hypothesis is that there are no differ-

ences in efficiencies between polyclinics with differentiated wage system and polyclinics without differentiated wage system in Kazakhstan. Alternatively, given that there is a lot of spending on differentiated wage system, it is more likely that polyclinics with the system may have higher efficiencies relative to those without the system. Such findings would be consistent with the government's anticipation.

Also, I am interested in finding which environmental and organizational variables may affect the efficiency scores of polyclinics. Before showing the regression results, I introduce the hypotheses concerning how each independent variable may affect the efficiency scores. One difference in efficiency may be because of the location of the polyclinic. I hypothesize that the urban regions of Kazakhstan tends to be more technologically advanced and have more professional staff and the rural areas have problems in medical technology and lack of professional staff. Another hypothesis is that private polyclinics are better than public polyclinics because private sector have to make advances in health management in order to make profits. Private polyclinics were included only if they provided free basic package of services budgeted by government. Also, I have to include variable identifying population characteristic such as number of people with disabilities. I focus on this characteristic because persons with disabilities might require more home visits. I hypothesize that polyclinics which have more health budget tend to be more efficient. If physicians and nurses get good wages they will provide better health care.

In this study the dependent variable the efficiency scores of polyclinics were measured by using the Data Envelopment Analysis (DEA) bootstrapping method with 1000 iterations. DEA is an axiomatic, mathematical programming approach to estimate efficiency scores of firms, hospitals, banks, and other decision making units. DEA originates from the work by Farrell (1957), but current popularity is due to paper by (Charnes et al, 1978). It is a non-parametric method used

to estimate the frontier function (Kuosmanen, 2006). The DEA technique is popular because of its flexibility and ease of application: it allows to use datum which are often routinely collected in the firm, it is possible to use multiple inputs and multiple outputs at the same time, does not require any assumption of functional form, therefore any inputs and outputs can be used for analysis (Jacobs, Smith, and Street, 2006).

There is a mathematical formulation of DEA method. In order to obtain efficiency scores of polyclinics the objective function is maximized. The objective function is:

$$\theta = \frac{u_1 y_{10} + u_2 y_{20} + \dots + u_r y_{r0}}{v_1 x_{10} + v_2 x_{20} + \dots + v_m x_{m0}} = \frac{\sum_{r=1}^s u_r y_{r0}}{\sum_{i=1}^m v_i x_{i0}} \quad (3)$$

Subject to

$$Pol_1 : \frac{u_1 y_{11} + u_2 y_{21} + \dots + u_r y_{r1}}{v_1 x_{11} + v_2 x_{21} + \dots + v_m x_{m1}} = \frac{\sum_{r=1}^s u_r y_{r1}}{\sum_{i=1}^m v_i x_{i1}} \leq 1 \quad (4)$$

$$Pol_j : \frac{u_1 y_{1j} + u_2 y_{2j} + \dots + u_r y_{rj}}{v_1 x_{1j} + v_2 x_{2j} + \dots + v_m x_{mj}} = \frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \leq 1 \quad (5)$$

where:

$Pol_j$  - polyclinic number  $j$ ;  $\theta$  - efficiency score of the polyclinic being evaluated by DEA;  $y_{rj}$  - amount of output  $r$  used by polyclinic  $j$ ;  $x_{ij}$  - amount of input  $i$  used by polyclinic  $j$ ;  $i$  - number of inputs used by the  $Pol_s$ ;  $r$  - number of outputs generated by the  $Pol_s$ ;  $u_r$  - coefficient or weight assigned by DEA to output  $r$ ;  $v_i$  - coefficient or weight assigned by DEA to input  $i$ .

## 5 Results and discussion

The results of the implementation of the DWS (Table 2) show that the system has negative and significant effects on efficiency scores. It means that polyclinics without the differentiated wage system are more efficient than polyclinics with the system by 6.4 percentage points on average. Physicians and nurses in polyclinics with differentiated wage system visited less patients compared to visits of physicians and nurses in polyclinics without the system. Also, patients visited more polyclinics without the system. This result is counterintuitive as it was anticipated that the introduction of such a system would motivate health workers and therefore increase the productivity of the polyclinics. However, the efficiency scores for polyclinics with the DWS are lower than polyclinics without the DWS. The possible reason of this negative result is that although the amount of spending has increased, the total amount of work has also increased. The physicians and nurses complain that paper documents have been increased after implementing the new system.

The results of the Tobit regression analysis (Table 2) suggest that location has a positive significant effect on the efficiency scores of polyclinics, which implies that polyclinics in urban areas are more efficient than polyclinics from rural areas. Physicians and nurses in urban regions visited more patients compare to visits of medical staff in rural regions by 9.1 percentage points on average. Also, patients visited more polyclinics in urban areas. This result is consistent as it could be explained by the fact that the health care system is more technologically advanced in urban areas. In addition, the type of polyclinics has positive significant effects on efficiency scores. Physicians and nurses in private polyclinics visited more patients compare to visits of medical staff in public polyclinics by 5.2 percentage points. Also, patients visited more private polyclinics. Private polyclinics tend to be more efficient than public polyclinics. These results can be explained intuitively

by taking into account that the private sector will have advances in health management in order to make more profits. Also, private polyclinics might have access to better equipment and capital.

In Figure 1 the distribution of efficiency scores is shown for polyclinics with the DWS in comparison with polyclinics without this system. The scores are normally distributed and there are some differences between these polyclinics. There are more polyclinics with the system which scores are around 0.6 and 0.75 than polyclinics without the system. However, the figure also shows that there are polyclinics without the system in which scores are around 0.8 and 0.95 than in polyclinics with the system. The number of service units, where efficiency scores are equal to 1.0 are approximately the same in both types of polyclinics.

Figure 2 shows the distribution of public and private polyclinics. The distribution of the efficiency scores of public and private are normally distributed. There are more public polyclinics where scores are around 0.2 and 0.3 than in private polyclinics. Most of the efficiency scores of private polyclinics are between 0.5 and 0.75. There are more private polyclinics where efficiency scores equal to 1 than in public polyclinics.

Figure 3 shows the distribution of urban and rural polyclinics. The distribution of efficiency scores of polyclinics in urban area is left skewed towards higher efficiency scores. There are more urban polyclinics where scores are around 0.65 and 0.90 than in rural polyclinics. Most of the efficiency scores of urban polyclinics are between 0.5 and 0.9.

There are several implications that can be drawn from this study. First, while incentivizing health care providers by supplementary payments, the implementation of the program caused additional work such as, increased paper documents, or work for the fulfillment of plans set by the Ministry. These factors could explain the negative impact of the DWS, as workers spend a vast time on the job that is not directly related to the improvement of public health. Second, in order

to further improve the DWS and provide material incentives for health care providers there is a need to strengthen their salaries depending on the size and the degree of difficulty and intensity of work, quality of care, as well as creating incentives for continuous professional development and training of medical professionals. Finally, optimally designed remuneration system is not only a way to monitor staff performance, but also an incentive to the development of the organization. However, due to the lack of appropriate cost-benefit analysis, an inaccurately planned design of the program can have negative effects on the whole labor remuneration system. The implementation of the program has cost 3 million US dollars for the Government of Kazakhstan. Given the result of this study and huge spending, the Government needs to carefully plan and design its programs in the future.

## **6 Robustness analysis on self-selection**

It is possible that the selection procedure of the polyclinics that implemented the differentiated wage system was not random. Therefore, it is possible that there is an endogeneity problem of introducing a differentiated wage system. Also, there is no information about when each polyclinic implemented a new system. It could be possible that polyclinics introduced the system at different times during 2011-2014 years. This also could create endogeneity problem. In order to solve these problems I use propensity score matching. By using this method I attempt to estimate the effect of the differentiated wage system by accounting for the covariates. Also, propensity score is used in order to reduce selection bias by equating group based on the control variables such as capacity, number of disabled, and health budget. I restricted the sample by using the propensity score matching method that in effects removes polyclinics that were unlikely to be treated. The

results of the propensity score matching (Table 3) is consistent with the results of the Tobit regression. The differentiated wage system has a negative effect on efficiency scores of polyclinics and it is statistically significant. It means that polyclinics without a differentiated wage system are better compared to polyclinics with a differentiated wage system by seven percentage points on average. Also, I used different methods of matching such as nearest-neighbor matching and inverse-probability weighting in order to check for consistency. Results suggest that polyclinics without a differentiated wage system are better compared to polyclinics with a differentiated wage system by between five and seven percent on average and significant at five to ten percentage points.

It is possible to check for overlapping assumption. The figure 7 shows the estimated density of the predicted probabilities of polyclinics without the system and predicted probabilities of polyclinics with the system. We can see that neither plot displays too much probability mass near 0 or 1. Also, the two estimated densities have majority of their corresponding masses in area in which they overlap each other. Therefore, we can say that the overlap assumption is not violated.

In order to check for robustness I also used quantile regression. It is possible that there are outliers in the dataset. These outliers could impact the regression estimates therefore I interested in distributional robustness. The results of the quantile regression is consistent with Tobit regression. The differentiated wage system has a negative effect on efficiency scores of polyclinics and it is statistically significant. This implies that polyclinics without the DWS are better compared to polyclinics with the DWS by nine percentage points on average.

## 7 Future research

In this study I use cross sectional data in order to determine the effects of the differentiated wage system on polyclinic performance. As it was mentioned before, non-random selection and the implementation of the system at different point of times create an endogeneity problem. In order to solve this problem, I use the propensity score matching and quantile regression analysis. However, there are still several limitations of this study that need to be addressed in future research. First, this study lacks the information on quality of service and the time-intensity of different treatments. To overcome this problem, it could be possible to collect data on justified complaints, index of untimely diagnosed pulmonary tuberculosis, level of hospitalizing the patients from among population attached due to complications of cardiovascular diseases, infant mortality rate from 7 days to 5 years, or the ratio of the number of unnecessary hospitalizations to the total number of hospitalizations. These indicators could help better evaluate polyclinic performance in general. Because the DEA bootstrapping method could handle multiple inputs and multiple outputs, we could add these indicators in order to have polyclinic efficiency scores based on quality. The resulting estimates could lead to more consistent outcomes.

Second, it is possible to include the difference in difference approach to overcome an unobserved heterogeneity problem. The model would include two sets of groups at different periods of time. The counterfactual would be polyclinics, for example in 2010, that are not exposed to the treatment during both periods. In the case of polyclinics where the same units within a group are observed in each time period (for example, 2010 and 2014), the average gain in the polyclinics performance in 2010 (control) group can be subtracted from the average gain in the polyclinics performance in 2014 (treatment) group. This set up will help to solve an unobserved heterogeneity

and find the true effect of the differentiated wage system on polyclinic performance.

Finally, we could find out the exact time when each polyclinic introduced the differentiated wage system. Using quality oriented inputs and outputs we could re-calculate efficiency scores. Hence, it is possible to construct panel data and to use the difference in difference method in order to obtain the effect of the differentiated wage on polyclinic performance. As a result of expanded data set, the introduction of exact timing of implementation of the system and alteration in methodological approach could ultimately result in better estimates with different set of outcomes.

## **8 Conclusion**

The implementation of a differentiated wage system is an ongoing process. The government of Kazakhstan has concluded that “Salamatty Kazakhstan 2011-2014” program caused an improvement of quality in healthcare system. I analyze 259 polyclinics performance as a result of introduction of differentiated wage system. The results of Tobit regression analysis show that type and location of polyclinics has significant effect on efficiency scores. The main result of this study is that the new system negatively affects polyclinics performance. Therefore, we might say that in general polyclinics with differential system are not better than other polyclinics. In my view, the further research is needed in order to determine the true effect of the differentiated wage system on polyclinic performance.

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## Tables and figures

Table 1: Descriptive statistics for key indicators of polyclinics

	Variable	Differentiated wage		Non-differentiated wage		Difference t-value
		Mean	SE	Mean	SE	
Inputs	Physicians	7.58	1.85	6.91	1.48	0.2866
	Nurses	6.06	1.48	5.53	1.18	0.2746
Outputs	Polyclinic visits	36645.82	1542.5	35379.78	1276.6	0.6383
	Home visits	2534.42	85.01	2368.01	69.2	1.5343
Environmental and organizational variables	Health budget	13683.91	1601.74	11468.71	1289.56	1.0899
	Disabled people	75.38	5.72	88.34	5.87	1.5551
	Capacity	132.47	2.34	129.61	1.96	0.9356
Efficiency score		0.6325	0.016	0.6577	0.016	0.2764

Table 2: Tobit regression results

Dependent variable: Efficiency score	
model	
Differentiated wage system	-0.064** (0.030)
Location	0.091*** (0.031)
Health budget	0.000 (0.000)
Capacity	0.001 (0.001)
Type	0.052* (0.030)
Number of disabled	0.000 (0.000)
Constant	0.487*** (0.077)
sigma	
Constant	0.195*** (0.009)
N	259
$R^2$	0.1146

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3: Matching estimators

Efficiency score	Matches	Propensity score	Nearest- neighbor	IPW
ATE diff (1 vs 0)	1	-0.075** (0.035)	0.061 (0.039)	-0.055 (0.037)
	5	-0.045 (0.033)	-0.055* (0.030)	
	10	-0.051* (0.032)	-0.047* (0.027)	

Standard errors in parentheses

\* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 4: Quantile regression results

Dependent variable: Efficiency score	
Differentiated wage system	-0.092** (0.041)
Location	0.114*** (0.042)
Health budget	0.000 (0.000)
Capacity	0.001 (0.001)
Type	0.087** (0.041)
Disabled people	0.000 (0.000)
Constant	0.403*** (0.104)
N	259
$R^2$	0.203

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



Figure 1: Density in efficiency scores between polyclinics with and without differentiated wages.

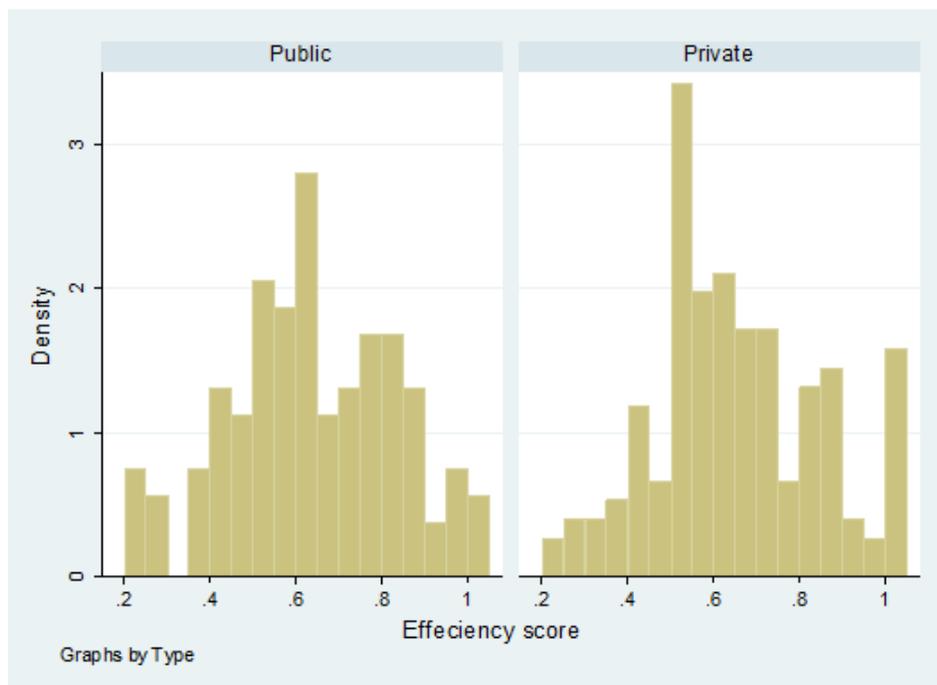


Figure 2: Density in efficiency scores between public and private polyclinics.

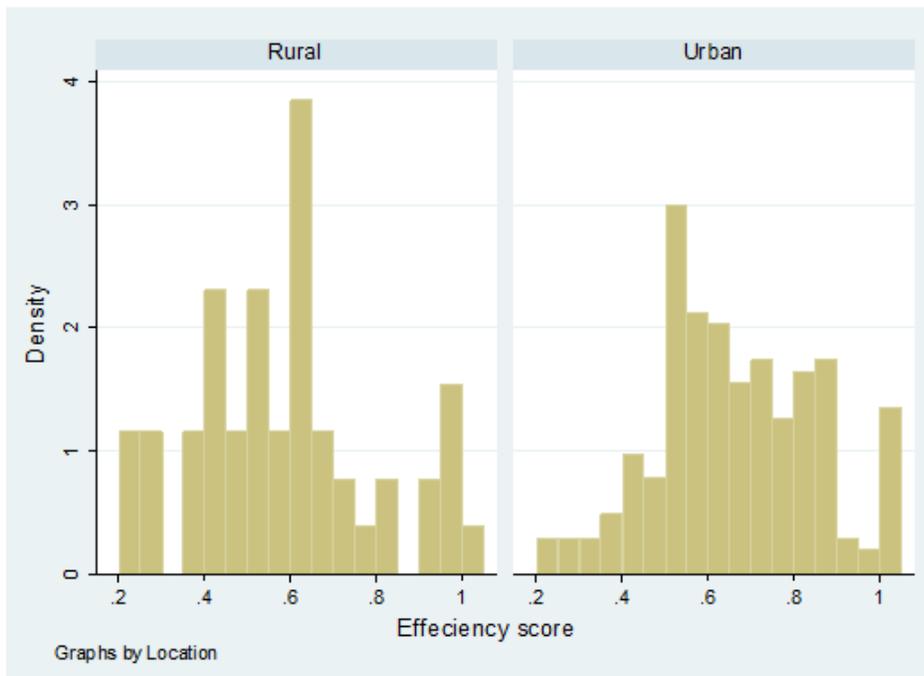


Figure 3: Density in efficiency scores between polyclinics in rural and urban areas.

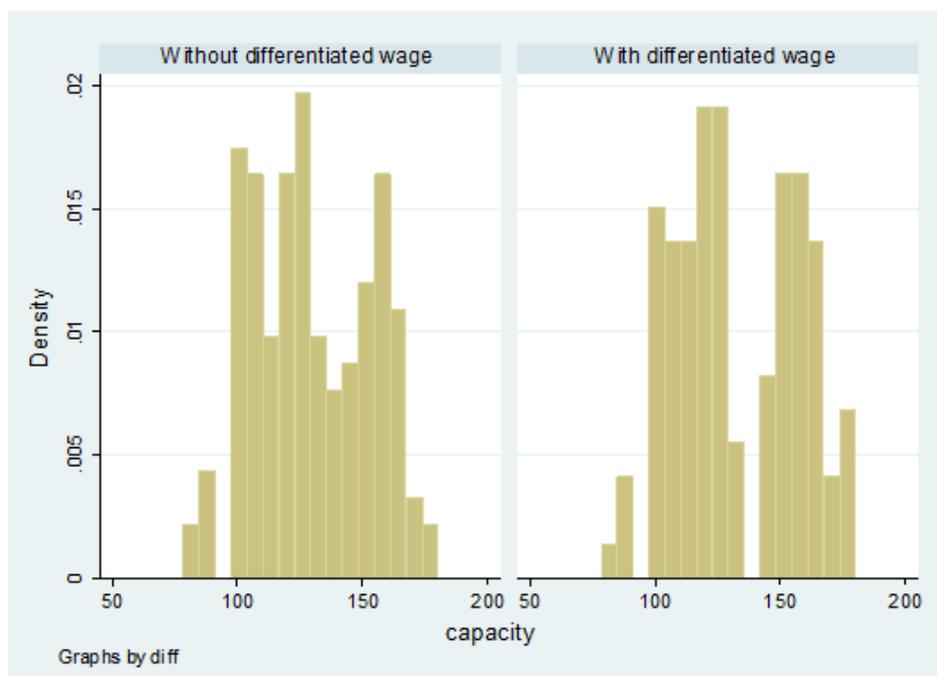


Figure 4: Density in capacities between polyclinics with without differentiated wages.

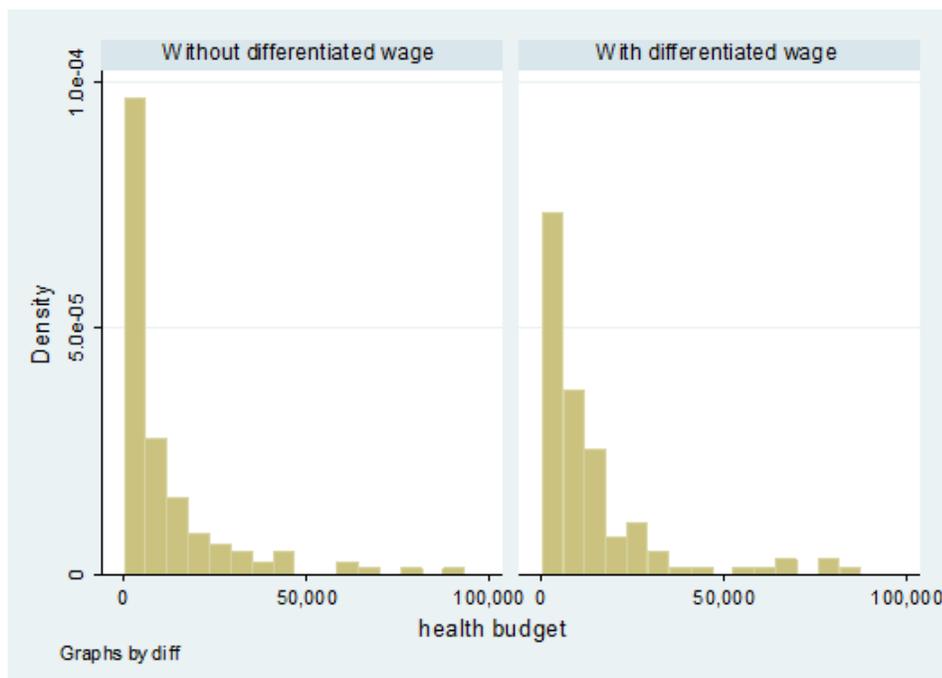


Figure 5: Density in health budget between polyclinics with and without differentiated wages.

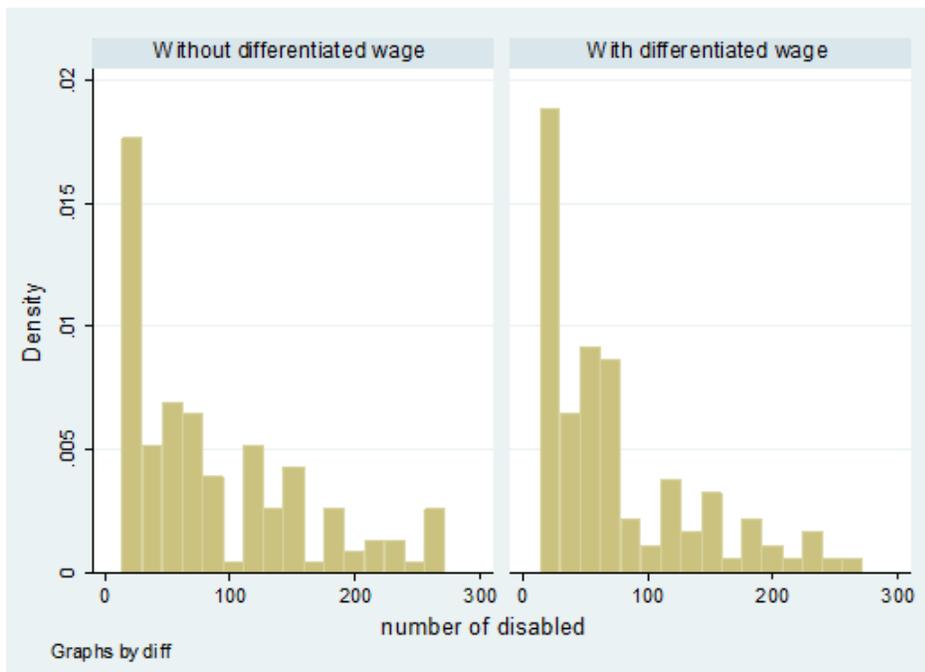


Figure 6: Density in number of disabled people between polyclinics with and without differentiated wages.

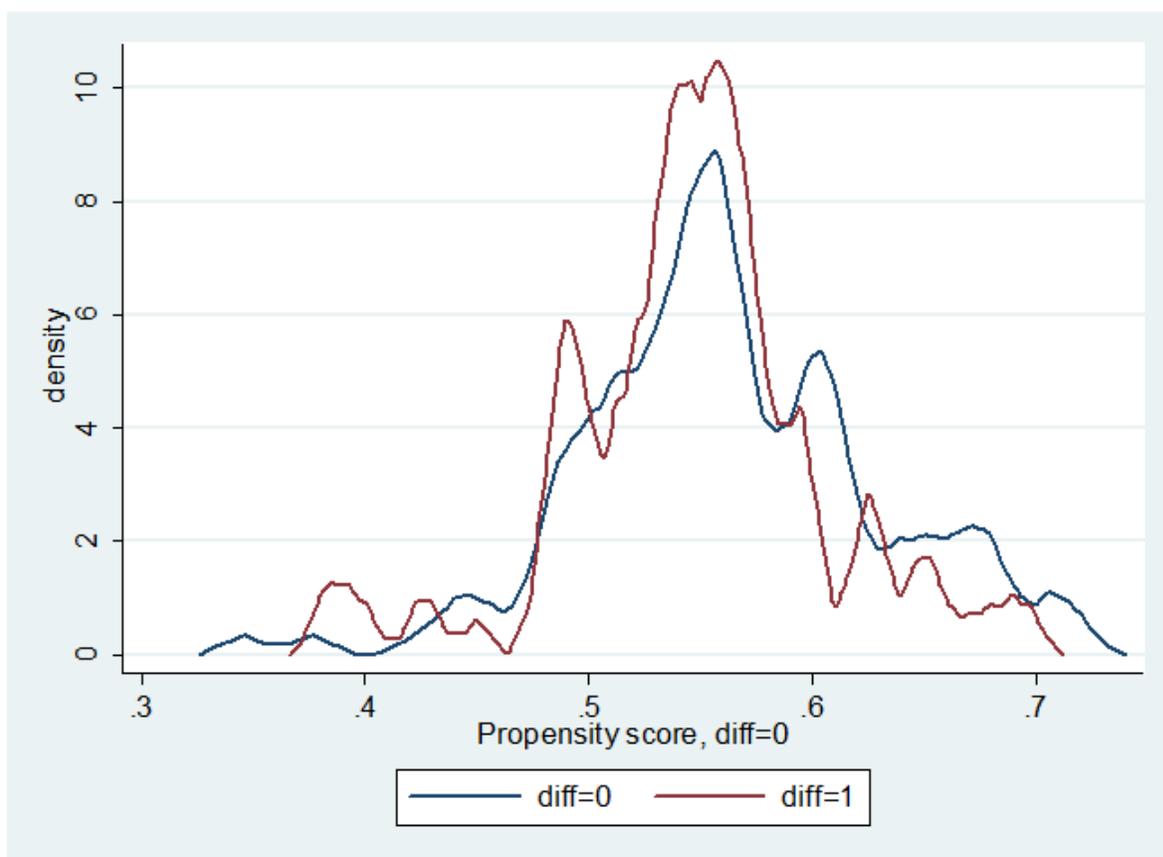


Figure 7: Propensity score. Overlap plot.