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**Differences in Skill Levels of Educated Workers
between the Public and Private Sectors,
the Return to Skills and the Connection between them:
Evidence from the PIAAC Surveys**

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Differences in Skill Levels of Educated Workers between the Public and Private Sectors, the Return to Skills and the Connection between them: Evidence from the PIAAC Surveys

Yuval Mazar

Abstract

This study examines the differences between the private and public sectors in a number of countries in the distribution of basic skills among educated workers and looks at variables that are correlated with those differences. It was found that in almost all the countries the return to skills is higher in the private sector, although there is a great deal of variation between countries. The gap in returns in Israel is similar to the average of the other countries in the case of men and higher than the average in the case of women. The larger is the gap, the higher is the skill level of workers in the private sector relative to the public sector. It was also found that the higher is a country's GDP per capita, the higher will be the skill level of educated men in the public sector relative to the private sector.

ההבדלים בין המגזרים הציבורי והפרטי במיומנויות העובדים המשכילים ובתשואה שהמיומנויות משיאות לשכר, והקשר בין שני המשתנים: עדויות מסקרי PIAAC

יובל מזר

תקציר

מחקר זה מתייחס לשורת מדינות ובוחרן כיצד המגזר הפרטי נבדל מהציבורי בהתפלגותן של מיומנויות היסוד המאפיינות את העובדים המשכילים, ואילו משתנים מתואמים עם הבדלים אלו. נמצא כי כמעט בכל המדינות התשואה למיומנויות גבוהה יותר במגזר הפרטי, אך יש בין המדינות שונות גדולה; פער התשואות בישראל דומה לממוצע של שאר המדינות בקרב הגברים וגבוה יחסית בקרב הנשים. ככל שהפער גדל כך עולה מיומנותם של העובדים במגזר הפרטי יחסית למיומנותם של המועסקים במגזר הציבורי. עוד נמצא כי ככל שגדל התוצר לנפש במדינה כך עולה מיומנותם של הגברים המשכילים במגזר הציבורי יחסית למיומנות המשכילים במגזר הפרטי.

1. The research hypotheses, the theoretical setup and the structure of the discussion

The research hypothesis

The mechanisms that determine wages in the public sector differ from those in the private sector. In the public sector, the basic wage is determined according to tables that focus on the formal characteristics of a worker and which are usually updated as a result of wage agreements, while in the private sector wages are determined primarily by a worker's productivity.¹ Therefore one can expect that the non-formal characteristics of workers (i.e. basic skills) will have a larger effect on wages in the private sector. In other words, it is reasonable to hypothesize that in the private sector skills provide a higher return. This hypothesis can be tested using estimates of basic skill levels provided by PIAAC, an international survey of working-age adults.

Similarly, it is possible to use the survey estimates to test whether the differences in the mechanisms between the sectors is correlated with the quality of workers in each sector. Thus, if in the private sector there is a higher return to skills, it is reasonable to hypothesize that the workers in that sector are characterized by higher skill levels. The hypothesis that a more equal distribution of wages will discourage high-ability workers is based on the assumption that if we examine workers who are identical with respect to observable variables (such as education and experience), we will find that those with higher ability will be attracted to positions that offer a salary commensurate with their skills (i.e. Pay for Skills), while those with low ability will be drawn to positions in which the salary is determined by formal-observable traits on a uniform scale.

The theoretical setup

The theoretical setup of the analysis is based on the classic immigration model of Roy (1951), which examines immigration from a more egalitarian society to a less egalitarian one. We apply the model to the self-selection of workers into sectors that differ in return to skills, or in other words sectors in which the range of compensation is relatively equal/unequal. We assume that the workers choose to work in the public sector (denoted by the subscript g) or in the private sector (denoted by the subscript p) and they know their basic skill level. We also assume that the mechanism for determining wages in the public and private sectors is captured by an equation similar to Roy's model:

[1]

$$\begin{aligned}w_{ij} &= a_j + \delta_j S_i + \varepsilon_{ij} \\j &= g, p \\ \delta_g &< \delta_p, a_g > a_p\end{aligned}$$

¹ See Mazar (2015) for further details.

where w_{ij} represents the logged wage of worker i in sector j . S_i represents the non-formal skill level of the worker (talent or ability, as opposed to, for example, education). a_j represents the constant in the two sectors and for simplicity it also includes the return on the worker's observable-formal traits, including education, experience, etc. δ_j represents the monetary return to skills in sector j .

The third row of [1] implies that the public sector pays more for formal-observable skills while the private sector pays more for non-formal skills. ε_{ij} is a random error ("noise"). The model is illustrated in Figure 1.

Figure 1

Logged wage of workers with similar observable characteristics as a function of their non-formal skills; public and private sectors

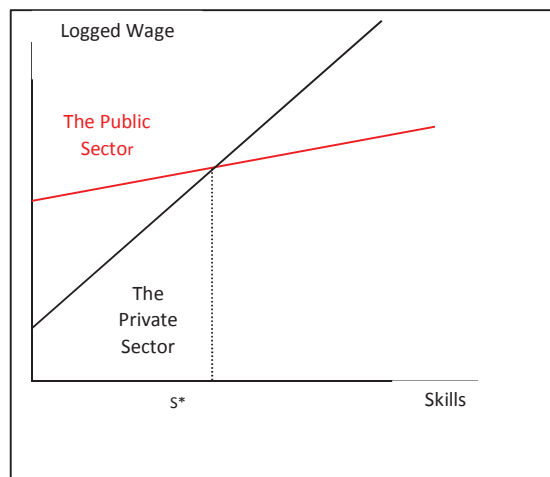


Figure 1 shows that when other characteristics are fixed, workers with a higher (lower) level of skill than S^* prefer to work in the private (public) sector. The wage profile in the private sector is steeper and therefore it can be expected that the probability (the marginal tendency) to join that sector will rise with the worker's skill level. This is the self-selection hypothesis.

The self-selection hypothesis has generally been tested using a quantiles regression where the dependent variable is hourly wage. These studies have shown that at higher wage levels there is a higher return from working in the private sector and that in the lower wage deciles the return on working in the private sector is in general negative while in the higher deciles it becomes positive.^{2,3} Mazar (2011) tested self-selection into sectors between 1983

² See, for example, Poterba and Rueben (2004), Bargian and Melly (2008). Mazar (2011) presents similar results for Israel. .

and 1995 and showed that workers who left the private sector to enter the public sector were characterized by a lower level of skills than workers who remained in the private sector and that workers who left the public sector to enter the private sector were characterized by a higher level of skills than workers who remained in the public sector. In that study, a worker's level of skill was measured according to the wage residual from a Mincerian regression run for each sector separately. However, it is possible to test the hypothesis in a different— and perhaps more accurate—way, using the PIAAC surveys, since they include wage data and estimates of a worker's basic skills, an approximation of S .

Structure of the analysis

The next section briefly describes the PIAAC surveys and their unique value in the current analysis. Section 3 examines the distribution of basic skill between the private and public sectors. Section 4 sketches the wage profile in the two sectors as a function of skill levels and shows that in the private sector the return to skills is higher than in the public sector. Section 5 tests whether there is a connection between the differences in profile and the way in which workers' skills are distributed between the sectors, namely whether the higher return in the private sector is correlated with a higher skill level than in the public sector and to what extent. Section 6 presents tests of robustness. Section 7 presents some possible identification problems and Section 8 concludes.

2. The PIAAC survey

The OECD carries out the PIAAC (Program for International Assessment of Adult Competencies) survey among most of its member countries and in two developing countries (Indonesia and Russia). In each country, a representative sample of the 16–65 age group is surveyed.

The survey seeks to measure the cognitive skills of members of the workforce by means of an exam in three types of skills:

- i. Literacy: the ability to understand a written text, evaluate it and use it.
- ii. Numeracy: the ability to access mathematical information and ideas, to use them and interpret them and convey them to others.
- iii. Problem-solving in technology-rich environments: the ability to use digital technology, communication tools and networks in order to solve problems and carry out tasks in a technological environment.

³ Workers with relatively weak observable characteristics earn a lower wage in the public sector. In the current study, we focus only on workers who have more than 12 years of schooling and have a matriculation certificate.

The skills are measured on a scale of 0 to 500 points. The average scores are standardized and are equal to 250 in all the countries, with a standard deviation of 50.

In addition, the survey includes a questionnaire on the personal characteristics of the respondents and their place of work and occupation. The respondents answer detailed background questions, including questions to do with formal education, age, gender and place of work (including salary, work hours and whether they work in the public or private sector). All of the respondents in all of the countries are asked the same questions and are given the same tests and the process is carried out in their mother tongue.

3. The skill levels of educated workers in the public and private sectors

In most of the countries included in the PIAAC survey, the level of formal education is higher in the public sector, since, among other things, it is differentiated from the private sector in the mix of tasks. Since there is a positive correlation between formal education and skills, in most of the countries the average level of skills in the public sector is higher than that in the private sector. Therefore, we focus on educated workers, i.e. those with more than a high school education. The estimation in all cases is carried out separately for men and women.

Figure 2 relates to the skills of educated male and female workers in the surveyed countries and presents the gap between the public and private sectors in the average of the medians of the three skill types:

$$\bar{S}_{jg} = \frac{\text{med}(S_{n,i,g}) + \text{med}(S_{l,i,g}) + \text{med}(S_{it,i,g})}{3}$$

$$\bar{S}_{jp} = \frac{\text{med}(S_{n,i,p}) + \text{med}(S_{l,i,p}) + \text{med}(S_{it,i,p})}{3}$$

i represents the worker, j represents the country, it , l and n represent the three skill types and p , g represent the private and public sectors, respectively.

Figure 2 shows a somewhat higher level of basic skills in the private sector, although there is a high level of variation between countries. Moreover, there is quite a high correlation (57 percent) between the genders in the direction of the gap. Thus, when the median skill level of men is higher in the private sector, this is also true for women. We also found that the skill levels have a similar variance in both sectors.⁴

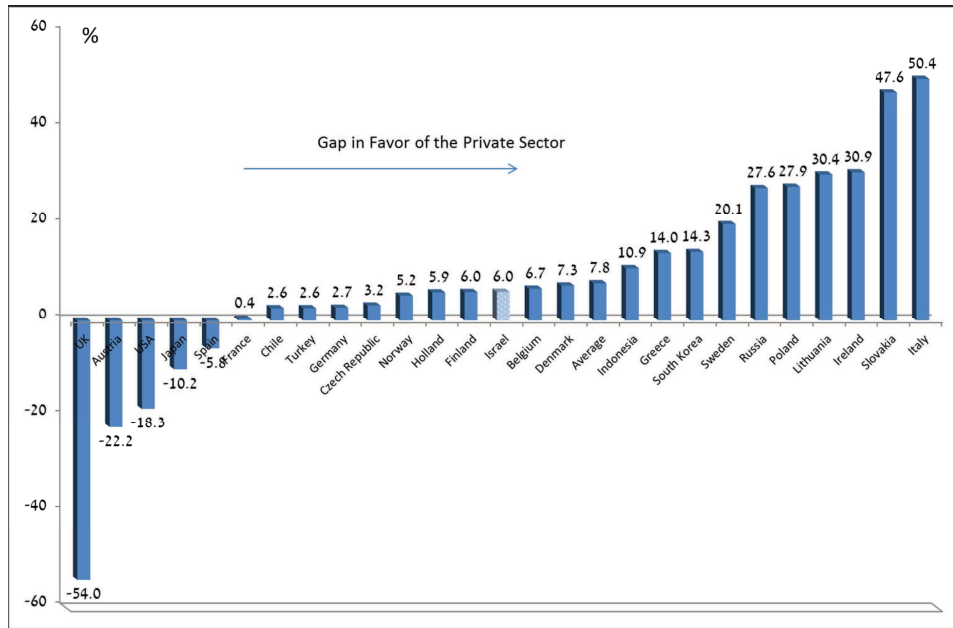
⁴ This finding indicates that the more compressed wage distribution in the public sector in most of the developed countries (see, for example, Mazar 2011) is not due to the fact that the skills in the public sector are dispersed differently than in the private sector, but rather that the return to skills is lower in that sector.

Figure 2

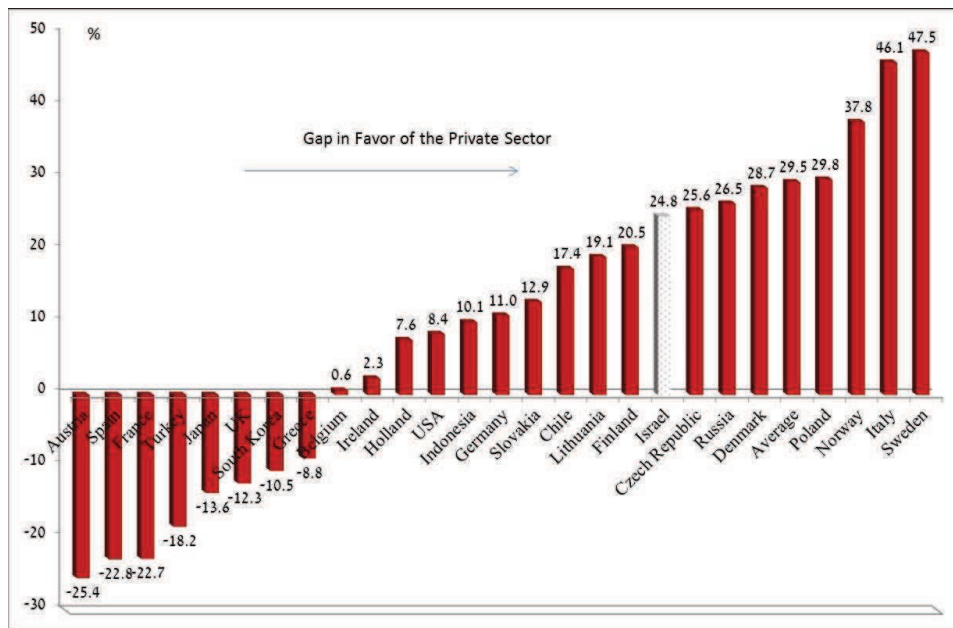
The gap between the public and private sectors in the skill levels of educated workers

$$\left(\frac{\bar{S}_{jp} - \bar{S}_{jg}}{STD(\bar{S})} \right)$$

Men



Women



As mentioned, in the next section we will present the wage profiles for the public and private sectors and will compare them between the various countries.

4. The wage profile in the public and private sectors

In order to estimate the return to skills for educated workers, we estimated a Mincerian wage equation for each country:

[2]

$$W_{ij} = C_j + \beta_j \cdot X_{ij} + \gamma_j \cdot Pub_{ij} + \lambda_j \cdot Pub_{ij} \cdot X_{ij} + \delta_j \cdot S_{ij} + \delta_{gj} \cdot Pub_{ij} \cdot S_{ij} + \varepsilon_{ij}$$

where S_{ij} denotes the average of the three skill types for worker i in country j (in contrast to \bar{S}_j calculated above which denotes the average of all the workers in the private or public sector in country j); W_{ij} denotes the worker's logged hourly wage; X_{ij} includes the workers' experience, experience squared and his most recent certificate of formal education; and Pub is a dummy variable for the public sector. According to Equation [2], the return to skills in the private sector is equal to δ_j and in the public sector to $\delta_j + \delta_{gj}$. Table 1 presents the results for these parameters for men and women separately. (Table A1 [in the appendix] presents the full regression results for Israel alone.)

Table 1

The increase in hourly wage as a result of an increase of one standard deviation in the skill level of educated workers

Men*

	Public Sector Return	Private Sector Return	The Gap
Chile	15.4	5.7	-9.6
Russia	23.1	15.6	-7.5
UK	14.3	6.8	-7.5
Belgium	3.3	4.9	1.6
Slovakia	9.4	11.0	1.6
South Korea	4.7	7.3	2.5
Greece	8.3	11.9	3.6
France	4.6	8.8	4.2
Poland	9.2	14.6	5.4
Indonesia	0.2	5.7	5.6
Israel	14.1	19.9	5.8
Denmark	6.0	12.0	5.9
Spain	2.7	8.7	6.0
Finland	0.3	6.7	6.4
Czech Republic	1.4	7.9	6.5
Holland	3.1	9.7	6.5
Italy	4.9	11.5	6.7
Japan	-4.7	7.6	12.3
Norway	-2.6	11.3	13.9
Ireland	-7.4	7.4	14.7
Lithuania	-6.5	12.5	19.0
The average	4.0	8.0	4.0

Women*

	Public Sector Return	Private Sector Return	The Gap
South Korea	7.2	4.1	-3.1
Indonesia	18.0	16.4	-1.6
Poland	8.5	10.1	1.6
Chile	9.5	11.3	1.8
Greece	9.1	11.9	2.8
Slovakia	9.1	12.6	3.4
Lithuania	3.7	8.3	4.6
Russia	4.8	9.7	4.9
Belgium	1.9	7.0	5.1
Norway	3.6	9.5	5.9
Ireland	0.8	7.0	6.2
Denmark	2.2	8.8	6.6
Finland	0.3	7.3	7.0
Italy	3.4	10.9	7.5
Holland	0.9	9.6	8.6
Japan	-0.1	9.7	9.8
UK	5.7	16.8	11.1
France	-1.5	9.8	11.3
Spain	0.3	12.8	12.5
Israel	4.1	17.2	13.1
Czech Republic	-2.0	16.9	18.9
The average	3.4	8.8	5.3

* The coefficients in Table 1 are presented in terms of standard deviations and therefore differ from those presented in Table A1.

As in previous studies,⁵ it was found that the return to skills among educated workers is significantly higher in the private sector and somewhat higher among women. In other words, the statistical estimations support the hypothesis that non-formal skills receive higher compensation in the private sector. In all of the sample countries, it was found with statistical significance that skills have a positive return in the private sector though there is variation between countries. The coefficient of correlation between the gaps among men and the gaps among women has an intermediate value of about 23 percent. The return on

⁵ Hanushek et al., 2013.

basic skills is very high in Israel, particularly in the private sector, as a result of the small number of workers with high skill levels.⁶

Appendix 1 further illustrates the significance of existing gaps between the sectors in terms of return to skills. Figure A1 focuses on the case of Israel and describes the wage profile of educated workers in the two sectors as a function of the worker's skill level. Figure A2 relates to all of the countries in the sample and uses the regression results in order to describe the proportion of countries in which the wage in the private sector is higher than in the private sector, according to skill percentiles.

5. The connection between worker skill levels in the public and private sectors on the one hand and GDP per capita and the wage profile in the two sectors on the other

In this section, we will test for a connection between the existing gaps in skill levels between the public and private sectors on the one hand and gaps in the return to skills between the sectors on the other. The following equation will be used:

[3]

$$100 \cdot \left(\frac{\bar{S}_{jb} - \bar{S}_{jg}}{\bar{S}_{jg}} \right) = C + \beta \cdot GDPC_j + \gamma \cdot Public_share_j + \delta_1 \cdot Gap_Return_j + \varepsilon_j$$

j denotes the country. The dependent variable is the gap (in percent) between the sectors in median skill level (see Section 3). The first two explanatory variables are GDP per capita ($GDPC_j$) and the proportion of workers in the public sector ($Public_share_j$).^{7,8}

Gap_Return_j is the gap between the sectors in the return to skills for educated workers (see Section 4) and it is the variable of interest. The regressions are estimated separately for men and women.

⁶ There is a negative correlation between the levels of basic skills in a country and the return to those skills in terms of wages (see Bank of Israel (2016), *Fiscal Survey and Selected Research Analyses* 141).

⁷ For 2014, in dollars and in terms of PPP.

⁸ We also tested the average skill level of all the educated workers in each country, both instead of GDP per capita and in addition to it, and found that the effect of self-selection into sectors is not statistically significant.

In addition to the gap in returns (the third column in Table 1), we also tested the effect of the returns in the public and private sectors, separately and together, as follows:

[4]

$$100 \cdot \left(\frac{\bar{S}_{jp} - \bar{S}_{jg}}{\bar{S}_{jg}} \right) = C + \beta \cdot GDPC_j + \gamma \cdot Public_share_j + \delta_2 \cdot Return_Public_Sector_j + \varepsilon_j$$

[5]

$$100 \cdot \left(\frac{\bar{S}_{jp} - \bar{S}_{jg}}{\bar{S}_{jg}} \right) = C + \beta \cdot GDPC_j + \gamma \cdot Public_share_j + \delta_3 \cdot Return_Private_Sector_j + \varepsilon_j$$

[6]

$$100 \cdot \left(\frac{\bar{S}_{jp} - \bar{S}_{jg}}{\bar{S}_{jg}} \right) = C + \beta \cdot GDPC_j + \gamma \cdot Public_share_j + \delta_4 \cdot Return_Public_Sector_j + \delta_5 \cdot Return_Private_Sector_j + \varepsilon_j$$

According to the theoretical setup, we expect that:

$$\delta_1 > 0, \delta_3 > 0, \delta_5 > 0$$

$$\delta_2 < 0, \delta_4 < 0,$$

In other words, the higher is the return to skills in the private (public) sector or the higher (lower) is the gap in return to skills, the larger (smaller) will be the gap in skill levels between the sectors. The estimation results are presented in Table 2 (the column number corresponds to the econometric equation).

Table 2**Estimation of the gap between the private and public sectors in the skill levels of educated workers (*t* statistics in parentheses)**

Men				
Equation No.	[1]	[2]	[3]	[4]
GDP per capita	-0.101 (-2.46)	-0.092 (-2.05)	-0.073 (-1.89)	-0.090 (-2.36)
Gap return	0.049 (1.97)			
Return in the public sector		-0.022 (-0.84)		-0.039 (-1.67)
Return in the private sector			0.1183 (2.30)	0.140 (2.76)
C	4.140	4.868	0.441	0.953
No. of observations	21	21	21	21
R-squared	0.309	0.192	0.351	0.442
<i>P</i> -Value of <i>F</i> -Test	0.036	0.146	0.021	0.017
Women				
Equation No.	[3]	[4]	[5]	[6]
GDP per capita	-0.056 (-1.28)	-0.046 (-0.97)	-0.064 (-1.37)	-0.031 (-0.67)
Share of Workers in the Public Sector	0.151 (2.49)	0.152 (2.35)	0.14 (1.83)	0.114 (1.56)
Gap return	-2.210 (-0.65)			
Return in the public sector		3.601 (0.89)		0.056 (0.88)
Return in the private sector			0.795 (0.15)	3.701 (0.91)
C	0.227	-1.024	0.103	-2.338
No. of observations	21	21	21	21
R-squared	0.284	0.299	0.267	0.332
<i>P</i> -Value of <i>F</i> -Test	0.120	0.102	0.142	0.145

The results indicate that there are clear differences between men and women. Among men, most of the parameters—at least the ones of interest—are significant and have the expected

sign, while among women most of them are not significant and cannot explain the gap in quality between the sectors.⁹ In particular, among men we found that the higher is a county's GDP per capita the lower will be the skill level of educated workers in the private sector relative to that in the public sector. In terms of elasticity, an increase of \$1000 in GDP per capita reduces the gap in quality by about 0.1 percentage points or about 0.7-0.8 percent of a standard deviation. Since we found that among men the "proportion of workers in the public sector" variable is not significant, we omitted it from Table 2 and from the estimation in general.

Regarding the gap in returns between the sectors, all of the parameters estimated for men have the sign predicted by the theory and most of them are statistically significant at a level of 10 percent. An increase of one percentage point in the gap in returns increases the skill gap by about 5 percentage points in favor of the private sector, which is equivalent to about 0.14 standard deviations in the skill level. Equations [4] and [5] show that the effect is primarily the result of the return to skills in the private sector and less on the return in the public sector.

Among women, we found that, except for one variable, the estimated variables were not significant and cannot explain the gap in skills between educated workers in the two sectors. The only statistically significant result was obtained for the size of the public sector, such that the larger is the public sector the larger will be the gap in skills in favor of the private sector.

These results are consistent with studies that have shown that in comparison to men women tend to give lower weight to salary relative to men when looking for a job while giving greater weight to fringe benefits. They are motivated less by pecuniary incentives and tend to avoid a competitive environment.¹⁰ It may be that these findings also indicate that in the public sector women are more involved in tasks that exploit their skills, but this goes beyond the scope of our discussion.

⁹ We also tested additional macro variables, including Employment Protection Legislation (EPL), which is published in OECD Statistics, but did not find that it is correlated with the gaps in quality between workers.

¹⁰ Bertrands (2010) surveyed the literature on the differences in characteristics between the genders. Examples in which men and women behave/respond differently can be found in: Brender and Gallo (2008), Cotton et al. (2010), Gill and Prowse (2010), Gneezy et al. (2009), Gneezy et al. (2003), Lavy (2008) and Gunther et al. (2010).

6. Tests of robustness

In addition to the models tested in the previous section, we examined several other dependent variables for the case of men.¹¹ We first tested the average (rather than the median) gap between skill levels in the public and private sectors and found that the results were very similar, particularly in sign, though somewhat less significant.

We then tested the gaps in skill levels over the entire distribution of skills. We obtained statistically significant results only for the percentiles in the middle of the distribution (the 25th to 75th percentile). In other words, the source of the effect on the self-selection of workers into the two sectors is primarily in the center of the distribution, rather than its extremes. This finding is consistent with the theoretical prediction presented in Figure 1, whereby the change in the gap in returns between the sectors is expected to influence S^* , i.e. the breakeven point, more than the extremes. This is because in most countries there is excess return to skills in the private sector and therefore in almost all of those countries we observe that in the upper end of the distribution of skills there is a gap in wages in favor of the private sector while in the lower end the gap is favor of the public sector (see also Figure A2).

Finally, we defined a "self-selection in favor of the private sector" variable. We calculated it by dividing all of the workers (in both sectors) into skill deciles and in every decile we calculated the frequency of workers in the private sector. We then estimated a regression of that frequency as a function of the skill decile; the slope of the estimated regression line is the aforementioned variable.¹² Figure 3 relates to each country in the sample and presents the average gap between the proportion of workers in the private sector in a given skill decile and the average proportion of workers in the private sector, as well as the slopes derived from that gap.¹³ Since the slope is positive in both sectors, it can be concluded that the higher is the skill level of educated workers the higher will be their proportion in the private sector. Figure 3 shows that the tendency to work in the private sector is higher primarily in the upper half of the skill distribution. Furthermore, we found that there is

¹¹ We also examined them among women but the results were not significant.

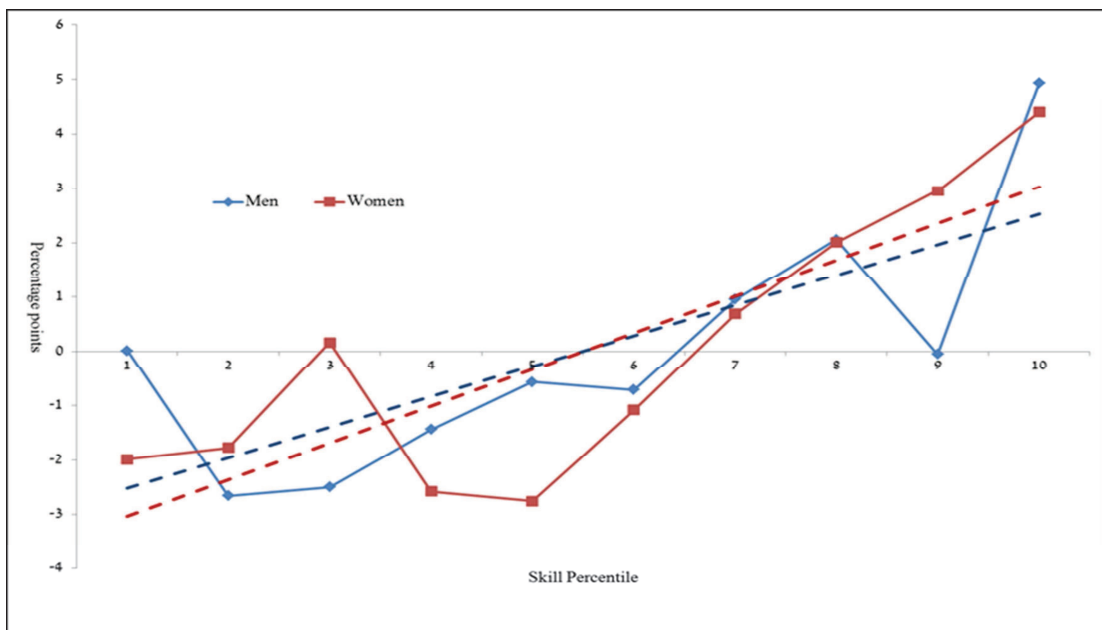
¹² The regressions are not presented but are available from the author.

¹³ Tables A2 and A3 (in the appendix) present the data for all the countries in the sample.

variation between countries in the extent to which educated workers tend to work in the private sector (Figure 4).

Figure 3

The gap between the proportion of workers in the private sector in a given skill decile and the average proportion of workers in the private sector¹

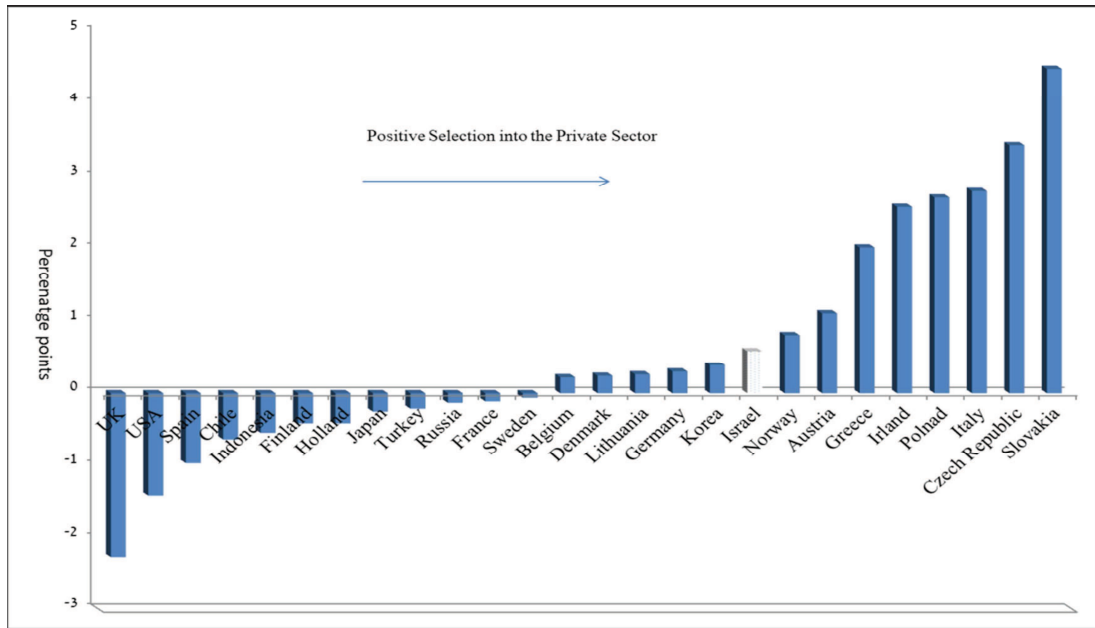


¹ The average gap in the sample countries. The dashed line is the average regression line.

Figure 4

"Self-selection in favor of the private sector" (slope of the regression line) in the surveyed countries

Men



Women

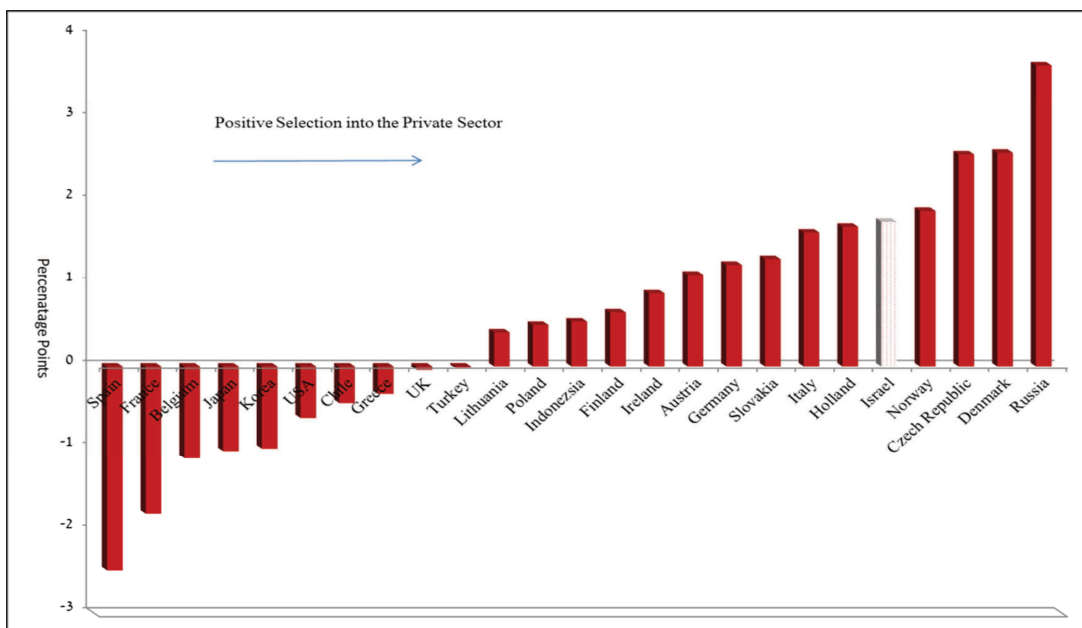


Table 3 presents the estimation results for the slope calculated for men.¹⁴ The table shows that although the sign is as expected and similar to the results in Table 2, the statistical significance of the results is lower and the statistical model itself (F test) is less effective in prediction than the previous model.

Table 3

Estimation of the gap between the public and private sectors in the skill levels of educated men (slope of the regression line)

(t statistics in parentheses)

Equation No.	[3]	[4]	[5]	[6]
GDP per capita	-0.0003 (-1.00)	-0.0002 (-0.77)	-0.0002 (-0.53)	-0.0002 (-0.81)
Gap return	2.593 (1.40)			
Return in the public sector		1.002 (0.53)		-1.993 (-1.10)
Return in the private sector			7.123 (1.87)	8.246 (2.11)
C	0.014	0.017	-0.008	-0.006
No. of observations	21	21	21	21
R-squared	0.119	0.037	0.182	0.237
P -Value of F -Test	0.320	0.712	0.164	0.193

¹⁴ As in the estimation in Section 5, the results were not significant for women.

7. Possible biases in identification

In the first stage of the analysis, we related to each country separately and estimated the return to skills in each sector by means of regressions for individuals. In the second stage, we tested whether there is a connection across countries between the estimated gap in returns in the first equation and the skill gap between the two sectors. However, it can be claimed that the gap in skill level between the sectors affects the estimation of the return in each sector (the first stage) and therefore one cannot use its results in order to determine (in the second stage) whether the gap in skill levels affects the gap in returns. We must test therefore how the gap in skill levels between the sectors can affect the gap in returns.

1. Assume that in a particular country the workers have relatively low skill levels and therefore there is a relative shortage of skilled workers in that country. The shortage is reflected in that country's higher return to skills and it is reasonable that this will be reflected primarily in the private sector. It appears that this transmission does not constitute a problem in our analysis since in the second stage we do not test the skill level in every country but rather how the gap in skill levels between the sectors is influenced by the gap in returns.
2. Assume that at the same wage level the public sector offers more fringe benefits than the private sector and in particular greater employment security. Also assume that as a result the public sector is more selective and succeeds in hiring workers with higher skill levels. Therefore, the private sector will seek to increase the return to skills because it will be experiencing a shortage of highly skilled workers. This is a realistic scenario but differs from the mechanism we estimate in the regression, since according to that mechanism in countries with a relatively large gap in returns the skill level will in fact be relatively lower in the private sector. In this respect, the parameter that we estimate in the regression constitutes an underestimation of the effect of the gap in returns on the decision of whether to work in the public sector or the private.

3. In any empirical research that includes statistical estimation, there is liable to be a problem in the estimation of the coefficients and their reliability as a result of omitted variables. In our case, such a problem may exist if a variable has been omitted (apart from education, experience and gender which are controlled for) which affects the choice of sector and is correlated with workers' skill levels.¹⁵ Is bias created in such a situation? Only when the degree of preference (i.e. the magnitude of the effect of skill level on self-selection) affects the return to skills. In other words, this preference constitutes a kind of omitted variable that affects both the dependent variables (the gap in skills between the sectors) and the explanatory variable (the gap in returns between the sectors). If the extent of preference raises the return to skills in the private sector, then the regression estimates in the second stage will be biased upwards. However, it is reasonable to hypothesize that if higher-skilled workers prefer to work in the private sector (for reasons unrelated to wages), this will push the return to skills down in the private sector or in other words will create a negative correlation. In this case, the estimates from the second stage will be biased downward, which will strengthen our results. If the extent to which the skilled workers prefer to work in the private sector does not affect the return to skills, there will not be any bias in the estimation of the return in the first stage nor in the testing of the connection between the gap in returns and the gap in skills in the second stage.

8. Conclusion

In this analysis, we examined the distribution of skills among educated workers in the public and private sectors, the wage profile in those sectors as a function of worker skills and the connection between the two. We found that in most of the countries surveyed in the PIAAC, the return to basic skills is higher in the private sector and there is a high level of variance between the countries. Israel is located in the middle of the distribution of the gap for men and in the upper third for women. Similarly, it is located in the middle of the

¹⁵ To illustrate, assume that workers in the public sector tend more to live in the country's capital and that in the capital workers' skill levels are higher/lower than those of the general population.

distribution of the gap in skills between the sectors. It was also found that in wealthier countries the gap in the quality of workers between the sectors is smaller and given the country's GDP per capita it is negatively correlated with the size of the public sector. Among men, it was found that the larger is the return to skills in favor of the private sector, the larger will be the gap between the skills of educated workers in favor of the private sector. Among women there was no evidence of this.

References

- Bank of Israel (2016), *Fiscal Survey and Selected Research Analyses*, pp. 21-28.
- Bertrand, M. (2010), "New Perspectives on Gender." In D. Card and O. Ashenfelter (eds.), *Handbook of Labor Economics*, Volume 4, Part B. Amsterdam: Elsevier, pp. 1545–1592.
- Brender, A. and L. Gallo (2008), "The Effect of Changes in Wages: GDP and Employee Characteristics on Working Hours," *The Economic Quarterly*, 55, pp. 175–212 (in Hebrew).
- Cotton, C., F. McIntyre, and J. Price (2010), "The Gender Gap Cracks under Pressure: A Detailed Look at Male and Female Performance Differences during Competition," NBER Working Paper 16436.
- Eckel, C. C. and P. J. Grossman (2008), "Men, Women Risk Aversion: Experimental Evidence." In C. Plott and V. Smith (eds.), *Handbook of Experimental Economics Results*, Vol. 1. Amsterdam: North Holland, pp. 1061–1073.
- Gill, D. and V. Prowse (2014), "Gender Differences and Dynamics in Competition: The Role of Luck," *Quantitative Economics*, 5, pp. 351–376.
- Gneezy, U., M. Niederle, and A. Rustichini (2003), "Performance in Competitive Environments: Gender Differences," *Quarterly Journal of Economics*, 118, pp. 1049–1074.
- Gneezy, U., K. L. Leonard, and J. A. List (2009), "Gender Differences in Competition: Evidence from a Matrilineal and a Patriarchal Society," *Econometrica*, 77(3), pp. 909–931.
- Gunther, C., N. A. Ekinici, C. Schwieren, and M. Strobel (2010), "Women Can't Jump? An Experiment on Competitive Attitudes and Stereotype Threat," *Journal of Economic Behavior & Organization*, 75(3), pp. 395–401.
- Hanushek, E. A., G. Schwerdt, S. Wiederhold, and L. Woessmann (2015), "Returns to Skills around the World: Evidence from PIAAC," *European Economic Review*, 73, pp. 103-130
- Koenker, R. and G. Bassett (1978), "Regression Quantiles," *Econometrica*, 46(1), pp. 33–50.
- Lavy, V. (2008), "Gender Differences in Market Competitiveness in a Real Workplace: Evidence from Performance-based Pay Tournaments among Teachers," NBER Working Paper 14338.
- Mazar, Y. (2011), "Testing Self-Selection in Transitions between the Public Sector and the Private Sector," *Israel Economic Review*, 9(1), pp. 151–180.

- Mazar, Y. (2011), “Workers Mobility and the Return to Education: Evidence from the Public and Private Sectors,” *Research in Labor Economics*, 20, pp. 175–208.
- Mazar, Y. (2015), “Wage Trends in the Public Sector and the Connection to Wages in the Private Sectors,” *Israel Economic Review*, 88, pp. 97–133 (in Hebrew).
- Moon, M. J., J.-H. Lee, J. Park, J. Chung, J. Choi (2016), “Skills and Wages of Public Employees: Investigating Korean Bureaucracy through PIAAC,” KDI School of Public Policy and Management Working Paper 16-02.
- Melly, B. and P. A. Puhani (2008), “Privatization and Changes in the Wage Structure: Evidence from Firm Personnel Records,” IZA Discussion Paper 3760.
- Poterba, J. and K. Rueben (2004), “The Distribution of Public Sector Wage Premia: Evidence Using Quantile Regression Methods,” NBER Working Paper 4734.
- Roy, A. D. (1951), “Some Thoughts on the Distribution of Earnings,” *Oxford Economic Papers*, 3(2): 135–146.

Appendix

Table A1

Wage regression for educated workers in Israel (dependent variable: logged hourly wage)

	(1) Men	(2) Women
Public Sector	0.0164 (1.438)	-0.487 (1.110)
Skills	0.00466*** (0.00113)	0.00401*** (0.00112)
Skills*PublicSector	-0.00141 (0.00180)	-0.00306** (0.00144)
Tenure	0.0811*** (0.0263)	0.0346* (0.0184)
Tenure^2	-0.00127** (0.000594)	-0.000666 (0.000444)
Tenure*PublicSector	-0.0423 (0.0441)	-0.0239 (0.0271)
Tenure^2*PublicSector	0.000942 (0.00104)	0.000921 (0.000652)
Education	0.0244 (0.0991)	0.0262 (0.0932)
Education*PublicSector	0.0683 (0.142)	0.155 (0.117)
Constant	0.395 (0.944)	0.934 (0.881)
Observations	267	341
R-squared	0.210	0.144

The standard deviations are in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Figure A1 presents the wage profile¹⁶ in Israel relative to the median wage in each sector as a function of the skill level among educated workers. The graph illustrates the gaps between the sectors in return to skills. Thus, workers with low skill levels earn a lower

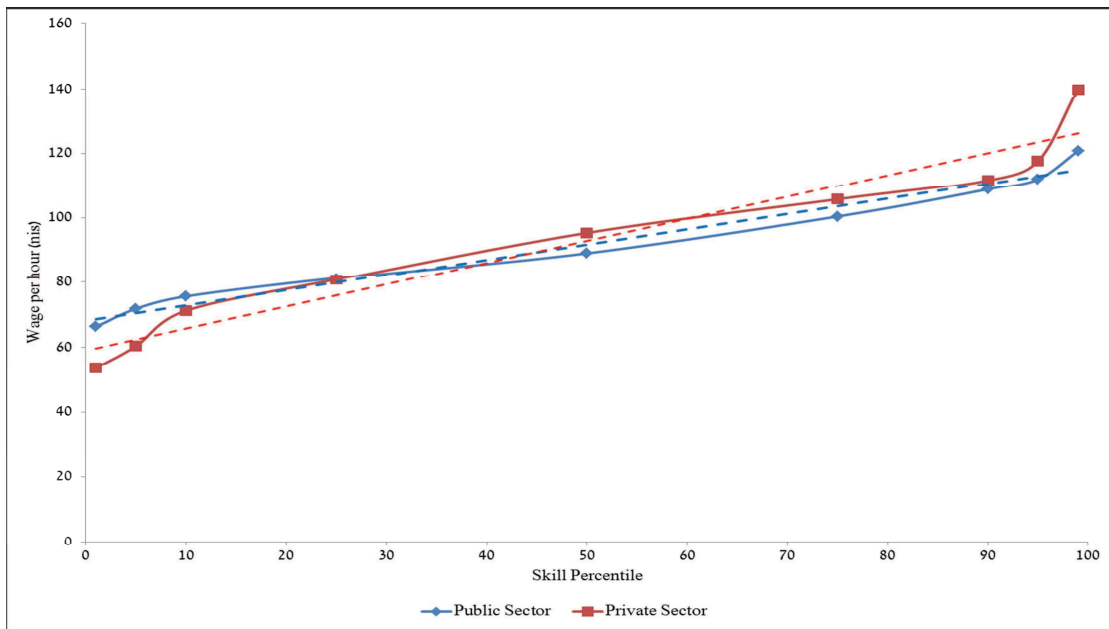
¹⁶ According to Equation [2].

wage in the private sector and workers with skill levels above the 25th percentile earn a higher wage in the private sector. The picture is similar among women, but wages in the public sector are higher up to the 80th percentile of skills.

Figure A1

The wage profile of educated workers in the private and public sectors in Israel as a function of the skill percentile

Men



The wage profile of educated workers in the private and public sectors in Israel as a function of the skill percentile

Women

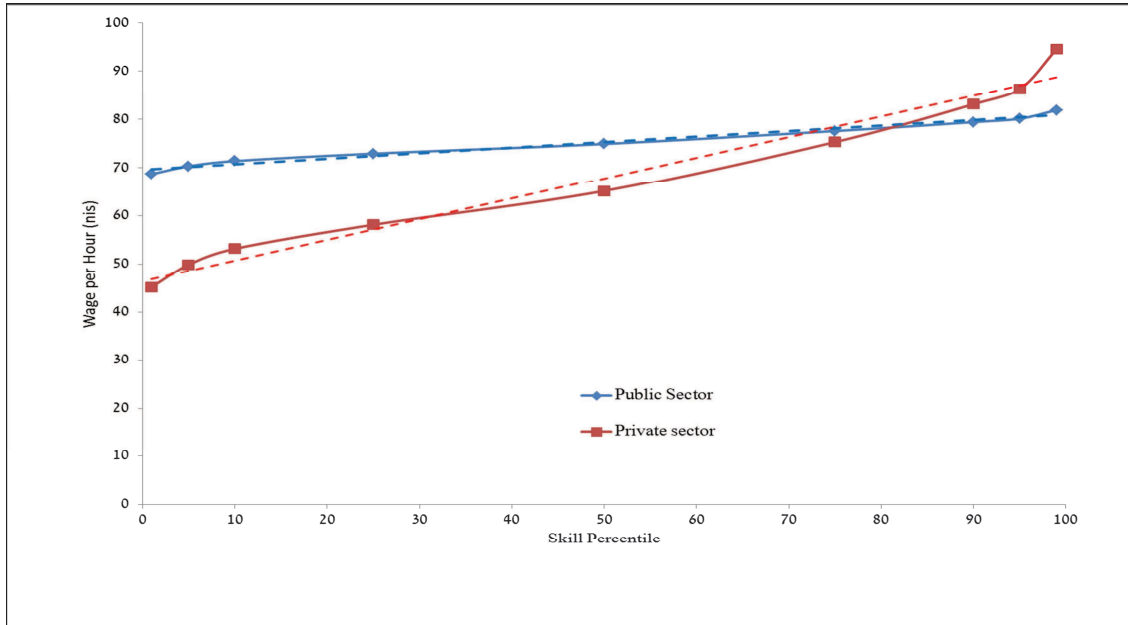


Figure A2 relates to all the countries in the sample and presents in a different way the dominance of the private sector in return to skills. On the assumption that the rest of the characteristics are fixed, in the 5th percentile of skills the wage in the public sector is higher in most of the countries. This proportion decreases as the skill levels of workers increase and in the 95th percentile the wages in the private sector are higher in 60 percent of the countries.

Figure A2

The proportion of countries in which wages in the private sector are higher than in the public sector as a function of the skill percentile

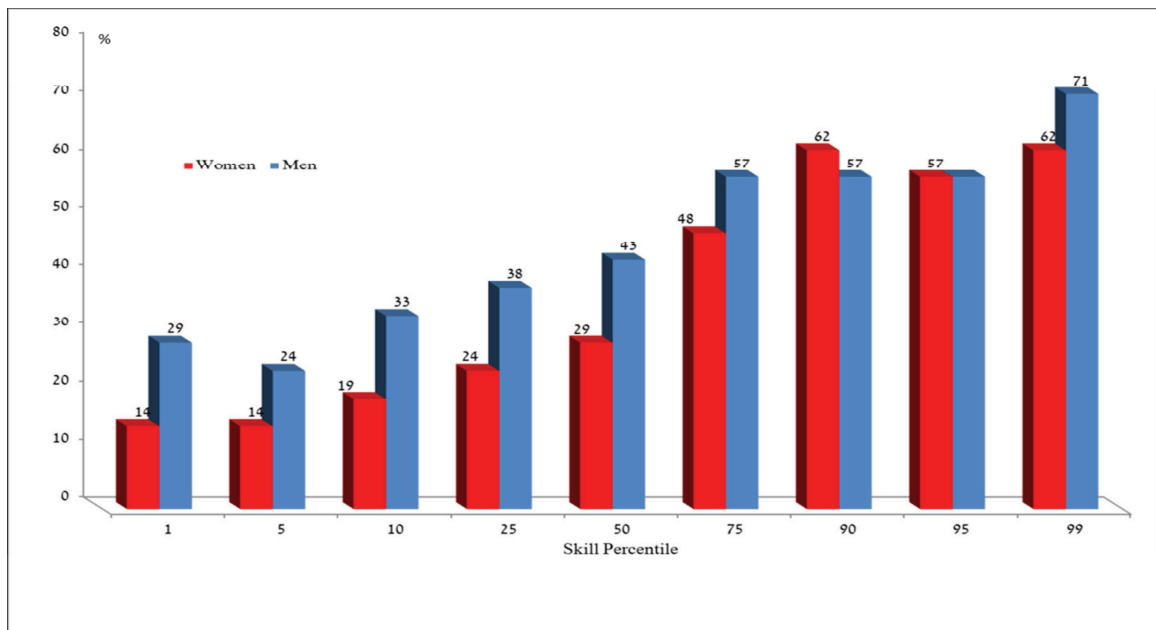


Table A2

The gap between the proportion of workers in the private sector in a given skill decile and the overall proportion of workers in the private sector; men

	Skill Percentile					Regression Slope
	1	2	5	9	10	
UK	-10.6	5.0	-5.9	-19.3	-9.2	-2.3
USA	18.3	1.9	-1.1	-4.2	-5.2	-1.4
Spain	13.9	-10.3	-3.0	-6.1	-0.1	-1.0
Chile	8.3	6.5	-8.2	1.2	-1.3	-0.6
Indonesia	19.4	-5.1	-1.1	-4.8	-10.8	-0.5
Finland	-7.3	6.8	2.5	-0.3	-6.0	-0.4
Holland	2.0	-4.6	11.5	-8.9	8.1	-0.4
Japan	-1.1	5.0	-2.5	7.1	-4.9	-0.3
Turkey	-7.5	1.3	-3.1	-30.5	26.8	-0.2
Russia	10.4	-3.2	-3.8	13.6	-5.5	-0.1
France	1.6	7.0	-5.5	-3.1	4.9	-0.1
Sweden	-0.5	3.8	0.3	-4.8	2.6	-0.1
Belgium	7.9	4.2	2.1	2.7	4.3	0.2
Denmark	-5.0	-11.9	2.4	-1.4	1.6	0.2
Lithuania	5.9	1.0	-1.9	-4.1	5.6	0.3
Germany	-1.1	6.8	6.3	-8.6	8.5	0.3
South Korea	-4.1	0.8	4.5	-0.0	0.7	0.4
Israel	-4.0	-3.9	5.5	1.8	8.0	0.6
Norway	-1.1	-5.9	11.0	-2.6	5.5	0.8
Austria	3.7	-6.1	-7.7	14.0	10.7	1.1
Greece	2.8	-11.5	11.9	-3.0	19.8	2.0
Ireland	-20.6	-3.1	8.5	2.8	5.1	2.6
Polnad	-5.5	-15.3	-12.1	7.8	16.7	2.7
Italy	-10.6	9.2	-18.5	1.9	12.8	2.8
Czech Republic	1.0	-38.0	-6.8	22.6	13.6	3.4
Slovakia	-15.8	-9.6	-0.1	24.7	15.9	4.5
The average	0.0	-2.7	-0.6	-0.1	4.9	0.6

Table A3

The gap between the proportion of workers in the private sector in a given skill decile and the overall proportion of workers in the private sector; women

	Skill Percentile					Regression Slope
	1	2	5	9	10	
Spain	20.9	5.6	-1.1	-11.6	-9.0	-2.5
France	15.6	5.5	-1.2	-3.8	-12.9	-1.8
Belgium	6.0	7.8	3.0	-5.1	0.2	-1.1
Japan	-1.0	11.8	1.8	-5.8	1.7	-1.0
South Korea	-0.8	12.6	-6.5	-2.4	-4.7	-1.0
USA	8.0	12.8	-16.0	0.9	0.8	-0.6
Chile	-3.4	11.1	-23.4	-11.5	8.0	-0.5
Greece	11.5	-7.2	3.0	-10.9	27.6	-0.3
UK	-14.3	4.9	-8.2	-8.5	7.7	-0.1
Turkey	9.4	-8.2	2.8	-16.7	14.5	-0.0
Lithuania	0.1	0.8	3.4	1.6	-1.2	0.4
Poland	-8.3	7.9	-7.0	6.6	-2.3	0.5
Indonesia	2.8	-6.7	6.8	-4.3	1.3	0.5
Finland	2.9	-17.8	1.1	-4.9	3.8	0.7
Ireland	-6.0	6.6	-15.6	16.3	4.4	0.9
Austria	3.7	-6.1	-7.7	14.0	10.7	1.1
Germany	0.6	-5.1	2.1	5.6	7.7	1.2
Slovakia	-10.9	-15.6	8.8	6.7	-6.3	1.3
Italy	-0.6	-0.4	-13.3	16.9	-0.9	1.6
Holland	-4.9	-14.5	-2.4	-5.0	7.2	1.7
Israel	-8.0	-5.8	1.1	11.0	-5.2	1.8
Norway	-19.0	-2.5	6.4	8.8	5.5	1.9
Czech Republic	-20.5	-6.8	3.9	28.2	-5.4	2.6
Denmark	-17.9	-2.9	-2.8	8.9	9.0	2.6
Russia	-4.3	-23.3	-14.9	17.9	24.7	3.7
Sweden	-13.2	-10.7	4.1	24.0	27.3	3.9
The average	-2.0	-1.8	-2.8	3.0	4.4	0.7