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WAGE GAPS BETWEEN MEN AND WOMEN STARTING TO WORK IN THE PUBLIC SECTOR

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This research examines whether there is a gap in wages between women and men starting to work in the public sector, and if so—what the reasons are for the gap and how it developed over the past 16 years. The research shows that at the start of the period a significant wage gap existed in favor of men, that this gap decreased over the 16 years covered by the research, and that since 2001, there is no difference in the average wage at the time of starting to work between men and women. The narrowing of the gap reflects the fact that men's real wages at the time of starting to work grew during the 16 years by only five percent, while those of women grew by 27 percent. The wage gap can be attributed to two influences: the difference in human capital, which creates a legitimate gap, and the difference in the return to human capital—which creates an illegitimate gap. The decrease in differences in human capital between men and women to a situation in which women currently enjoy an advantage, has led to a narrowing in the wage gaps between them. This narrowing is a result, among other things, of the accelerating process of academization among women, by virtue of which the proportion of women entering professions whose average salary is relatively higher has grown steadily. No less significant has been the decline in the return to human capital among men relative to women, and this too has led to reducing the wage gap.

A further examination showed that when the research population is "uniform" between the sexes, wage gaps between men and women are even smaller, even though they have grown during the past four years.

Furthermore, it was found that on starting to work, men generally received higher grades than women for the same profession. In this area as well, women's relative situation has improved significantly over the years.

JEL classification: J-31, J-45, J-78
Key words: Public Sector Labor Markets, Women-Men Wage Differentials, Oaxaca Decomposition, Discrimination

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1. INTRODUCTION

This empirical research discusses wage gaps between men and women at the time of joining the public sector in Israel between 1990 and 2005.

The issue of wage gaps between different population groups in the labor market has been extensively researched in recent years, worldwide and in Israel. In the United States, most of the attention has been devoted to wage gaps between blacks and whites (Juhn et al., 1999); in Israel wage differences have been examined between Sephardi and Ashkenazi Jews (Friedlander et al., 2002; Habelferd, 1992; Mark, 1996; Smooha, 1985; Rubenstein & Brenner, 2003), and between men and women (Efroni, 1980; Habelferd & Choen, 1999b; Klinov, 2004; Kraus, 1992b; Semyonov & Lewin-Epstein, 1991; and many others). All the research on wage differences between men and women has pointed to a gap in favor of the men. The wage gap decreased when the employees' characteristics were taken into account, but still remained significant. For example, Kraus (2002) examined the wage gap between men and women at three points in time—1972, 1983 and 1995—and found that women earned on average about 56, 58, and 53 percent less than men respectively. When the influence of other factors is neutralized, women earned 36, 31, and 25 percent less than men, respectively. The explanation of the gap in percentage terms grew over the years from 36 percent to 53 percent, but the gap itself remained significant even when the employees' characteristics (age, seniority, experience, education, etc.) were held constant—a finding that points to a surplus return for the men's characteristics. Kraus shows that over the years the differences in human capital (all the characteristics that affect the wage level) increased in favor of the men, while the gap in favor of the men as return for those same characteristics (in other words, the discriminatory component) continued to decrease.

The following are the major factors explaining the wage gap between men and women:

a. *Human capital*—men differ from women according to the number of years of study and the profession studied (Black, 2003; Brown & Corcoran, 1997), their work experience (seniority), and the average number of hours they work (Becker, 1985; Ben-Porath, 1967; Mandel & Semyonov, 2004; Mincer, 1974; O'Neil, 2003). Furthermore, an advantage in human capital channels the employee from the start to higher wage levels, while an increase in the general wage variance will be translated into an increase in wage gaps between groups of employees included in the right-hand side of the wage distribution, as opposed to those on the left-hand side. Choen & Habelferd (2003) compared the wages of Ashkenazi men to those of Sephardi men, Arab men, Sephardi women and Ashkenazi women at four different times (1975, 1982, 1992, and 2001), and found that despite the reduction in gaps in human capital between the groups,[1] the wage gap between them in favor of the Ashkenazi men had hardly changed, and had sometimes even grown. The major reason for this was the growth in the variance of wages over the years: Ashkenazi men, who are located more frequently in the right-hand side of the high-wage distribution gained from this process, while the other groups that are located more frequently in the left-hand side of

[1] Arab men are an exception in this case: no narrowing of gaps in human capital was recorded between Ashkenazi men and Arab men.

the relatively high-wage distribution, lost. Were it not for the growth in the variance of wages, Choen & Habelferd claim, the wage gap between Ashkenazi men and the other groups would have decreased considerably.

b. *Job mobility*. A not insignificant part of the wage gap between men and women is explained by men's greater tendency to change jobs and to "jump at an opportunity" more frequently than women. Men are more sensitive to the salaries they are offered, while women are generally more conservative and have a greater antipathy toward taking risks (Manning, 2003b; Mincer, 1974; Topel, 1992). This, by the way, is one of the reasons that women tend more than men to work in the public sector. The public sector is regarded as more conservative, has less wage variance, a smaller wage gap between men and women, and women reach more senior positions—compared with the private sector (Krauss, 1992b, 2002).

c. *Psychological differences, bargaining*. Men's bargaining ability over their starting wage is better and their reservation wage is higher, the result being that they receive higher starting wages. This theory holds that women are less aware of their ability and tend to compromise more than men. Men, by nature, are more competitive than women: negotiations are a type of competition—job advancement even more so. This latter factor, however, explains very little of the gap in wages between women and men (Babcock & Laschever, 2003; Bowles, 2001; Feinstein, 2000; Goldsmith, 1997; Manning, 2003; Neiderle & Vesteruld, 2005).

d. *Wage discrimination.* Even taking all the above factors into account and other factors not mentioned, most research shows a significant wage gap in favor of men. This gap, at least part of which cannot be explained by observed variables, might well be due to wage discrimination. For example: research that examined stock prices and the functioning of women as CEOs compared to men, shows that the market underprices women—an unjustifiably lower assessment (Wolfers, 2006).

e. Possibly the gap between wages of women and men who have recently joined the public sector is a result of a different reservation wage between the sexes (Rubinstein & Mulligan, 2005) and of selection bias. Since I am only able to identify new employees, a higher reservation wage for men will lead to a wage gap. This gap in the reservation wage in favor of men could possibly be a result of men's better bargaining ability, a change in the composition of employees joining the labor market,[2] and/or a difference in outlook between men and women. Thus, for example, the man, who sees himself as the major breadwinner, is not prepared to compromise on his wage, as opposed to the woman who does not view herself in this way. From this it follows that the increase in women's reservation wage in recent years at the time they start working, will lead to a decrease in wage gaps between women and men that is not a consequence of a decrease in wage discrimination in favor of

[2] Rubinstein & Mulligan showed that in the past (the mid-1960s to the early 1980s) women with high earning potential remained at home, while today this is true for women with low earning potential. Thus, the measured wage of women in the past was lower than their potential wage, while the opposite is true today.

men. The increase, or at least the non-decrease in the rate of participation of women at all levels of education in recent years, weakens this claim,[3] while the decrease in the rate of women joining the public sector during the period of the research strengthens it (Figure A-1).

The present research does not aim to explain the reasons for the decrease in the wage gaps between the sexes, but rather to break down the changes, both in characteristics and in returns, in an individual manner and without explaining why they came about. For example, the research shows that the human capital of women joining the public sector has risen in relation to men joining the sector, a factor that has reduced wage gaps, but we did not analyze why the human capital of women rose more than that of men. The reasons for the changes could be examined in another article.

The contribution of this research to previous research in this area is its focus on wage gaps specifically between men and women new employees in the public sector. Focusing on wage gaps among this population enables us to analyze the first factor more precisely, weakens the second factor and emphasizes the influence of the other factors.

Most previous research dealt with general wage gaps—the permanent wage, the monthly wage, and the wage per hour of work. These research projects were mainly based on cross-sectional data for a particular period, or on panel data for several periods, and examined the wage gap between men and women while neutralizing the influence of many characteristics—age, profession, employment sector, education, seniority, sex, family status, ethnic origin etc. As opposed to these research projects, there has hardly been any consideration in the research of wage gaps in Israel between men and women at the commencement of their employment.[4]

The reasons for researching this particular topic are as follows:

a. Because the process of academization in recent years has been more rapid among women than among men, we expected to find changes in their relative wages. Changes in the wages of new employees can be more easily implemented than changes in the wages of senior personnel that are anchored in complex wage agreements that are very difficult to change. Salaries of new employees are more sensitive to changes in the macroeconomic environment than those of senior personnel.

The research findings show a real increase over the years in the salaries of new employees. This, among other things, is due to the fact that more employees are commencing to work in professions in which the average salary is relatively high, as opposed to working in professions in which the average salary is low—mainly as a result of the process of academization. Despite this, the starting wage of the new employees relative to other employees in the public sector is consistently declining.

b. Part of the gap in permanent wages between male and female employees is a consequence of physiological and normative factors such as pregnancy, breastfeeding, maternity leave, and the strong tendency of women to play a dominant role in their

[3] Central Bureau of Statistics' personnel data for the relevant women.

[4] The division by age does not define the new employees, despite being a reasonable approximation.

children's education and the housework, at the expense of investing more at work. These circumstances reduce women's working hours and their chances for promotion, and accordingly their wages (Becker, 1985). These circumstances probably have a lesser influence on the wages of new employees.[5]

c. The initial wage is a significant springboard for the employee and strongly influences his future salary. Changes in wage gaps at the time of joining the labor force were expressed in gaps in permanent wages.

There is a strong positive correlation between permanent wage levels and starting wages: starting wages are meant to reflect the employee's abilities as the employer sees them, as well as how the employee views his own abilities—his bargaining ability. Furthermore, the employer can assess the employee's wage path and his expected progress, and determine his starting wage accordingly. This theory is even more valid with regard to the employee's permanent wage in that an employee who earns less than he is capable of, in his opinion, will probably move at some stage to another job, while an employer will not pay an employee a wage in excess of his marginal productivity (in conditions of certainty and equilibrium in the labor market). There is thus a theoretical connection between the new employee's wage and his permanent wage: the initial wage reflects the expectations of both the employer and the employee regarding the latter's ability, while the permanent wage reflects his actual ability. The important point is that even if the employer expects that a man will invest more in his work in the future than a woman—prejudice—he is not entitled to tempt him with a higher starting wage. The law in Israel prohibits a connection of this kind, which could lead to wage discrimination in favor of males. If we assume that men indeed invest more in their work, on average, than women[6] solely in terms of the number of working hours,[7] we have a conflict between two forces—the law and business considerations. I will examine in this paper how the public sector deals with this issue. The public sector, as opposed to the private sector, is bound by collective wage agreements that are relatively easy to enforce, and it is therefore more difficult to practice wage discrimination in this sector.

An employee's salary on commencing work is meant to reflect his ability both in the employer's eyes and in his own eyes: the employer will not offer an employee a higher salary than that which matches the employer's assessment of the employee's ability[8] on the basis of an interview and the employee's signals (education, experience); the employee will

[5] Even if the above factors are taken into account, the reason being that the law prohibits discrimination based on prejudices and stereotypes.

[6] Among other things, for normative and possibly even evolutionary reasons.

[7] Men, on average, work more hours weekly than women in almost every profession.

[8] On the assumption that there is no shortage of workers. As opposed to this, if the employer fears that he will not find another employee, he will be forced to offer the employee more in order to reduce the risk of remaining without an employee. In other well-known equilibrium models, the employer initially pays his employee less than his marginal productivity, and in time his wage exceeds his productivity. In yet other models, the employer pays the worker above his marginal productivity in order to motivate him to work more.

not agree to a wage inferior to that which matches his earning ability.[9] This is known as the reservation wage. Thus if the employee starts working, his initial wage expectancy reflects his earning ability. (An employee who is over-evaluated will receive too high an entrance wage, but will be promoted at a slower pace than an employee who was under-evaluated, and will be compensated by more rapid promotion).

I will examine the wages of new employees entering the public sector according to specific cases and by regression analysis that controls for other explanatory variables, such as the employee's profession. I will examine whether a wage gap exists between men and women, and, if so, how has the gap changed over the past 16 years.

The major part of the paper is devoted to examining the factors that have influenced the development of wage gaps. I will present the development of wages offered to new employees joining the public service, both women and men. The expectation is that in the wake of the academization process mentioned above, more new employees will begin working at a higher starting wage.[10] This phenomenon is expected to be more salient among women, because the rate of academization among new female employees is particularly high. At the same time, the entry of more educated women will possibly lead in time to disrespect for their education, which will be translated into a decrease in its return: in the past, academic education constituted a good signal of a female employee's ability, while today far more women study, and the relevant information on the female employee's ability as a result of having academic qualifications is declining (Arrow, 1973; Maoz & Moav, 1999). Arrow presents a model in which academic studies serve as a means for classifying employees according to their ability. In their article (and in other articles), Maoz and Moav (1999) present a model in which the greater the number of educated employees, the greater the decrease in the return to education.

Chapter two of the article briefly describes the date file. Chapter three presents wage gaps between men and women in general and by means of regressions. Chapter four analyzes the reasons for these gaps and how they have developed over the years. Chapter five discusses the changes over time in the characteristics of the new employees in the public sector by sex, and in addition, in order to examine the robustness of the findings, we have examined wage gaps between men and women only among populations with similar characteristics—a uniform population. Chapter 6 examines the distribution of the men and the women according to their salary grade at the time of joining the public service. The final chapter is devoted to a summary and conclusions.

[9] On the assumption of full employment. On the other hand, when there is a danger of unemployment, the employee will agree to moderate his wage demands, thereby weakening his bargaining power.

[10] The academization process as expressed in the data is upwardly biased in view of the fact that in recent years employees have been more frequently recruited through personnel companies. These employees, most of whom have relatively fewer years of education, do not appear in the data file.

2. THE DATA

I will analyze the data file of salaries and characteristics of civil-service employees.

a. The population

The data covers the public sector only, and not the complete public sector: the file does not include data on teachers, military personnel, Bank of Israel employees, municipalities (except for the Jerusalem municipality), and public companies (except for Bezeq, the Broadcasting Authority and Ben-Gurion airport). The file includes employees of all the government ministries, as well as data on the police, the Water Authority, the Israel Lands Administration, the National Insurance Institute, Yad Vashem and the Israel Museum. The employee files include on average 120 thousand observations obtained from the Ministry of Finance each month.

b. Uniqueness of the data and its quality

The file is neither a sample nor a survey. It includes data on all the employees and the pensioners in the above institutions. The data are the salary slips themselves; they were not collected by means of questioning employees or any estimate, hence their reliability.

c. Structure of the data

Each employee has a coded identity number, which enables us to monitor employees over time, to know who has remained in the civil service, who has retired and who has joined. Indicated for each employee is his or her sex, age, employment scale (administrators, engineers, economists, doctors, social workers, etc.), wage grade, work status (permanent, temporary or contract employee), whether full-time or part-time, and his professional seniority. The file also includes data on the employee's salary, including gross salary, base salary and types of additional salary after deducting various additions. The data does not include information on the number of hours the employee works and his formal education. The employees' education can be derived from their employment scale, from their grade and from specific supplements given to employees in recognition of their education. In order to arrive at an estimate of wage per hour worked, we took two principle decisions:

1. Because the linear wage correction for full-time or part-time jobs is insufficiently precise, and because most employees who started work on a part-time basis were women (Figure A-1 in the appendix), this correction could bias the results.[11] The research thus focused only on new employees starting to work on a full-time basis. This deduction removed a quarter of the observations, the result being that while prior to the deduction half the population were men, after the reduction their proportion rose to 58 percent.

[11] According to Kraus (2002): "…The gender differences among full-time workers are very much the same as those observed among part-time workers in all three years (1975, 1983, 1995 YM) studied." Despite this, and because we have sufficient observations, it was decided in this research to consider only new employees for full-time positions.

2. We neutralized the influence of the employee's work status.

d. Limitations of the data

The sample does not include the total public sector in that it omits teachers and municipal employees. This implies that conclusions cannot be drawn from the research about the whole public sector. The non-inclusion of teachers in the sample is problematic, because teaching is the major profession that employs women, both with respect to the percentage of women among teachers, and the percentage of women who are teachers. Any change in salaries paid to teachers could thus affect the major conclusions of the research.

e. The research population

In each of the years from 1990 to 2005 we examined only the new employees—employees who were not recorded in the database prior to joining the civil service. These are young people, less than 30 years old, who started working in full-time jobs, are not Knesset members, ministers, or senior contract employees (exceptional observations). After making these deductions, we found that, on average, 1,850 new employees joined the public sector each year, so that the total researched population included almost 30 thousand observations.[12]

These are *cross-section* data of the new employees joining the public sector each year, and the calculated wage is the gross wage of the employees in the month of December.[13]

Table 1
Descriptive Statistics of the Data

	All		Men		Women	
Frequency	29,670		17,320		12,350	
	Average	Standard Deviation	Average	Standard Deviation	Average	Standard Deviation
Wage	5,556	2,064	5,715	2,068	5,333	2,038
Employment scale, profession	28.4	12.3	28.1	11.2	28.7	13.6
Age	24.8	2.9	24.9	2.8	24.7	3.1
Seniority	1.0	1.2	1.18	1.3	0.80	1.0
Men	0.58					

The average wage of men is 7.2 percent higher than that of women, even though men's average scale level is lower than that of women (a measure of the average wage of the profession). Men's seniority is greater than that of women in view of the fact that men undergo three years of compulsory military service, while women are required to serve for only a year and nine months. The average age of new employees is similar for both sexes.

[12] To avoid confusion: The 120 thousand monthly observations refer to all employees, irrespective of the number of years worked. This research deals with a far smaller population—the new employees, who constitute about 3 percent of all the observations.

[13] As mentioned, an employee is defined as a new employee if he was not included in the database for December of the previous year. His maximum work experience is thus 11 months and his minimum 0.

3. PRELIMINARY ANALYSIS

a. Description of wage gaps between new men and women employees

The research hypothesis is that if at the beginning of the 1990s a wide initial wage gap existed between men and women, the gap narrowed over the years as a result of greater awareness of discrimination, growing academization among women, legislation[14] and court judgments.

An initial examination of the average wage of new employees over the past 16 years reinforces this hypothesis. The wages of newly employed men over the whole period were 7.2 percent higher than those of women.[15] Over the years, however, there has been a marked narrowing of the wage gap, and in recent years there is no difference in the average wage of women and men entering employment (Figure 3.1)

Figure 3.1
Average starting wage of female and male employees

Figure 3.1 shows that over all the years examined, the average initial wage of males up to 2001 was higher than that of females. However there is a clear trend of a narrowing of the gap, and from 2001 onward there is no difference in average wages of new employees by sex. A high correlation exists between men's and women's starting wages.[16] The narrowing of the wage gap reflects the fact that the women 's average wage grew by 27 percent (1.5 percent on average per annum), while that of new male employees grew by

[14] Such as the 1995 law regarding equal opportunities and the promotion of employing women in government service.

[15] The wage is the gross wage after deducting one-time additions, vehicle insurance and clothing allowance.

[16] Pearson's correlation coefficient between the two series is 0.82.

only 5 percent (0.3 percent per annum). Furthermore, when the composition of employees in their various scales remains constant—both the men and the women remain in the same scale over the years as they were in 1990—men's wages fell in real terms over the years, while that of women increased each year on average by only 0.6 percent (Figure A-2).

We wished to examine whether the median wage of men is higher than that of women. The finding proves that the wage gaps are not only a result of extreme values of men's and women's wages.

Figure 3.2 presents the median-wage ratio and the average-wage ratio of new male and female employees over the past 16 years.

Figure 3.2
The median and average wage ratio of new male and female employees

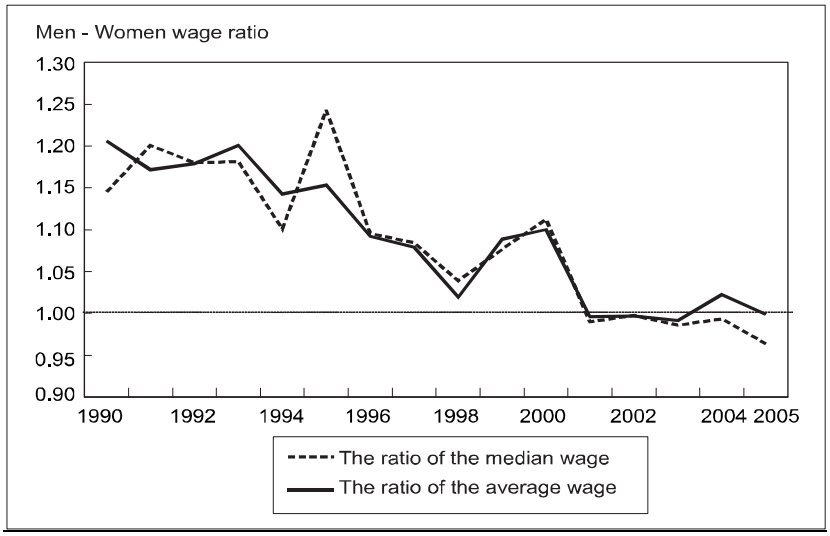


Figure 3.2 indeed shows a slight decrease in the median-wage ratio in comparison with the average-wage ratio.[17] However, the median wage for new male employees is also higher than that for new female employees. From 2001 there is no significant difference in the median wage between men and women, and obviously there is also a high correlation between these two series. The conclusion is that the extreme values do indeed affect the wage gap between men and women, but are not the only factor. The factors underlying the significant wage gap are more complex.

In order to examine whether the growth in real wages of the new employees over the years was a consequence of changes in the composition of the population—academization (or more generally, an increase in the educational level, including an increase in the percentage of school students passing the matriculation examination and a decrease in the

[17] The median wage of men, averaged over all the years, is 6.2 percent higher than that of women.

percentage of high-school dropouts)—we examine what would be the wages of the new employees over the years had the structure of the population remained constant. For this purpose we make use of the base composition—the composition of the new employees in 1990. The results are presented in Figure 3.3.

Figure 3.3
The development of the wages of new employees when the population composition remains constant – the 1990 composition

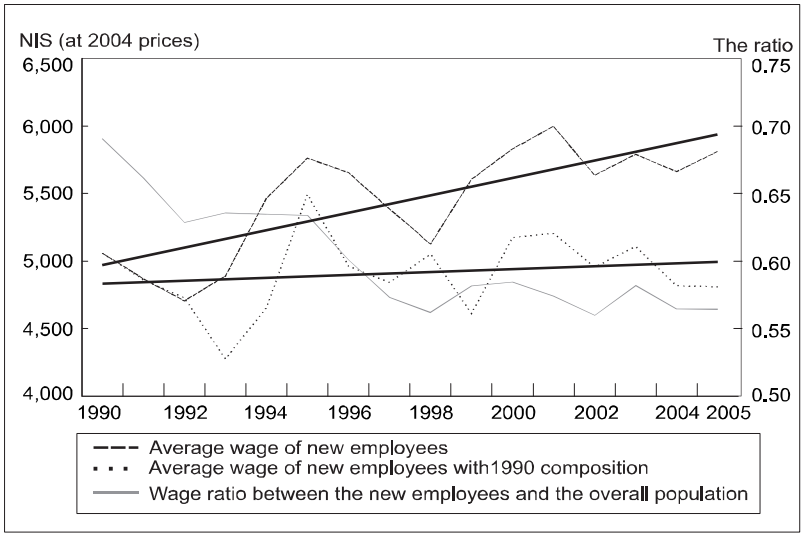


Figure 3.3 shows that the change in the composition of the new employees contributed to the real increase in the wages of the new employees over the years. When the population composition remains unchanged, the real wage of the new employees did not change over the years, as opposed to an average growth of 0.9 percent each year when the population composition changes. Despite the above, we observe a decrease in the wage ratio of the new employees in relation to the other public-sector employees up to 1998—an average of 69 percent in 1990 to an average of 56 percent in 1998. From this it follows that wages of the new employees rose over the years, but that the rate of increase was less than that of the other employees.[18]

The following figures present the process of academization and its impact on the wages of new employees, when we differentiate between men and women.

[18] The wages of all employees, especially new employees, grew less during these years than the labor productivity. The cost of work of new employees per unit of GDP thus fell greatly in these years.

Figure 3.4
Percentage of new employees over the years with an academic education, divided by sex

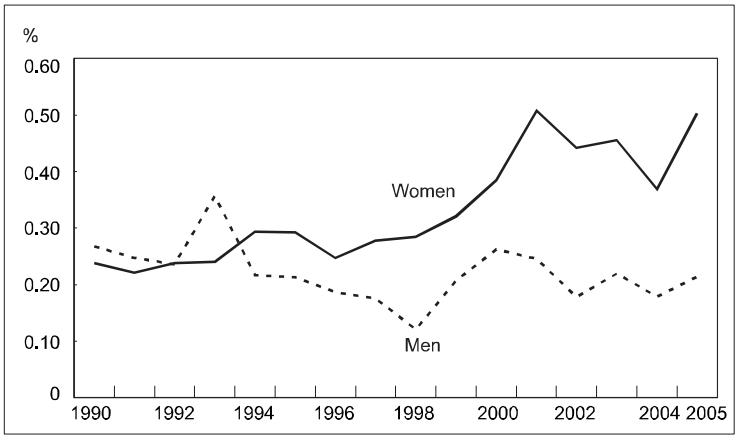


Figure 3.5
Wage ratio of new employees between men and women over the years, by education

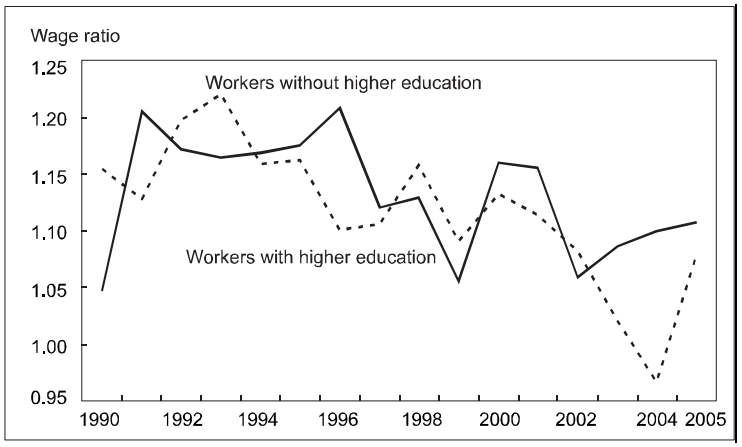
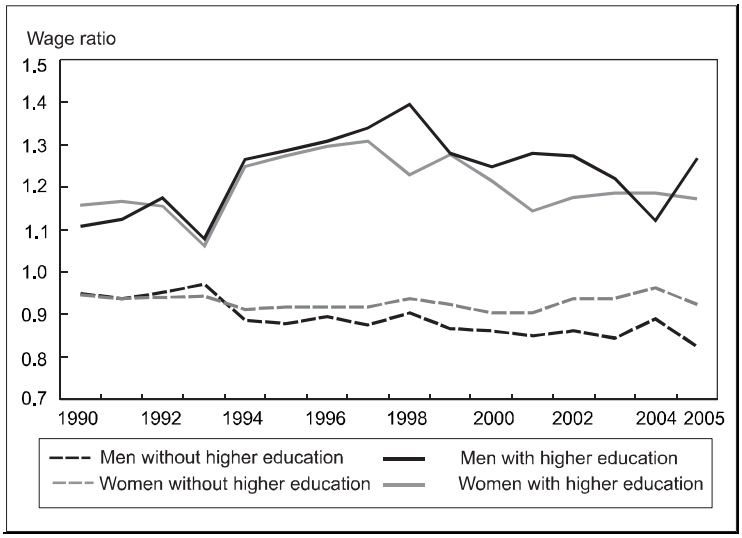


Figure 3.6
The return to education—the ratio of the wage to the average wage of new employees, by sex over the years



From the diagrams we see that the percentage of new female employees with an academic degree shows an increasing trend, and that a considerable gap has opened between the women and the percentage of new male employees with an academic degree—which we refer to as "the phenomenon". Possibly the non-academization recorded on the part of the males is a result of a relative decrease in the supply of males with an academic education, which could be accompanied by a negative selection process among them, in which males with an academic education preferred to work in the business sector. This assumption was not examined in the research and constitutes an area for further study. Furthermore, the wage ratio between males with an academic education and females with an academic education, which was very high at the beginning of the 1990s, declined over the years. For both men and women, the economic return to education grew from the start of the period up to 1999, but since then we can discern a decreasing trend in this return. Regarding the rates of return, wages between men and women with an academic education have become equal, while a small wage gap still remains between men and women without an academic education, even though this gap is smaller than it was and is not systematic.

This concludes the presentation of the descriptive statistics of the data.

b. Empirical examination of the wage gap

In order to examine whether a wage gap exists between men and women at the time of their starting to work that is not explained by other factors, and that possibly these factors are correlated with the sex of the employee, it is necessary to perform a regression analysis in which we keep these factors constant. Men possibly start working at a stage that their education, age, seniority, employment scale and salary grade are all at a higher level. Age or seniority clearly do not attest to discrimination of any kind, while everything connected to education may attest to a distortion in the acquisition of education. In any event, young women today are no less educated than their male peers, even though there are significant differences in their areas of study (engineering, for example, is still largely male dominated).

In order to estimate the wage gap between men and women at the time of entering the public service, beyond the above factors, I will examine the variable *sex* while keeping these other variables constant.

The regression will be performed on five different types of wage, from overall gross wage to the lowest wage, excluding taxes,[19] even though the results will be presented for only one wage—the second.[20]

The more interesting variables in this research are the dummy variable for sex (male = 1; female = 0), interaction variables between sex and the chronological years (in which 1990 is the intercept, and for each year there is an appropriate indicator variable), and between sex and other characteristics. If we find that the variable which explains *sex* is positive and significant, then there is indeed a positive gap in favor of men that is not explained by the other variables.

The initial model (an incomplete model, obviously) that I will initially estimate, is a one-variable regression over the years, in which the only explanatory variable is the sex of the employee. The aim of the initial estimation is to emphasize the influence of the stipulation on the explanatory variables.

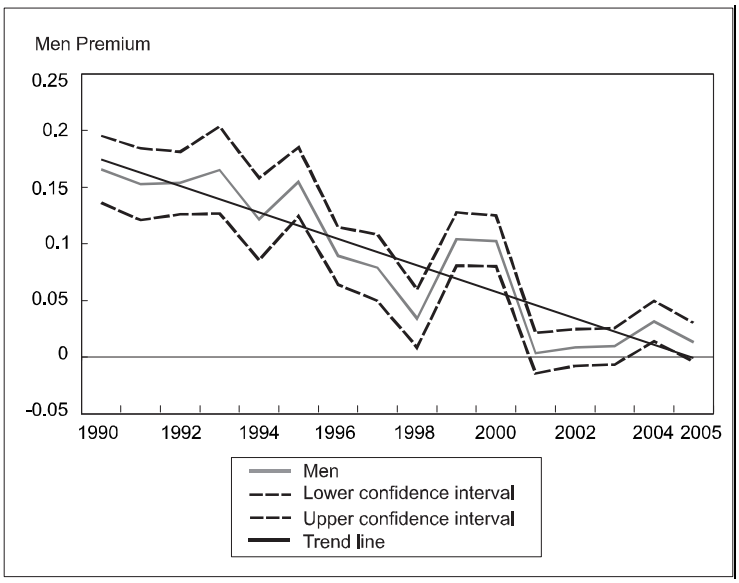
Model 1:

Figure 3.7 presents the value of the coefficient (a positive coefficient implies a positive wage gap in favor of the men) and its 95 percent confidence levels over the years (actually a *t*-test).

[19] The types of wage include overtime and are detailed in the appendix.

[20] The gross wage after deducting: back-payments within the additions, vacation pay, sabbatical, retirement, absence from work, strikes, private advance payments, debts to the ministry, retroactive advanced-study compensation, Jubilee grant, vehicle insurance, vehicle license, convalescence pay and clothing allowance.

Figure 3.7
Value of the coefficient of the variable *men* over the years



In most years the wage gap in favor of men on joining the public sector was significant; this gap narrowed over the years, and in the past five years (excluding 2004) it was not significant.

We wished to examine what happens to the variable *men* over the years when we also hold additional explanatory variables constant: the scale (profession), seniority and age of the employee. The scales are classified in ascending order of average wage in each scale, from the scale in which the average wage is the lowest, to that in which the average wage is the highest.

Model 2:

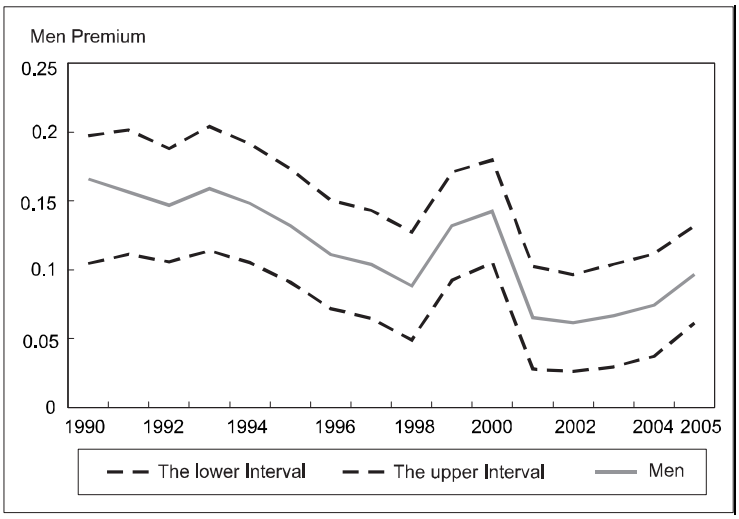
$$\log(Wage_t) = f(occupation,\ age,\ tenure,\ tenure^2, man,\ year_t,\ man \cdot year,\ x^T year_t)$$

in which x are the explanatory variables (scale, seniority,[21] age) that are multiplied by the dummy variables of each year from 1991 onward. The *R sqr* of the regression is 40 percent. The output of the regression and its important variables appear in the appendix. An additional model that gave dummy variables to the employees' scales instead of continuous variables, produced almost identical results.

The following figure presents the results of estimating the coefficient of the variable *men* in the multivariable regression.

[21] Experience and age are not highly correlated: the correlation coefficient is -0.03.

Figure 3.8
Estimating the parameter *men* in the multivariable regression



A comparison of the results of the multivariable regression to that of the single explanatory variable shows:

a. In the multivariable regression the wage gap in favor of men is significant throughout the years.

b. At the start of the period researched, the coefficient in the one-variable regression is greater than the coefficient in the multivariable regression, while the opposite is true at end of the period. This finding leads to an important conclusion: the characteristics of the men were preferable at the start of the period (in that stipulating them lowers the value of the parameter), while the characteristics of the women were preferable at its conclusion (in that stipulating them raised the value of the parameter).

This finding can be presented in the following way (excluding exceptions in 1992 and 1993):[22]

$$E\left(\frac{W_{men}}{W_{women}}\right) \geq E\left(\frac{W_{men}}{W_{women}}\middle| X\right)_{t=1990...1996}$$

$$E\left(\frac{W_{men}}{W_{women}}\right) \leq E\left(\frac{W_{men}}{W_{women}}\middle| X\right)_{t=1997...2005}$$

These findings point to the need to examine in more depth the factors that over the years influenced the development of the wage gap between men and women.

[22] For most of the years these differences were not significant.

Furthermore, the slope of the one-variable regression (the trend line in the 16 years of research of the estimated parameter) is far greater—almost double its absolute value.

An analysis of the results of Model 2 shows a wage gap in favor of men for almost all types of wages.

This raises the question of whether these findings attest to wage discrimination between the sexes. Beyond the comments in Chapter 1 regarding the different reservation wage between men and women, the types of wage do not deduct all the additions, including the payment for overtime.[23] For the years 2000-2005 in which wages were examined without payment for overtime, it was found that the major conclusions held, and that moreover the wage gaps between men and women in those years were even greater after deducing overtime pay from the wags, particularly for the employees without academic degrees. The wages of new female employees after deducting overtime fell on average in these years by 10.1 percent, while the wages of new male employees fell by only 6.6 percent. As a result, men's wages in these years, which, without deducting overtime pay, were on average 2.5 percent higher than average women's wages, were 6.4 percent higher after the deduction. Among the new employees with academic degrees, men's wages are presently 7.7 percent higher, as opposed to a difference of 6.6 percent before the deduction, while among the new employees without academic degrees, men's wages are 13.4 percent higher, as opposed to 10.2 percent before the deduction.

In an additional examination in which the variable *status*[24] was held constant, the major conclusions remain unchanged. A further conclusion that emerges from performing the multivariable regression is that the wage gaps are slightly narrower when the employee's status is permanent: the variable *man* obtains a value of 0.10, as opposed to 0.11 obtained in the model without controlling for the employee's status. As opposed to this, when the status of the new employees is contractual or temporary, the variable *man* obtains the values of 0.132 and 0.123 respectively.

4. ANALYSIS OF THE INFLUENCES OF THE FACTORS ON WAGE GAPS

In order to quantify the different influences of the variables explaining the characteristics and the parameters, we performed the regression each year for men and women separately, with the assistance of Oaxaca's (1973) method.

For each year, from 1990 to 2005, the model is:

$$\log(Wage_{j,t}) = f(occupation,\ age,\ tenure\ ,tenure^2)$$

$$j = Man, Female$$

$$t = 1990 - 2005$$

[23] A simple mathematical explanation of how each addition influences wage gaps appears in the appendix.

[24] The variable *status* is divided into three major categories—permanent, temporary, and contract employee.

This estimation system suffers from the problem of "sample-selection bias". If the probability of the generalizations in the sample is dependent on the sex of the employee—the implication being that the examined population is not a representative sample of the population—the estimates of the regression will be biased. Two findings reduce the effect of this problem: 1. The sample comprises more or less equal proportions of women and men; 2. The use of a different model in which appropriate dummy variables can be graded, does not change the results. In addition to the problem of bias, any problem of additional endogenousness of the explanatory variables will bias the results. Generally, the problem of endogenousness is focused on the variable of seniority: is it seniority that causes the increase in wages, or perhaps it is the increase in wages that motivates an employee to stay in the job longer? Clearly, however, this problem is irrelevant in our case, because the seniority in the research is only that of new employees, and the seniority recorded for an employee joining the public sector is the corrected seniority of the duration of his or her military service.[25] Finally, the problem of heterogeneity (difference) between the sexes could also bias the results. If there is an additional variable, not included in the model, that influences wages and is dependent on the sex of the employee, the regression will produce biased estimates.

According to the model:

Men's wages, 4A: $\log(W_M) = B_M \cdot X_M + U_M$

Women's wages, 4B: $\log(W_F) = B_F \cdot X_F + U_F$

Men's wages with women's parameters, 4C: $\log(\hat{W}_M) = B_F \cdot X_M$

Men's salaries with women's characteristics, 4D: $\log(\hat{W}_F) = B_M \cdot X_F$

The wage gap as a result of differences in parameters – discrimination,[26] 4E:

$$D_{MF} = \log\left(\frac{\overline{W}_M}{\hat{W}_M}\right) = \log\left(\frac{\overline{X}_M \cdot B_M + \overline{U}_M}{\overline{X}_M \cdot B_F}\right) = \log\left(\frac{\overline{X}_M \cdot B_M}{\overline{X}_M \cdot B_F}\right)$$

The wage gap as a result of differences in characteristics, 4F:

$$E_{MF} = \log\left(\frac{\hat{W}_M}{\overline{W}_F}\right) = \log\left(\frac{\overline{X}_M \cdot B_F}{\overline{X}_F \cdot B_F + \overline{U}_M}\right) = \log\left(\frac{\overline{X}_M \cdot B_F}{\overline{X}_F \cdot B_F}\right)$$

[25] It could be claimed that this seniority is an expression of widespread discrimination resulting from differences between the sexes in the length of military service, and thus has no place on the right side of the equation. Changes in this variable, however, or in its contribution to wages could be expressed in a change in the wage gap, and for this reason we wish to hold this variable constant.

[26] Direct market discrimination occurs when different rental prices are paid by employers for the same unit of human capital owned by different groups (Mincer, 1974).

Therefore, the overall average wage ratio between men and women can be broken down, 4G:

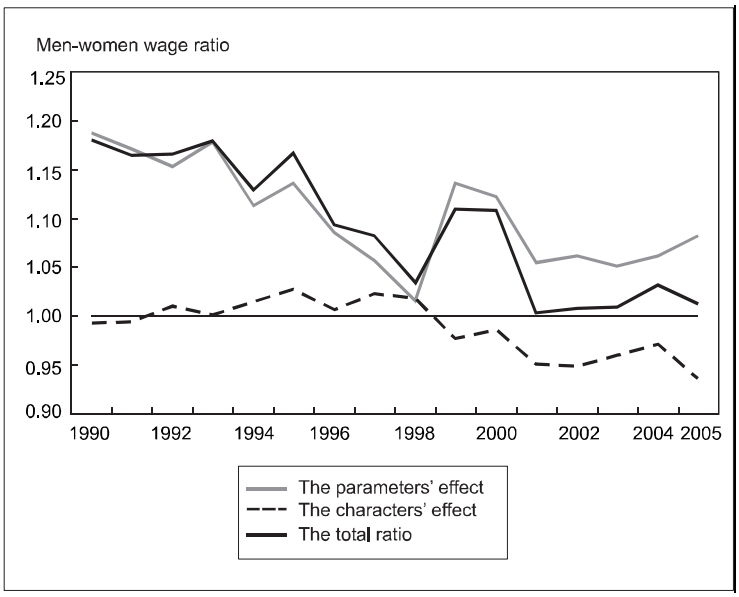
$$\log\left(\frac{\overline{W}_M}{\overline{W}_F}\right) = \log\left(\frac{\overline{X}_M \cdot B_M}{\overline{X}_F \cdot B_F}\right) = \log\left(\frac{\overline{X}_M \cdot B_M}{\overline{X}_M \cdot B_F} \cdot \frac{\overline{X}_M \cdot B_F}{\overline{X}_F \cdot B_F}\right) =$$

$$\log\left(\frac{\overline{X}_M \cdot B_M}{\overline{X}_M \cdot B_F}\right) + \log\left(\frac{\overline{X}_M \cdot B_F}{\overline{X}_F \cdot B_F}\right) = D_{MF} + E_{MF}$$

On the assumption that the wage structure for women is implemented both for women and for men, and that the labor market is non-discriminatory:

Figure 4.1 presents the results of the estimate.

Figure 4.1
Breakdown of the influences on wage gaps of new employees between men and women



According to the figure the influence of the parameters was more dominant in the mid-1990s, and the decrease in the return to characteristics of the men relative to the women is what caused the decrease in the wage ratio between them. We can discern a trend in the influence of the characteristics of the employees: Up to 1998, the characteristics of the men were "preferable" to those of the women (a gap that reached a peak in 1995)—the implication being that the influence of characteristics tended to widen the wage gap between men and women. From 1998, we can discern a reduction of the differences in

characteristics between them, and from 1999-2005 this component even led to a narrowing in the above gap.

Alternatively we can present:

4H: $$\log\left(\frac{\overline{W}_M}{\overline{W}_F}\right) = \log\left(\frac{\overline{W}_M}{\hat{W}_F}\cdot\frac{\hat{W}_F}{\overline{W}_F}\right) = \log\left(\frac{\overline{X}_M\cdot B_M}{\overline{X}_F\cdot B_M}\cdot\frac{\overline{X}_F\cdot B_M}{\overline{X}_F\cdot B_F}\right) =$$

$$\log\left(\frac{\overline{X}_M\cdot B_M}{\overline{X}_F\cdot B_M}\right) + \log\left(\frac{\overline{X}_F\cdot B_M}{\overline{X}_F\cdot B_F}\right) = E_{FM} + D_{FM}$$

This is on the assumption that the wage structure for men is implemented both for men and for women, and that the labor market is non-discriminatory:

Figure 4.2
Breakdown of the influences on wage gaps of new employees between men and women

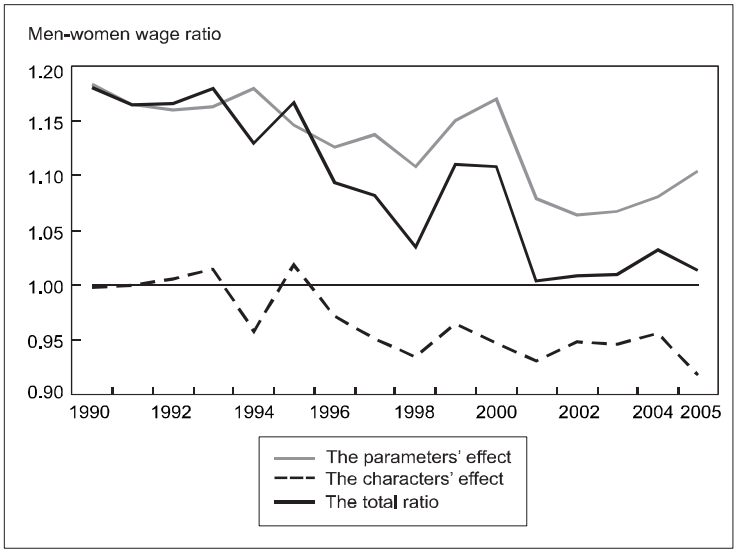
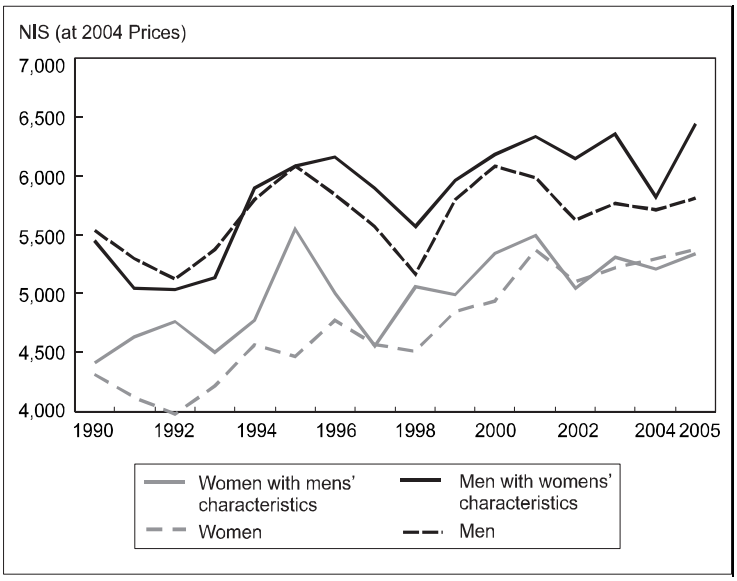


Figure 4.2 presents a similar picture to that of Figure 4.1 in which the narrowing of the wage gap in the mid-1990s was due mainly to the reduction in the parameters of the men relative to the women. As opposed to the previous diagram, however, in which men had an advantage in characteristics from 1996-1998, according to Figure 4.2 the men had already lost their advantage by 1996.

In the next chapter we will assess in depth the development of the employees' characteristics over the years, from their entry into the public service. Based on the findings of the following chapter, Figure 4.2 appears to reflect well the process that took place during these years.

The influence of the characteristics and the parameters can also be presented by comparing the hypothetical wage of women when the men's characteristics are attributed to them, and that of men when the women's characteristics are attributed to them. The gap between the broken line and the solid line in Figure 4.3 represents the influence of the characteristics, while the gap between the broken line of the men and the solid line of the women represents the influence of the parameters.

Figure 4.3
The hypothetical wage of women with the characteristics of men, and vice versa

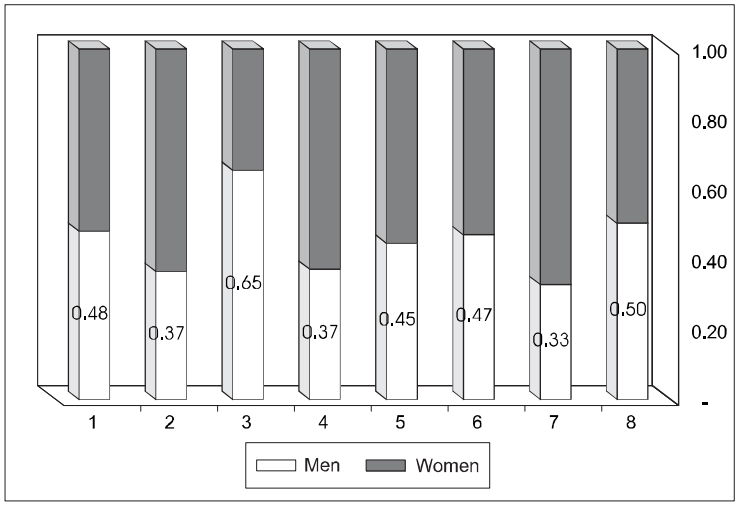


5. THE DEVELOPMENT OF CHARACTERISTICS AMONG NEW EMPLOYEES IN THE PUBLIC SERVICE

In order to investigate the issue of the characteristics in depth, we examine the distribution of new employees by sex according to groups of scales over the years 1990-2005.

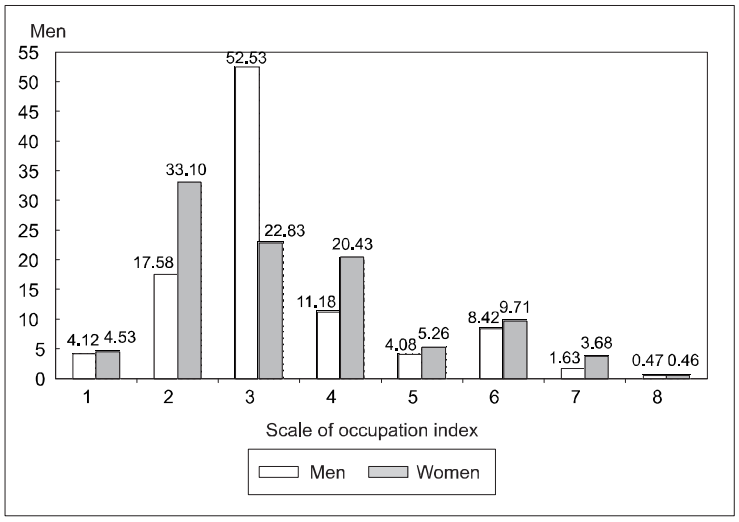
The scales were divided into eight groups in ascending order of average wage in each group of scales, so that the employees in scale group 1 are on scales with the lowest average wage (scales 1-10), and the employees in scale group 8 are on scales in which the average wage is the highest (scales 70-75). Figure 5.1 presents the average percentage of men and women for each year in each group of scales. All the percentages presented are corrected for the proportion of men and women in the population.

Figure 5.1
Percentage of men and women by scale groups – average of all the years



The picture that emerges from the diagram is incomplete; in order to obtain a clearer picture it is necessary to examine the distribution of the employees into groups of scales for each sex separately. Figure 5.2 presents this distribution for men and women respectively.

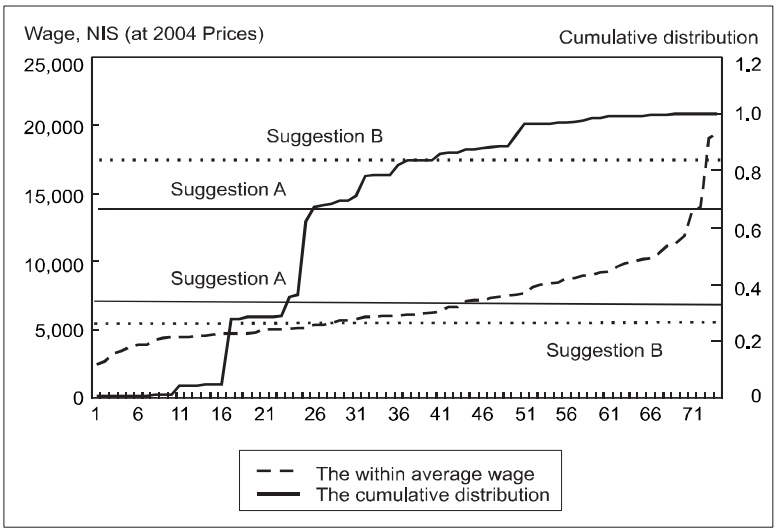
Figure 5.2
Distribution of new men and women employees by scales – multi-year average



Several conclusions can be drawn from Figure 5.2. Most new employees, both men and women, are entering professions in which the average wage is relatively low, a result of the nature of the demand for and the supply of employees at the start of their careers. Among the women, the percentage of new employees in scale group 2 is the highest (a third of the women), while among the men, scale group 3 is dominant (more than half the men were part of this scale group). This appears to be the salient difference between men and women in their distribution by scales on first entering the public service. The female majority in scale group 7 and the equality in scale group 8, as can be seen in Figure 5.1, should be seen against their relatively negligible proportion in the new-employee population.

The question to be analyzed in this chapter is: Has there been any development in recent years on this issue in favor of women? We will examine the development in the distribution of wages of new employees with the help of Figures 5.1 and 5.2—by dividing the research period in each diagram into three sub-periods.[27] In order not to be distracted by small percentages, we would like to conflate scale groups even further. The question was how to do this. Observe Figure 5.3.

Figure 5.3
Cumulative distribution of employees according to the scales index



The diagram shows several items:

a. The cumulative distribution of the new employees by scale groups (the right axis).
b. The average wage in each group of scales.
c. The average wage among all the new employees at 2004 prices—NIS 5,556.

[27] 1990-94; 1995-99; 2000-05.

d. Twice the average wage among all the new employees at 2004 prices—NIS 11,116.
e. Two proposals for dividing the scales into three groups:

i) Proposal A: Division into three parts of equal size.

ii) Proposal B: Division into low-wage professions, medium-wage professions, and high-wage professions: 28 percent, 40 percent, and 32 percent of the population, respectively.

In my analysis, I implement the second division. The processes, as will be presented below on the basis of this division, are not obtained if the first division is implemented.

Figure 5.4 presents an index of the proportion of men in a division into 3 groups of scales during the three five-year periods of this research. When the index is equal to 1, the distribution of the allocation between the sexes is equal, an index greater than 1 indicates an excess allocation of men, and an index less than 1 indicates an excess allocation of women.

We define an index, *M*, as follows:

$$M \equiv \frac{Observed_{men}}{Expected_{men}}$$

$$Expected_{men} = \% \frac{Men}{All}$$

In which the denominator is the proportion of men in the population.

Figure 5.4
Index *M* of the rate of new male employees in each scale group, conflating the scale groups into 3 groups by three periods

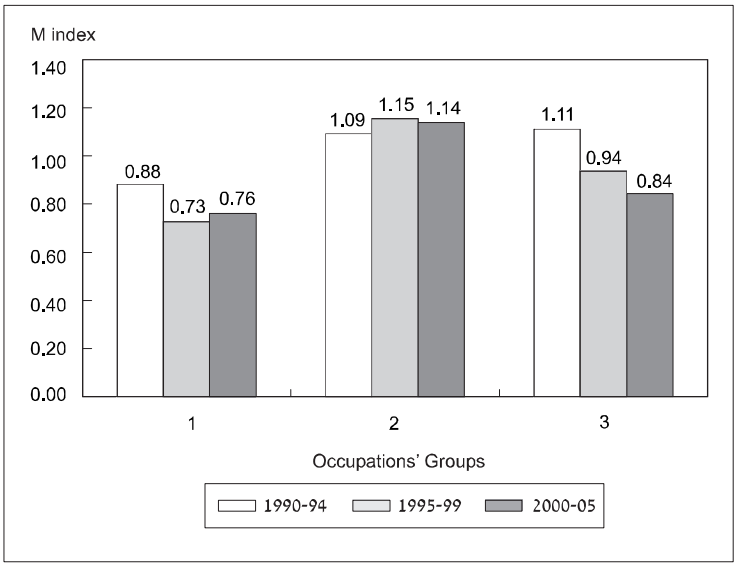


Figure 5.4 indicates that changes have indeed taken place: the proportion of men in the scale groups of the high average-wage employees has decreased over the years (the proportion of women has grown). At the beginning of the period, the proportion of men in these groups was higher than their proportion in the population, while at the end of the period, their proportion was lower. The trend seems clear: the distribution of employees in the scale groups has become more egalitarian over the years. In the other two groups, of the low- and medium-wage scales, no specific trend is evident.

The relative improvement in the women's position, as reflected in Figure 5.4, possibly indicates an improvement in their absolute situation; it could also, however, be a result of the worsening of the men's situation. In order to answer this question, we will examine whether there were any changes over the years in the distribution of new employees in the scale groups for each sex.

Figure 5.5 examines the distribution of men, Figure 5.6 the distribution of women.

Figure 5.5
Distribution of the new male employees in the scale groups over the three periods

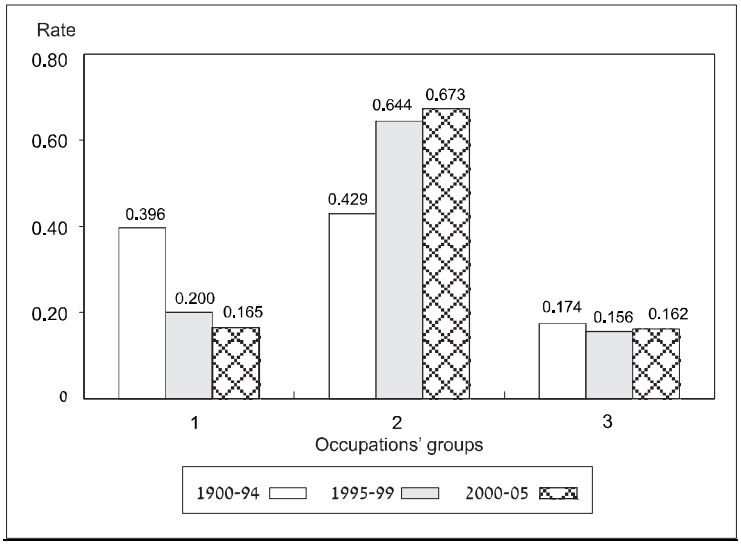
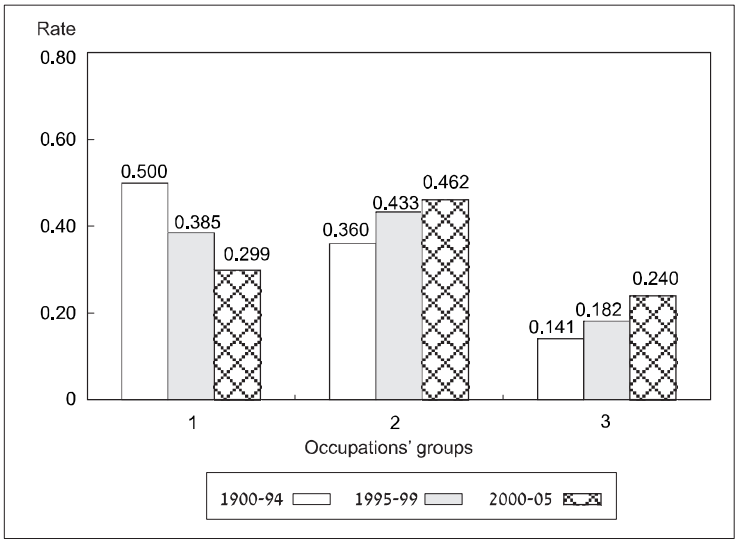


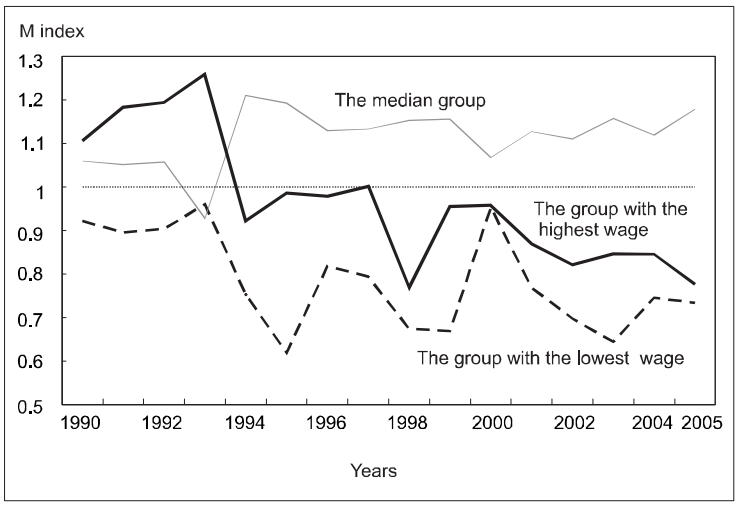
Figure 5.6
Distribution of the new female employees in the scale groups over the three periods



From Figures 5.5 and 5.6 we see that the situations of both men and women have improved. Regarding the division of new employees in each of the scale groups, we see that the major dynamic among the men is that more men started work in the mid-scale group at the expense of the first-scale group. As opposed to the men, the decrease in the proportion of new women employees in the first-scale group was expressed by a rising proportion of women joining both the mid-scale group and especially the scale group in which the average wage is the highest: At the start of the period, 14 percent of the women joined this group, while by the end nearly a quarter of the women joined the group.

Figure 5.7 summarizes the process that took place during the past 16 years. The diagram presents the same *M* index as in Figure 5.4 of the proportion of men in each of the three scale groups throughout the research period.

Figure 5.7
The *M* index of the proportion of men in each of the three scale groups over the years



From Figure 5.7 we can discern three processes:

a. The proportion of men in the scale group with the high average wage has decreased over the years. At the start of the period, their proportion in this group was higher than their proportion among new employees, while at the end of the period their proportion in this scale is lower than their proportion among the new employees.

b. The proportion of women in the lower scale groups is greater than their proportion among the new employees almost throughout the period being researched. It is difficult to point to any trend in this scales group over the years. It would appear that the professions in this group are mainly "women's" professions.

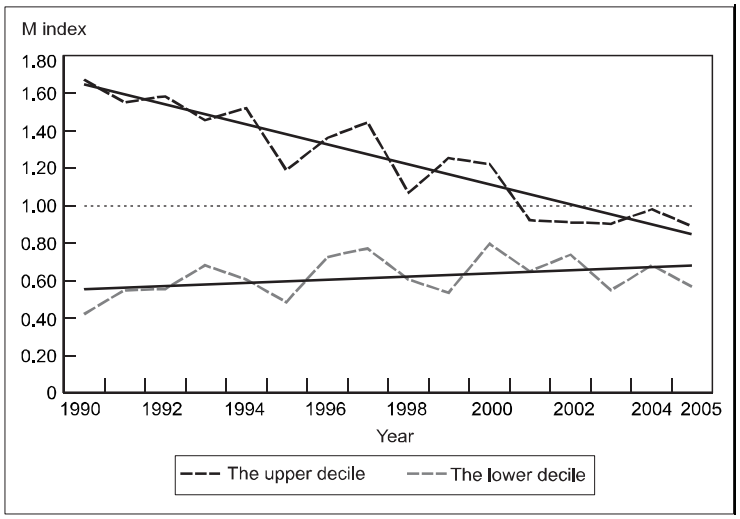
c. The proportion of men in the mid average-wage-scales group is higher than their proportion among new employees for all of the past 16 years.

How did these changes affect the proportion of men among the new employees when the division is according to wage deciles (as opposed to division according to scale groups)?

Until now we have seen the narrowing of the average wage gap and the reasons for it.

Figure 5.8 details the relative progress of new female employees in the public sector. The diagram presents the *M* index of the proportion of men in the upper and lower deciles. The horizontal line represents an egalitarian situation in which the proportion of men in the upper or lower deciles is equal to their proportion of the new employees, and thus the proximity of the two lines will reflect a trend of the narrowing of the gaps between the sexes.

Figure 5.8
***M* index of the proportion of men in the upper and lower wage deciles over the years**



A clear growth is evident over time in the percentage of women in the upper wage decile of the new employees, and from 2001 this proportion is even greater than their proportion of new employees. In the past five years this situation seems more or less stable. It is difficult to discern a trend over time in the proportion of women among the lower decile. In all the years covered by the research, the proportion of women in the lower wage decile is greater than their proportion among the new employees—a finding that could attest to the choice of relatively low-income professions, professions that were and still are essentially female—hinting at a lower reservation wage among women. We have already obtained an indication of this in Figures 5.5 and 5.7 where we saw that the proportion of women in the scale groups in which the average wage was relatively low, was and still is higher than their proportion in the population.

In an examination among wage quintiles, as opposed to wage deciles, a similar but interesting picture is obtained: in most of the years the proportion of women in the upper quintile is higher than their proportion in the upper decile (an unsurprising finding, according to the research). However, the proportion of women in the lower quintile is very similar to their proportion in the lower decile. This finding reinforces the previous hypothesis regarding the prevalence of "women's" professions in the lower wage quintile, which women occupy, apparently more than men, for reasons of convenience.

Examination of the robustness of the findings

In this section we will examine whether a salary gap also exists between men and women in uniform populations. As opposed to the previous model in which an overall comparison was made among the whole new-employee population, in this model I will compare only

men and women who are similar with respect to the explanatory variables. This means that as opposed to the previous model, a man who was on a particular scale (or seniority, grade or age or any possible combination of any of these variables) in which women are not included in the sample, are not included in this new model, and the same applies to women. Thus, this model, as opposed to the previous one, does not create hypothetical observations. Obviously this method will reduce the sample, but a finding regarding a wage gap in this sample will provide substantial reinforcement for the previous findings of the research.

In the new sample of the similar populations, the number of observations decreased from 29,670 to 11,518. The matching was done according to scale, grade, seniority, age, group of ministries, and the years. In view of the fact that the sample population was almost two-thirds smaller, the major part of the research focused on the whole population, with the deductions mentioned above.

From the analysis it emerges that the development of the wage ratio between men and women in the uniform population was similar to its development in the overall population. Admittedly, at the start of the period being researched the wage ratio among the uniform population was less than its counterpart in the overall population, but this situation changed in the years 1996-1998. From 2002 onward the wage ratio in favor of men was greater among the uniform population—a finding that fits well with our findings in Chapter 4. Overall, the wage ratio between men and women, which was 1.072 in the overall population, fell by only 0.6 percentage points to 1.066.

Among the uniform population, and given the profession, seniority and age of the employees, a man earns about 7.4 percent more than a woman, as opposed to 9.0 percent in the population as a whole. We therefore again conclude that the estimated wage gap between men and women is not a result only of a difference in characteristics between the populations.

From the econometric analysis it emerges that there is no significant difference in any of the years between the two populations in an estimate of the variable *man*. The variance of the parameter grew considerably, as a result of which in 1994, 1995, 2001, 2002 and 2003 the estimated wage gap between men and women is not significant. The reason for the increased variance is probably the decrease in the number of observations. The slope of the regression line over time (decrease in the wage gap between men and women) is more moderate in the uniform population, an expected result which arises from the weakening of the influence of the characteristics on the differences in the wage level that emerged from the analysis in Chapter 5.

Finally, in the uniform population as well, the proportion of men in the upper decile is relatively greater at the start of the period, and decreases over the years.

6. GRADES

In this chapter we return to the overall population of new employees and we will examine, given a certain grade, whether the distribution of the grades was different between men and women. On joining the public sector, do men receive higher grades than women joining on

the same scale? And, if so, how widespread is the phenomenon? Can any trend be discerned over time? Does the phenomenon become more salient as the grade increases?

The reason the variable "grades" was not included as an explanatory variable in the previous analysis is that, as opposed to the other explanatory variables that are exogenous, and are almost outside the employer's control, this variable is endogenous, and thus enables the allocation of gender-biased grades.[28]

The new employees in each year were divided according to the scales at which they entered; the distribution of the grades was examined for every scale and for each year. Each level of the hierarchy (range of grades) was divided into four quarters—hereinafter the grade level. Observations in which the first quarter of the hierarchy was equal to the third quarter in that hierarchy, were removed from the analysis. In other words, if in a specific scale in a specific year there was an insufficient variety in the entry grades of new employees, the scale was removed from the data. This deduction removed 25 percent of the observations.

Following the deduction, we examined for each employee separately, what his grade was compared to the quarterly grade:

- If his grade was less than the quarterly grade or equal to it, the grade received the value 1.
- Otherwise, if his grade was less than the median grade or equal to it, it received the value 2.
- Otherwise, if his grade was less than the grade of the 75th percentile or equal to it, it received the value 3.
- Otherwise it received the value 4.

This is the dependent variable. If men tended to receive higher grades, this would presumably be reflected in a higher value of the dependent variable.

We examined this phenomenon with statistical tools taken from the analysis of frequency data.

As in the previous chapters, we begin with a description of the data followed by a regression analysis to examine the significance of the results.

Figure 6.1 presents the *M* index for allocating the lowest and the highest grade levels of men among the new employees over the years. The horizontal line represents an equal division between the sexes. A similar curve reflects the situation for women.

Two major conclusions emerge from the diagram:

a. New male employees tended to receive a more generous allocation of higher grade levels, and a non-allocation of lower grade levels. This phenomenon was prominent in the early 1990s.

b. The women's situation improved over the years in both respects mentioned above (paragraph a), and even surpassed that of the men in the past two years.

[28] At the end of this chapter an index of the employee's grade at the time he starts to work is introduced into the model of wage gaps between men and women. The findings of this model should be interpreted with some caution.

We conclude from these findings that the decline in the return to characteristics of men relative to characteristics of women, which was evident in Figures 4.1 and 4.2, is an expression of a process of decreasing preference for men over the years in giving grades.

Table 2 presents separately for men and women the allocation of grades for all the scales, seniority and the years.

Figure 6.1
***M* index for the allocation of higher and lower grade levels to the men over the years**

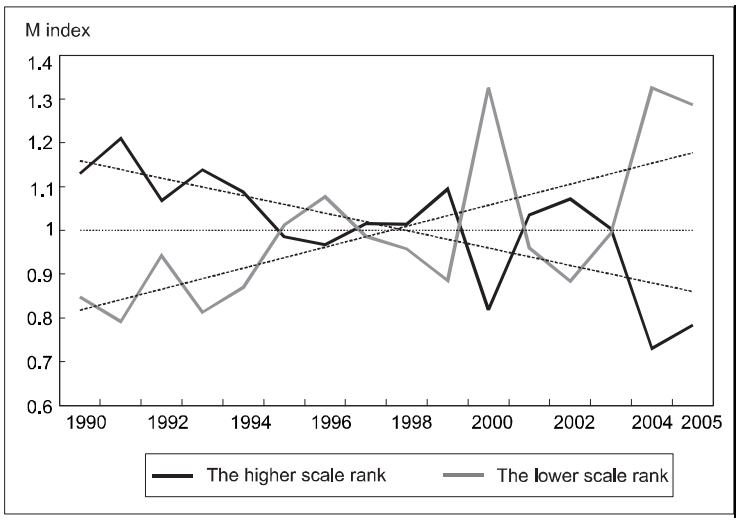


Table 2
Distribution of grade level, men and women

	Men		Women	
Level and Grade	Number of employees	%	Number of employees	%
1	944	9.4	1,036	8.6
2	5,967	59.3	7,865	65.1
3	1,900	18.9	1,711	14.2
4	1,253	12.4	1,463	12.1
Total	10,064	100.0	12,075	100.0

From the table we conclude that the grades distribution among the women and the men during the 16 years were relatively similar. Despite this, it appears that women tended more to start working at the second grade level, while the men tended more to start working at the third grade level. We will examine whether these gaps are significant, how they

changed over time, and how they are affected by the wage scale. Finally we will examine how allocations of grade levels affected the wage gaps over the years.

Table 3 presents the standardized residuals of the observed values less the expected values. A negative value means that a small number of observations, relative to the independent expectations, were recorded for this value, while a positive value means the opposite. Absolute values higher than 1.96 represent statistical significance at the 5 percent level.

Formally:[29]

$$met\_residual_i = \frac{(Observed_i - Expected_i)}{\sqrt{Expected_i}}$$

Table 3
The standardized residuals of the grades by hierarchical level, men and women

Dependent Variable	Men	Women	Probabilities Ratio Women to men
1	1.46	-1.34	0.91
2	**-4.05**	**3.69**	1.10
3	**6.38**	**-5.82**	0.75
4	0.52	-0.48	0.97

From Table 3 we conclude that the division by grades is not coincidental: in the second hierarchical level there is a clear preference for women, at the expense of men; the opposite picture emerges from the allocation of the grades in the third hierarchical level—characterized by a preference for men. The right column represents the relevant probability level—the likelihood of a woman in a particular scale receiving a grade at the second hierarchical level is 10 percentage points higher than the parallel likelihood for a man, and 0.25 percentage points lower than the likelihood for a man at the third hierarchical level.

Table 4 breaks down the research population into three successive quintiles (as in Chapter 6) and examines the standardized residuals of each cell separately for each quintile.

The table confirms statistically what was presented in Figure 6.1. At the start of the period, when starting to work, women tended to receive lower grades than men—a probability ratio of 1.2 and 0.68 for the low and the high grade levels, respectively. In the middle of the period researched, 1995-99, there was no significant statistical difference between men and women in the division of the grades. In the last period, 2000-05, women tended to receive higher grades than men—a probability ratio of 0.93 and 1.17 for the low and high grade levels, respectively.

[29] $\sum_i^k (met\_residual_i)^2 \approx \chi^2_{(C-1)(R-1)}$

We did not observe a preference for granting high grades to men in any of the professions we examined. We therefore apply this examination to selected professions in order to ascertain in which this phenomenon was prominent and in which not.

Table 4
The standardized residuals of the grades by hierarchical level, divided into three quintiles

The Dependent Variable	Men	Women	Probabilities ratio
Grade Level	1990-94		women to men
1	**-**1.25	1.22	1.17
2	0.33	-0.38	0.98
3	**-2.60**	**2.54**	1.28
4	**3.56**	**-3.48**	0.68
	1995-99		
1	-1.57	1.90	1.20
2	1.50	-1.82	0.94
3	-0.32	0.39	1.03
4	-1.58	1.31	1.16
	2000-05		
1	0.70	-0.74	0.93
2	**3.99**	**-4.21**	0.86
3	**-7.80**	**8.24**	1.95
4	-1.74	1.83	1.17

A further examination reveals that for some professions women were allocated relatively high grades, while for others they were allocated relatively low grades; the same was true for men.

We will use an appropriate model to examine the allocation of grades over time and its trends. In the basic model without interactions, we will examine the coefficients of gender, scale, seniority and the years. In order to ascertain the influence of gender, given the other parameters, which are possibly dependent on gender and on the dependent variable—we will hold variables such as seniority and profession constant.

The explanatory variable can obtain four different values with ordinal significance, and therefore the appropriate model for describing this problem is the *ordinal probit.* The results of the regression are presented in the appendix.

The regression shows that given the scale, seniority and year of entering the public sector the explanatory variable gender is negative and significant, albeit relatively small—the marginal effect of being a male lowers the probability of the employee being included in one higher hierarchical grade level by 0.011.

In an inclusive model we examine the interaction of these variables with time and with gender.

The model:

$$\Pr ob(Y = y) = f(man, occupation, tenure, year, x^T year_t)$$

When the variable *year* is conflated into three quintiles (1990-1994, 1995-1999, and 2000-2005), the first quintile is the intercept.[30]

According to the results, in the first and the second quintile the variable *man* is not significant, while in the third quintile the variable *man* is significant and negative. When the other factors are constant, the likelihood of a man obtaining one higher grade level is 19 percent less than that of a woman.

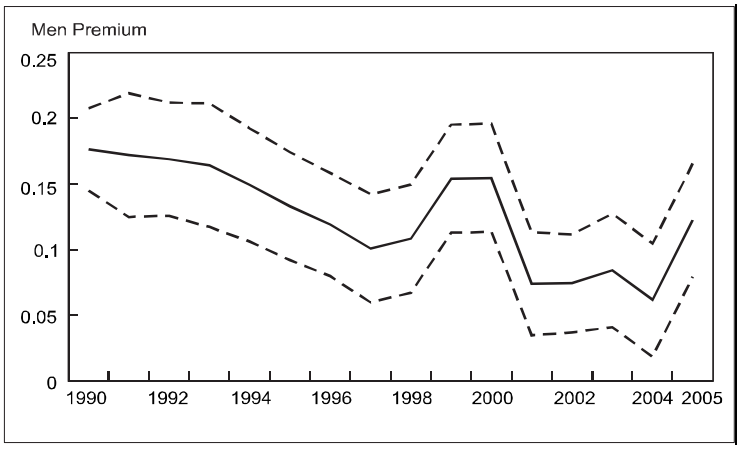
We now add the additional variable to the explanatory variables—the relative height of the grade in each scale—and we examine how the variable influences the level of explanation of the model in general, and in particular how the estimates of the parameters that interest us change compared with the estimate without the new variable.

Model 3

$$\log(Wage_t) = f(occupation,\ rank,\ age,\ tenure,\ tenure^2, man,\ year_t,\ x^t year_t)$$

The *R sqr* in this regression is 45 percent. The result of estimating the parameter *man* is presented in the following diagram. The regression results are presented separately.

Figure 6.2
Estimate of the parameter men in the multivariable regression

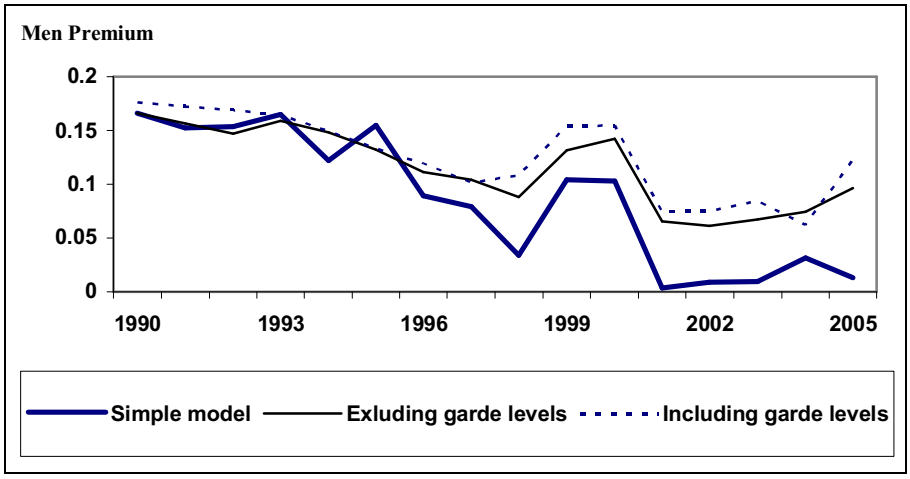


Very similar to the findings presented in Figure 3.8, the strength of the variable *man* decreases over the years. In view of the fact that in recent years women tended to obtain higher grades, the value of the variable in the past six years is greater than in the previous model, although not significantly. The result is that the slope of the trend curve in Model 3 is the most moderate.

[30] Without conflating the years into quintiles the model does not converge.

Figure 6.3 summarizes the results of the three models.

Figure 6.3
Estimate of the parameter *man* according to the three models: the simple, excluding grade levels, and including grade levels



7. SUMMARY AND CONCLUSIONS

We have researched the development of the wage gap between men and women starting to work in the public sector. We found that the gap has narrowed over the years: the average wage of new women employees in the public sector rose by 27 percent during the past 16 years, while that of men rose by only 5 percent. What has led to the narrowing of the gap is the increase in the human capital of the women and its return relative to the men. A sharp change has taken place over the past 16 years in the composition of the women joining the labor market: the percentage of new women employees with academic degrees has grown consistently, and currently their proportion among the new women employees is far greater than the proportion of men with academic degrees. Specifically, the percentage of women with academic degrees among all the new female employees has grown from 25 to 50 percent, while the percentage of men with academic degrees has remained at the level of between 25 and 20 percent. The growth in human capital of the women has been translated over the years into a choice of professions with a higher average wage, both relative to men and in absolute terms. The research also examined the allocation of the grades in the various professions at the time of starting to work in the public sector, and found that a substantial change had taken place in this area as well. At the start of the period being researched, men tended to obtain more senior grades than women, while by the end of the period the trend had reversed itself: currently women tend to obtain the high grades, at the expense of the men.

The research does not examine whether the narrowing in the wage gap is a result of policy, macroeconomic changes in the economy, an increase in the reservation wage of the women when joining the public sector, or a relative decline in the supply of men with academic degrees who prefer to work in the private sector. All these issues we leave for further research.

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Appendix

Table A-1

Percentage of Male New Employees Each Year

Year	Percentage of Males
1990	50
1991	45
1992	47
1993	46
1994	54
1995	60
1996	61
1997	55
1998	62
1999	58
2000	55
2001	62
2002	65
2003	65
2004	58
2005	61

Results of the regression – Model 2
The dependent variable: Log of the real wage

	The Coefficient	The *t*-value
The intercept	7.914	(107.13)
Male	0.157	(10.000)
Scales index	0.009	(12.730)
Seniority	0.010	(1.380)
Age	0.010	(3.300)
Year 1991*Male	-0.009	(-0.410)
Year 1992*Male	-0.017	(-0.790)
Year 1993*Male	0.001	(-0.040)
Year 1994*Male	-0.017	(-0.760)
Year 1995*Male	-0.037	(-1.780)
Year 1996*Male	-0.063	(-3.200)
Year 1997*Male	-0.070	(-3.420)
Year 1998*Male	-0.082	(-4.060)
Year 1999*Male	-0.039	(-1.96)
Year 2000*Male	-0.030	(-1.53)
Year 2001*Male	-0.111	(-5.780)
Year 2002*Male	-0.110	(-5.950)
Year 2003*Male	-0.105	(-5.590)
Year 2004*Male	-0.097	(-5.150)
Year 2005*Male	-0.076	(-4.140)
Degrees of freedom	94	
R^2	0.3970	
ADJ R^2	0.3951	

Results of the regression – Model 3
The dependent variable: Log of the real wage

	The Coefficient	The *t*-value
The intercept	7.897	(101.970)
Male	0.166	(10.290)
Scales index	0.009	(9.470)
Seniority	0.000	(0.030)
Age	0.006	(1.920)
Grade	0.056	(5.400)
Year 1991*Male	-0.002	(-0.100)
Year 1992*Male	-0.006	(-0.250)
Year 1993*Male	-0.003	(-0.110)
Year 1994*Male	-0.024	(-1.110)
Year 1995*Male	-0.046	(-2.140)
Year 1996*Male	-0.067	(-3.260)
Year 1997*Male	-0.083	(-3.950)
Year 1998*Male	-0.073	(-3.500)
Year 1999*Male	-0.028	(-1.330)
Year 2000*Male	-0.017	(-0.082)
Year 2001*Male	-0.113	(-5.600)
Year 2002*Male	-0.112	(-5.800)
Year 2003*Male	-0.087	(-3.960)
Year 2004*Male	-0.114	(-5.110)
Year 2005*Male	-0.054	(-2.444)
Degrees of freedom	110	110
R^2	0.444	0.444
$ADJ\ R^2$	0.441	0.441

Results of the regressions of the *Ordinal Probit:*

The dependent variable: The employee's grade level on starting to work (receives values from 1, the lowest, to 4, the highest)

	(Model 1)	Coefficient	(Model 2)	Coefficient
Index of the scales	0.0004	(4.11)	0.200	(13.30)
Age	0.051	(19.81)	-0.034	(-0.98)
Seniority	0.113	(17.90)	**-0.033**	
Male	-0.116	(-7.52)	-0.022	(-0.50)
Male marginal effect	**-0.106**		-0.116	(-3.74)
Male marginal effect *Second quintile			**-0.022**	
Male marginal effect *Third quintile			**-0.154**	
Number of observations	22,131		22,131	
Pseudo R^2	0.0144		0.0183	
Iteration 1	-23,522		-23,522	
Iteration 2	-23,184		-23,091	
Iteration 3	-23,184		-23,091	
Iteration 4	-23,184		-23,091	
Log likelihood	-23,184		-23,091	
Prob > chi2	0.0000		0.0000	

The method:

Wage of a specific man $\sum_{j=1}^{k_m} et_j$

In which *et* represents the value of the addition, and k_m the code of the highest addition of a specific man.

Thus the average wage of men $\frac{1}{n_m}\sum_{i=1}^{n_m}\sum_{j=1}^{k_m} et_j$ in which n_m represents the number of men.

Similarly, the average wage for women is $\frac{1}{n_w}\sum_{i=1}^{n_w}\sum_{j=1}^{k_w} et_j$

From this it follows that the average wage gap between men and women is $\frac{1}{n_m}\sum_{i=1}^{n_m}\sum_{j=1}^{k_m} et_j - \frac{1}{n_w}\sum_{i=1}^{n_w}\sum_{j=1}^{k_w} et_j$

We can develop this formula in order to ascertain the influence of a specific addition:

$$\frac{1}{n_m}\sum_{i=1}^{n_m}\sum_{j=1}^{k_m} et_j - \frac{1}{n_w}\sum_{i=1}^{n_w}\sum_{j=1}^{k_w} et_j = \left(\frac{k_{1m}}{n_m}\bar{et}_1 + \frac{k_{2m}}{n_m}\bar{et}_2 + \ldots + \frac{k_{mm}}{n_m}\bar{et}_m\right) - \left(\frac{k_{1w}}{n_w}\bar{et}_1 + \frac{k_{2w}}{n_w}\bar{et}_2 + \ldots + \frac{k_{ww}}{n_w}\bar{et}_w\right) =$$

$$= \bar{et}_1\left(\frac{k_{1m}}{n_m} - \frac{k_{1w}}{n_w}\right) + \bar{et}_2\left(\frac{k_{2m}}{n_m} - \frac{k_{2w}}{n_w}\right) + \ldots + \bar{et}_m\left(\frac{k_{mm}}{n_m} - \frac{k_{mw}}{n_w}\right) + \ldots + \bar{et}_w\left(\frac{k_{wm}}{n_m} - \frac{k_{ww}}{n_w}\right)$$

In which k_{ii} represents the number of men/women who received the specific addition (could also be 0), and $\bar{et}_i$ represents the average value of the addition, the i th only for the employees who received it.

In order to assess the relative influence of the i th addition, we normalize its influence by dividing it by each average wage gap between men and women.

The relative influence of the i th addition on the average wage gap between men and women:

$$\frac{\bar{et}_i\left(\frac{k_{im}}{n_m} - \frac{k_{iw}}{n_w}\right)}{\frac{1}{n_m}\sum_{i=1}^{n_m}\sum_{j=1}^{k_m} et_j - \frac{1}{n_w}\sum_{i=1}^{n_w}\sum_{j=1}^{k_w} et_j} = \frac{\hat{et}_{im} - \hat{et}_{iw}}{\frac{1}{n_m}\sum_{i=1}^{n_m}\sum_{j=1}^{k_m} et_j - \frac{1}{n_w}\sum_{i=1}^{n_w}\sum_{j=1}^{k_w} et_j}$$

In which $\hat{\bar{et}}_{ij}$ represents the value of the average addition among all the men or the women new employees, not only for those who received the particular addition.

Figure A-1
Proportion of women among all the new employees of Malam each year – for all the new employees and for the new employees in full-time positions only

Figure A-2
Average wage of new men and women employees over the years based on the 1990 distribution