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Based on Cross-Sectional and Panel Data

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Abstract

The paper examines the wage gap between women and men in the public sector during their entire careers. An analysis of cross-sectional data shows that the women-men wage ratio decreases monotonically until age 50. An analysis of panel data indicates that the gap is due largely to the fact that as a whole, men joined the public sector, mainly at advanced age, entered positions having higher wages than those of women. On-the-job-promotion during the employees' careers was a relatively minor factor. No evidence was found that men who joined public sector received a different wage premium than women, given their salary in their previous place of employment. The increase of the wage gap as a function of employees' ages reflects a difference in their wages in their workplaces before joining public administration.

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פערי השכר בין גברים לנשים במינהל הציבורי בישראל – ניתוח בעזרת נתוני חתך ופאנל

יובל מזר ונועם מיכלסון

תקציר

מחקר זה בוחן את התפתחות פער השכר בין נשים וגברים במינהל הציבורי בישראל לאורך כל מסלול הקריירה שלהם. מניתוח נתוני חתך לאורך השנים נמצא שיחס השכר בין נשים לגברים קטן בצורה מונוטונית עד גיל 50. ניתוח נתוני פאנל מצביע שהסיבה העיקרית לכך נעוצה בהצטרפות של גברים בגילאים גבוהים יחסית למינהל הציבורי שמאופיינת בתפקידים בעלי שכר גבוה ביחס לנשים ופחות בגלל קידום מהיר יותר של גברים בהשוואה לנשים במהלך הקריירה. לא נמצאה עדות לכך שגברים שהצטרפו למינהל הציבורי במהלך הקריירה שלהם קיבלו פרמיית שכר שונה בהשוואה לנשים שהצטרפו בהינתן שכרם בתקופת הבסיס, כך שפער השכר שגדל עם הגיל של העובדים המצטרפים הוא השתקפות של שכר שונה במקום עבודתם הקודם.

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1. Introduction and a Review of the Literature

The question of wage differentials between men and women in particular, and between different population groups in general, has been widely discussed in the literature, and studies on the subject are published very frequently. The basic research in both Israel and around the world attempts to estimate the gender wage differential by neutralizing various individual characteristics. This differential is partly attributed to discrimination. Other studies add a characteristic of an individual or firm, or a macroeconomic characteristic correlated with the estimated differential, and thus attempt to precisely quantify the discrimination factor.

Many studies have been conducted in Israel of the wage differentials between men and women (Klinov, 2004; Haberfeld and Cohen, 1998b; Kraus, 1992b; Semyonov and Lewin-Epstein, 1991; Efroni, 1980; and many more).[1] All the studies about the wage differential between men and women indicated a gap in favor of men. The wage differential narrowed when characteristics of the employees were taken into account, but remained significant. For example, Kraus (2002) examined the wage differential between men and women at three points in time – 1972, 1983, and 1995 – and found that women earned 56%, 58%, and 53% less than men on the average in those years, respectively. When the effect of other factors is neutralized, it was found that women earned 36%, 31%, and 25% less than men on the average, respectively. The proportion of the differential explained rose during these years from 36% to 53%, but the differential itself remained significant even when the characteristics of the employees (age, seniority, experience, education, etc.) were kept constant. This finding indicates an excess return on the characteristics of men. Kraus shows that over the years, the differences in human capital (all the characteristics affecting the wage level) widened in favor of men, while the differential in favor of men in the return on those characteristics (i.e. the discriminatory factor) decreased.

The principal contribution of the current study, especially in Israel, is the separate use of cross-sectional and panel data. This use makes it possible to explain the trend in wage differential between men and women more precisely, while separating the factors related to

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[1] Additional studies about the differentials between population groups in Israel were conducted for the wage differential between Sephardim and Ashkenazim (Rubinstein and Brenner, 2003; Friedlander, 2002; Haberfeld, 1992, Mark 1996; et al.).

differences in promotion between men and women (i.e. among the steadily employed workers) from the factors related to various characteristics of new recruits in public administration (among the recruits). This question has never before been researched in Israel, nor, to the best of our knowledge, anywhere else in the world.

The literature dealing with the differences between men and women in the probability of promotion is extensive. The findings range from a positive gap in favor of men (e.g. McCue, 1996; Cobb-Clark, 2001), to an absence of any difference (e.g. Lewis 1986), to a positive gap in favor of women (Barnett, Baron, and Stuart, 2000). For further details and a summary of the literature about the differences in promotion between men and women, see Blau and DeVaro (2006).

The study by Peterson and Saporta (2004) reported an interesting finding. They used personnel data for professional and administrative employees and managers in a large company providing services in the US. They showed that the chances of promotion were higher for men at the lower levels of the organizational hierarchy, while in the upper part of the hierarchy, the chances of promotion were greater for women. This finding is inconsistent with the existence of an alleged "glass ceiling" blocking the promotion of women.

On the other hand, only some of the studies also examined the differential in pay rises accompanying promotion, and there is little literature discussing the effect of the gap between men and women in mobility between places of employment on the differing development of their salaries. The findings of the existing literature are also not clear cut: Blau and DeVaro (2006) found that the probability of promotion for men was higher than that of women, but that given a promotion in salary, there was no difference in pay rise between men and women. These two findings were also duplicated in the studies of Olson and Becker, 1983 and McCue, 1996. Cobb-Clark (2001) reported a similar finding concerning the gap in the probability of promotion, but also found positive pay rise differential in favor of women. The studies of Gerhart and Milkovich (1989) and Hersch and Viscussi (1996) found a positive gap in favor of women in the probability of promotion, but the former found no differential in pay rise, while the latter found a gap in favor of men. The significant difference in results between the various empirical studies can be explained by the difference between the samples (in some cases, only one or two firms were examined).

There is an extensive literature focusing on the question of the gaps between men and women in mobility between places of employment. Loprest (1992), who focused on young employees, found that men profited an average of 50% more than women from a change in places of employment. As a result, the rate of salary increase of men in general at the beginning of their careers was faster (by about 22%). Topel and Ward (1988) found that a change in workplace accounted for 40% of the pay rise of a man at the beginning of his career. Royalty (1998) found no consistent gaps between educated men and women in the probability of a change in places of employment, or a change from being employed to being unemployed. Keith and McWilliams (1999) found that men spent more effort on a change to a higher-paying place of employment than employed women, a difference that could also explain why the premium for men in a change of workplace was usually greater (Light, 2005). Another explanation for the higher premium among men is superior networking among men at the top management level of workplaces, which also confers on them greater awareness of their salary (Dreher and Cox, 2000). Still another explanation of the different development in salary in general, especially the difference with respect to a change in workplaces, is the difference between men and women in the effect of child care (Williams, 2008). For example, changing to a part-time position is far more common among women (Loprest, 1992). See also an extensive review of the literature on the subject.

In Israel, Mazar (2007) found that the chances of promotion in salary grade (and therefore also of a pay rise) among employees in public administration were practically uncorrelated with gender, and that the same was true of the total number of promotions during the career of an employee. Mazar also found that the cumulative contributions of promotions to the total increase in pay were similar for the two sexes, and were estimated at 60-70%, which was higher than that found in other studies around the world.

In another study (Mazar, 2008[2]) that examined the wage differential between men and women among young recruits to public administration, Mazar found that these differentials had become smaller in 1990-2005. The narrowing of the gap is attributed at the beginning of the period mainly to a drop in the return on the characteristics of men in comparison with

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[2] The study also describes the main factors that could explain the wage differentials between men and women, including a difference in human capital, mobility between places of employment, threshold salary, bargaining ability, and also discrimination.

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women (the parameters), and its continuation is attributed mainly to improvement in the characteristics of women in comparison with men, which is principally a result of accelerated academization among women.

The continuation of the study is constructed as follows: Chapter 2 describes the database, research method, and descriptive statistics. Chapter 3 presents the principal result. The following chapters strengthen its robustness: Chapter 4A examines in detail the difference in the development of salary between men and women among steadily employed workers, and Chapter 4B the selection of the steadily employed workers. Chapter 5A examines the wage differential between men and women among recruits to public administration, and Chapter 5B the selection of those recruits. Chapter 6 examines the conclusions from the preceding chapters for the employees' wages in a particular year – 2009, and Chapter 7 summarizes the study.

2. The Data and the Research Method

For the purposes of this study, we used detailed administrative data for the wages of public administration employees in Israel in December during the years 1991-2009. The figures also include partial personnel data (the position – employment scale, salary grade, seniority, gender, and age) and the employee's education as mainly reflected in his position. Most of the power of the database lies in the ability to track employees each year who have been steadily employed in their jobs, compared with those recruited that year. This tracking makes it possible to analyze the differences between the results obtained from cross-sectional data and those obtained from panel data, i.e. from following the progress of individuals. Another advantage in administrative data is their reliability, because these are true data, in contrast to surveys, in which the data source consists of the answers to questionnaires. Finally, the database is not a sample; it represents the entire population, in this case the population of public administration employees. The public administration population in this study consists mainly of employees in the various government ministries. The remaining employees are from other public agencies, such as the National Insurance Institute, the Israel Securities Authority, the Office of the President of Israel, etc.

Wage differentials between men and women derived from **cross-sectional data** were calculated as follows: in order to neutralize the effect of the years, the total real wage (in 2009 prices) excluding overtime pay was calculated, according to gender and age, based on the cross-sectional data from 10 different years during 1991-2009, meaning for all the employees who worked in each year.[3] It is therefore possible for an employee who worked during the entire period to be counted 10 times, even though he "belonged" to a different age each year. The weighted average salary was then calculated for each gender and age group over the 10 years examined, and the wage ratio between men and women during the course of their careers was derived from this.

Since the population included in the cross-sectional data was not constant, because many employees joined and left during these years, it was not possible to derive an unbiased differential between men and women over the course of their careers. For this purpose, it is necessary to divide the population in each period into two groups: workers who are steadily employed and those who are not. The steadily employed are those who worked each year during a given period, while the non-steadily employed include both the employees who joined each year and those who left.

The population of those steadily employed in the study includes 15,515 employees (of whom 36% were men) who worked continuously during 1991-2009, i.e. for 19 years, aged 25-60.[4] Panel data of this type can be analyzed in two ways. One is to track employees at the beginning of their career, and to examine the wage differential between men and women within this group. The disadvantage of this method is that when employees are defined as being in a particular age range at the beginning of their careers (25-28, for example), the number of observations is relatively small (about 1,100). Furthermore, the increase in salary according to age is also affected by events occurring in particular years (the 1993-1994 wage agreements, the recession that began at the end of 2000, etc.). The second method, which we

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[3] In order to minimize fluctuations stemming from workers employed in public administration for a very short period, we also examined salary development according to gender and age only for those who worked in public administration at least three years, but no significant differences were found.

[4] Since women on maternity leave appear as receiving 0 salary, and are therefore not included in our database, the requirement of steady employment during the entire period generates selection, because it is likely that women in their childbearing years will go on maternity leave at least once during the period of the study. We therefore also examined the results for a "softer" definition of steady employment (appearing in a given number of years during the period of the study, a number that varies according to the woman's age). It was found that the principal results were robust.

chose to use, is the median increase in salary[5] at each age (ages 25-60) for all the employees and in all the years and ages in which they appeared. Since the data in question were panel data, every employee was likely to appear more than once. For example, the salary increase in 1991 of an employee who was 25 at the beginning of the examined period will be included in the rise in the average wage of 25 year-olds, and his salary increase in 1992 will be included in the average salary increase for 26 year-olds. The calculation of the average salary increase of 26 year-olds will also include the salary increase of those who were 26 years old in each of the years between 1991 and 2009.

Other than those steadily employed, the cross-sectional analysis of all the employees included the non-steadily employed – those who joined and those who left. Since we are interested in analyzing the wages of employees still in public administration according to age, we will focus solely on those recruited.[6] The population of recruits in this study includes employees who joined public administration during 12 specific years during 1992-2009 (the years were 1992-1995 and 2002-2009. We lack adequate personnel data for the other years), and remained in public administration for at least two years (in order to avoid excessive fluctuations). Here, too, wages were averaged according to gender and age, and over the years.

It should be noted that for the three populations we use the analysis method that generates "synthetic" databases of employees of various ages in different years. The disadvantage of this method is that it blurs the structural changes that took place in both public administration itself and in the general economic environment over the years. This analysis does not allow us to estimate the effects of various new laws and regulations added or subtracted from the system during these years.[7] Nonetheless, we chose to use this method because of the averaging that it does over the years, because we are interested in characterizing the salary development of employees over the course of their entire career. Examining the effects of structural changes and the like is not the purpose of this study, and is certainly worthy of a study in it own right.

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[5] We chose to use the median in preference to the average because it is not affected by extreme values. During the period of the 1993-1994 wage agreements, there were many extreme values, and using the average would therefore lead to biased results.

[6] We nevertheless also examined those who left, which yield results of particular interest.

[7] In particular the Law of Equal Pay for Female and Male Workers (1996), the effect of which deserves its own study.

Nevertheless, due to the real possibility that structural changes during these years were correlated with the dependent variable in the study, we examined the principal results of the study in different time periods (meaning for original data). Most of the results were found to be robust: shorter definitions of steady employment (five and 10 years) were also examined; for recruits, each year of joining was examined separately; for all the employees (cross-sectional data), 2009 was used in Chapter 6 as a test case. The similar results obtained (and presented in an appendix) for all population definitions indicate their robustness throughout the period of the study.

Descriptive Statistics

Descriptive statistics of the three populations defined above appear in Table 1.

Table 1 – Descriptive Statistics of the Three Investigated Population Groups

	All Public Administration Employees (Cross-Sectional) [8]	Recruits [9]	Steadily Employed [10]
Total number of employees	630,420	55,558	15,515
Annual average	63,042	4,630	
Women	383,573	34,701	9,835
Men	246,847	20,857	5,680
Average wage (2009 prices)	11,184	8,785	7,764
Women	9,801	7,748	6,633
Men	13,333	10,511	9,724
Average wage excluding overtime	9,238	7,587	6,435
Women	8,507	6,962	5,826
Men	10,375	8,628	7,489
Age	43.4	35.9	37.4
Women	43.1	35.3	37.1
Men	43.9	36.9	37.9

Source: Bank of Israel.

According to the cross-sectional data, the average number of **all the employees** (aged 25-60) in public administration during the study period was about 63,000, constituting 3% of all wage earners in the economy. Their wages during the study period were 40% higher than the

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[8] As defined above, this population is an accumulation of 10 months of cross-sectional data from various years, in order to avoid fluctuations liable to result from an analysis of a single month.
[9] All those joining public administration in 12 different years during 1991-2009.
[10] The average age and wage reported for 1991, i.e. at the beginning of the steady employment period.

average wage of all wage earners, and the rate of increase in 1991-2009 was similar to the rate of increase in the average wage of all wage earners. The proportion of men in public administration averaged 39% during the study period, but this proportion dropped monotonically over the years, from 46% in 1991 to 36% in 2009. The average wage among men for all employees was 35% higher than the women's wages. A relatively steep drop in this ratio occurred in the 1990s, mainly as a result of the wage agreements signed in public administration in the mid-1990s.

An average of 4,600 new employees **joined** public administration each year. 2009, when over 7,000 new employees joined, was especially prominent in this respect. The average wage of the new recruits was about 20% lower than that of all the employees. The proportion of men among the new recruits averaged 38%; in this case also a certain downward trend over the years in the proportion of men joining public administration was evident. The average wage of men joining public administration was 36% higher than the women's average wage. No trend whatsoever in this ratio could be distinguished over the years.

According to the panel data, the number of those employed continuously in their jobs in 1991-2009 (aged 25-60) was 15,515. During the study period, their average real wage rose by an annually average of 3.3%, compared with 1.3% for all public administration employees. The proportion of men among the steadily employed group was 36.6%, and their average wage (excluding additional work) was 28% higher than that of women.

The Wage Being Tested

The wage structure in the public sector is divided into employment scales and salary grades. "Employment scales" are in effect positions (engineers, technicians, lawyers, etc.), and "salary grades" are the special internal ladder for each employment scale, which has ordinal significance: a higher salary grade means more pay (and usually a more senior position). The salary of an employee in the public sector has a number of components.

- The base pay, also called the basic salary or the combined wage, is a function of the employee's employment scale, salary grade, and years of seniority. Its level is revised in the framework of wage agreements or linkage to the Consumer Price Index.

- Salary increments granted to all employees, and those granted according to employment scale and/or ministries. Some of these are paid every month, and some once a year.

- Reimbursement of expenses according to various employee entitlements (vehicle, telephone, etc.).

- Payment for additional work, including overtime, being on call, being on duty roster, etc.

In this study, we have chosen to focus on an analysis of the gaps in the total wage – the total salary paid each month, excluding annual increments (recreation pay, clothing, etc.) and personal increments (advances, grants, etc.). The wage of each part-time employee has been adjusted and calculated proportionately, as if he had been a full-time employee. The examined salary does not include overtime pay. The reason is that this is the best approximation to the hourly wage that can be produced from the data. The use of this wage, instead of the wage including additional work, is due to the relatively large difference between men and women in the average number of work hours.[11] We note that at the same time, we also considered other definitions of salary, including the total wage including additional work, the total wage excluding both additional work and reimbursement of expenses, and base pay.[12] It was found that the principal conclusion of the study was not very sensitive to the first two definitions, but was slightly more sensitive to the basic pay definition.

With the help of the cross-sectional data for the above-mentioned sub-populations (steadily employed and recruits), we can examine the source of the differentials in total salary between men and women in public administration – whether the two sexes are promoted at a different rate, or whether the source of the difference between them lies in their career dynamics.

3. The Principal Results

Figure 1 displays the development of the women-men wage ratio during their careers, divided into various populations, as defined in the preceding section.

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[11] For example, in 1995 in the public sector, the average number of work hours among men was 40% more than among women (Mazar, 2009).
[12] This constitutes 40-45% of the total salary; this ratio is 10% higher among women.

Figure 1: The Women-Men Salary Ratio during Their Careers – Various Populations
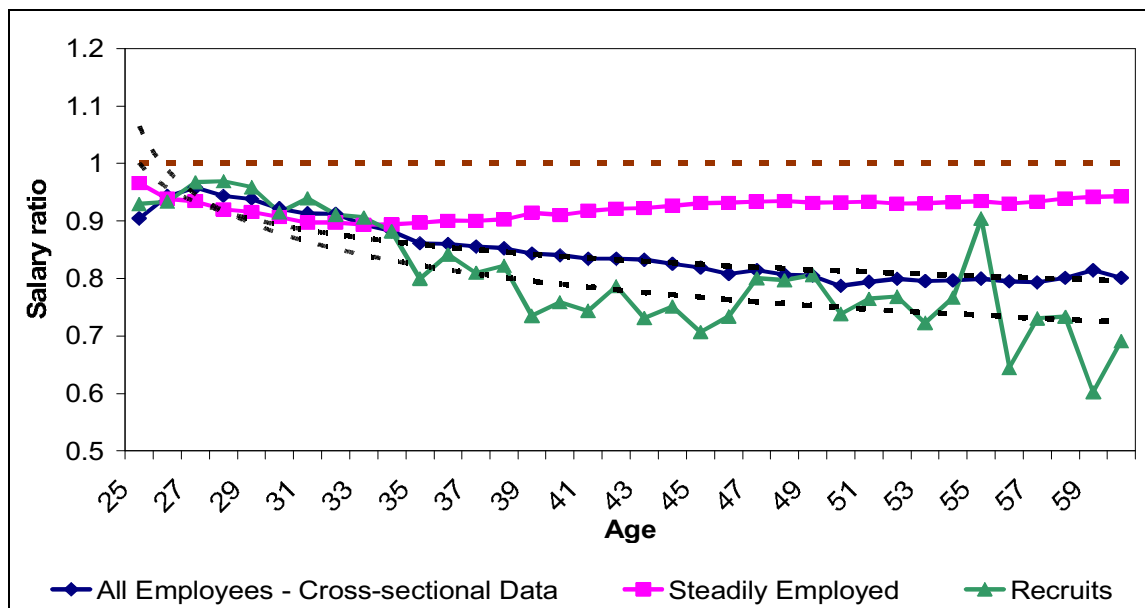
Source: Bank of Israel.

The cross-sectional data indicate that the women-men salary ratio decreases (i.e., the gap widens) between age 30 and age 50, and then remains at around 80% until age 60. Breaking down the cross-sectional data into two populations – steadily employed and recruits – explains the source of the difference: the women-men salary ratio among the steadily employed decreases at the beginning of their career, and reaches 89% around age 35, then begins to gradually rise, reaching 94% by the career end. The gap between the cross-sectional data and the data for the steadily employed can be explained by the data for the joiners, as indicated by the graph: the women-men salary ratio decreases as the age of recruitment rises. The great degree of fluctuation at the end of the sample can be explained by the paucity of observations at these ages.[13,14]

Development of the women-men salary ratio according to the cross-sectional data is more understandable when the two populations are separated. While the panel data indicate almost identical ratios over the course of careers, a gap exists in the population of recruits, which widens with age. It therefore follows that this population is the source of the naturally more moderate picture obtained from the cross-sectional data. We will discuss the analysis of this

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[13] Since the data were derived in different ways, the populations do not completely add up.
[14] A similar finding appears in literature around the world, in which the wage differential between men and women widens with age. For example, see Blau and Kahn, 2000 or Cotter, 2001 et.al.

population later in more depth, but it must be determined initially whether, as hinted by the graph of the steadily employed, there is really no difference between men and women in progress during their careers.

4.A. Steadily Employed Workers

As we saw above, when the steadily employed population alone is examined, we find much smaller wage differentials than those in the general population (cross-sectional data). In this section, we reinforce and establish this initial conclusion by analyzing the promotion path of men and women during their careers.

In order to examine the development of wages by age, we checked the rate of change in the real wage at every age according to gender among those steadily employed in their jobs during the entire 1991-2009 period. An analysis of this type weakens the effects of the years themselves, as explained above, and makes it possible to see the "net" path taken by salary. The results of the analysis, when salary at age 24 is normalized to be 100, are displayed in Figure 2.

Figure 2: The Development of Men's and Women's Salary During Their Careers (Basis – Age 24 = 100)
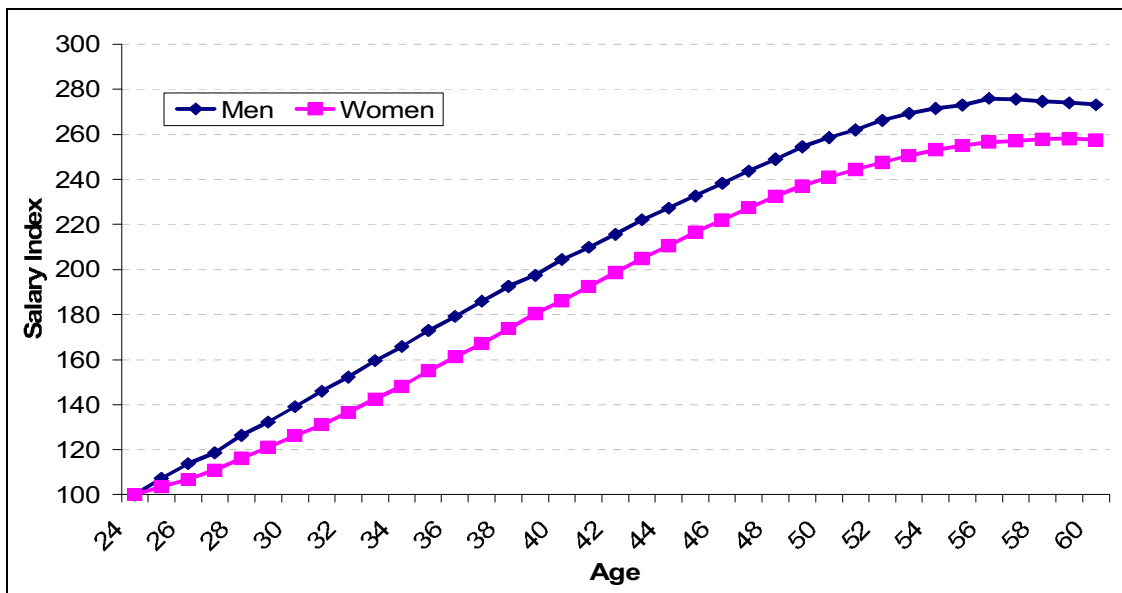
Source: Bank of Israel.

The picture obtained from this graph is in effect a mirror image of the wage differentials between men and women among the steadily employed, as displayed in Figure 1. Here, too, certain wage gaps are evident. This graph, however, has only a single explanatory dimension – the employee's age. There is nothing in it to isolate other factors likely to affect promotion in salary. One key example is the division into employment scales: it is possible that women are promoted more quickly at every age, but men are employed in positions in which progress in salary is quicker, resulting in the picture in the graph. An analysis of promotion in salary using multivariate regression is therefore necessary.

The model estimated through regression is based on Mazar's mode (2007), which tested the factors correlated with the probability of promotion in salary grade for individual i:

$$\log(\frac{W_t^i}{W_{t-1}^i}) = \beta_0 + \beta_1 \log(\frac{W_{t-1}^i}{W_{t-2}^i}) + \beta_2 \log(\frac{W_{t-2}^i}{W_{t-3}^i}) + \beta_3 MEN^i + \beta_4 AGE^i + \beta_5 Change\_Scale^i +$$

$$\beta_6 Moved\_to\_Contract^i + \beta_7 Staedily\_Contract^i + \sum_{j=1}^{7} g^i + \sum_{j=1}^{18} y^i + \varepsilon^i$$

In the multivariate model, we included the following variables as independent variables for explaining the difference of the log of the wage:

- The rate of increase in salary from the preceding year. According to Mazar (2007), this variable is extremely correlated with the probability of promotion in a given year. An employee who was promoted in salary grade in the preceding year has less chance of promotion in the current year. The difference in wage should therefore be negatively affected by a change in salary in the preceding year. As in the above-mentioned study, we inserted another lag of the rise in salary.

- Age (AGE) and gender (MEN) of the employee

- A binary variable (Change_Scale) that receives the value 1 if the employee's employment scale changed in the same year.

- Control of personal contracts: two variables – a variable (Moved_to_Contract) that receives the value 1 if the employee changed (employment scale) to a personal contract,

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and a variable (Steadily_Contract) that receives the value 1 if the employee was already on a personal contract, and remained in it.[15]

- Dummy variables for the years and for groups of employment scales. For this purpose, we defined seven groups of employment scales: administrative, technicians, academics, senior employees, medical professions, paramedical professions, and judges.[16]

- We defined a number of specifications as a proxy for the variable of the employee's qualifications, including the ratio of the employee's salary grade to his age at the beginning of the period of the study. No robust estimation results were obtained for this variable, for which several explanations are possible:

  a. The variable does not accurately estimate the employee's qualifications.

  b. The employee's qualifications do not affect the development of his salary during his career in public administration, given the other variables.

  c. Selection of the steadily employed and the inability of this variable to estimate the qualifications of these employees.

The estimation results of the model according to various specifications are displayed in Table 2.

The principal and most interesting results of this study concern the gender variable. In all four specifications in which the population is composed of men and women, this variable is not significant, or is negatively significant and very small. It therefore follows that when all the other variables are constant and the population is composed solely of the steadily employed, there is almost no difference in promotion between men and women, and if there is any difference, it is that men receive less promotion. This result, combined with the negative coefficient of age, explains the form of the graph in Figure 2: promotion that decreases with age, with no great difference between men and women.

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[15] In public administration, there are a number of employment scales defined as personal contracts, and which have a different system for determining salary. For most of these employment scales, salary is significantly higher than for the "ordinary" employment scales.
[16] The employees were divided into employment scale groups according to their main profession, similar to the classification by the Central Bureau of Statistics in the private sector.

Another variable whose analysis is interesting is overtime. As emerges from the various specifications, the overtime that an employee worked during the preceding year has no effect on his promotion in salary in most of the specifications. Even in cases in which the variable is significant (column 7, for example), the effect is unimportant: one standard deviation in overtime – 21.7 hours – will on the average add 0.4% to the salary increase in a year. The gap between men and women for this variable is 10 hours: men work on the average 18.5 overtime hours per month, and women 8.5 hours. Given a coefficient of 0.0002 for overtime, it can explain a gap of only 0.2% between men and women. Since the coefficient of MAN in this specification is –0.54%, even if we include men's greater amount of overtime, the gap will remain positive in favor of women. Even when men and women are examined separately, the effect of overtime on promotion is negligible. The conclusion, beyond the question investigated in the study, is that overtime does not grant any real premium for promotion in salary. Since men work more overtime than women, it can be said that the absence of any effect by overtime on promotion is a kind of reverse discrimination in favor of women, since men are actually working overtime without any return in promotion.[17]

The effect of a pay rise in previous years on an increase in the current year again indicates the importance of this variable in explaining promotion in salary in the public service. As in Mazar (2007), here, too, it was demonstrated that a pay rise in the preceding year, and even two years before the current year, had an extremely negative effect on an employee's increase in salary.[18]

From columns 7 and 10, it can be seen that the power of the effect increases with age: the effect of a pay rise in year t-1 and t-2 at ages 46-60 is 3 and 4 times, respectively, the effect at ages 25-45. At the same time, this is true only for men (column 12); salary increases for women aged 46-60 are almost unaffected by a pay rise in previous years.

The table also shows that when the population is not divided into age groups, the explanatory power of the model (R-square value) for men is four times as great (approximately) as for women. Division into age groups indicates a difference between the

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[17] Other than the payment for the overtime.

[18] Mazar (2007) found that the source of two thirds of the increase in salary in public administration during a career was promotion in salary grades. Promotion in salary grade has an extremely strong negative serial correlation, reflected in a rise in salary itself during the employee's career.

25-45 age group, in which the explanatory power for men and women is the same and relatively strong, and the 46-60 age group, in which the difference between men and women is again evident. It therefore appears that part of salary in the group of women aged 46-60 is not adequately explained by the model, and we hypothesize that this part is reimbursement of expenses. We checked the power of the model in explaining salary without the reimbursement of expenses item, and the explanatory power indeed increased substantially (R-squared = 0.15). The effect of salary promotion in previous years became significant again.

An examination of the behavior of the reimbursement of expenses item shows that it is a relatively "pro-female" time, compared with other items. An examination of the women-men wage ratio excluding this item consistently shows a wider gap over the years. Regression testing its magnitude over the years (the results of which are not displayed here) indicates that the change in salary among women during their careers is greater than among men (although its level is lower at every stage).[19]

In summary, the regression displayed here indicates that the among the population of the steadily employed in the sample, there is no differential (certainly not a positive one) between men and women in salary increases during their career. As in previous studies of promotion in the public service, here also it was found that the variable that most affects promotion in salary (in a negative way) was promotion in the preceding years. On the other hand, the power of this variable increases at more advanced ages, especially among men. The explanatory power of the model, which varies according to age group and gender, indicates that among women, there is an element – reimbursement of expenses – that is not adequately explained by the model.

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[19] One possible explanation for this phenomenon, which should however be regarded with some skepticism because we are unable to prove it, is that there are expense items that are reimbursed to women at a relatively late stage in their careers. One example of this is the vehicle item: when there is one car in the family, it is more likely that the man will receive reimbursement of expenses for it. Buying a second is possible at a later stage in life, at which point the women receive reimbursement of expenses for it. Another example is travel allowance: at an earlier stage in life, when the children are being raised, a woman will prefer to work closer to home. Traveling to a more distant job becomes possible later, at which point reimbursement of travel expenses will also grow.

4.B. Selectiveness of the Steadily Employed

In this subchapter, we will consider whether the employees who remained constantly in public administration differ in their observed characteristics and/or unobserved qualifications from those who left. In other words, whether it is correct to conclude that the absence of a real gap in promotion between men and women steadily employed in public administration is not due to positive or negative selection of employees. An example of such selection is a situation in which the men who left public administration were outstanding employees, while the women who left public administration were inferior. In this case, the similarity in the promotion rates of the steadily employed is between men who were not outstanding employees and women who were. Despite the importance of this testing, of interest in its own right, we emphasize (as noted in the preceding section) that no significant dependence was found between an employee's qualifications and the expected increase in his salary.

Merging the 1995 census data (the personnel figures for that year) with annual data for income tax brackets (figures for the wages and economic sector for 1996-2005) makes it possible to check which employees left public administration in these years, and where they went. An employee who left public administration was defined as an employee who worked there in 1995 (sub-sector 77[20]) and who worked in a different workplace in 2003-2005. We emphasize that at this stage, it was not possible to merge the administrative files with the income tax brackets, meaning that an exact identification of the same employees who joined and for whom the tests in the preceding sections were conducted was impossible.

Figure 3 displays the average number of years of education of the employees who switched to the private sector and of those who remained in public administration. The graph shows us that there was no obvious difference in the number of years of education between the men and women who left public administration for the private sector and those who remained in the former. Nevertheless, it was evident that the hourly wages of women who left public administration were lower than women who remained in it, which hints at a negative selection among women who left public administration for the private sector, while the hourly wage of men who left public administration was similar to those who remained in it

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[20] Including general public administration, government ministries, the National Insurance Institute, and public order. The degree of overlap between the population according to this definition and the population from the administrative files at our disposal was high, although not perfect.
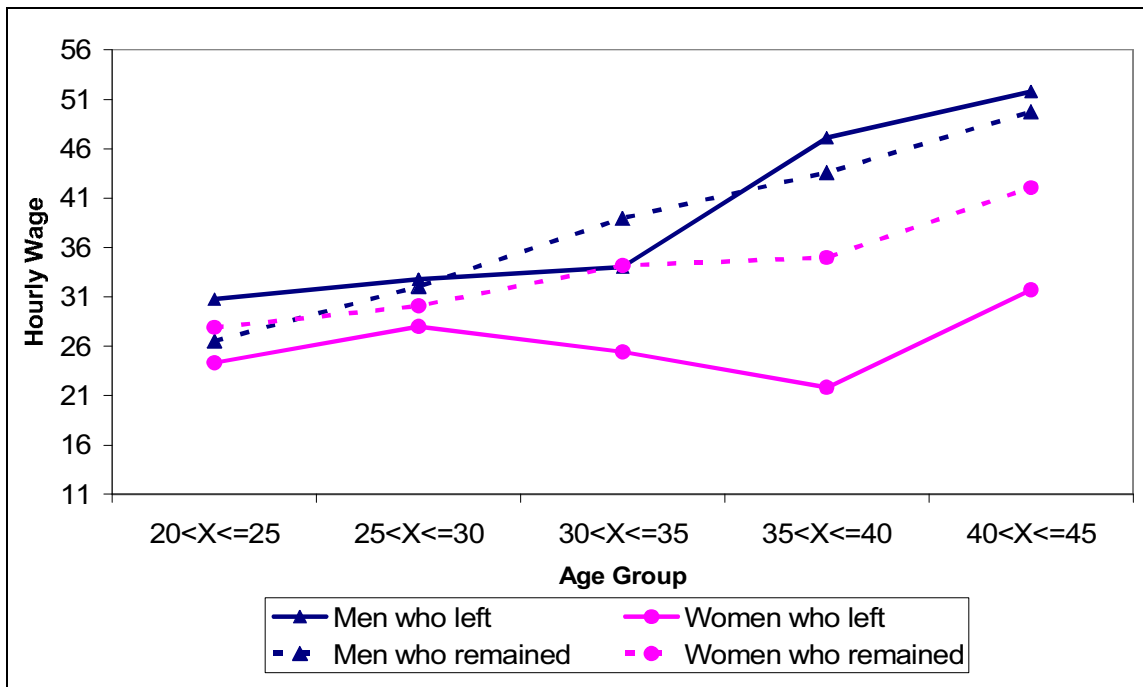
(Figure 4). From Figure 5, we conclude that both men and women who left public administration for public services were more educated than those who remain in public administration. The gaps between the two sexes were similar. Among men who left public administration for public services the educational gap was reflected in a higher hourly wage than among those remaining in public administration, while this was not true of women (Figure 6). This finding again hints at negative selection of women who left public administration for public services.

Figure 3: Average Number of Years of Education According to Age Group – Men and Women Who Left Public Administration for the Private Sector
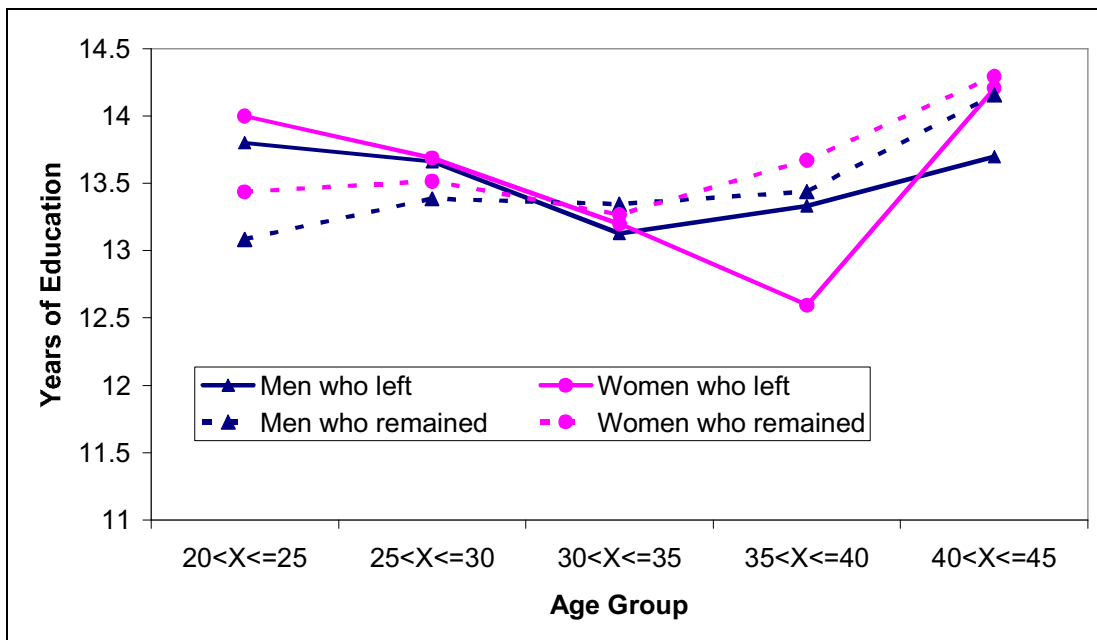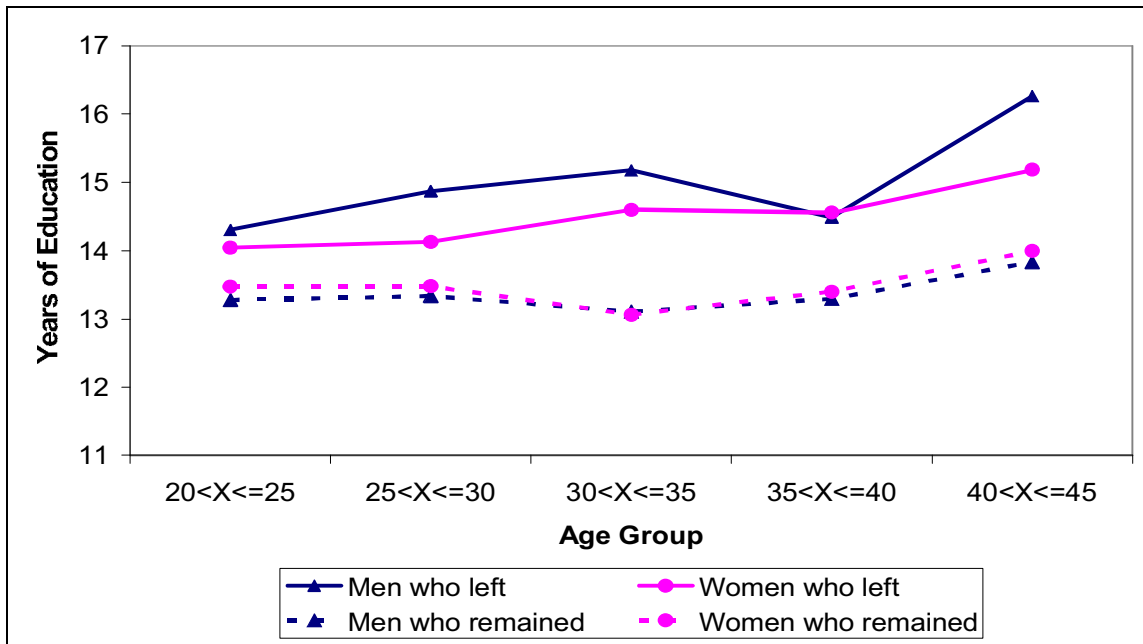

Source: The Central Bureau of Statistics and Bank of Israel Analyses.

Figure 4: Average Hourly Wage in the Base Year According to Age – Women and Men Who Left Public Administration for the Private Sector
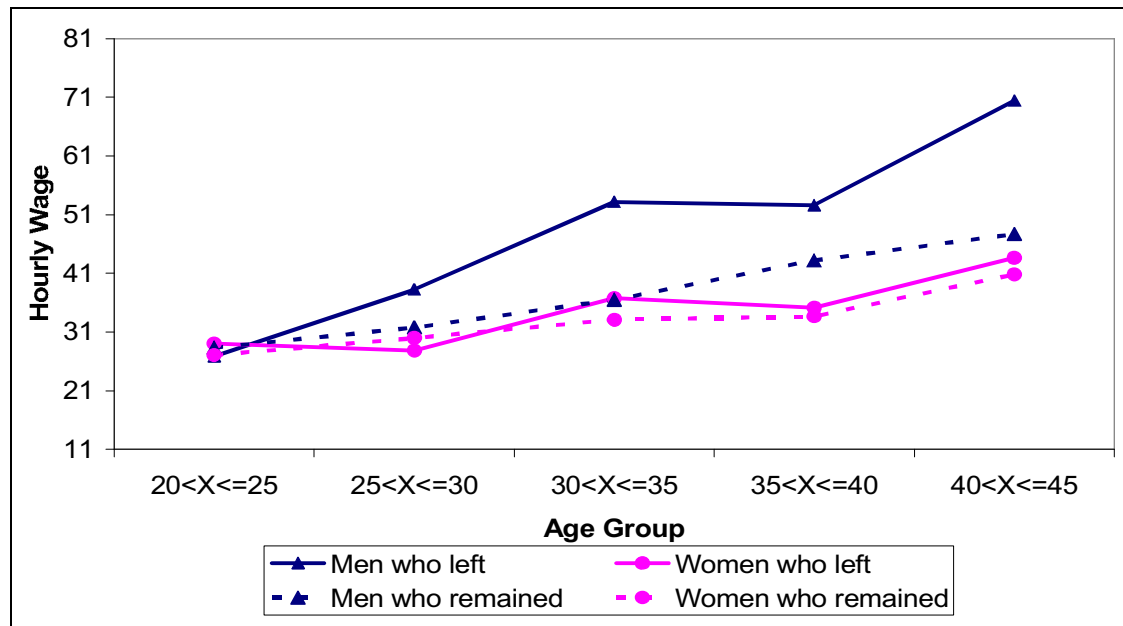
Figure 5: Average Number of Years of Education According to Age Group – Men and Women Who Left Public Administration for Public Services

Figure 6: Average Hourly Wage in the Base Year According to Age – Men and Women Who Left Public Administration for Public Services

Support for these conclusions is displayed in Table 6. Based on the appropriate regressions, which control the standard independent variables (including occupation), we examined the probability of leaving public administration. The table displays only the estimate of the parameters of interest. We assumed that the unexplained salary residual of an employee is positively correlated with his unobserved expertise (qualifications), both specific expertise and general expertise (see Mazar 2008, 2009 for further discussion). It was found that women who left public administration were negatively selected in comparison with those who remained in it, whether they switched to the private sector or to public services. On the other hand, no selection whatsoever was detected among men who left public administration for public services; however, non-monotonic selection was found among men who left public administration for the private sector – selection in the form of a U. This means that both men whose wages were lower than expected according to the estimated models and men whose wages were higher than their expected wages were more inclined to leave public administration for the private sector than men whose wages were about the same as their expected wages. It therefore follows that assuming that a correlation between the wage residuals of employees and their qualifications, both the most qualified and the least

qualified men were inclined to leave public administration for the private sector. This finding is similar to that of Mazar (2008, 2009) concerning the inclination of men to leave public services for the private sector.

Nevertheless, it is important to stress that the magnitude of the coefficient is not great enough to reach a definite conclusion about those leaving public administration, compared with those remaining in it, since only a marginal effect is involved (see Figure N-1, while also noting the relative frequency of the cases). For example, it cannot be concluded that women who remained in public administration were more qualified than those who left; only that the likelihood that a woman will leave public administration decreases monotonically, although not steeply, with her qualifications.

Through the panel data,[21] we also evaluated the probability of leaving public administration for each year. For this purpose, we examined the group of those recruited to public administration in 1988 – 1,132 men and 1,325 women – and tracked them each year until 2008. We applied survival analysis regression, in which we estimated the probability of leaving public administration. The control variables were age, the year, education, (MA, BA, technician, and non-academic), base pay, the difference between gross salary and base pay, the hours worked by the employee, a variable indicating whether or not the employee received a salary grade in the preceding year, a variable indicating whether the employee had tenure, a variable indicating whether the employee had changed employment scale, and a hierarchy variable for the level of the employee's salary grade in comparison with his employment scale (corresponding to the employee's salary residual in the previous regressions and receiving values between 0 and 2).

The direction of the results is similar to those of the regressions that tested the likelihood of leaving public administration according to the Central Bureau of Statistics data. In further detail: for **men**, it was found that an academic degree was correlated with the probability of leaving public administration by 2.7%, and tenure reduced the likelihood by a similar rate. Receiving a salary grade in the preceding year decreased the likelihood of leaving by 0.7%. The elasticity of the difference between gross salary and basic pay was –0.05%, and the elasticity of basic pay itself was –0.04%. Similar to the finding concerning the non-

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[21] According to the administrative data file described in Part 2.

monotonic effect of the salary residual, it was found that the effect of the hierarchy variable of the employee's salary grade was non-monotonic, and the probability of men leaving the public sector as a function of the salary grade hierarchy variable was in the form of a U. For women, it was found that an academic degree increased the probability of leaving public administration by 2.3%, a change in employment scale increased it by 4.5%, and tenure reduced it by 5%. Having received a salary grade in the preceding year did not affect the likelihood of leaving. The elasticity of salary among women was slightly lower than for men: the elasticity of the difference between gross salary and base pay was –0.03%, and the elasticity of basic pay itself was –0.02%. The finding for women was similar to the finding for the effect of the salary residual, and the effect of the hierarchy variable on the employee's salary grade was found to be negative. Keep in mind that for both men and women, the effect of the salary grade hierarchy variable was not strong.

To summarize the findings, it can be concluded that the effect of most characteristics of employees on the decision to leave public administration among men and women was similar to this effect among men, meaning that the population of those steadily employed did not demonstrate selection at a level that could cast doubt upon the similarity in salary development between men and women steadily employed in public administration.

5.A. Recruited Employees

The lower graph in Figure 1 displays the wage differentials between men and women according to the age at which they joined public administration. As shown by the graph, as the age of recruitment rises, the wage gap between women and men widens. What is the explanation of the existence of the gap and the fact that it increased? There are several hypotheses. One assumes that the distribution of jobs filled by men and women is the same, and that there is a difference in the salary grade at entry, and therefore in salary. Another hypothesis assumes that the source of the differences lies in the composition of those recruited with respect to the positions that they fill, i.e. that men enter positions with higher salaries than women, and that this phenomena becomes more pronounced as the recruitment age rises.

In order to test these hypotheses, we created a new variable that ranks the positions by their salary. The position with the highest salary[22] receives the value 1, the next in the salary hierarchy receives the value 2, and so forth. Figure 7 displays the average mark for women and men recruited according to their age at joining, and a graph of the women-men wage differentials according to the recruitment age.

Figure 7: The "Mark" of the Positions Among Recruits According to Age and Gender, and the Women-Men Wage Differentials
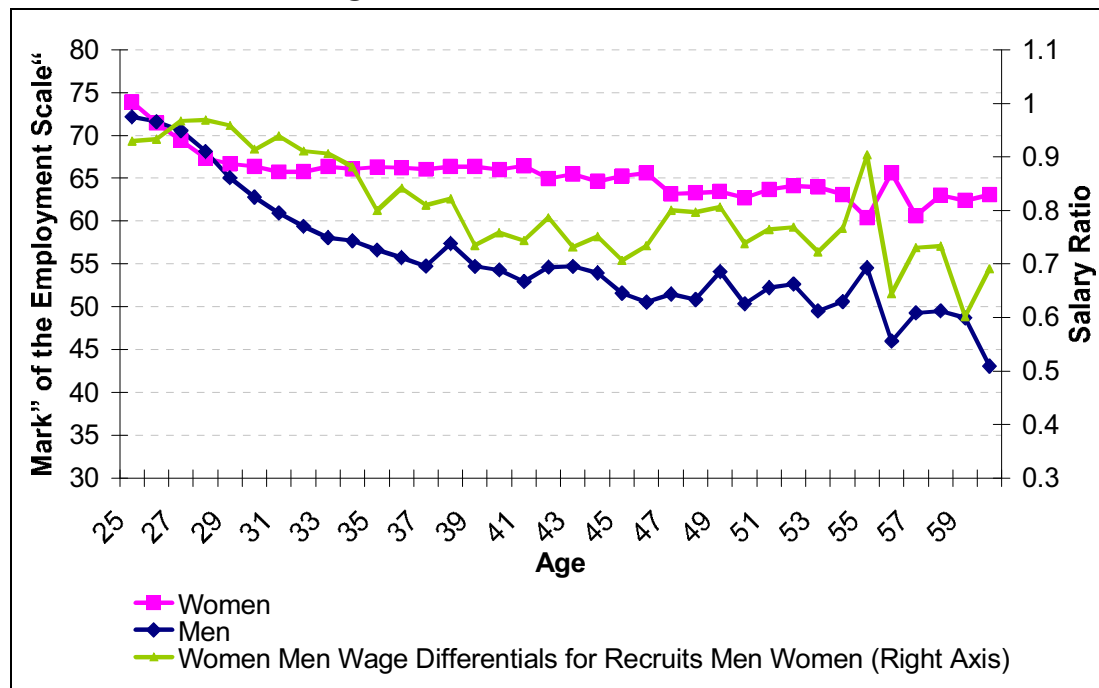
Source: Bank of Israel.

It can be seen in the graph that as the age at recruitment rises, the average "mark" of the positions entered by men is lower than that of women, meaning that they take up positions with a higher average salary. The similarity between the development of the difference between the marks of the positions assumed by men moving to public administration and those of women recruited, and the development of women-men wage differentials, supports the hypothesis that the gap results from differing compositions positions among the employees joining public administration.

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[22] In order to avoid bias, we calculated the average salary in an employment scale in 10 different years. The "mark" given is according to the average of all the years.

Further support for this hypothesis can be found if we consider what the salary of the men recruited to public administration would have been, were the composition of their positions the same as that of women, or, alternatively, what women's salary would have been when recruited to public administration had the composition of their positions been the same as that of men. A (decomposition) analysis like this separates the existing differences into the effect of salary and the effect of the composition of positions.

Figure 8 shows that the principal source of wage differentials between men and women recruited to public administration is the differing compositions of their employment scales, not the differing salary grades assigned to men and women in the same position, because when the weights are the same, the levels of average salary according to age groups are similar for men and women. It can therefore be concluded that had women entered at all ages at positions with the same composition as those at which men entered, their average wage at recruitment would have been similar to that of the men.

Two additional conclusions can be drawn from the graph: 1. The superior composition of positions of men increases with the age of the recruits: the higher the recruitment age, the greater the difference between men and women in the quality of their positions. 2. The

Figure 8: Isolation of the Effect of the Composition of Positions on Women-Men Wage Differentials During Their Careers

Source: Bank of Israel.

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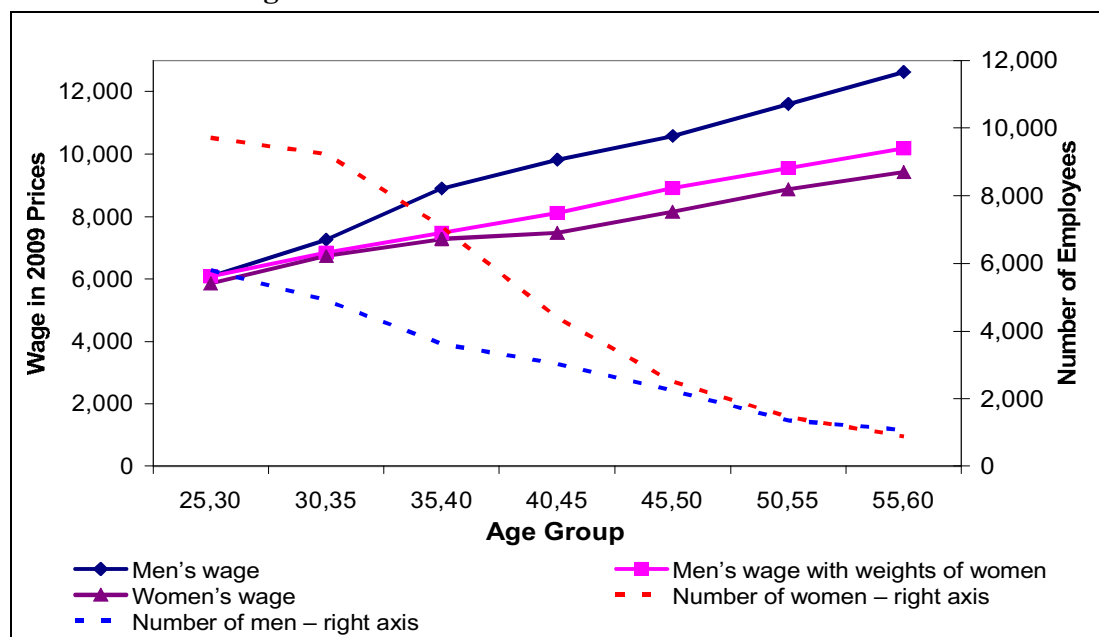
probability of switching to public administration as a function of the recruitment age decreases more sharply among women, so that the average age of women entering public administration is lower than that of men – 34 versus 36.

The following regressions test the significance of the above findings.

Basic regressions for salary – Basic regressions for salary tested (the results are not displayed) indicate the importance of the position as an independent variable among recruits and its connection with the gaps between men and women at recruitment: a salary regression not conditional on the recruit's position shows that the salary of male recruits to public administration was 13.6% higher than that of that of female recruits. When control of the positions assumed at recruitment is added, however, the gap narrows to only 3.6%. We note that when the dependent variable is the salary excluding reimbursement of expenses, the variable "Man" is not significant at all. This means that when we compare salary without any differential element and control the composition of employment scales, in which men and women differ, there is no gap between men and women. If this is the case, the reimbursement of expenses item among recruits is pro-male, in contrast to the finding among the steadily employed, for whom this item was pro-female. A possible explanation for this will be given below.

Regressions on the quality of the positions – The regression results, displayed in column (1) of Table 3, indicate that the average of the positions of male recruits was greater than that of women (keep in mind that the lower the rank of the job, the higher the job's average salary). Column (2) shows that the situation of men in comparison with women with respect to the quality of the positions improves with age. Column (3) shows that the situation of women with respect to the average rank of their positions improves over time. Column (4) shows that while average of the positions of women improves over time, the gap between them and men in the quality of positions as a function of age widened; this is a result of the frequency of personal contracts, which increases with time, and which were signed particularly with men. Figure 9, based on the regression coefficients in Column (4), displays the ratio of respective positions of men and women (men divided by women) as a function of age in 1992 and 2009. The graph highlights this last conclusion: in both years, the ratio

decreases with age (men join at "better" positions than women), but the slope in 2009 is markedly greater than in 1992.

Figure 9: The Ratio of Positions Between Men and Women at Recruitment, According to Age, in 1992 and 2009
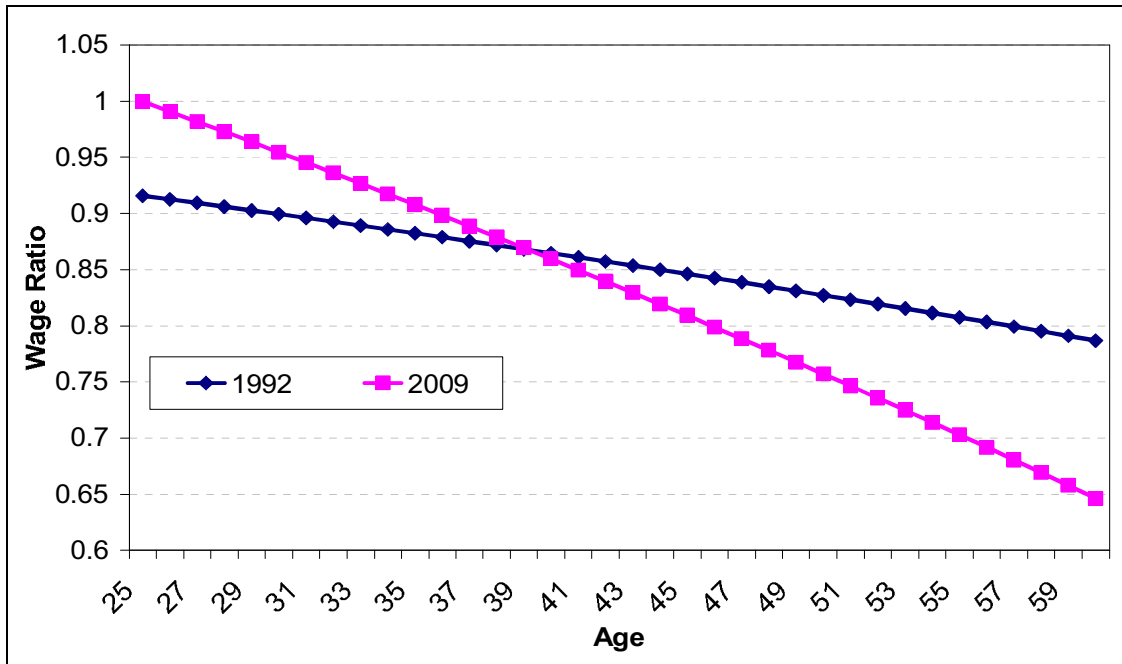
Source: Bank of Israel.

We note that when we examined the same regression for recruits who remained steadily employed in their jobs until 2009, we obtained similar coefficients.

5.B. Selectiveness of Those Joining

Merging the 1995 census data (the personnel figures for that year) with annual data for income tax brackets (figures for wage and economic sector for 1996-2005) made it possible to check which employees were recruited to public administration, including their gross salary and additional individual particulars before recruitment. We defined an employee recruited to public administration as an employee who did not work in public administration (unless in another job, i.e. in the private sector, or in other public services) in the base year (1995), and worked in public administration (sub-sector 77) in 2003-2005; we thereby avoided including temporary transfers of employees.

It is possible that employees who joined public administration came from outside the labor market, i.e. were unemployed or did not actively participate in the labor market. Given the gap, in view of the high salary levels observed, however, we assumed that most of the employees recruited to public administration came from the labor market. We considered only employees aged 25-60 in 1995. The tested salary was the gross salary.

According to the sample we tested, of 96,000 employees in the private sector in 1995, 1% transferred to public administration – 0.8% of the men and 1.5% of the women. Of 45,000 employees in public services, 6% joined public administration – 6.6% of the women and 5% of the men. A 10-year period was involved. If we multiply the proportion of employees switching to public administration during this period by the number of employees actually working in the private sector and in public services, we conclude that the number of those recruited to public administration during this period who came from the private sector or public services was 48,000, and that 40% of them came from the private sector. We note that this figure is very similar to the result in Section 5.A, according to which an annual average of 4,600 employees at these ages moved to public administration. This finding supports the assumption that most of the employees recruited to public administration aged 25-60 came from the labor market, specifically the civilian labor market.

With econometric tests, we sought to check whether men who recruited to public administration received an additional wage premium beyond that received by women, given the characteristics of the employees who joined, including the salary in the base year.

It was found that both men and women who left the private sector for the public administration had more education than those who remained in the private sector, but no real difference between the sexes in level of education was evident (Figure 10). Among the employees who left public services, the level of education of the four groups was more similar.

In all the tests (Table 5), no significant positive wage premium was found for men in switching from the private sector to public administration. This was true when we examined all the employees, when we examined only the educated employees, when we examined only employees with more work experience, and when we examined only employees who worked full time in 1995. We found a negative wage premium for the Women dummy variable in

Figure 10: The Average Number of Years of Education According to Age – Women and Men Who Left the Private Sector for Public Administration
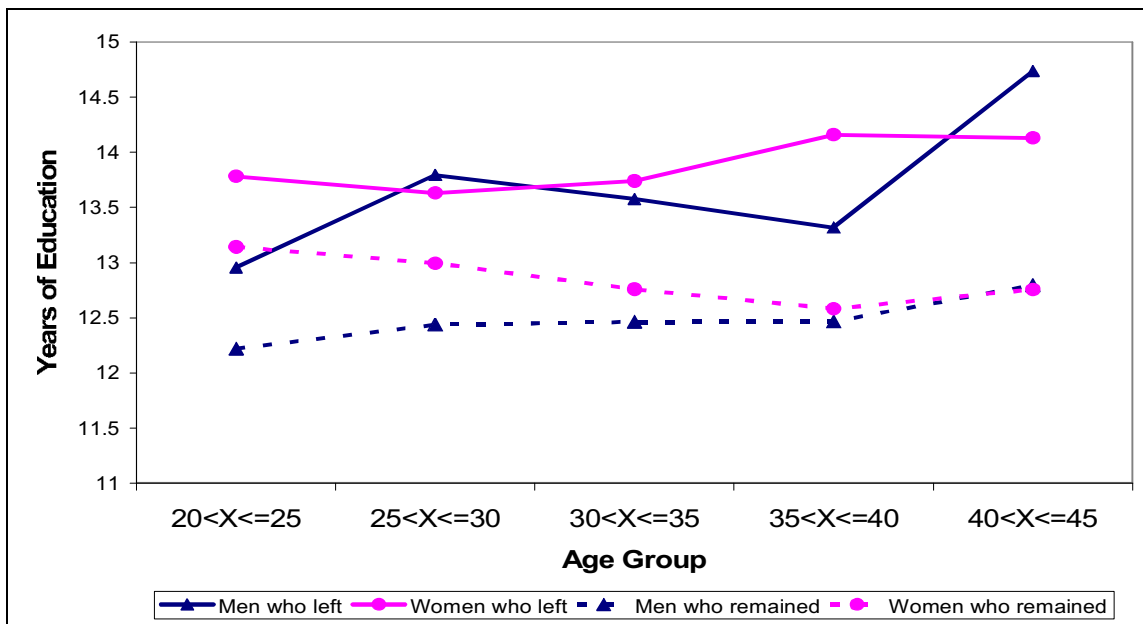
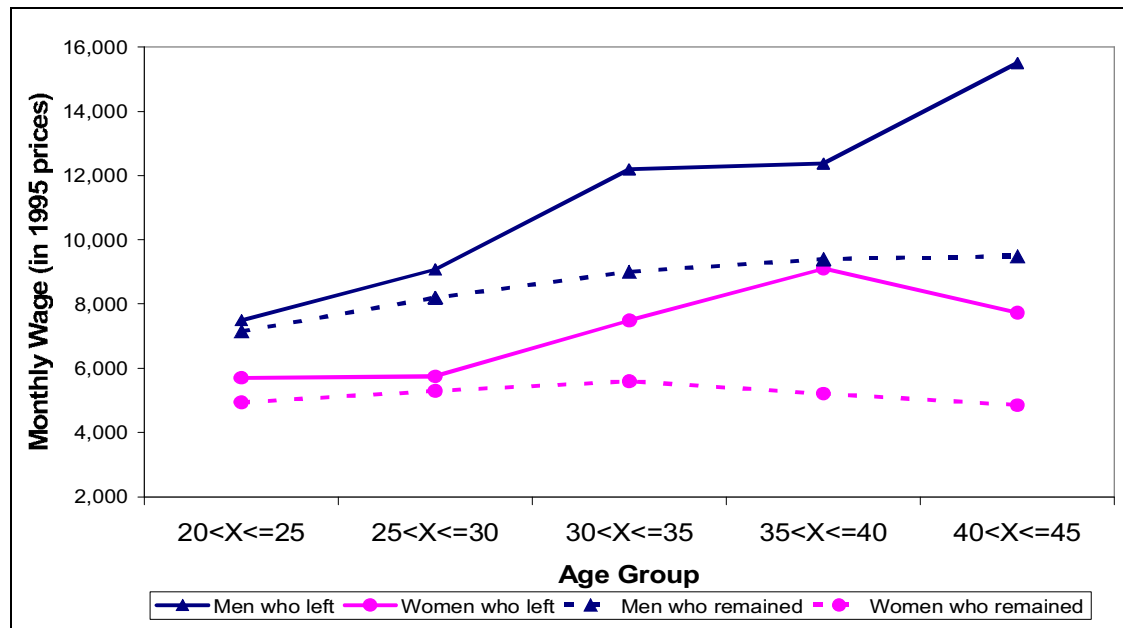**Source**: The Central Bureau of Statistics and Analyses by the Bank of Israel.

public administration, but the variable for the interaction between the employee's gender and joining public administration was found to have no effect. This means while that given the salary in 1995, women in public administration earned less in 2005 than men working there on the average, the improvement in the salaries of women who switched from the private sector to public administration was either no less than that of the men who transferred, or even exceeded it. Furthermore, the econometric tests indicate significantly that both men and women recruited to public administration benefited from a positive wage premium, compared with employees remaining in the private sector,[23] a premium that increased with the age of the employee at recruitment (Figure 11). This wage premium was approximately equal to one third of the wage premium of those who transferred in the opposite direction.

We note that in contrast to switching from the private sector to public administration, men who switched from public administration to the private sector benefited from an additional positive premium not enjoyed by women who made the same transfer – a 16% premium for

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[23] This finding is similar to the findings in the literature, according to which a single transfer confers a positive premium on an employee – Abbot and Beach, 1994; Topel and Ward, 1992; Loprest, 1992. On the other hand, it was found that frequent transfers between places of employment were accompanied by a negative premium – Light, 2005.

men in general, and a 21% premium for well-educated men (Table 5). In contrast to both of these cases, a positive premium for women was also registered in a switch from public services to public administration (Figure 12 and an econometric test available to the reader from us).

Figure 11: The Average Monthly Wage in 2005 by Age – Women and Men Who Left the Private Sector for Public Administration

Source: The Central Bureau of Statistics and Analyses by the Bank of Israel.

Similarly, in order to assess the selection of employees recruited, we ran regressions testing the likelihood of switching from the private sector or public services to public administration. Regressions whose estimates are of interest are displayed in Table 6. It was found that men who left the private sector for public administration were positively selected. This means that according to this measure, public administration has succeeded in attracting the most qualified men from the private sector. Since the wages of men in the private sector were higher than those of women, the salary offered them in public administration also had to be higher, and the wage differential between men and women was also maintained in public administration. This finding contradicts the findings of Mazar, 2008 and 2009, according to which the inclination of women (in the main) to switch from the private sector to public services (which in his studies included public administration) declined with their

qualifications. When we examine the tendency to move from public services to public administration, we find positive selection for both sexes.

Figure 12: The Average Monthly Wage in 2005 by Age – Women and Men Who Left Public Services for Public Administration

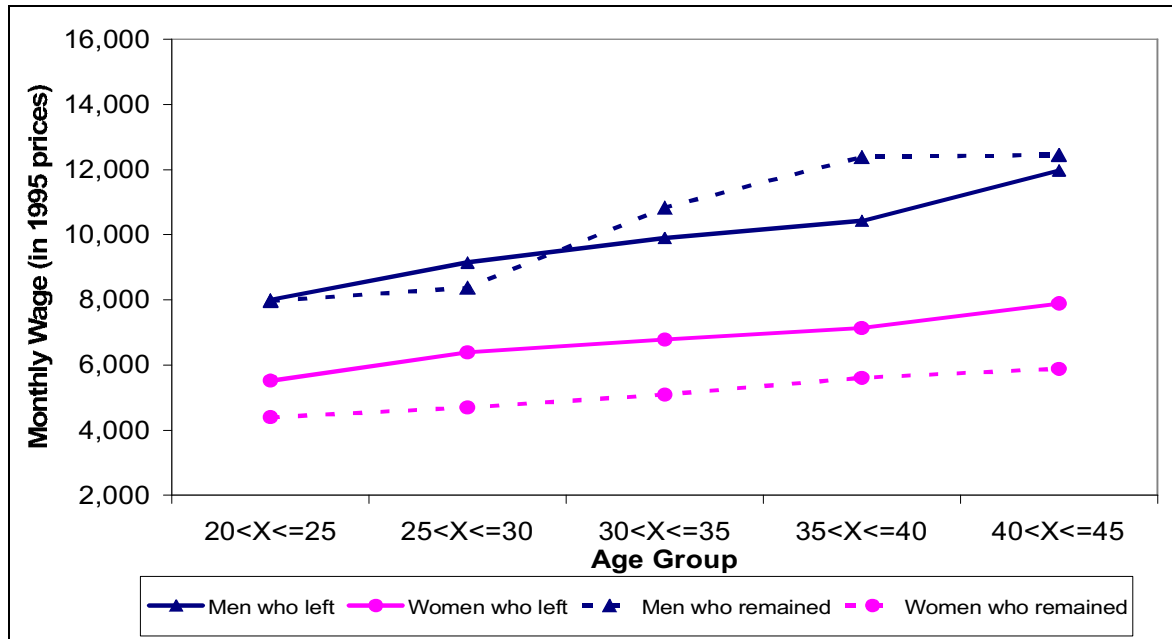Source: The Central Bureau of Statistics and Analyses by the Bank of Israel.

It can be concluded from the above graph that the gap between men and women recruited to public administration is not a result of the larger positive premium granted to men transferring, in comparison with women. It appears that the reason for the gap lies in the wage differential between men and women in their previous workplace, before they moved to public administration. We have not investigated in depth the source of this gap, because it is not the subject of this study. In any case, the examination that we conducted concerning the composition of occupations of those joining public administration according to the various ages indicates no change in favor of men as age rises.

Consistently with the results, it can be explained why reimbursement of expenses among those joining is pro-male: the reimbursement of expenses item is relatively elastic, even more than receiving a "better" employment scale. It is therefore used as a means of offering a higher salary. Given the above-mentioned results, according to which the salaries of men in the private sector switching to pubic administration were higher than those of women

making the same switch, it can be concluded that the reimbursement of expenses item was indeed also used as a means of offering a higher salary to men.

Figure 13: The Average Monthly Wage in 2005 by Age – Women and Men Who Moved to Public Administration
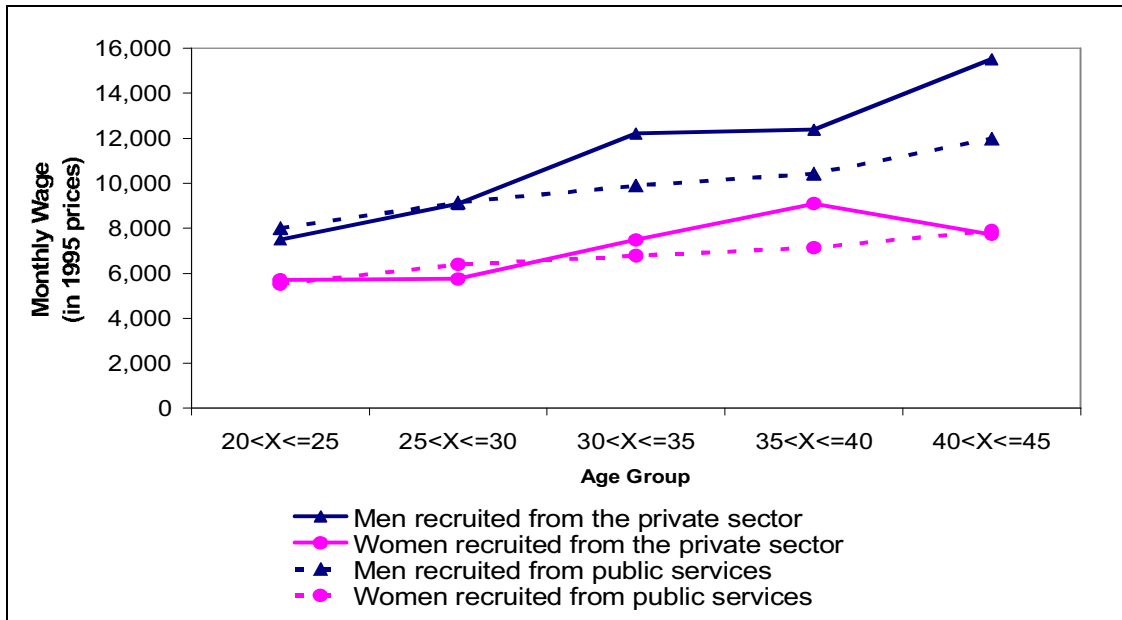
Source: The Central Bureau of Statistics and Analyses by the Bank of Israel.

Figure 14: The Relative Frequency by Age of Men and Women Who Moved to Public Administration
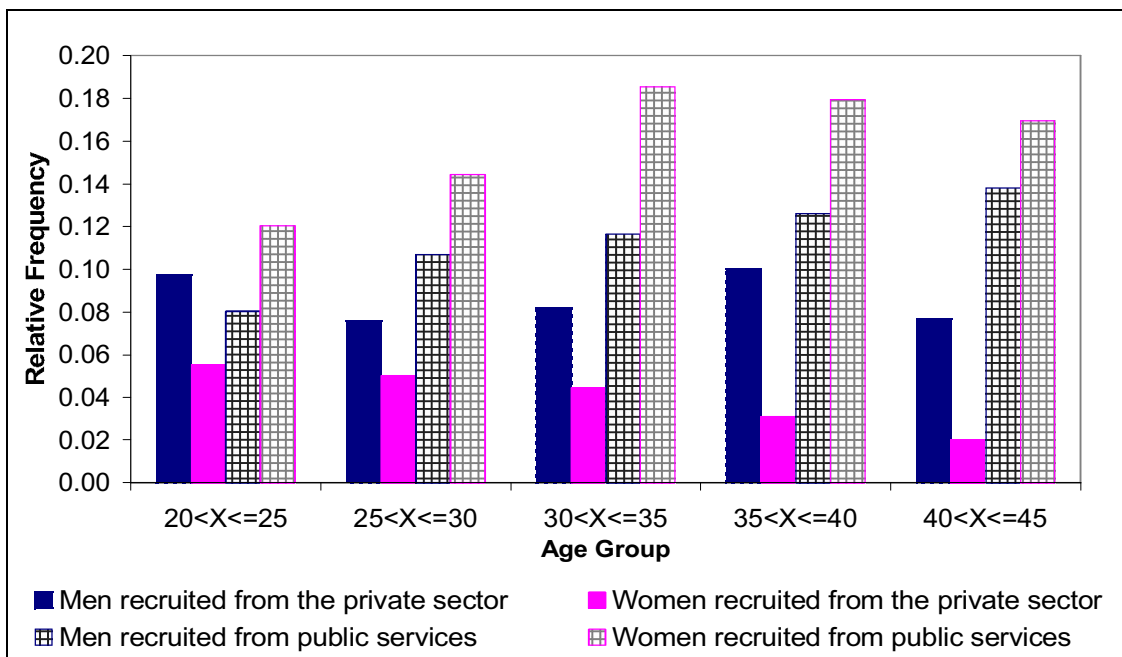
Source: The Central Bureau of Statistics and Analyses by the Bank of Israel.

6. 2009 as a Test Case

Up until now, we conducted our analyses for various years in order to obtain multi-year explanations of the gaps – or their absence – between the wages of men and women. As we proved, advancement in salary with age does not differ between the steadily employed men and women over a given period. On the other hand, where the employees recruited to public administration are concerned, wage gaps at entry are evident, which also become wider as the age of recruitment rises. These do not, however, reflect any preference whatsoever in the salary grades granted upon entry; they reflect a difference in the composition of positions.

We now aim to apply our findings, and to test them in a single specific month – December 2009. We made this choice because when this article was written, this month was the most current one for which we had data. The analysis will be of the composition of employment scales, which, as seen above, exert the principal effect on the wage differentials between men and women in public administration. Given the above, we would expect to find that there is no substantial difference between the quality of the positions filled by men and women; if such a difference is found, it is the result of recruitment at a more advanced age. As stated above, the reality is that men enter public administration in "better" positions. The mirror image of the quality of positions will be apparent, therefore, in salary.

Column (1) in Table 4 includes only the variable "Man," without any control of the interaction between it and the recruitment age. Without this elasticity, we obtain a significant estimate for this dummy variable. In column (2), however, in which this interaction is added, the estimate is again not significant; this means that the quality of the position in 2009 is a function not of gender by itself, but of gender and the age at recruitment. As the age of recruitment rises, the quality of men's positions becomes preferable to that of women's positions. From similar regressions we tested, in which the dependent variable was salary, similar results were obtained with respect to the direction of the effect of the variables. The analysis for 2009 is consistent with the findings listed above: the wage differential between men and women is mostly a result of different compositions of employment scales, which change with the age at recruitment.

The Decision to Join Public Administration as Dependence on the Age of the Person Recruited and the Year in Which He Was Recruited – Conclusions from the Data for 2009

As seen in Table 4, Column 1, older employees moving to public administration had a greater probability of getting a position with a higher average salary. The more recent the year in which an employee was recruited, however, the less likely it was that he obtained a position with a higher average salary. It therefore appears that substitution exists between the positive return on the recruitment age and the negative return on the recruitment year. Had the effect of these factors been linear, it would have been better for an employee to postpone the date of his moving to public administration, since the absolute value of the age parameter was two and a half times the size of the absolute value of the recruitment year. However, the square of both the recruitment year and the recruitment age were found to be significant (Table 4, Column 3). An analysis of the marginal effect of these two factors and a comparison of the absolute value of the return on both them (the price of postponing recruitment versus the positive return on the recruitment age) show that it is worthwhile for an employee to move to public administration at age 38 (approximately), i.e. 13 years after the youngest age at which he can join (according to the sample), and 12 years before the age at which the return on the recruitment age becomes negative.

7. Summary

The analysis in this study makes it possible to identify the source of the wage differentials between men and women in public administration, as shown by looking at the cross-sectional data. It appears that the source of the gap lies in the difference in how men and women move to public administration, not a difference in advancement between men and women steadily employed in public administration. An analysis of the population of those steadily employed in public administration careers indicates that men and women have similar wage development, and that in any case, the wage gaps between them are almost identical throughout their careers in 1991-2009. Selection, which could have changed this conclusion (because if the steadily employed men and women had different (unobserved) characteristics, while receiving similar recompense, their similarity in salary development

would not indicate equality in pay), was also tested during this period. As noted above, however, this selection did not detract from the reliability of the findings.

An analysis of the population of employees switching to public administration from the private sector or from other public services during the period of the study clearly shows that men entered public administration in better positions than women – positions with higher pay. This probably reflects wage differentials that existed in their previous place of employment, not discrimination in public administration. This phenomenon, which is monotonic at all ages, is the main cause of the wage differential between men and women during the course of their careers, as indicated by the cross-sectional data. It appears that positions in public administration constitute a tool that facilitates wage elasticity in a relatively non-elastic system in order to attract high-quality employees. This conclusion is worthy further research in order to describe and quantify this phenomenon.

Other than the finding about wage differentials in the preceding place of employment, this study also found that the reimbursement of expenses item is pro-female among the steadily employed workers and pro-male among recruits to public administration. This finding, in itself also worthy of testing in more depth, increases the need for an accurate examination of the various salary items (basic pay, salary increments, overtime pay, and reimbursement of expenses) in order to understand the magnitude of each item's contribution to generating the existing differential. A study of this type is likely to prove very useful in understanding the complicated salary system in public administration.

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Table 2: The Factors Affecting the Change in Basic Pay Between Year $_t$ and Year $_{t-1}$

Steadily Employed Workers, 1991-2009

	All the Employees (1)	Men (2)	Women (3)	All the Employees (4)	Men (5)	Women (6)
Constant	1.4167*** [0.0785]	1.2846*** [0.0337]	1.4503*** [0.1292]	1.4646*** [0.1548]	1.2364*** [0.1966]	1.5798*** [0.1606]
The change in the log of salary between year $_{t-1}$ and year $_{t-2}$	-1.3650*** [0.4576]	-1.1821*** [0.1649]	-1.5297* [0.8422]	-1.3710*** [0.4589]	-1.1871*** [0.1652]	-1.5407* [0.8477]
The change in the log of salary between year $_{t-2}$ and year $_{t-3}$	-0.5705*** [0.1937]	-0.4870*** [0.0770]	-0.6460* [0.3524]	-0.5774*** [0.1959]	-0.4925*** [0.0773]	-0.6562* [0.3580]
Man	-0.0061 [0.0060]			-0.019 [0.0163]		
Age	-0.0013*** [0.0002]	-0.0016*** [0.0003]	-0.0010*** [0.0003]	-0.0015*** [0.0004]	-0.0018*** [0.0003]	-0.0014** [0.0007]
Change in position	0.0443* [0.0236]	0.0385*** [0.0125]	0.0407 [0.0432]	0.0402 [0.0259]	0.0372*** [0.0123]	0.0361 [0.0462]
Switched to a personal contract	0.9178*** [0.0397]	0.8934*** [0.0472]	0.9706*** [0.0624]	0.8717*** [0.0514]	0.8677*** [0.0474]	0.9240*** [0.0736]
Was in a personal contract in year $_t$ and in year $_{t-1}$	0.0522* [0.0274]	0.0318* [0.0179]	0.1034 [0.0763]	0.0538 [0.0388]	0.021 [0.0189]	0.1179 [0.1019]
Overtime in year $_{t-1}$				0.0014 [0.0011]	0.0003*** [0.0001]	0.0023 [0.0024]
Control for groups of positions	Yes	Yes	Yes	Yes	Yes	Yes
Control for years	Yes	Yes	Yes	Yes	Yes	Yes
Control for ministries	No	No	No	Yes	Yes	Yes
Observations	235,592	84,748	150,844	235,592	84,748	150,844
R-squared	0.059	0.205	0.044	0.060	0.207	0.045
Adjusted R-Squared	0.059	0.205	0.043	0.060	0.206	0.045

Table 2 (continued)

		Ages 25-45			Ages 46-60	
	All the Employees (7)	Men (8)	Women (9)	All the Employees (10)	Men (11)	Women (12)
Constant	1.4041*** [0.0430]	1.3814*** [0.0264]	1.6184*** [0.0271]	1.4617*** [0.2532]	1.0322*** [0.3622]	1.9373*** [0.5020]
The change in the log of salary between year $_{t-1}$ and year $_{t-2}$	-0.5374*** [0.0097]	-0.5656*** [0.0192]	-0.5214*** [0.0092]	-1.8802*** [0.7249]	-1.5069*** [0.2399]	-2.267 [1.4202]
The change in the log of salary between year $_{t-2}$ and year $_{t-3}$	-0.2251*** [0.0056]	-0.2149*** [0.0102]	-0.2362*** [0.0064]	-0.8011** [0.3131]	-0.6419*** [0.1140]	-0.9668 [0.6088]
Man	-0.0054*** [0.0011]			-0.0234 [0.0222]		
Age	-0.0009*** [0.0001]	-0.0020*** [0.0003]	-0.0003** [0.0001]	-0.0025*** [0.0009]	-0.0023*** [0.0007]	-0.0025* [0.0014]
Change in position	0.0351*** [0.0116]	0.0114 [0.0149]	0.0520*** [0.0169]	0.0329 [0.0438]	0.0459** [0.0181]	0.0167 [0.0741]
Switched to a personal contract	1.0231*** [0.0715]	0.9276*** [0.0731]	1.2176*** [0.1410]	0.8336*** [0.0582]	0.8597*** [0.0584]	0.8109*** [0.0972]
Was in a personal contract in year $_t$ and in year $_{t-1}$	-0.0169 [0.0179]	-0.0172 [0.0160]	0.0129 [0.0571]	0.1037 [0.0698]	0.0505 [0.0311]	0.16 [0.1389]
Overtime in year $_{t-1}$	0.0002*** [0.0001]	0.0003*** [0.0001]	0.0001 [0.0001]	0.0017 [0.0016]	0.0002 [0.0001]	0.0026 [0.0028]
Control for groups of positions	Yes	Yes	Yes	Yes	Yes	Yes
Control for years	Yes	Yes	Yes	Yes	Yes	Yes
Control for ministries	Yes	Yes	Yes	Yes	Yes	Yes
Observations	91,862	31,948	59,914	143,730	52,800	90,930
Adjusted R-Squared	0.274	0.273	0.283	0.069	0.230	0.056

Table 3: Factors Affecting the "Mark" of the Position Filled When Joining Public Administration

	(1)	(2)	(3)	(4)
Constant	71.7033***	69.5190***	72.1299***	69.8123***
	[0.2308]	[0.2519]	[0.2631]	[0.2840]
Man	-7.2651***	-1.8442***	-8.3145***	-6.0407***
	[0.1804]	[0.3127]	[0.3595]	[0.5671]
Age^{+}	-0.4393***	-0.2439***	-0.4388***	-0.2447***
	[0.0104]	[0.0139]	[0.0104]	[0.0139]
Year^{+}	-0.0251*	-0.0279**	-0.0638***	-0.0534***
	[0.0142]	[0.0142]	[0.0183]	[0.0182]
Age X Man		-0.4432***		-0.1788***
		[0.0209]		[0.0334]
Year X Man			0.0981***	0.3893***
			[0.0291]	[0.0434]
Age X Year X Man				-0.0251***
	[2.0345]	[2.1358]	[2.4484]	[2.5261]
Observations	55,558	55,558	55,558	55,558
Adjusted R-Squared	0.063	0.071	0.063	0.072

* The variables age and year were normalized to 1-36 and 1-17, respectively.

Table 4: Factors Affect the "Mark" of the Position (All Employees, December 2009)

	(1)	(2)	(3)
Constant	62.1275***	59.9823***	60.0578***
	[0.7170]	[0.7419]	[6.6859]
Age at joining	-0.3074***	-0.2221***	-1.5034***
	[0.0108]	[0.0133]	[0.0727]
Square of age at joining			0.0175***
			[0.0011]
Year of joining	0.1357***	0.1320***	0.5725***
	[0.0082]	[0.0082]	[0.1462]
Square of year of joining			-0.0022***
			[0.0008]
Man	-7.2158***	-0.2532	-7.0213***
	[0.1553]	[0.6456]	[0.1554]
Age X Age at joining		-0.2290***	
		[0.0206]	
Observations	69,790	69,790	69,790
R-Squared	0.044	0.046	0.048

Table 5: Salary in 2005

	(1) All the Employees	(2) Well-educated Employees	(3) All the Employees	(4) Well-educated Employees
Salary in the base year	0.52258*** [0.00422]	0.50927*** [0.00770]	0.36225*** [0.02371]	0.32255*** [0.03571]
Women	-0.27528*** [0.00604]	-0.28366*** [0.01097]	-0.09650*** [0.03054]	-0.16604*** [0.04419]
Switched to public administration	0.00599 [0.11909]	-0.25132 [0.19301]		
Switched to public administration X Age	0.00777** [0.00309]	0.01195*** [0.00490]		
Switched to public administration X Woman	**0.01409** **[0.04566]**	**0.05330** **[0.07437]**		
Switched to the private sector			1.25618*** [0.15626]	1.67174*** [0.23386]
Switched to the private sector X Age			-0.03311*** [0.00422]	-0.03986*** [0.00619]
Switch to the private sector X Woman			**-0.16076**** **[0.06768]**	**-0.21357**** **[0.09974]**
Observations	96,484	26,421	4,227	1,590
Adjusted R-Squared	0.4092	0.4184	0.2618	0.2464

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Table 6: Transfers Matrix

<u>From Public Administration</u>

To the Private Sector

	No. of Observations	Probability of a Transfer	Residual's Wage	Square of Residual's Wage	Education
Women	2,197	10.8%	**-0.059** (-4.23)	0.011 (0.78)	-0.001 (-0.28)
Men	1,869	21.5%	0.029 (1.39)	**0.046** (3.37)	**0.009** (2.42)

To Public Services

	No. of Observations	Probability of a Transfer	Residual's Wage	Square of Residual's Wage	Education
Women	2,197	15.1%	**-0.057** (-3.85)	-0.008 (-0.56)	**0.012** (3.88)
Men	1,869	9.2%	0.021 (1.49)	0.009 (0.98)	**0.008** (3.28)

<u>To Public Administration</u>

From the Private Sector

	No. of Observations	Probability of a Transfer	Residual's Wage	Square of Residual's Wage	Education
Women	35,886	1.5%	0.001 (0.62)	0.000 (0.62)	**0.001** (4.39)
Men	60,598	0.8%	**0.002** (2.46)	0.000 (0.33)	**0.001** (5.17)

From Public Services

	No. of Observations	Probability of a Transfer	Residual's Wage	Square of Residual's Wage	Education
Women	32,531	6.6%	**0.048** (16.81)	**0.017** (8.00)	**-0.003** (-4.50)
Men	13,385	5.1%	**0.006** (1.91)		**-0.002** (-2.96)

The other results of the estimation of the parameters are available upon request.
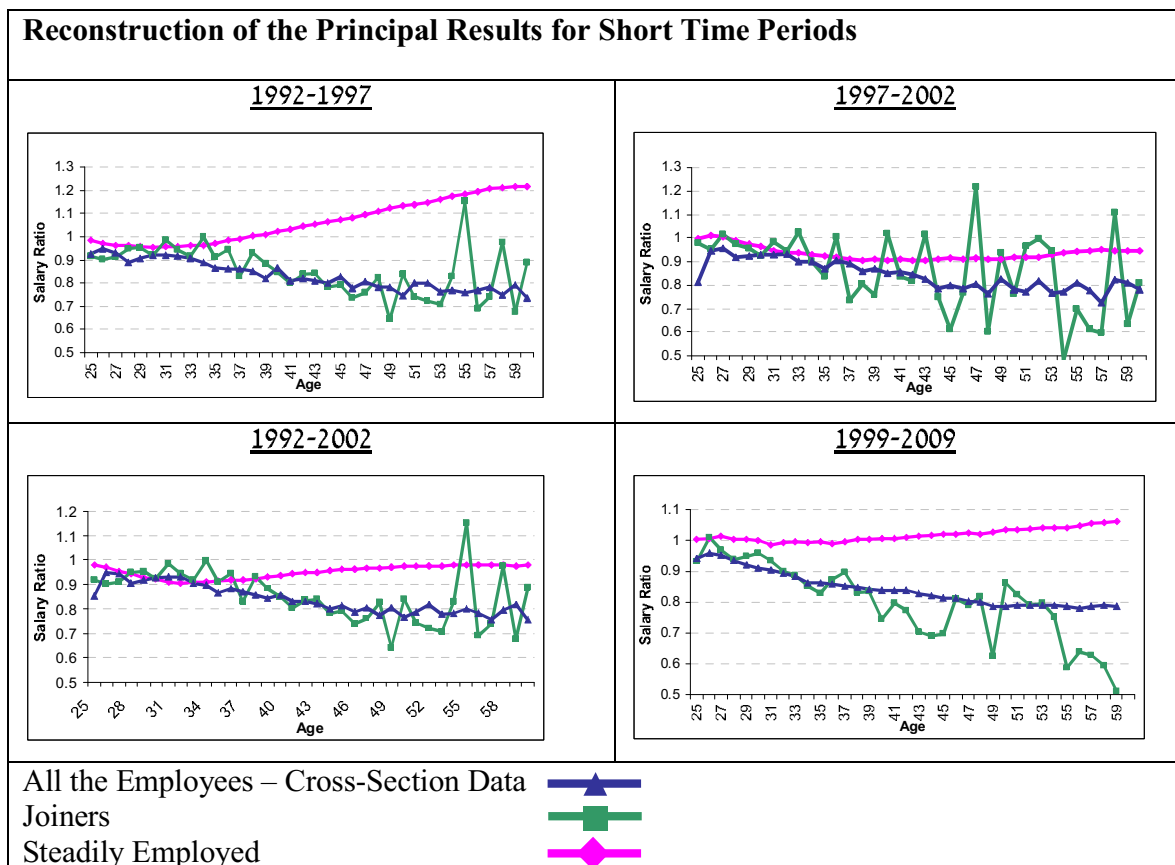
Figure N-1: The Probability of Leaving Public Administration for the Private Sector
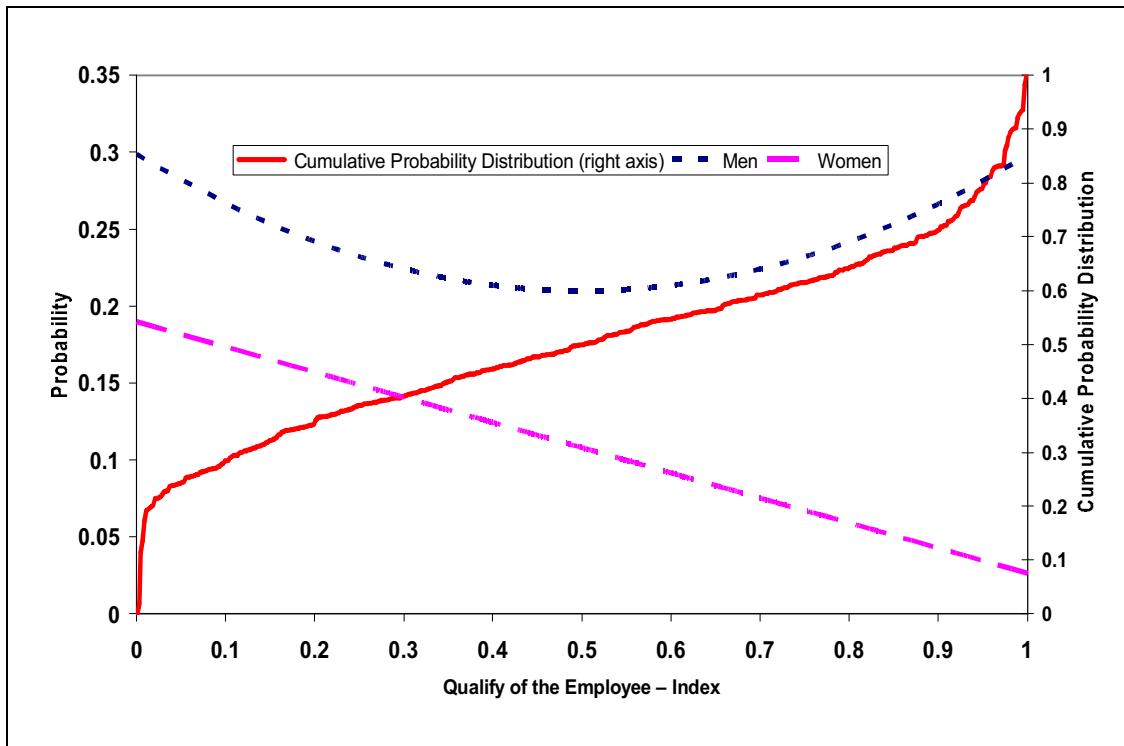
Appendix: Robustness testing for the Principal Results

As presented in the body of the article, a long-term analysis spread over 18 years has both advantages and disadvantages. We chose this period in order to average and smooth results likely to prove more volatile than would have been the case, had we focused on shorter time periods. Nevertheless, in order to show that the principal results in the article presented in Figure 1 are not random and dependent on the sample, we created similar graphs for shorter time periods of five and 10 years. In each of the following graphs, the population of the steadily employed was constructed using the method explained in the text of the article, with a steadily employed worker being defined as one who worked in each of the five or 10 years in the relevant period. Those joining were all the employees who joined during that period (in the years for which there are detailed personnel data), and the cross-section data were the average of all the cross-section data in that period.

Reconstruction of the Principal Results for Short Time Periods

1992-1997 — *1997-2002* — *1992-2002* — *1999-2009*

All the Employees – Cross-Section Data
Joiners
Steadily Employed

It can be seen that the results similar to those obtained in Figure 1 are also obtained for shorter periods. The only significant difference is in the 1992-1997 period: the women-men salary ratio among the steadily employed rose and describes 20% more salary promotion among women than among men. This deviant finding is probably a result of the wage agreements signed in 1993-1994, which were pro-female. An examination of this period, which is shorter and gives greater weight to the wage agreements, therefore reflects their effect, although this conclusion should be established in more depth. In any case, looking at the 1997-2002 period indicates that subsequently to the slackening of the effect of the wage agreements, the picture reverted to a resemblance to our principal finding. All in all, looking at the entire 1992-2002 period, a development similar to our principal finding is obtained. In summary, it appears the principal results are not dependent on the sample, and repeat themselves in shorter time periods and at different times. The 1993-1994 wage agreements caused a deviation from the principal result, but they themselves deviated in their magnitude and significance, and therefore should not be regarded as a representative period.