

Assessing Research and Teaching Performance in Israel's Higher Education System: The Case Study of Ariel University

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Abstract

The aim of the current study is to examine research and teaching assessments in the higher education sector from a gender perspective and specifically the associations between individual attributes (gender, age, country of birth, and tenure), academic attributes (rank and faculty), and achievements in research and teaching (measured by bonuses awarded based on research excellence and student feedback surveys). The data were collected from Ariel University, where a unique system of faculty performance evaluation was in place between 2003 and 2012. The main findings of this study point to statistically significant correlations between gender and excellence in research: Female faculty members achieved slightly higher teaching scores than male faculty members while male faculty members showed superiority in research excellence scores. We also found more male faculty members in higher ranks than female faculty members. The findings of this study suggest that female faculty members may have gender-specific factors that explain their lower research achievements, such as factors related to work-family balance at fertility age.

Keywords

Higher Education, Faculty Achievements, Gender

1. Introduction

This study focuses on the performance quality in research and teaching in higher education from a gender perspective. Between 2003 and 2012, a special procedure was employed by Ariel University, awarding a 60% salary bonus to faculty based on their achievements in teaching and research. Our study focuses on the relationship

between faculty achievements and individual characteristics such as gender, age, discipline and rank.

In Israel, higher education institutions receive most of their budget from the government in the form of an annual grant, to be used at their discretion, without requiring them to report how this grant will be utilized (aside from the obligation to submit complete budgetary reports throughout the year). In addition, institutions are also budgeted by performance-based outcome indicators. The budgeting model operated by the universities includes two components: Teaching and research. In the teaching component, institutions are rewarded by how close they are to the student/faculty ratio determined by the Planning and Budgeting Committee (PBC) of the [Israel Council of Higher Education \(CHE\)](#) (21.5 for universities and 35.5 for colleges) and by the rate of graduates who complete their studies in the standard number of years. Each institution's performance on these measures is examined annually, using a formula that reflects how close the institution is to the goals. The closer the institution is to the goal, the greater the proportion of the maximum teaching budget it receives. In the Israeli model, there are no indicators that refer to the quality of teaching, such as satisfaction surveys. The universities themselves conduct teaching surveys each semester, but the scores on these surveys are not a consideration in the government's budgeting model. The research component of the budget is based on competitive resource allocation and is allocated according to the relative score of each university. The five outcomes measured to determine the scores are: competitive research fund awards (34.0%), other research fund awards (15.0%), training research students for Ph.D. degrees (15.0%), publications in scientific journals (34.0%), and MA graduates in the research track with thesis (2.0%). Each component has a relative weight reflecting its relative significance in determining distribution of the budget.

Assessing faculty activities and remuneration based on performance in teaching and research have become one of the most important topics in the past decade ([Gillespie, Hilsen, & Wadsworth, 2002](#); [Sinuany-Stern & Davidovitch, 2007](#); [Wadsworth, 1994](#)). Academic faculty members perform a broad range of activities in the fields of research, teaching, academic administration and community service. Academic freedom, however, inhibits supervision and reporting of faculty members' performance in different areas of activity ([Manning & Romney, 1973](#)).

Several methods are used to assess the performance of academic faculty. The primary instrument used to assess teaching is students' feedback surveys, conducted at the end of each semester, by distributing feedback questionnaires to students ([Hativa, 2013](#); [Kreber, 2001](#)). The faculty promotion process is also based on assessments of the performance of senior faculty. Since 1993, many academic institutions in Israel use self-assessments and senior peer assessments, which are performed once a year based on excellence criteria for research and teaching performance. The results of this assessment find expression in the salaries of faculty members, in the form of an excellence bonus. Our first studies on performance measures of faculty in teaching and research ([Sinuany-Stern & Davidovitch, 2007, 2014](#)) found no statistically significant difference in excellence scores when comparing male and female faculty members, although indications emerged of the following tendency: male faculty members received higher excellence scores for research activity, while in assessments of teaching practice, a significant gender effect was found in favor of the female faculty. Since the dominant criterion for promotion decisions in academic systems is research, the findings of that study pointed to the danger that the promotion of women in academic systems might continue to be slow.

Since 1993, the PBC of the Council for Higher Education (CHE) has allowed each university to grant bonus of up to 13% addition to the salary of each faculty member based on their excellence. In practice, due to the faculty union, each university constructed the requirements for excellence so that almost 100% of the faculty receives a 13% bonus for their academic achievements every year.

Different arrangements take place in Israeli colleges. Since colleges can grant only Bachelor and Master degrees, but not Ph.D., and since colleges were not budgeted for research, in 2003 the PBC allowed colleges to grant bonus of 20% addition to the salary to 20% of their best achieved faculty, 15% addition to the salary to another 20% of their second best faculty, and 7.5% addition to the salary to another 20% of the third best faculty. Altogether bonus awards were limited to only 60% of the faculty.

Each college selected and adopted specific elements of the PBC scheme, which was fundamentally intended to promote the quality of teaching in colleges. Ariel University was established as a college in the 1980s as the College of Judea and Samaria. In 2007 it became Ariel University Center, and in 2012 it became a university. As a college, Ariel was the first college to adopt the bonus system saw the bonus system as vehicle to encourage faculty to excel in research, in order to gain a university status. The criteria for a bonus included assessments for research, teaching, academic administration, and community service. The bonus system there followed the regulations for colleges until 2012. Thus our study concentrates of the data of 2012, the last year the college bonus

system was employed at Ariel.

The following three indices reflecting faculty performance quality were examined: (1) excellence score based on a combination of research and teaching achievements (students/assessments of their instructors' teaching were also assessed separately as a third index); 2) whether the faculty member received a bonus in the past (as a result, 2003 data were used only as inputs in calculating faculty bonuses in 2004). We looked the relationship between each of the above indices and faculty characteristics and their interaction with gender. The faculty characteristics are: age, seniority, country of birth, tenure, rank, and discipline. The variable "country of birth" has special significance in the context of higher education in Israel. Immigrant absorption has been one of Israel's major aims since establishment of the State of Israel. For this purpose, the ministry operates activities and programs aimed at assisting new immigrant scientists and R&D personnel. For example, immigrant scientists (holding post-graduate degrees and experienced in the field of research and development) are eligible for employment advice and aid for locating jobs in research and/or development in Israeli academia, industry, research institutes, and hospitals. The assumption is that immigrant scientists are Israel's future intellectual reserve and a national and strategic asset. Between 1989, when the Soviet Union opened its gates to citizens who wished to leave the country, until 2008, the number of immigrants from the Commonwealth of Independent States reached one million, almost one third of whom had academic degrees, and a significant portion were defined as scientists by the Ministry of Absorption and consequently eligible for assistance in integration in the academic and industrial sectors of the economy (Sinuany-Stern & Davidovitch, 2014). This study also offers an opportunity to explore the contribution of immigrant scientists to academic research and development, in view of the enormous economic and social resources invested in the integration of this group.

2. A Case Study: Performance Measures of Faculty of Ariel University

The aim of this research is to examine the associations between Ariel University faculty achievements in research (excellence score) and teaching (feedback score) and: personal traits (gender, age, years since immigration, and country of birth) and occupation-related factors (rank and faculty).

There are several ways to examine performance measures for academic faculty in Israel: a) Evaluation of achievements in appointment and promotion processes; b) Evaluation of teaching, using feedback surveys; c) Evaluation based on excellence bonus criteria—evaluated annually since 1993 in Israeli universities and since 2003 in Israeli colleges (but not implemented by the majority)—based on criteria in the fields of research, teaching, academic administration, and community service.

Eligibility for Excellence Bonuses Based on CHE Criteria—Comparing Universities and Colleges

The criteria for an excellence bonus in research include scientific publications, research grants, editorial positions in refereed journals, awards, positions as advisors and research dissertation committee appointments.

We note that the criteria for excellence bonuses in teaching include teaching quality measures and are reflected in feedback scores, classroom size, a distinction between undergraduate and graduate courses, initiatives and innovations in teaching, sophisticated use of computerized teaching instruments that are used by other instructors, preparation of computerized learning materials, video-taped courses, new teaching guide for a course, unique and new initiative in promoting teaching and learning, and publication of a teaching guide.

Faculty members eligible to submit applications for an excellence bonus had to be employed in a 2/3 full-time position or more, were not on sabbatical or in their first year of work at the institution. Faculty members completed a questionnaire regarding all the research and teaching activities noted above. A maximum of 60% of the eligible applicants who received the highest scores received an excellence bonus based on the guidelines listed in **Table 1**. Over the years, these guidelines were amended in response to faculty requests to include additional elements in the questionnaire.

3. Method

3.1. Part A

3.1.1. Study Population

All senior faculty members who were eligible to submit an application for an excellence bonus at the institution,

Table 1. Criteria for excellence bonus—universities and colleges.

	Universities	Colleges
Senior faculty member	v	v
Scope of position	Generally full-time	At least 2/3 full-time position
Period: previous year of activity	v	v
	Excellence bonus of up to 13%	7.5%, 15% or 20%
Salary bonus	Bonus of up to an additional 13% for dedicating full time to the institution	
	Total—up to 26%	Total up to 20%
Eligibility		60% of the faculty receive a bonus:
	No limit on the number of awardees (90% of the faculty receive a bonus)	The top 20% receive a 20% bonus, The next 20% receive a 15% bonus, The next 20% receive a 7.5% bonus. 40% of the faculties receive no bonus.

based on their academic achievements, in the period from 2003 to 2012, including those who did and who did not receive bonuses based on the research and teaching excellence criteria.

3.1.2. Research Questions

- 1) Was there an increase in excellence scores over the years by gender, and if so to what degree?
- 2) Was there an increase in the percentage of faculty members eligible to submit an application for an excellence bonus over time?
- 3) Was there an increase in teaching feedback scores over time, by gender?
- 4) Were there differences in personal traits (age, years since immigration, country of birth, and academic rank) over time, by gender?

3.2. Part B: The Connection between Performance Measures and Faculty Variables Comparing 2011/2012

3.2.1. Study Population

All senior faculty members who were eligible to submit an application for an excellence bonus at the institution based on their activities in 2011/2012, including those who received and those who did not receive an excellence bonus based on excellence criteria in teaching and research.

3.2.2. Research Questions

- 1) Is there any relationship between faculty characteristics and their interaction with gender, and excellence scores, and if yes, to what degree?
- 2) Is there any relationship between faculty characteristics and their interaction with gender, and receipt or non-receipt of a bonus, and if yes, to what degree?
- 3) Is there any relationship between faculty characteristics and their interaction with gender, and teaching feedback, and if yes, to what degree?
- 4) Which factors predict excellence scores, receipt or non-receipt of a bonus, and teaching feedback scores?

Each component received some predetermined points. The total score range was unlimited (range was 15 - 200 and varied over the years). The bonus was awarded according to the total number of points. However faculty members were required to earn points in research and reach a minimal average feedback score of 3.5 (on a scale from 1 to 5). The faculty characteristics examined were gender, rank, seniority, age, country of birth, and discipline.

4. Study Findings

4.1. Part A: Faculty Performance and Traits over 10 Years

In the first section we will present the findings concerning all senior faculty members who were eligible to submit an application for an excellence bonus at the institution based on their activities during the years 2003-2012, including those who did and those who did not receive an excellence bonus, with the aim of examining the connection between gender and other variables and faculty outputs over the years.

In this section we will present the research findings in several sections: First we will present the descriptive statistics of the study variables by gender over time, using means and graphs (Table 2).

Table 2. Study variables—means.

Gender	Year	N	Mean excellence score	% received bonus out of total	Mean feedback score	Mean rank	Mean seniority	Mean age	% Israeli born	% born in the USSR
Female	2003	23	13.96	-	-	2.04	5.78	48.61	73.9	4.3
	2004	23	14.61	30.4	-	2.04	6.78	49.61	73.9	4.3
	2005	23	19.95	43.5	-	2.09	7.52	50.17	78.3	4.3
	2006	28	26.38	46.4	-	2.07	7.18	49.29	82.1	3.6
	2007	32	25.16	46.9	-	2	7.5	49.41	75	9.4
	2008	30	29.3	43.3	-	2	7.5	49.53	80	10
	2009	43	28.58	39.5	4.37	1.93	6.86	49.23	76.7	11.6
	2010	49	29.86	38.8	4.37	1.82	6.76	50.08	77.6	12.2
	2011	61	38.9	44.3	4.31	1.82	7.2	50.8	80.3	11.5
	2012	67	42.7	52.2	4.22	1.81	7.34	51.07	82.1	10.4
	Total	379	30.3	43.81	4.31	1.92	7.08	50.01	78.62	9.22
Male	2003	57	14.42	-	-	2.88	5.44	51.49	52.6	29.8
	2004	60	37.02	65	-	2.9	6.17	52.23	51.7	28.3
	2005	69	35.86	50.7	-	2.78	6.3	51.59	55.1	26.1
	2006	78	38.35	61.5	-	2.71	6.44	52.58	52.6	29.5
	2007	94	34.13	55.3	-	2.71	6.48	53.66	58.5	25.5
	2008	94	42.55	55.3	-	2.77	6.89	55.61	56.4	27.7
	2009	107	41.31	45.8	4.23	2.68	7.11	56.07	61.7	23.4
	2010	125	44.76	48.8	4.16	2.64	7.46	56.19	64	22.4
	2011	143	54.2	52.4	4.13	2.55	7.67	55.87	65	22.4
	2012	150	61.9	59.3	4.12	2.53	8.19	56.4	66.7	21.3
	Total	977	43.86	54.33	4.15	2.68	7.06	54.73	60.09	24.77
Total	2003	80	14.29	-	-	2.64	5.54	50.66	58.72	22.47
	2004	83	30.65	55.41	-	2.66	6.34	51.51	57.85	21.65
	2005	92	31.84	48.9	-	2.61	6.61	51.24	60.9	20.65
	2006	106	35.14	57.51	-	2.54	6.63	51.71	60.39	22.66
	2007	126	31.85	53.17	-	2.53	6.74	52.58	62.69	21.41
	2008	124	39.35	52.4	-	2.58	7.04	54.14	62.11	23.42
	2009	150	37.66	43.99	4.27	2.47	7.04	54.11	66	20.02
	2010	174	40.56	45.98	4.22	2.41	7.26	54.47	67.83	19.53
	2011	204	49.63	49.98	4.18	2.33	7.53	54.36	69.58	19.14
	2012	217	55.97	57.11	4.15	2.3	7.93	54.76	71.45	17.93
Total	1356	40.06	51.39	4.2	2.47	7.06	53.41	65.27	20.42	

Findings show that excellence scores in this study increased over the years among both males and females, as presented in **Figure 1**. However, male faculty's excellence scores were consistently higher than scores of female faculty.

Several achievements were scored slightly differently over the years, and therefore the fluctuations that we see in the percentage of research bonus recipients over time do not necessarily attest to a trend in the proportion of bonus recipients, independent of gender, as presented in **Figure 2**, especially since similar fluctuations are retained when the data are viewed by gender. It is interesting to see that the difference between the percentage of male and female faculty members who received a bonus diminished over time.

Regarding feedback scores (students' evaluations of teaching), there was no increase over the years, not even by gender, as presented in **Figure 3**.

The third research question explored changes in the faculty's personal traits (gender, years since immigration, country of birth, and rank) over time (see **Figures 4-8**). The mean age of faculty members ranged from 50 to 55. Age increased slightly over time, where the trend for males and females was similar. However, female faculty's mean age was consistently lower than the mean age of male faculty. The mean age difference between males and females was 4 years. It is interesting that there is no uniform trend over time, by gender, in faculty seniority.

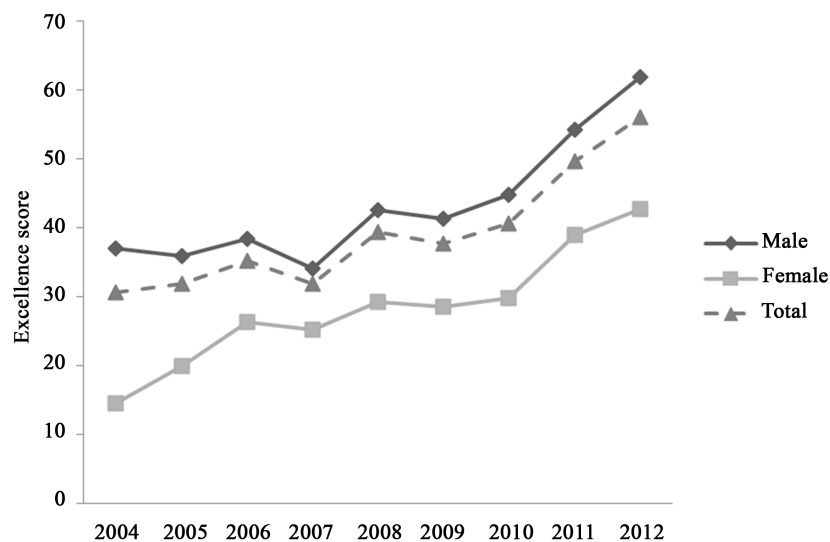


Figure 1. Excellence scores over time, by gender.

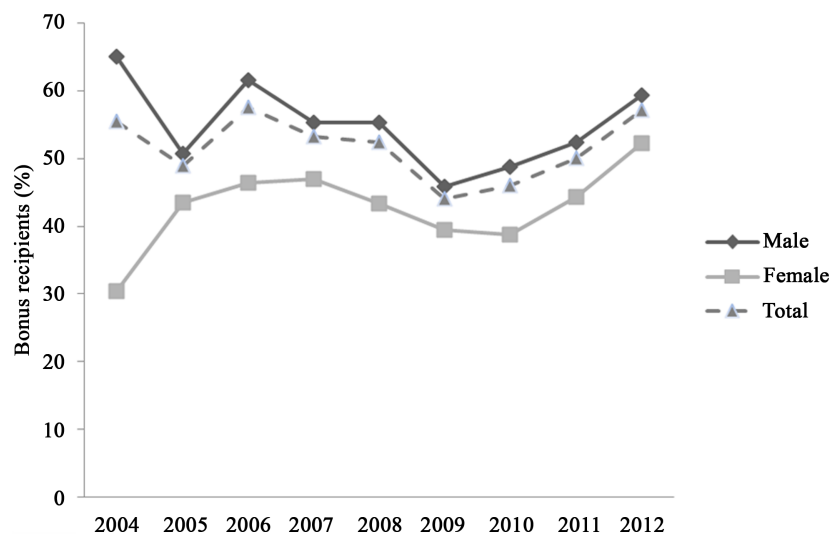


Figure 2. Bonus recipients over time, by gender.

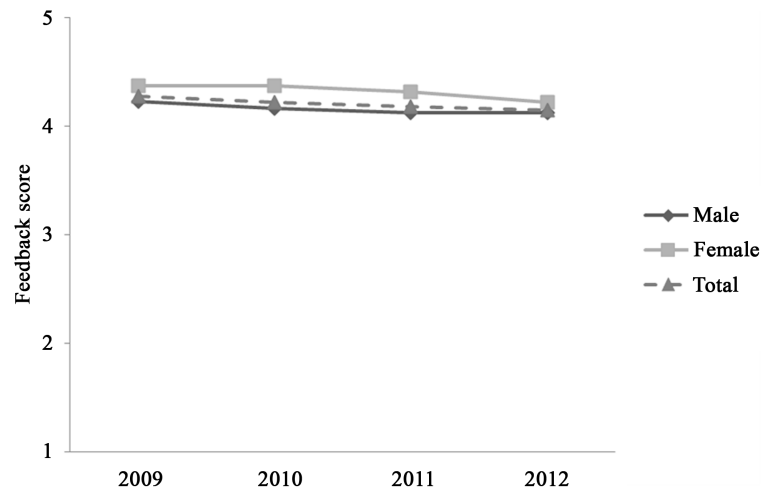


Figure 3. Feedback scores over time, by gender.

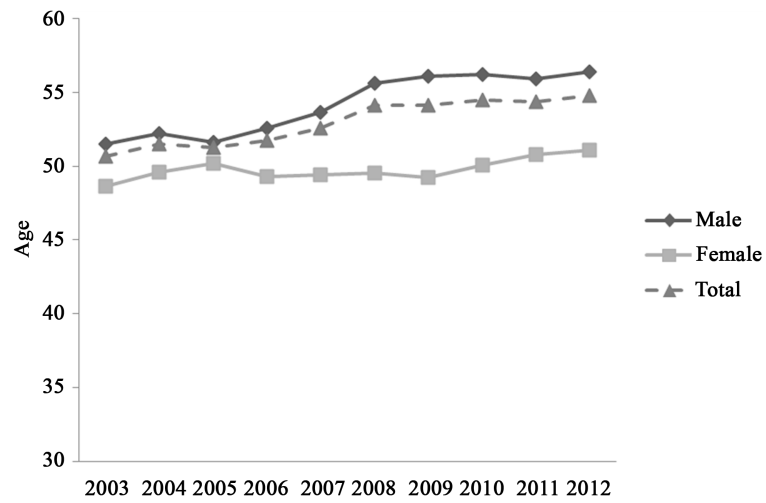


Figure 4. Age over time, by gender.

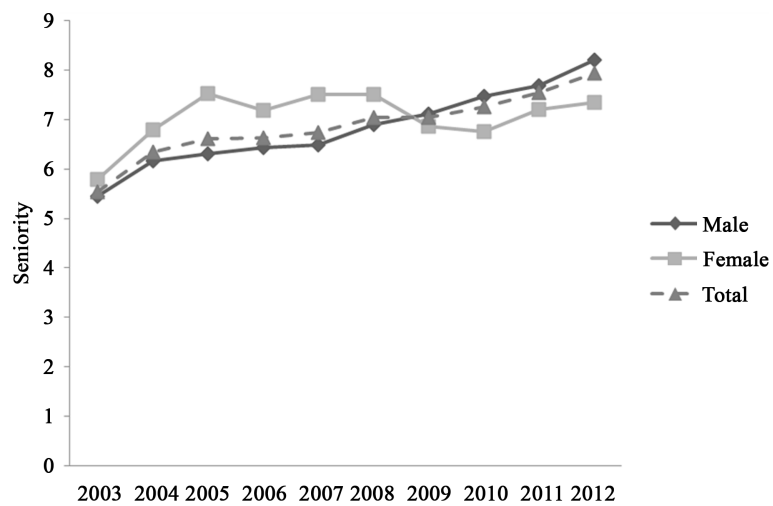


Figure 5. Seniority over time, by gender.

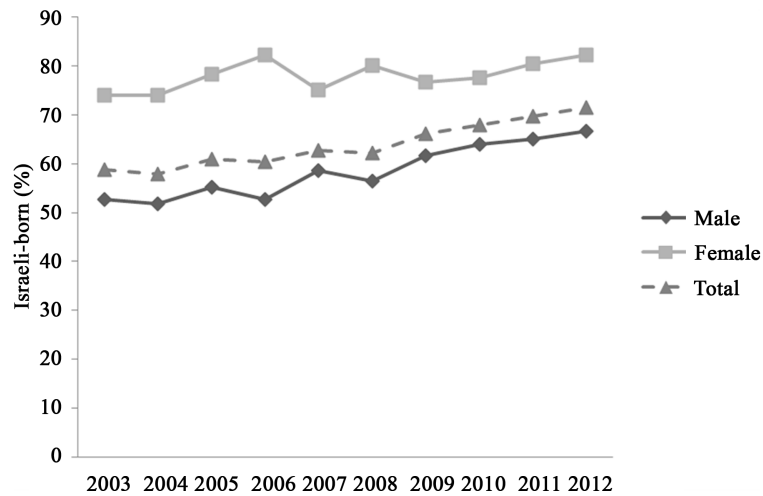


Figure 6. Percentage of Israeli born faculty over time, by gender.

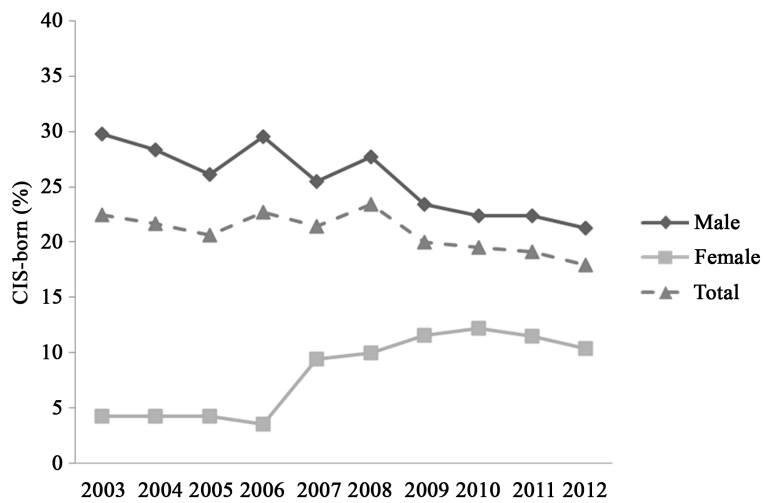


Figure 7. Percentage of USSR-born faculty over time, by gender.

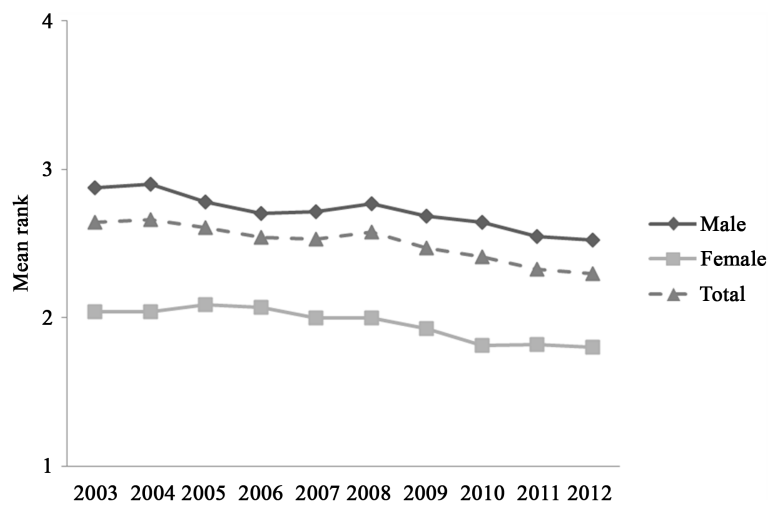


Figure 8. Rank over time by gender.

Over time, more than 73% of the female faculty members were Israeli born, while less than 57% of the male faculty members were Israeli born. Over time, the percentage of male faculty members born in Israel increased from 52% to 66%. There is a significant difference between males and females in terms of their country of birth. The percentage of males who were born in the USSR is much higher than the percentage of females who were born in USSR in each year, although the difference diminished from 25% in 2003 to 11% in 2012. The percentage of USSR-born male faculty dropped from 29.8% in 2003 to 21.3% in 2012, while the percentage of USSR-born female faculty increased from 4.3% in 2003 to 10% in 2012.

Over time, the mean rank of male faculty was consistently higher than the mean rank of female faculty. The decrease in rank indicates that new senior faculty members were hired at lower ranks. Indeed, the number of faculty members eligible to submit a bonus application, which was 80 in 2003, increased considerably to 217 in 2012.

4.2. Part B

In this section we will examine the connections between quantitative research variables using Person correlations. The research hypotheses that examine the gender-based differences in the quantitative variables will be examined using t-tests for independent samples, and the research hypotheses that examine the gender-based differences in the categorical variables will be analyzed using a chi-square test for independence. Subsequently regressions were run for the following variables: Excellence score (step-wise regression), receipt of excellence bonus (logistic regression), and feedback score (step-wise regression) using the research variables and interaction effects between gender and these variables.

The statistical tests were performed on the years 2011 and 2012 separately, using SPSS version 21. The significance level used for testing the research hypotheses was 5%.

4.3. Comparison of 2011 and 2012

To examine the differences between 2011 and 2012 in excellence scores, feedback scores, and receipt of excellence bonuses, we performed two t-tests for dependent samples (**Table 3**) and McNemar's test, respectively.

Although the excellence scores of male faculty members in 2012 were significantly higher than those of female faculty members in 2012, the difference between the percentage of male and female faculty members who received a bonus in those two years was not statistically significant, and the non-significant difference in favor of male faculty declined over time. Regarding feedback scores, the difference that existed in the female faculty members' favor also declined: In 2011 it was statistically significant but was not significant in 2012. In seniority, the difference that existed between male and female faculty members in males' favor was not statistically significant in either of the two years. In age, there was a statistically significant difference between males and females in these two years: Male faculty was consistently older than female faculty, based on mean age. The greatest difference between male and female faculty was in rank—male faculty's ranks were statistically higher than the ranks of female faculty in both of these years. This was also true for faculty—on average; men tended toward natural sciences, engineering, architecture, and communications, while women on average tended toward social sciences, humanities, and health sciences.

4.4. Regression Results 2011-2012

There is a similarity between the regression results for excellence scores in both years. Findings show that the standardized coefficients (β) of the variables common to both regression are similar, while the standardized

Table 3. Findings of t-test for Differences between 2011 and 2012 in excellence scores and feedback scores.

Variable	N	2011		2012		t
		M	SD	M	SD	
Excellence score	202	49.26	56.49	60.13	57.48	-4.26***
Feedback score	208	4.18	0.60	4.15	0.57	0.82

*** $p < 0.001$.

coefficients (β) of the variables that are not common (Male, Male \times architecture and communications) are low. Most of the variables that explain excellence scores in these two years are related to gender and its interaction effects with other variables (seniority, age, and rank). The results of the regression equations in both years are similar—In both case they explain 41% and 42% of the variance, respectively. The signs of the common variables in the regressions for both years are also identical. The variables that were added to the regression for 2012 add only 3% to explained variance.

The regression explained a small percentage of the variance in both years: 13% in 2011 and only 6% in 2012. In each year there are only two statistically significant explanatory variables. There is a large difference between the results of the regression in both years. Age is a variable that is common to both years—and in both years, feedback scores decline with age. Age is more significant a predictor of feedback scores in 2011 than in 2012. The second variable is not common to both regressions. In 2011, the interaction effect of gender and age emerges as a statistically significant explanatory variable, but its contribution was limited to 2%.

Regarding the regression on receipt of excellence bonuses, the Odds Ratio indices of the variables common to both regressions (age and seniority) are similar. These two regressions explain a similar percentage of the variance (45%). The variables that explain most of the variance are identical in both years: age and seniority. Since the number of faculty members in architecture and communications is very small (12% or 6% of the total faculty), their impact on the regression is limited (5%) and only affects the faculty members in these disciplines.

5. Discussion

In the current study, which examines the academic outputs of academic faculty over the years, we found that age is the sole variable that was found to be statistically significant in the three predicted variables (excellence scores, receipt of bonus, and feedback scores) in the two years that were studied (2011 and 2012). Furthermore, in both 2011 and 2012, stronger ties were found between seniority, age, and rank and excellence scores among males than among females. Among the men, all these ties were statistically significant, while among females no ties were found between age, rank, and excellence scores. These ties indicate that among females there may be additional variables that explain the low achievements, perhaps variables related to their key role in the family (Sinuany-Stern & Davidovich, 2007) and the age of fertility, to which a considerable share of the senior female faculty belong, being on average younger than the men. Age is more significant in predicting feedback scores in 2011 than in 2012. In 2011, a stronger relationship was found between age and feedback scores among males than among females. Seniority increases the chances of receiving an excellence bonus, while age decreases the chance of receiving an excellence bonus, with no significant difference between 2011 and 2012. Most of the variables that explain excellence scores in these two years are related to gender and its interactions with other variables (seniority, age, and rank). The results of the regression equations in both years are similar—they explain 41% and 42% of the variance, respectively. The signs of the variables common to the regressions of both years are also identical. The variables added to the regression of 2012 are negligible, and add only 3% to explained variance. The gender effect is apparent in the excellence scores for research and teaching: male faculty members received higher excellence scores for research activities.

Although the proportion of males who received an excellence bonus is consistently higher than the proportion of females over time, the difference diminishes with time, and in the years 2011 and 2012 the difference between the percentage of males and the percentage of females who receive an excellence bonus did not reach statistical significance at all. Similarly to excellence scores, the regression equation is influenced especially by age and seniority but not by gender variables. Rank only affects the regression for 2011, but not the regression for 2012. Here also, the results of the regression are good and explain 46% and 44% of the variance, respectively. The signs of the variables common to the regressions of both years are also identical. The variables that were added to the regression in 2012 are negligible, and add only 4% to the explained variance.

Although consistently over the decade from 2003 to 2012, feedback scores of females were higher than those of men, and the difference was statistically significant in 2011, this difference decreased in 2012 and was no longer significant. In the regression on feedback scores, age was the only explanatory variable common to both years. In total, the quality of the regression was low and contributed only 10% to explained variance.

Two variables express evaluations of the achievements of senior faculty: The first in importance is rank, and the second is excellence scores. Both components have an impact on the salaries of senior faculty. Rank has a long-term impact while excellence scores may change dramatically from one year to the next according to the

faculty's achievement in the preceding year, but its impact is significant and may account for up to 20% of the salary. In ranks, the difference between males and females is most significant and consistent over time. Men have higher ranks than women. For example, 24.67% of the male faculty has a rank of full professor while only 4.48% of the female faculty has this rank. And yet it is interesting that there is no statistically significant difference in receipt of excellence bonus between males and females, despite the fact that over time we consistently see that males' excellence are higher than excellence scores of women. However, in research excellence scores, male faculty members have significantly higher scores than female faculty.

Since research is the dominant criterion for promotions in academic system, the findings of this study point to the danger that the promotions of female faculty will continue to be slow, because their research achievements, reflected in the excellence scores, are inadequate, and these also affect their academic rank in the promotion process. The findings of the current study raise a policy question concerning the initiatives needed to achieve gender equality in the academia, in research and in teaching, in view of the fact that the [Council of Higher Education of Israel](#) also views women's representation in senior ranking academic faculty as a significant issue. The CHE (see CHE website, 2012) notes that efforts should be directed to bring women in the academia by recognizing the value of their research and their opportunities for promotion. Such steps should eventually close the gap between women and men in senior faculty positions regarding tenure and academic leadership. We believe that women who are able and willing to join academic faculty, have the possibility of doing so in universities and colleges.

Overall, we found that a gender effect that is apparent in excellence scores (in favor of male faculty members), but no gender effect is apparent in teaching scores based students' feedback. Seniority was found to have a significant positive effect on excellence scores, while age had a negative effect on all three measures: excellence score, receiving bonus, and teaching feedback.

Additional variables related to female faculty members should be explored to explain these low achievements, possibly variables related to females' free time for self-refreshment, their central role in the family during the fertility age, which is characteristic of a considerable percentage of the senior female faculty, who are younger than their male counterparts.

6. Conclusion

The conclusions of this study are subject to the limitations of this study, which was conducted as a case study and therefore offers a limited perspective on the studied topic. As this is an exploratory study, this topic should be further studied in other institutions of higher education to offer a comparative perspective and studies these effects on a larger scale.

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