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Is the Marginal Effect of Education on Income Diminishing?

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Abstract

This study seeks to determine the effect of education on income for wage workers in Israel, for the years 2005 – 2015. The hypothesis of this study is that the marginal effect of the number of years of education on income will be declining, such that at a certain point, it will be zero or even negative. The results of the study show that until 2012, the marginal effect of the number of years of education on income is linear. However, beginning in 2013, the marginal effect of the number of years of education on income is declining.

Keywords: Education; Income; Wage; Israel; Age.

JEL: j3

1. Introduction

Regarding the size of the effect of education on income, there are practical effects that occur both on a personal and national level. On a personal level, acquiring an education is a process which is expensive, both because of tuition costs and the opportunity cost of not working, or working less. Therefore, it is important to know what the return on this investment is. This is true, even on a national level. Education in general, and academic education in particular, require large expenditures. Similarly, to lose the labor force of the students while they are studying has an impact at the national level. Over the years, in most countries, an academic degree is considered to be of higher quality than professional certification, and that the holder of an academic degree is considered in society as being of higher quality, relative to a person who holds only professional certification.

According to Maclean and Wilson (2009), many colleges have been established in the last few years. This has led to a dramatic rise in the number of academic degree holders. As such, the integration of academic degree holders into the work force has become more challenging. In order to distinguish among all of the candidates, the quality of an academic degree is judged not only according to field of study and type of degree, but also by the quality of the institution where the degree was earned. Bosch

and Charest (2009) posited that due to technological, societal, and economic changes, an academic degree is no guarantee of a job. There has been a recent increase in the demand for specifically tailored vocational training and not necessarily a protracted liberal arts education, which is available at many academic institutions. Today, firms (and even governments) encourage young people to focus on professional certification. The student receives a partial academic education, yet benefits from an improved and refined professional proficiency by working at companies as part of the learning process. Moreover, many companies even commit to hiring these students after they finish their certification while they are still in school. Therefore, it seems that in today's world, professional certification has become an important element that aids in joining the labor force.

1.2. review of the literature

While professional certification may be an important way for many people to enter the labor force, Ben-David (2010) shows that people with academic degrees enjoy higher incomes and earn promotions at a higher rate than people with professional

or vocational certifications. Iannelli and Raffe (2007) show that despite significant changes in the labor market, with the market flooded with educated people during a time where there is a specific demand for those with professional training, society still places the academic degree at the top of the occupational pyramid, especially if that degree was earned at a top institution. Therefore, it is expected that degree holders will be considered higher quality employees and will benefit from more promotions and higher salaries. People in society maintain a perception which is no longer valid regarding the demands of the labor market. An academic degree may be a reasonable proxy for personal characteristics like diligence, work ethic and broad knowledge of a subject. However, all these traits come with a low level of expertise. Therefore, the individual must also undergo professional certification for more efficient assimilation into the labor force. It may be that, to a certain extent, an academic degree and a professional certificate are complementary goods and not necessarily substitutes. Clarke and Winch (2007) suggest that in order for integration into the labor force to be more efficient, academic institutions must institute reforms in order to meld academic degree programs with professional training. Change in the socio-economic perception of society is required in order for those with professional certification to earn promotions and better work conditions. Certain countries have begun applying these reforms (for example, the US, Germany, and Australia). However, some have questioned whether the slow process and amount of oversight are having a negative impact on the education people are receiving from these programs.

When examining the topic of education, we must look to the academic literature regarding human capital. Human capital is a composite mixture of an individual's traits and skills which raises or lowers the individual's value in the eyes of society. Human capital includes age, sex, level of health, professional experience, education level, and other qualitative factors. Despite this, most of the professional literature links human capital to education and proficiency, in a way that is statistically significant. In practice, education is considered the main and most important factor when weighing human capital. However, according to Becker (2009), changes in education that were begun decades ago have led to changes in the way that human capital is measured in a number of countries (though mainly in the US). If in the past the value of human capital was measured primarily by way of the number of years of education, today this value is also measured by the educational institution, such that an increase in the importance of attending college in the United States has led to a sharp increase in the number of academic degrees (which has turned the American public into one that is, allegedly, better educated). As a result of the excess of academically qualified citizens, companies and organizations began to look at the type of educational institution attended as it pertains to measuring human capital.

Iannelli and Raffe (2007) claim that the increase in the supply of education has led to a more accurate re-examination among people and companies that want to measure human capital. Take for example the idea that an academic education is considered better than professional training, and a university is considered of higher quality relative to private colleges. The reasons for this are rooted primarily in social views and less in factual basis. For instance, there is a social stigma that graduates of professional training courses, and not academic institutions, are people with a low level of individual ability, poor motivation and poor discipline when compared to academic graduates. According to Modood (2004), the increase in academic proficiency and the greater accessibility to academic institutions led to significant social changes such that today, women as well as other minority groups are taking part in institutions of higher education. The ability of groups who are targets of prejudice, to integrate into the academic world, has led to cultural changes. Minority groups continually increase their human capital by enrolling in academic institutions with the motivation to complete their studies because they want to make up for other forms of discrimination such as racism or social status. Similarly, many women also join institutions of higher education because they want to change their social status.

Within the concept that an individual can get either certification or a degree, and that a person who chooses certification is somehow "less worthy," there is no discussion of the areas of interest of the individual, economic resources available, and other demographic aspects which must affect the decision to pursue (and earn) professional certification instead of an academic degree. If so, we can see that the differences in education are not necessarily proof of the degree of human capital, since academic graduates do not necessarily possess the experience and skill to exploit the knowledge they have acquired. Therefore, Raffe (2003) raises the idea that the merging of academic education and professional training constitutes the ultimate solution which should significantly increase the human capital of society. This process can be tailored by looking at three components. The first component is based on building a new study program that combines professional training with a suitable field of academic study. In this way the individual benefits from a broad academic education and the development of practical skills. The second component encourages organizations to get rid of the distinction (and flawed notion) that exists between a person with an academic degree and one with professional certification. Most of an individual's practical training happens in the work place as a part of one's job and not necessarily outside of the place of employment (such as in the lecture halls). The third component seeks to reduce the amount of time required to study. In most cases, academic programs last for three or four years and sometimes there is a focus on subjects that are

not relevant to any job one is likely to do once one enters the workplace. Or, there are changes in society or technology that no longer match the curriculum.

In contrast to pursuing an academic degree, professional training is considered shortened and focused, in order certify the individual for specific expertise within a short period of time and to integrate that individual quickly into the workforce. Oketch (2007) claims that the influence of education is not limited to the career area of a single individual. The general level of education in a country has a greater influence over the whole society, including scientific and social development. The discussion of education is usually related to how developed the country is and the character of the society that makes up the country. At the end of the day, higher education and professional certification greatly develop every aspect of society. For example, the concentration on academic or practical education decreases the crime level simply by reducing the number of young people on the streets. Education allows for the development of technology and the development of social perspectives, while professional training increases the chances of the individual to join the labor market, even if one doesn't have the resources to acquire an academic degree.

Another claim raised by Baum and Lake (2003) postulates that education makes possible the shaping of a society with liberal and democratic perspectives. The choice to pursue professional training or an academic degree allows for the expression of differing views and opinions. The existence of differing viewpoints is likely to create dilemmas when searching for solutions to various social issues where a moral solution is required. In a similar vein, Halliday (2000) claims that the significant difference between an academic education and practical training difference is mainly in the realm of critical analysis (which is more prevalent in an academic education). Despite this difference, both types of education help to develop a more friendly, fertile, and progressive society. Both types of education encourage teamwork, self and organizational management, interpersonal communication, problem identification and management, and personal development. Education influences society in ways that are not only economic, but also in the development of friendly relationships, communication, ethics, and general social outlook. Studies by Toolsema (2004) and Bosch and Charest (2012) show that, in the last four decades, the demand for academic expertise portrayed above remained the same while the demand for professional expertise changed significantly. Therefore we can understand why, recently, there is a reduced demand for general academic elements and a greater demand for concentrated technical knowledge, which professional training emphasizes. This change forms the basis of the discussion of the question "what is the proper education for the economy and the business world?"

Diverse societies specifically demand to employ people with professional certification. Academic education is no guarantee of finding a job because the supply of students with academic degrees is, in many instances, outpacing the supply of jobs in the graduates' professions. Viewing the world as if higher education guarantees a quality job creates a situation such that the market for graduates with academic degrees is saturated. These graduates' ability to integrate into the labor force is uncertain.

According to Ben-David (2010), in Israel in the 1980's a person with 16 years of education or more could expect to find a job with 95% certainty. By 2010 the level of certainty fell to 85% and the number of university graduates is significantly higher. In addition, during the 1980's the number of students attending university was 54,000, but only a decade later this number had doubled. By 2012 the number of students was estimated to be about 250,000. However, a person with only 12 years of education or less has a significantly reduced ability find a job in today's world relative to a person with an academic degree. Therefore, we can argue that education and cognitive skills in general guarantee personal and economic development across all countries, whether developed or developing (Hanushek and Wobmann, 2007).

According to Harris, Handel, and Mishel (2004) one of the more difficult problems regarding education is the need to identify future challenges. The educational standard of society must be maintained at a suitable level so as to address challenges that are, supposedly, to be expected. Acquiring education which is not suitable for the realities of the real world may very well lead to difficulties adapting to different challenges. Therefore, acquiring education in a given field which is supposedly seen as "prestigious," could very well be inefficient (if not irrelevant) regarding social, economic, and political realities that the individual and society must face in present times. In spite of the understanding that one must match one's educational field with the demands of the marketplace, there still exists the viewpoint that an academic degree from a prestigious university will help the individual enter the labor force, irrespective of the field in which the degree was earned or the employment prospects upon graduation. Similarly, according to Brown (2003), prestigious universities pull in students from all over the world. Acceptance and completion of a degree program from a prestigious university is a way of bearing witness as to the quality of the person, regardless of what degree was obtained. Similarly, the level of the degree, and not necessarily the field of study or even the grades achieved, is considered important, and in many cases, advanced degrees are a requirement for entry level work in certain fields. In Brown's study of 100 students in the United States, 99 said they

would prefer to have a Master's degree with average grades, and only one student would prefer to have a Bachelor's degree with perfect grades. Students seem to be of the opinion that a Master's degree constitutes a significant advantage relative to other certifications in the pursuit of a career.

While it may be that society places a value on the level of a degree earned, Leitch (2006) suggests that in terms of the economy, there is no import to level of certification, only to level of expertise. In his report on careers and education published in Britain in 2006, Leitch maintains that universities, colleges and schools are required to bring changes and reforms to their educational programs such that the programs will concentrate more on developing expertise among the students, and less on the amount of education, which at times is not effective for the economy in general, or the individual in particular. The report notes that people other than university heads need to recognize technological and economic changes and to adopt them. This requires individuals to change traditional social attitudes that they may harbor whereby professional certification is viewed as having lesser value than an academic degree. In an era where expertise is important and not necessarily the type of degree, an outdated view such as this must change. Professional training, at the end of the day, matters just as much as an academic degree for the economy as well as employment. In light of the above, various countries have begun enacting reforms whose goals are to integrate broad academic education with practical training that directly meets the demands of industry. Take for example Maclean

and Wilson (2009) who show that students in the US and Germany enjoy broad educations, but there is a strong emphasis on professional training and these students take an active part in the workplace during their studies. Integrating work with school can certainly benefit the students later in their career path when they are looking for work, when asked to demonstrate tangible skills. This is an accepted practice in Germany that has proven itself over time. This method has been received with much criticism in the United States. With this method, courses of study in Germany allow for professional study in the classroom and in the workplace, such that companies will often adopt and support students and, in many cases, reserve a job for them upon graduation. On the one hand students who undergo professional certification benefit from academics in the classroom, but on the other hand they spend most of their time in the workplace where they acquire expertise suitable for the industry in which they work. This process guarantees that the students who choose this course learn less academically and don't receive a degree, but they receive critical professional training and the promise of a job when they finish their programs.

One of the problems raised by the integration of work training and studies is the need to establish regular study which doesn't suffer from pressures related to work. According to Maclean and Wilson (2009) in countries such as Germany, Australia, and England there is strict supervision by the government regarding the certification and field of study. The length of study is estimated to be between a few months to two years and the students must meet a certain standard in order to obtain certification. A similar level of study to an academic curriculum in terms of content, but not in terms of scope, and therefore most countries rate the certificates by level instead of degrees. That is, first, second, or third level certification is not the same as a Bachelor's, Master's, or Ph. D. At the end of the day, students who choose to learn a high level of certification, for instance level three, benefit from being able to integrate into the job force more quickly and with higher wages, such that many times their integration into the work force and their career advancement is higher than those with academic degrees. In Australia and Germany, this method has been shown to be highly successful such that with each year, students are demanding more professional certification and most of them already work in jobs in their given professions before having finished their studies. Take for example the state of Victoria in Australia where the number of students enrolled in professional certification programs was estimated to be around 5,000 in 2003. By 2006 the number was estimated at 12,000, whereby most of the students were already working before they finished their course of study.

The relationship between education and wage level

The social viewpoint in existence today in Western countries is that in places where the work is technologically intensive, the workers are required to hold advanced academic degrees in fields like engineering, or other degrees whose terms of study are three years or more. Despite this, Maclean and Wilson (2009) suggest that in the United States, most of the technology companies employ workers who are professionally certified and only slightly less than a quarter of the employees are degree holders. The reality is that there has been a prolonged shortage of qualified professionally certified workers. At the end of the day the shortage of qualified workers increases the demand and increases the level of wages significantly for suitable employees. Companies do not have difficulty recruiting university graduates and engineers, whose numbers have increased consistently and accordingly with the market demands. However, companies have great difficulty recruiting professionally certified workers. Therefore, companies offer their professionally certified employees incentives like higher wage packages, comfortable job conditions and other such benefits. However, Neuman and Ziderman (2003) claim that at the end of the day, a person who acquired an academic degree has a greater overall ability than a person who

acquired professionally certified training. The period of study and investment in an academic degree is prolonged and broader in scope, and this is expressed in most cases by the higher wage levels of holders of academic degrees as opposed to those with only professional certification.

A study by Ben-David (2010) in Israel shows a consistent trend, over a span of years, of a significant gap in wages between educated workers (including skilled workers) and uneducated workers. This study maintains that jobs which require high levels of expertise command higher wages. In addition, most workers with higher education enjoy faster promotions and an increase in wage levels, relative to workers with lower education levels. Other findings from the Israeli report show that there is a direct connection between the quality of the degree and wage levels. That is, the level of certification is measured by the certificate (professional training or academic degree) and also by which institution (university or college). In general, it seems that college graduates earn up to 30% less than their colleagues from universities in professions like economics, accounting, law, computer science and engineering. Similarly, professions which require expertise and higher levels of intellectual skills like mathematics or sciences raise the wage level of these graduates even higher. However, when looking at the wage levels according to level of education, it seems that holders of Master's degrees earn more than holders of Bachelor's degrees, as well as holders of a Ph. D (Navon, 2004). A possible explanation is that a person holding a Master's degree has more expertise and experience than a Ph. D (because the pursuit of the Ph. D "wasted" more time learning), and therefore commands a higher wage. Studies done in other countries yielded similar results, such as Dominguez and Gutierrez (2013), who found that holding a Ph. D doesn't bring with it better working conditions or benefits relative to holders of lower ranked degrees. One of the reasons for this is that, frequently, holders of Ph. D's work for government institutions and in the public sector. Also, there is a lot of temporary work relative to the private sector, which is also true of workers who have a Ph. D.

1.2. Gender Wage Gaps

When looking at gender differences we see that women earn less than men, even when both are equally qualified. This is nothing new and only strengthens the idea and old truth that women face prejudice in the workplace, even when they have the same expertise and skills as men. For example, a woman with a Master's degree in the private sector may very well earn up to 50% less than a man who does the same job and has the same expertise. In practice, in most countries in the world, women earn less than men. For example, Navon (2004) found that in Israel women earn 17% less than men when both hold the same academic degree and work in the same profession.

Materials and Methods

From reviewing the available literature we see that higher education allows for quicker integration into the job market. Similarly, an academic degree is still considered to be more prestigious (especially in the eyes of the employers), makes possible a wider range of promotions, and commands a higher salary. Therefore, we expect that an increase in the number of years of education will translate into an increase in income. On the other hand, we see that in the last few years, the issue of professional expertise has become important. As is known, professional certification (which requires fewer years of study) delivers more professional expertise than an academic education (which requires more years of study). Therefore, the professional certification process is expected to reduce the amount of time that the increased education requires in order to be reflected by income. The hypothesis of the study which comes out of these two questions is that the marginal influence of the number of years of education on income is a decreasing function, such that at a certain point the effect will be negligible or negative.

Description of the Data

The research was based on surveys regarding household income, from the Central Bureau of Statistics. Until 2011, the relevant survey was "The Combined Income Survey." Beginning in 2012, the Bureau of Statistics combined the income survey with an expenditures survey called "The Household Expenditure Survey" (which includes income as well). The research was done for the period spanning 2005 – 2015. The goal of the research was to determine whether or not there was a change in the structure of household income, over that period. The database for the empirical study includes only employees who worked full time, over the period. The self employed, those who did not work at all, and those who worked part time have been eliminated from the sample population. The following have also been eliminated from the sample: those who have had fewer than 8 years of schooling (no high school) or more than 22 (number of years to receive a PhD); those over 66 (retirement age) or under 25 (in Israel, the overwhelming majority of people under 25 have yet to fully integrate into the workforce); those whose last year of education was in a Yeshiva (religious Jewish school). A Yeshiva education is generally irrelevant to the work force, and therefore the number of years of education is not expected to have any influence

on income. Also, a portion of the Yeshiva students have many, many years of education (sometimes more than 40), and this is an extreme case.

Separating the sample into Jews and Arabs

The population in Israel is divided into two main ethnic groups: Jews and Arabs. Jews make up the majority and Arabs constitute the minority. There are enough differences between the two groups such that the Arabs have a more difficult time integrating into the workforce, and it is reflected in income disparity (see Table1) and work force participation.

Table 1: Wage by ethnicity and gender

Year	Arabs		Jews	
	Women	Men	Women	Men
2005	5,578	7,715	7,500	12,579
2006	5,351	7,076	7,747	12,847
2008	5,193	7,304	7,968	13,318
2009	5,193	7,274	7,992	12,779
2010	5,569	6,783	7,943	12,731
2011	5,469	6,814	7,879	12,711
2012	5,793	7,392	8,659	13,946
2013	5,745	7,297	8,541	13,940
2014	5,773	7,979	8,808	14,082
2015	5,938	8,269	9,270	14,881

This is shown by the following two variables: "income disparity" and "work force participation." Income disparity can be gleaned from Table 1. In 2016 68.1% of Jews participated in the work force, as opposed to 45.3% for Arabs.

In addition, the education levels in the workforce, for Arabs, is very different than in the workforce for Jews. The data for education, by ethnicity, is listed in Table 2.

Table 2: the distribution of workers by years of education, according to ethnicity

Years of education	8		12		15		22	
	Arabs	Jews	Arabs	Jews	Arabs	Jews	Arabs	Jews
2005	0.10	0.02	0.53	0.37	0.17	0.29	0.20	0.32
2006	0.11	0.02	0.53	0.35	0.17	0.29	0.19	0.33
2008	0.12	0.02	0.55	0.36	0.15	0.29	0.19	0.33
2009	0.09	0.02	0.52	0.36	0.12	0.28	0.27	0.33
2010	0.09	0.02	0.54	0.35	0.13	0.30	0.24	0.33
2011	0.09	0.02	0.52	0.35	0.14	0.29	0.25	0.34
2012	0.08	0.01	0.50	0.35	0.14	0.27	0.28	0.36
2013	0.06	0.01	0.53	0.34	0.11	0.29	0.30	0.36
2014	0.06	0.01	0.53	0.33	0.14	0.29	0.27	0.37
2015	0.06	0.01	0.54	0.33	0.15	0.27	0.25	0.39

According to the data in the table, the level of education among Arabs is much lower than that among Jews. Because of these differences, this study will deal with each of the above groups separately. This separation allows for comparison between groups.

Description of the Model

The dependent variable in the model is the real income of employees, designated “Income.”

The independent variables are:

Number of years of education, designated “school.” As previously stated, the goal of the study is to determine the hypothesis which states that as the number of years of education increases, income does as well, but at a decreasing rate. Therefore, it may be that at a given level of education, additional schooling will not further increase income, and may even reduce it. Therefore this variable appears twice in the model: once linearly, and once squared.

The age of the employee is denoted as “age.” The accepted hypothesis regarding this variable is that as one gets older, income increases, but the rate of increase decreases over time. It may be that at advanced ages, further aging will lead to a decrease in income. Therefore, this variable also appears twice: once linearly and once squared.

A dummy variable for men (which takes a value of 1 for men and 0 for women), denoted as “man.” Also, in order to determine the effect of number of years of education for men as opposed to women, this variable appears a second time in the model as “man*school,” denoting the product of “man” and “school.”

A dummy variable for single individuals takes a value of 1 for single, 0 for married. This variable is denoted as “single.”

Accordingly, the model is as follows:

$$\text{Income} = \beta_0 + \beta_1 \text{school} + \beta_2 \text{school}^2 + \beta_3 \text{age} + \beta_4 \text{age}^2 + \beta_5 \text{man} + \beta_6 \text{man} * \text{school} + \beta_7 \text{single}$$

Results and Discussions

The results of the regression for Jews appear in the table 3 :

Table 3: Results for Jews

Variable	Year									
	2005	2006	2008	2009	2010	2011	2012	2013	2014	015
Constant	-18,449	-16,937	-21265	-23,505	-24,256	-24,259	-32,075	-31,529	-40,643	-32,308
School	836	805	813	931	904	860	1,780	1,701	1,891	1,596
school ²	***	***	***	***	***	***	-27	-27	-32	-21
Age	627	564	772	798	835	876	880	909	5,922	4,444
age ²	-6.5	-5.5	-7.8	-8.1	-8.4	-9.0	-8.6	-8.9	-283	-197
Man	***	-2,038	-3,120	***	***	***	***	-3,093	***	-2,723
Man*schoo l	387	528	619	368	367	359	396	608	393	600
Single	-1,670	-1,494	-1,418	-1,440	-747	-1,471	-1,621	-1,555	-1,761	-1,925
Radjusted	0.24	0.25	0.24	0.24	0.23	0.25	0.22	0.21	0.23	0.26

*** The coefficients for these variables were not statistically significant and were removed from the regression

The data from Table 3 shows that for the years from 2005 until 2011, the coefficient for the number of years of education is positive, while the coefficient for the number of years squared is not statistically significant. For these years, the number of years of education and income have a linear relationship.¹ However, beginning in 2012, the picture changes since the coefficient for the number of years of education squared becomes negative and statistically significant. The implication is that the marginal impact of the number of years of education on income decreases as the number of years of education

¹ This was also the result when the regression was run using the transformation of the natural log instead of the squared regression.

increases. Until 2015, there is still no relevant region over which the increase in the number of years of education reduces the income, since the absolute value of the coefficient is relatively small. As a result, the number of years of education where income begins to decline (that is, the point at which the product of $\beta_1 * \text{school} + \beta_2 * \text{school}^2$ begins to decrease) is above 30, which is not in the relevant region. The conclusion is that for Jews, for years after 2011, an increase in education increases income. However, the rate of increase is decreasing as education increases.

Another interesting result is that the coefficient for the variable “age” is positive, while that of “age squared” is negative. The implication here is that as one gets older, income increases. However, it increases at a decreasing rate, until at a certain point an increase in age causes a decrease in income. These two variables, together, show that for Jews, the maximum income is reached at age 49 (as of 2005) to 52 (as of 2015).

Another result that comes out of the regression demonstrates the wage gap between men and women. The coefficient for “man*school” is positive for all the years. This means that among Jews, the gap between income for men and women grows as the number of years of education increases.

In some of the years, the coefficient for “man” was statistically significant and negative. It would appear that this result implies that men earn less than women. However, this conclusion is faulty. In the model, the effect of gender on income is composed of “man” as well as “man*school.” If we look at both of these effects together, it seems that for both variables, in all of the years, for eight years of schooling or more (the minimum education level in the study), the gender effect is positive. If we look at the year 2006, for example, the coefficient for man is -2,038 and the coefficient for man*school is 528. For a man with 8 years of education, the combined effect is: $-2,038 + 528*8 = 2,186$, which is of course positive.

One possible reason for this is the difference in career choices between men and women. Table 4 contains data for the percentage of workers in various academic professions in 2011¹ according to gender, for Jews. Column 2 displays the percentage of men, column 3 displays the percentage of women, column 4 displays the difference between them, and column 5 shows the average wage (of both men and women together) for the given professional field.

Table 4: The percentage of Jewish workers, by gender, in academic professional fields in 2011

Occupation	Men	Women	Difference between men and women	Average Wage
1	2	3	4	5
Chemists, physicists, and mathematicians	2.0%	1.0%	1.0%	19,873
Engineers and architects	7.3%	1.8%	5.4%	18,144
Doctors, veterinarians, and pharmacists	1.0%	1.8%	-0.8%	14,626
Judges and lawyers	0.9%	1.2%	-0.3%	14,661
Biologists and pharmacologists	0.3%	0.4%	-0.1%	13,220
Economists, accountants, and psychologists	2.5%	3.4%	-0.9%	13,127
Social scientists	0.3%	0.4%	-0.1%	9,157
Academics working in academic institutions	0.8%	0.7%	0.1%	13,476
Teachers	1.8%	4.5%	-2.7%	9,901
CEOs	2.6%	0.7%	2.0%	23,918
Executives	6.9%	3.8%	3.1%	17,031
Total	26.4%	19.7%	6.8%	15,832

¹For the years after 2011 there is no specific data on occupations, so only the distribution for 2011 was calculated.

Column 4 shows that the percentage of men employed in the exact sciences, engineering, and management is larger than for women. Column 5 shows the incomes of the various professions. Men are more highly represented in the professions that pay higher wages. This may be a reason why men have a higher return on education.

Regression results for the model for the Arab population

In the following table are the results of the regression for the Arab population

Table 5: regression results for the Arab population

Variable	Year									
	2005	2006	2008	2009	2010	2011	2012	2013	2014	2015
Constant	***	***	***	***	***	***	-2,896	***	***	***
School	-612	***	-337	-957	-356	-332	***	***	***	-480
school ²	48	13	35	58	36	37	23	23	23	45
Age	121	80	87	288	86	73	97	***	***	438
age ²	***	***	***	-3	***	***	***	1	17	***
Man	3,145	***	2,948	2,950	2,198	2,351	2,672	4,357	3,033	3,283
Man*school	***	188	***	***	***	***	***	-143	***	***
Single	***	-903	-755	-962	***	-641	***	-1,096	-1,141	-977

*** The coefficients for these variables were not statistically significant and were removed from the regression.

In all of the years the coefficient of **school²** is positive, signaling that the marginal effect of education is not decreasing, but rather increasing. In some of the years, the coefficient for **school** is negative (in other years it was not statistically significant), but in most of the years (except for 2005 and 2009) the breakeven point is fewer than 12 years of education. That means that in most of the years, the twelfth year of schooling already increases one's income. It appears as if the difference between the effect of education on Arabs and the effect on Jews is derived from the number of years of education, for each group. Looking at the data from Table 2, there are fewer Arab employees with many years of education. Therefore, the phenomenon of having "extra" years of education simply doesn't come into play.

An interesting finding from the data shows that, among Arabs, an increase in age always increases income. Unlike among the Jews, the Arabs seem to have no specific age whereby income begins to decline. One possible explanation for this is the way in which employment is structured among each population. There is a hypothesis (which was not checked as part of this study) which states that the decline in income after age 50 is mainly in the fields of technology, exact sciences, and management. Table 7 shows the percentage of Arabs and Jews that work in these fields.

Table 6: percent of Arabs and Jews that work in the fields of technology, the exact sciences, and management for 2011¹

Professional field	Percentage of Arab workers in the given field, out of the entire Arab population	Percentage of Jewish workers in the given field, out of the entire Jewish population
Total	4.62%	11.00%
Executive management	0.85%	3.24%
CEO	0.00%	1.23%
Doctors, pharmacists, and veterinarians	1.08%	0.48%
Engineers and architects	1.23%	3.40%
Chemists, physicists, and mathematicians	0.08%	0.96%
Biology and pharmacology	0.00%	0.12%

¹ There is no detailed data for professions after the year 2011, so only the distribution for the year 2011 was calculated.

The table shows that the occupation rate in these fields for Arabs is smaller than that for Jews, except for one. This may explain why, among Arabs, there is no decrease in income as age rises.

There is also a difference between Arabs and Jews regarding men and women. The data showed that, among Jews, the difference in income between men and women favored men, and increased with the number of years of education. Among Arabs, the income difference between men and women is steady and uninfluenced by education.

Conclusion

The goal of this study was to determine the connection between education level (expressed as years of education) and income, for employees in Israel between the years 2005 – 2015. The study distinguished between Jews and Arabs because each group integrates into the labor market in markedly different ways, as Jews represent the majority and Arabs the minority. From the literature arose the claim that in the last few years, the influence of an academic education has declined somewhat, as the market has shown a preference for professional training. Therefore, the hypothesis of the study states that the marginal influence of the number of years of education will decrease, such that at a certain point it will be very close to zero, and might even be negative. The study used a squared regression that examined the influence of the number of years of education on income for wage workers.

The results of the study show that there are large differences between the Jewish and Arab populations. Over the time period of the study, there was a change in the character of the influence of education on income, among Jews. From 2005 – 2011, the effect was linear. However, beginning in 2012, the situation changed. During this latter period, the marginal effect of the number of years of education decreased, even though over the relevant region of up to 22 years of education, the effect is still positive. It is reasonable to conclude that for Jews, the hypothesis of the study is partially correct in that the effect of education on income (through 2015), though decreasing, it still positive.

Another important result regarding the Jewish population is that the effect of education on income for Jewish men is higher than for Jewish women. This result demonstrates that the wage gap between Jewish men and Jewish women comes about because women are over represented in occupations that simply don't pay as much as the occupations in which men are over represented. Therefore, as a group, women simply earn less than men, despite having the same amount of education. Among the Arab population, wage gaps between men and women still favor men, but don't depend on education.

Additionally, the way in which age affects income is different for Arabs and Jews. Regarding Jews, income reaches a maximum around age 50, and then begins to decline. Regarding Arabs, the effect of age on income is positive up through the retirement age of 66. Differences between Jews and Arabs seem to stem from differences in education levels, as well as occupational differences between the two groups.

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