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The Arab Economy in Israel: Dynamics of Barriers

Eran Yashiv

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Eran Yashiv[†]
Tel Aviv University

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Abstract

This paper studies the dynamics of barriers to labor market participation in terms of human capital acquisition (pre-labor market) and in the labor market itself. It analyzes the barriers, their relative role, and the resulting effects on labor market outcomes using data on Israeli Arabs, as compared to the Jewish majority.

I find a downward trend in total barriers facing men in low- and intermediate-skill occupations, which is the result of the decline in labor market barriers, and an increase in barriers in high- skill occupations as a result of rising human capital barriers, offset only partially by lower labor market barriers. For women there was a downward trend of barriers at all skill levels engendered by a significant decrease in labor market barriers.

Key words: labor market, barriers, dynamics, human capital , discrimination

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[†]The Eitan Berglas School of Economics, Tel Aviv University. Tel: 03-640-9233. yashiv@tauex.tau.ac.il; <https://www.yashiv.sites.tau.ac.il/>

1 Introduction

Ethnic minority groups often face significant barriers both in terms of human capital acquisition (pre-labor market) and in the labor market itself. These barriers have far-reaching implications for economic outcomes and social welfare. They engender misallocation of human talent, and consequently, economic losses. This paper studies the dynamics of these barriers, their relative role, and the resulting effects on labor market outcomes and on economic misallocation. It uses data on Israeli Arabs, as compared to the Jewish majority, from the Israeli Central Bureau of Statistics (CBS) using four decades of censuses. The uniqueness of this case lies in the fact that this is a big minority group, constituting over 20% of Israel's population, and that there was a significant evolution in the barriers facing it over the period 1972 to 2008. The data are used in a general equilibrium model, recently proposed by Hsieh, Hurst, Jones, and Klenow (2019), to study the dynamics of barriers. The model examines the differences in labor market outcomes between groups in the economy using an enhanced Roy (1951) model of occupational choice, embedded in a general equilibrium set-up. More specifically, the model caters for educational choices, labor force participation decisions, and occupational preferences. It focuses on the dynamics of barriers to human capital investment and on labor market discrimination.

I find a downward trend in total barriers facing men in low- and intermediate-skill occupations, which is the result of the decline in labor market barriers, and an increase in barriers in high-skill occupations as a result of rising human capital barriers, offset only partially by lower labor market barriers. For women there was a downward trend of barriers at all skill levels engendered by a significant decrease in labor market barriers.

The paper proceeds as follows: Section 2 surveys the literature. Section 3 discusses the background of Israeli Arabs in the labor market in Israel. Section 4 outlines the model, while Section 5 presents the empirical methodology. Section 6 delineates the results and discusses their implications. Section 7 concludes.

2 Literature

Recent empirical work shows that the dynamics of barriers are important. For example, in a comprehensive review paper, Fryer (2011) has shown that the racial achievement gap between Blacks and Whites is still remarkably robust across time, samples, and particular assessments used (based on the analysis of ten large datasets). His review points to barriers to human capital acquisition as the underlying cause. In similar vein, Chetty, Hendren, Jones, and Porter (2020) find that Black Americans have substantially lower rates of upward mobility and higher rates of downward mobility than Whites, leading to large income disparities that persist across generations.¹

The repercussions of barriers causing misallocation are very substantial. The current paper makes use of the model by Hsieh, Hurst, Jones, and Klenow (2019) who examine the effect of misallocation on aggregate productivity. Their empirical work uses U.S. data in the period 1960-2010. They estimate that between 20% and 40% of growth in aggregate market output per person (across various specifications) can be explained by an improved allocation of talent following declines in barriers.

The case of Israeli Arabs examined here may shed light on ethnic minorities in other advanced economies. Peri (2016) reviews labor market related outcomes of such minorities in key advanced economies. He shows that the average share of immigrants has risen over time and by 2015 was 13% of the population in both the U.S. and Europe. He discusses the fact that employment in manual, low-skill occupations is a salient feature amongst these minorities, as it is in the case of Israeli Arab men. Dustmann and Frattini (2013) offer a detailed review of the relevant data for Europe. They conclude that "Across all countries, it seems that immigrants are economically disadvantaged, even if we compare them to natives with the same characteristics. This disadvantage is more pronounced for immigrants from non-EU countries."² Peri (2016) notes the idea, developed by Acemoglu (2002), whereby, faced with a larger supply of manual skills, firms will choose more manual intensive production techniques, thereby perpetuating this phenomenon.

The next section looks at pertinent findings for Israeli Arabs.

¹At the same time, they find that Hispanic Americans are moving up significantly in the income distribution across generations with high rates of intergenerational income mobility.

²See their Section 7 for this cite and for additional conclusions.

3 Israeli Arabs in the Labor Market

I delineate key facts, recent papers and some background regressions.

3.1 Key Facts

The following are key facts on Israeli Arabs, to serve as background for the current analysis. The data are all taken from the Israeli Central Bureau of Statistics (CBS).

(i) *Make-up of the Israeli Arab population.* This is a big minority in Israel: at the end of 2021, the Arab population in Israel numbered 2 million, which is 21% of the total population of 9.45 million. This number pertains to Arab-speaking people, living in Israel with full Israeli citizenship.³ This population is composed of 1.7 million Muslims, 18% of Israel's population, 149,000 Druse (a religion close to, but different from, Islam), 1.6% of the total population, and 182,000 Christians, 1.9% of the total population.

(ii) *Geographical dispersion.* Almost all (99%) of the Arab population lives in separate towns and villages (i.e., where there is no Jewish population) and is concentrated primarily in the north of Israel. Data from 2021 indicate that about one-half of the Muslim population in Israel live in the north; 22% live in the Jerusalem region, 11% percent in the center, 18% in the southern region, and 1% in the Tel Aviv area. The Druse in Israel live in two main northern regions (19% in the Haifa region and the rest elsewhere in the Galilee). Of the Arab Christian population in Israel, 13% live in the Haifa region, 70% elsewhere in the north, and 9% in the Jerusalem region.

The following three points refer to data for 2019, preceding the COVID crisis.

(iii) *LFP, employment, and unemployment.* The most notable fact is the low LFP rate: the total Arab rate was 45% , with women at a 30% rate. Over a half century, from 1970 to 2019, Arab women LFPR rose from 7% to 30%; it has been consistently lower than that of Jewish women, which rose from 32% to 66% over the same time period.⁴The prime age (25-65) employment-population ratio is 55% , with a 36% rate for women⁵. Un-

³Though part of the same nation, this population is not to be confused with the Palestinian population living in the West Bank and Gaza.

⁴See pages 473 and 477 at https://www.cbs.gov.il/he/publications/DocLib/shnaton_saruk/shnaton1971_num22.pdf. It pertains to women over 14 in 1970 and over 15 in 2019.

⁵Page 17 at https://www.cbs.gov.il/he/publications/DocLib/2021/1815_labour_force_survey_2019/h_print.pdf

employment was 3.8% in the aggregate, and 5.4% for women.⁶

In terms of the cross-section there is a high level of variation in labor force participation rates among Arab women across education groups: 21% for those with less than 12 years of schooling, and 57% for those with more than 12 years of schooling.⁷

(iv) *Wages and hours worked.* Income Survey data indicate substantially lower wages for Arabs relative to Jews: the Arab hourly wage was 70% of the Jewish hourly wage, and the ratio is 75% for women. Total hours worked per week was 36.8 for Jewish women and 32.6 for Arab women.⁸

(v) *Education.* LFS data indicate the following cross-sectional distribution for Arab women: 35% have less than 11 years of schooling, 36% have 11 to 12 years of schooling, and 29% more than 12 years.⁹

The bottom line is that Arab Israelis are a big minority, highly concentrated geographically, where women have low labor force participation rates and low wages relative to their Jewish counterparts.

3.2 Literature

The following recent papers have documented the situation of Israeli Arabs in the labor market.

Kasir and Yashiv (2011, 2013) have reported substantial gaps between Jews and Arabs in economic outcomes. In particular, Arab men are heavily concentrated in low-skill, low-wage occupations and retire early from the labor force following work in physically-demanding jobs. Arab women have low rates of labor force participation and, when working, are heavily concentrated in few, specific mid-skill occupations. Kasir and Yashiv (2015) provide estimates of significant GDP losses related to the adverse situation of Israeli Arabs. Razin (2018, chapter 9) discusses the adverse outcomes of Israeli Arabs from the wider perspective of the whole Israeli economy and society.

3.3 Participation Regressions

Another background perspective on Israeli Arabs in the labor market is offered by labor force participation regressions. I use data on Arab and

⁶Page 17 at

https://www.cbs.gov.il/he/publications/DocLib/2021/1815_labour_force_survey_2019/h_print.pdf.

⁷https://www.cbs.gov.il/he/publications/doclib/2019/9.shnatonlabourmarket/st09_10.pdf.

⁸https://www.cbs.gov.il/he/publications/doclib/2022/1870_income_over_15_2019/t11_2019.pdf.

⁹https://www.cbs.gov.il/he/publications/doclib/2019/4.shnatoneducation/st04_80.pdf.

Jewish men from repeated cross-sections of the Labor Force Survey (LFS) of the Israeli Central Bureau of Statistics (CBS), dated 2004 to 2011 pooling the cross sectional observations. Table 1 shows the results of Logit participation regressions (following the specifications expounded in Blundell and Macurdy (1999, 2008)). The dependent variable is the probability of being in the labor force regressed on linear-quadratic age and education and on marital status, number of children under 14, number of earners in the household, health, and residency location (five big towns and other residence definitions). The table reports the regression coefficients and their standard errors (columns 1 and 2) and the marginal effects and their standard errors (columns 3 and 4), for Arab men and for Jewish men.

Table 1

The results reported in the table imply that:

(i) Participation rises with age, education, number of earners, and residency in the bigger towns; it falls with the number of young children and with ill health. Being married has a positive effect in the Arab population and a negative effect in the Jewish one.

(ii) The marginal age effect is increasing and concave for both groups, and is stronger for Jewish men.

(iii) The education profile is concave too and is stronger for the Arabs.

4 The Model

I use the model of Hsieh, Hurst, Jones, and Klenow (2019), including their notation.

4.1 The Set Up

Workers. The economy consists of a continuum of workers, each in one of M market occupations or in the home sector. The groups to be considered here are Arab and Jewish, men and women. The model includes three periods of working life to be examined using synthetic cohorts analysis. Thus, workers are indexed by occupation i , group g , and cohort c .

Each worker possesses heterogeneous abilities. The allocation to be determined endogenously in this economy is the match of workers with occupations. Workers are endowed with idiosyncratic talent in each market occupation, denoted by ϵ and characterized by a Fréchet distribution extreme value distribution. They are also endowed with an idiosyncratic talent in the home sector, to be denoted ϵ^{home} , also characterized by a Fréchet

extreme value distribution. Workers also have group-specific preferences for working in an occupation (z_{ig}).

Individuals invest in their human capital and choose a market occupation in an initial “pre-period”, after which they work for three periods (“young”, “middle”, and “old”). Human capital investments and the choice of market occupation are fixed after the pre-period. Individuals subsequently choose between the home sector and their chosen market occupation each period.

Human capital accumulation. Workers use time s and goods e to acquire human capital. They do so in the initial period, and this human capital remains fixed over their life time.

The barriers. There are barriers to human capital accumulation (denoted τ^h) and discrimination in the labor market (denoted τ^w).

Barriers to human capital accumulation are increased monetary costs associated with accumulating occupation-specific human capital. These costs are a proxy for group-specific factors. Examples include discrimination in favor of certain groups in the development of certain skills, restrictions on admission to higher education or to training programs, differences in school quality between groups locations, and social norms that steer groups away from certain occupations.

Labor market discrimination, τ^w , works as a tax on individual earnings. The assumption is that the firm owners discriminate against all workers of a given group, so τ^w affects all the cohorts of group g equally at a given point in time. This idea follows Becker (1957), assuming the owner of the firm in the final goods sector discriminates against workers of certain groups so that there is “taste” discrimination in the form of lower utility for the owner when employing workers from the disliked groups.

Occupational choice. Individuals assume that they will work in their chosen market sector when making their human capital decisions. The occupational choice problem is in fact picking in the first period the occupation that delivers the highest value of lifetime utility. Because talent is drawn from an extreme value distribution, the highest utility can also be characterized by an extreme value distribution. The overall occupational share can be obtained by aggregating the optimal choice across people.

Labor Force Participation. After the individual chooses a market occupation, a decision is made on whether to work in the chosen market sector or in the home sector every period. If the individual chooses the home sector, consumption is income from home production minus payments for past investments in human capital.

Final Goods Firms. A representative firm produces final output Y from workers in M occupations.

Educational Goods Firms (schools). These firms sell educational goods e to workers who use it as an input in their human capital. A similar same set up is used as for final goods firms so the frictions τ^h are pinned down by the discriminatory tastes of school owners.

Equilibrium. A competitive equilibrium in this economy consists of individual choices of life time consumption and of goods and time investment in human capital; occupational choice in the pre-period; a labor force participation decision in each subsequent period; total efficiency units of labor of each group in each occupation; final market output; and an efficiency wage in each occupation.

4.2 Optimality Decisions and Equilibrium Outcomes

Optimal Worker Decisions

Lifetime utility is given by:

$$\log U = \left[\beta \sum_{t=c}^{c+2} \log C(c, t) \right] + \log(1 - s(c)) + \log z_{ig}(c) \quad (1)$$

where $C(c, t)$ is the consumption of cohort c at period t ; $s(c)$ the time invested in human capital by cohort c in the pre-period; there is no discounting; $z_{ig}(c)$ denotes the utility benefit of working in occupation i among members of group g ; β is a parameter quantifying the trade-off between lifetime consumption and time spent accumulating human capital.

The workers face:

a. a budget constraint:

$$C(c, t) = (1 - \tau_{ig}^w(t))w_i(t)\epsilon T h_{ig}(c, t) - e_{ig}(c, t)(1 + \tau_{ig}^h(c)) \quad (2)$$

where T is the return to experience (assumed to be a function of age $t - c$), $w_i(t)$ is the price per efficiency unit, and $h_{ig}(c, t)$ their human capital; agents borrow $e_{ig}(c, t)(1 + \tau_{ig}^h(c))$ in the pre-period to purchase $e(c)$ which they need to repay over their lifetime subject to the life-time budget constraint is given by:

$$e(c) = \sum_{t=c}^{c+2} e(c, t) \quad (3)$$

b. a production function for human capital:

$$h_{ig} = s_i^{\phi_i} e_{ig}^{\eta} \quad (4)$$

where ϕ_i and η are elasticities.

Talents in market occupations are drawn from a multivariate Fréchet distribution with parameter θ :

$$F_g(\epsilon_1, \dots, \epsilon_M) = \exp - \left[\sum_{i=1}^M \epsilon_i^{-\theta} \right] \quad (5)$$

Each individual chooses the occupation that maximizes expected lifetime utility from market work. Given an occupational choice, the occupational wage w_i , and idiosyncratic ability ϵ_i in that occupation, each individual chooses C, e, s to maximize expected lifetime utility from market work given the constraints. Each individual chooses between the market occupation and the home sector in each period.

The optimal time (s_i^*) and goods (e_{ig}^*) spent on human capital are given by :

$$s_i^* = \frac{1}{1 + \frac{1-\eta}{3\beta\phi_i}}; \quad e_{ig}^* = \left(\frac{\eta(1 - \tau_{ig}^w)w_i\bar{T}s_i^{\phi_i}\epsilon}{1 + \tau_{ig}^h} \right)^{\frac{1}{1-\eta}} \quad (6)$$

where $\bar{T} = 1 + T(1) + T(2)$.

Labor Market Equilibrium Outcomes

These decisions lead to the following outcomes. The fraction of people choosing an occupation is given by:

$$\tilde{p}_{ig}(c) = \frac{\tilde{w}_{ig}(c)^\theta}{\sum_{s=1}^M \tilde{w}_{sg}(c)^\theta} \quad (7)$$

where:

$$\tilde{w}_{ig}(c) = \frac{\left(\frac{\bar{T}}{3}\right) w_i(c) s_i(c)^{\phi_i(c)} [(1 - s_i(c)) z_{ig}(c)]^{\frac{1-\eta}{3\beta}}}{\tau_{ig}(c, c)} \quad (8)$$

$$\tau_{ig}(c, c) = \frac{(1 + \tau_{ig}^h(c))^\eta}{1 - \tau_{ig}^w(c)} \quad (9)$$

The following variables are the key objects of the analysis.

The variable $\tau_{ig}(c, c)$ represents total barriers. It is a composite of human capital barriers τ_{ig}^h and labor market discrimination τ_{ig}^w facing cohort c when young ($t = c$).

The variable $\tilde{w}_{ig}(c)$ is the overall reward that a worker from group g with the mean talent obtains by working in occupation i , relative to the power mean of \tilde{w} for the group over all occupations.

The variable $\tilde{p}_{ig}(c)$ is the fraction of people from cohort c and group g who choose occupation i , a choice made when they are young.

Labor force participation i.e., the fraction of people in occupation i , cohort c and group g at time t who decide to work rather than stay at home is given by:

$$LFP_{ig}(c, t) = \frac{1}{1 + \tilde{p}_{ig}(c) \cdot \left[\frac{\Omega_g^{\text{home}}(c)}{\bar{T}(t-c) \cdot (1 - \tau_{ig}^w(t)) \cdot w_i(t)} \right]^\theta} \quad (10)$$

where $\Omega_g^{\text{home}}(c)$ is the mean of home talent of group g in cohort c which is fixed over time.

Average wages in an occupation i of cohort c belonging to group g at time t are given by:

$$\begin{aligned} \overline{\text{wage}}_{ig}(c, t) &= \gamma \eta \left(\frac{m_g(c, t)}{LFP_{ig}(c, t)} \right)^{\frac{1}{\theta} \cdot \frac{1}{1-\eta}} [1 - s_i(c)] z_{ig}(c)^{-\frac{1}{3\beta}} \quad (11) \\ &\cdot \frac{(1 - \tau_{ig}^w(t)) \cdot w_i(t)}{(1 - \tau_{ig}^w(c)) \cdot w_i(c)} \cdot \frac{T(t-c)}{\bar{T}} \cdot \frac{s_i(c)^{\theta_i(t)}}{s_i(c)^{\theta_i(c)}} \end{aligned}$$

where $\gamma = \Gamma(1 - \frac{1}{\theta} \cdot \frac{1}{1-\eta})$ is a parameter related to the mean of the Fréchet distribution of talents; $m_g(c, t) = \sum_{i=1}^M \tilde{w}_{ig}(c)^\theta$.

5 Empirical Methodology

I outline the data used and the methodology.

5.1 The Data

The data are taken from the 1972, 1983, 1995, and 2008 censuses of the Israeli CBS. These are all the census years in which earnings data are available. The variables taken consist of wages, years of schooling, and occupation. I create pseudo-panel data by using synthetic cohorts over time, defining three age periods for a cohort's life cycle: the young (aged 45-35), the middle aged (36-47) and the old (48-59). These intervals are related to

the minimum time period between the censuses. To facilitate calibration, repeated cross sections of the CBS Income Survey are also used.

The cohort structure used is shown in Table 2.

Table 2

The division into occupations is based on the CBS occupation classification at the level of one digit. I divided occupations according to skill level (low, intermediate and high) as follows:

1. In the 1995 and 2008 censuses, the division is based on the 1994 CBS uniform classification of occupations:

a. high- skill occupations – academic occupations (0), professionals and engineers (1), and managers (2).

b. Intermediate-skill occupations – clerical (3) and agents, salespeople and service workers (4).

c. Low-skill occupations – agriculture (5), professional workers in manufacturing, construction and other industries (6–8) and unskilled workers (9).

2. In the 1972 and 1985 censuses, the division is based on the 1972 occupation classification:

a. high- skill occupations – scientific and academic (0), professionals, engineers and similar occupations (1), and managers (2).

b. Intermediate-skill occupations – clerical (3) and agents, salespeople and service workers (4).

c. Low-skill occupations – service workers (5), agriculture (6), professional workers in manufacturing, construction and transportation and other professional laborers (7–8) and other workers in manufacturing and transportation and unskilled laborers (9).

Tables 3-5 show summary statistics.

Tables 3-5

5.2 Calibration

In order to solve the model and derive the dynamics of the key variables of interest, calibration of the following model parameters is needed.

(i) The parameter η denotes the elasticity of human capital with respect to education spending and is equal to the fraction of output spent

on human capital accumulation. This is calibrated using data on education spending (public plus private) as a share of GDP in Israel over the cited census years and the labor share (including imputation for the self-employed).

(ii) Fréchet distribution parameter θ – there are two ways to calculate the parameter θ . In the first, wages within an occupation for a given group are modelled to follow a Fréchet distribution with the shape parameter $\theta(1 - \eta)$. Using data from the Income Survey of the cited census years, I estimate $\theta(1 - \eta)$ to fit the distribution of the residuals from a cross-sectional regression of log hourly wages on $Mx4x3$ occupation-group-age dummies in each year.

According to the second method, the extensive margin elasticity of labor supply with respect to a wage change is $(\theta(1 - LFP_g))$. Using a labor supply elasticity of 0.26 from Chetty et al (2013) and LFP_g estimated from Income Survey data (pertains to the young, aged 25-34), the model then implies a value of θ .

(iii) The weight of consumption in the utility function β – I use the relation given by the model between the Mincerian return around mean schooling \bar{s} and β . I derive the return using a regression of log average wages on average schooling across occupation-groups, with group dummies as controls.

(iv) Preferences z – I normalize preferences $z_{i,jm} = 1$ for the benchmark group, which will be Jewish men, assuming that this group suffers no discrimination, i.e., $\tau_{i,jm}^h = \tau_{i,jm}^w = 0$.

I follow Hsieh, Hurst, Jones, and Klenow (2019, Table II) and set the elasticity across occupations σ to 3.

Table 6 presents the resulting calibration values:

Table 6

6 Results

After calibrating the model using the census data, as discussed in the Appendix, I get the following results. Table 7 and Figure 1 show occupational preferences and the total barriers facing the cohorts that were young in the various census years for Arab men and women.

Table 7 and Figure 1

Occupational Preferences. Consider the occupational preferences of the Arab population. The low-skill occupations in each group are normalized

to 1, and occupations with values greater than 1 indicate a preference for the occupation relative to the low-skill, base occupation. It can be seen that while there is no clear pattern of occupational preference evolution over time, for men there is a non-monotonic rise in preferences for mid- and high-level occupations, and for women there is a hump shape evolution in terms of these two occupations.

Total barriers. Next consider the barriers facing individuals in each group in the occupational choice stage relative to those facing Jewish men. The value of the barriers for the latter is normalized to 1. To the extent that the value is greater than 1, the barrier facing the group will be higher and vice versa. Table 7 shows a downward trend in the barriers facing young Arab men in low- and intermediate-skill occupations. On the other hand, and in contrast to conventional wisdom, the results point to the opposite trend in the high-skill occupations. Thus, Arab men have an incentive not to choose these occupations. From 1995 onward, Arab men have an incentive to choose low-skill occupations and therefore it appears that the market “prefers” Arab workers in low-skill occupations. These results, in addition to the model’s results regarding preferences, indicate that the high concentration of Arab men in low-skill occupations is the result of barriers they face in other occupations, rather the result of their preferences.

With respect to the barriers faced by Arab women in choosing an occupation, convergence can be seen in the barriers in all occupations. Thus, barriers were very high relative to Jewish women in the 1970s, but they decreased significantly up until 2008. Nonetheless, it appears that the barriers facing Arab women are still high relative to Arab and Jewish men, which apparently reflects the fact that they are members of a minority group and a group that has more traditional views. Interestingly, the highest barrier is in the low-skill occupations. The high volatility in the values of preferences for an occupation make it impossible to draw any conclusions with regard to the tendency of Arab women in their choice of occupation. However, it can be said that the effect of the various barriers on the occupational choice of Arab women is declining over time.

Decomposing barriers. It should be recalled that barriers consist of barriers in the labor market and barriers to human capital accumulation. The model makes it possible to separate the barriers into these two components so as to understand what drives the trends in the barriers as a whole. Table 8 and Figure 2 describe the results with respect to labor market barriers and human capital barriers and their combination, for the three occupation levels.

Table 8 and Figure 2

Arab men.

A downward trend can be seen in labor market barriers across all occupations. In the high-skill occupations, barriers have been lowered substantially and in 2008 the barriers to Arab men in the labor market, relative to those facing Jewish men, were quite low. In contrast, in the intermediate-skill occupations there was a more moderate decline and significant barriers persist. In the low-skill occupations, it appears that Arab men did not face any barriers in the labor market and since the 1990s these have been lower than the normalized zero "tax" level. Thus, it appears that the market is "encouraging" Arab men to work in occupations which require only a low skill level.

A different picture emerges with respect to the human capital barriers facing Arab men. While in the low- and intermediate-skill occupations, there have been no significant changes, there appears to have been a major increase in the barriers facing Arab men who choose high-skill occupations. This may be related to developments in the education system, in particular in higher education. There has been a substantial rise in high-tech related fields both in terms of student numbers and in terms of wages and productivity in high-tech jobs. This has become a major economic development in Israel since the 1990s. In these fields there is low participation rate of Arabs. It remains to be explored what exactly are the barriers in question.

Overall, there appears to have been a downward trend in total barriers facing Arab men in low- and intermediate-skill occupations which is the result of the decline in labor market barriers, while the increase in barriers in the high-skill occupations is the result of rising human capital barriers, offset only partially by lower labor market barriers.

The model predicts two opposing effects as a result of these trends in labor market barriers. On the one hand, the lowering of labor market barriers is expected to raise the wages of Arab men and thus to increase their incentive to work. On the other hand, the increase in total barriers in the high-skill occupations "pushes" more men to choose intermediate- and low-skill occupations, which have lower wages and therefore there will be a higher concentration of Arab men in those occupations. Thus, as a result of the repeated choice in each period between market work and household work, and given relatively low wages, Arab men will have a lower rate of labor force participation.

Arab women.

An examination of labor market barriers shows that in 2008, labor market barriers facing Arab women in the high- skill occupations were lower than in the other two occupation types.

When I look at human capital barriers facing young Arab women, it can be seen that here as well there was a decrease in the low- and intermediate-skill occupations and that the relatively high barriers that prevailed in the 1970s declined during subsequent decades, with the most dramatic decrease in the low-skill occupations. In contrast, and as in the case of Arab men, there was a moderate increase in barriers facing Arab women in high- skill occupations. In 2008, the biggest barrier was in the high- skill occupations, which is in contrast to the 1970s when the biggest barrier was in the low-skill occupations.

The downward trend in total barriers facing young Arab women in low- and intermediate-skill jobs is a result of declines in both human capital barriers and labor market barriers. However, it should be recalled that the barriers facing Arab women in these occupations were very high in the past, relative to both Jewish men and Arab men. Therefore, it appears that the process of convergence is not yet complete and in 2008 Arab women still faced high barriers in these occupations relative to the other groups. As in the case of Arab men, one can also see two opposing trends among Arab women in high- skill occupations: a decrease in labor market barriers and an increase in human capital barriers. However, and in contrast to Arab men, the net effect of the two trends is a decrease in the barriers in these occupations.

7 Conclusions

This analysis shows there are significant effects to the dynamics of barriers, both labor market ones and human capital ones. There are two surprising findings meriting further exploration: a rise over time in high-skill human capital barriers for men and women; and, additionally for women in relation to preferences for mid- and high-level occupations, a hump shape evolutions. These are left for future research.

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8 Tables and Figures

Table 1
Logit Participation Regressions

	(1) coefficients-Arabs	(2) coefficients-Jews	(3) dydx-Arabs	(4) dydx-Jews
Age	0.367*** (0.002)	0.391*** (0.001)	0.028*** (0.000)	0.034*** (0.000)
Age ²	-0.005*** (0.000)	-0.004*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Schooling	0.179*** (0.002)	0.138*** (0.001)	0.014*** (0.000)	0.012*** (0.000)
Schooling ²	-0.006*** (0.000)	-0.005*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Married	1.294*** (0.008)	-0.137*** (0.003)	0.100*** (0.001)	-0.012*** (0.000)
Children (under 14)	-0.004** (0.002)	-0.187*** (0.001)	-0.000** (0.000)	-0.016*** (0.000)
No. earners	1.374*** (0.004)	1.565*** (0.002)	0.107*** (0.000)	0.135*** (0.000)
Ill health	-4.909*** (0.013)	-4.275*** (0.006)	-0.381*** (0.001)	-0.369*** (0.000)
Residential area		see table below		
Constant	-7.716*** (0.039)	-9.269*** (0.016)		
Pseudo R-squared	0.547	0.488		
N	1,954,000	8,731,000		

	Residential area coefficients			
	(1) coefficients-Arabs	(2) coefficients-Jews	(3) dydx-Arabs	(4) dydx-Jews
Jerusalem	−0.543*** (0.013)	−0.390*** (0.005)	−0.042*** (0.001)	−0.034*** (0.000)
Tel_Aviv	0.561*** (0.025)	0.478*** (0.006)	0.044*** (0.002)	0.041*** (0.001)
Haifa	−0.018 (0.021)	0.139*** (0.007)	−0.001 (0.002)	0.012*** (0.001)
Rishon	−0.414*** (0.041)	0.091*** (0.007)	−0.032*** (0.003)	0.008*** (0.001)
Ashdod	0.015 (0.034)	−0.328*** (0.008)	0.001 (0.003)	−0.028*** (0.001)
Mid-scale Towns	0.422*** (0.018)	−0.088*** (0.004)	0.033*** (0.001)	−0.008*** (0.000)
Other urban	−0.746*** (0.012)	−0.187*** (0.004)	−0.058*** (0.001)	−0.016*** (0.000)
Rural	−0.797*** (0.018)	0.409*** (0.006)	−0.062*** (0.001)	0.035*** (0.000)

Notes:

1. Mid-scale towns have a population of 100,00 to 200,000.
2. "Ill health" is the percentage reporting of absence from work because of ill health.
2. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$
3. N is the population in the pooled years 2004-2011.

Table 2: Cohort Structure

Cohort Number	Chorot Characteristics	Young	Middle	Old
1	Young at 2008	2008	-	-
2	Young at 1995	1995	2008	-
3	Young at 1983	1983	1995	2008
4	Young at 1972	1972	1983	1995
5	Middle at 1972	-	1972	1995
6	Old at 1972	-	-	1972

Note: Cohorts are Y (young, aged 25-35), M (middle, 36-46), and O (old, 47-57).

Table 3
Share of Occupations in Employment

occupation skill level	1972	1983	1995	2008
Low	.51	.41	.33	.24
Mid	.23	.25	.34	.37
High	.25	.34	.33	.39

Table 4
Share of Workers in Occupations, by group and cohort
sample mean values, 2008

Cohort	Occupation	Jewish Men	Jewish Women	Arab Men	Arab Women
Young	Home	0.20	0.16	0.25	0.71
Young	Low	0.21	0.06	0.48	0.03
Young	Mid	0.26	0.43	0.15	0.09
Young	High	0.33	0.35	0.12	0.17
Middle	Home	0.14	0.17	0.27	0.76
Middle	Low	0.31	0.10	0.47	0.04
Middle	Mid	0.20	0.39	0.13	0.08
Middle	High	0.36	0.34	0.14	0.12
Old	Home	0.19	0.27	0.46	0.86
Old	Low	0.33	0.11	0.30	0.03
Old	Mid	0.17	0.35	0.09	0.04
Old	High	0.30	0.27	0.15	0.07

Table 5
Wages $wage_{ig}(c)$ in Occupations, by group and cohort
 sample mean values, 2008

Cohort	Occupation	Jewish Men	Jewish Women	Arab Men	Arab Women
Young	Low	79,506	48,875	65,333	40,614
Young	Middle	79,568	62,310	70,246	45,206
Young	High	145,599	90,218	99,811	65,074
Middle	Low	108,067	53,141	73,967	40,952
Middle	Middle	136,725	80,687	87,120	53,352
Middle	High	241,189	129,066	137,910	92,052
Old	Low	114,222	53,767	76,789	44,461
Old	Middle	149,693	84,561	101,721	69,830
Old	High	259,929	145,014	164,127	116,963

Notes:

1. Occupations are divided into low, mid, and high.
2. Cohorts are Y (young, aged 25-35), M (middle, 36-46), and O (old, 47-57).

Table 6
Calibration Values

parameter	definition	value
η	Goods elasticity in human capital prod.	0.116
σ	Elasticity across occupations	3
θ	Fréchet shape	1.39
β	Consumption weight in utility	0.157
$z_{i,jm}$	Occupational preferences, Jewish men	1
$\tau_{i,jm}^h$	Human capital barriers, Jewish men	0
$\tau_{i,jm}^w$	Labor market discrimination, Jewish men	0

Table 7
Occupational preference and barriers facing the young cohorts

a. Occupational preference of the young cohorts

Year	Arab women			Arab men		
	Low skill level	Intermediate skill level	High skill level	Low skill level	Intermediate skill level	High skill level
1972	1.00	0.92	0.84	1.00	0.94	0.92
1983	1.00	1.42	1.37	1.00	1.00	1.00
1995	1.00	1.05	0.51	1.00	0.98	1.07
2008	1.00	0.91	0.67	1.00	1.06	1.07

b. Barriers facing the young cohorts

Year	Arab women			Arab men		
	Low skill level	Intermediate skill level	High skill level	Low skill level	Intermediate skill level	High skill level
1972	24.54	16.09	7.74	1.05	2.19	2.42
1983	11.43	8.02	5.21	1.16	2.21	2.34
1995	6.13	4.84	3.67	0.77	1.57	2.54
2008	4.74	2.83	3.27	0.64	1.81	2.80

Table 8: Labor market and human capital barriers

a. Labor market barriers

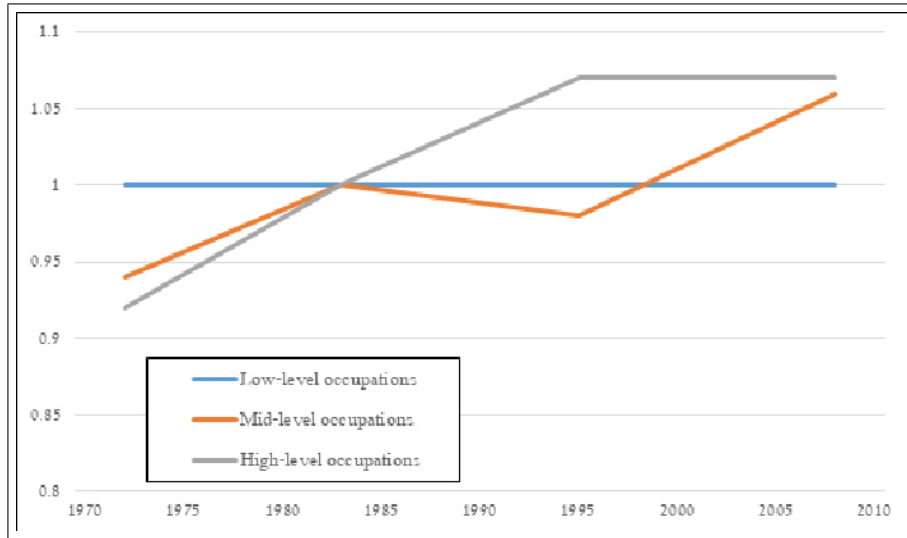
Year	Arab women			Arab men		
	Low skill level	Intermediate skill level	High skill level	Low skill level	Intermediate skill level	High skill level
1972	10.19	13.96	7.74	1.05	2.19	7.74
1983	3.88	6.54	3.00	1.16	2.21	1.65
1995	3.67	4.55	1.59	0.93	1.57	1.18
2008	2.49	2.83	1.49	0.77	1.81	1.07

b. Human capital barriers facing cohorts that were young in 2008

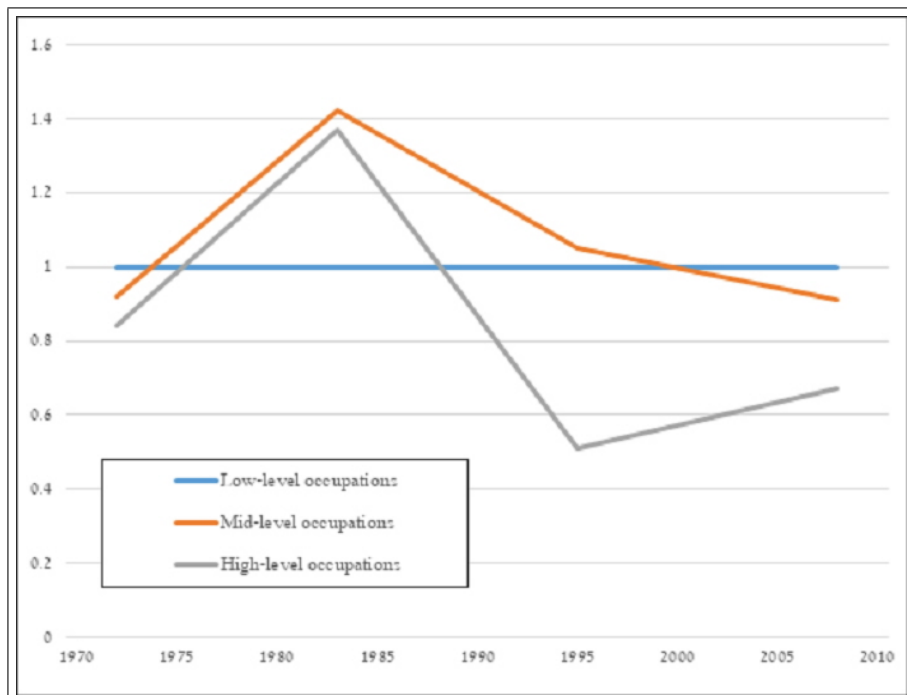
Year	Arab women			Arab men		
	Low skill level	Intermediate skill level	High skill level	Low skill level	Intermediate skill level	High skill level
1972	2.41	1.15	1.56	1.00	1.00	1.18
1983	2.95	1.23	1.73	1.00	1.00	1.42
1995	1.67	1.06	2.31	0.83	1.00	2.15
2008	1.90	1.00	2.19	0.83	1.00	2.61

Figure 1: Occupational Preferences and Total Barriers

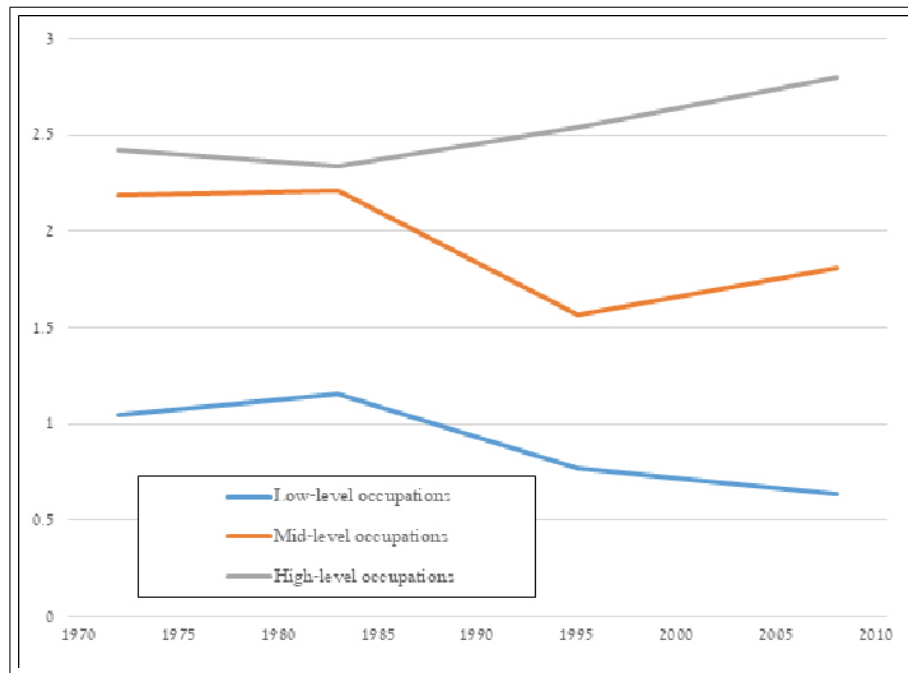
a. Occupational Preferences, Arab men



b. Occupational Preferences, Arab women



c. Total Barriers by Occupation, Arab men



d. Total Barriers by Occupation, Arab women

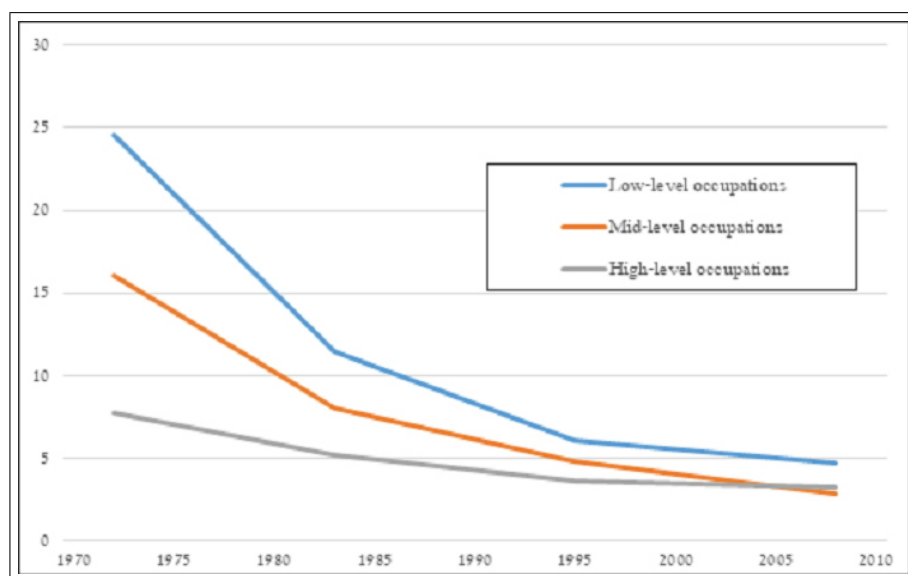
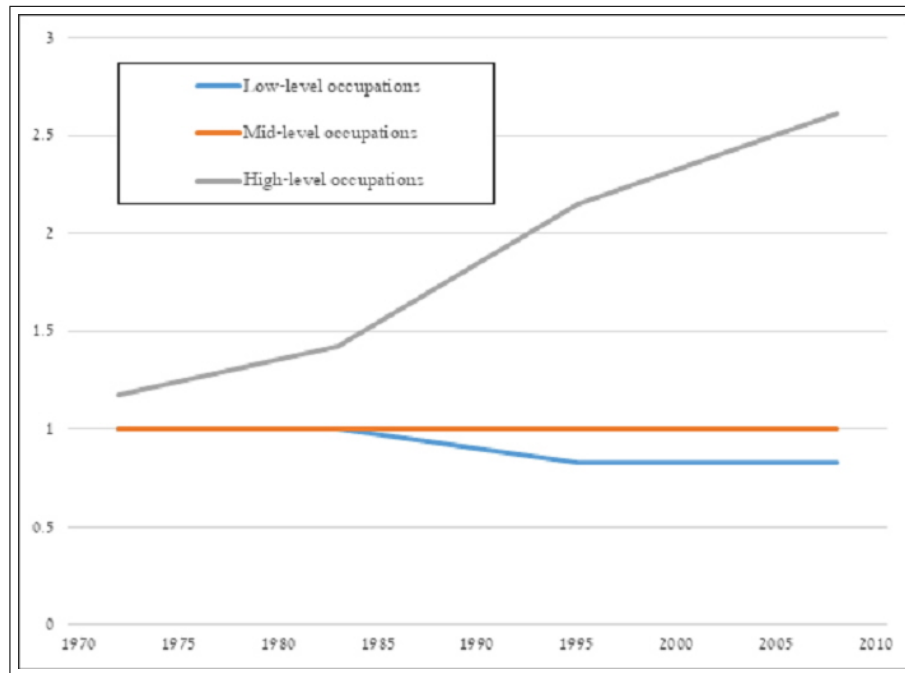
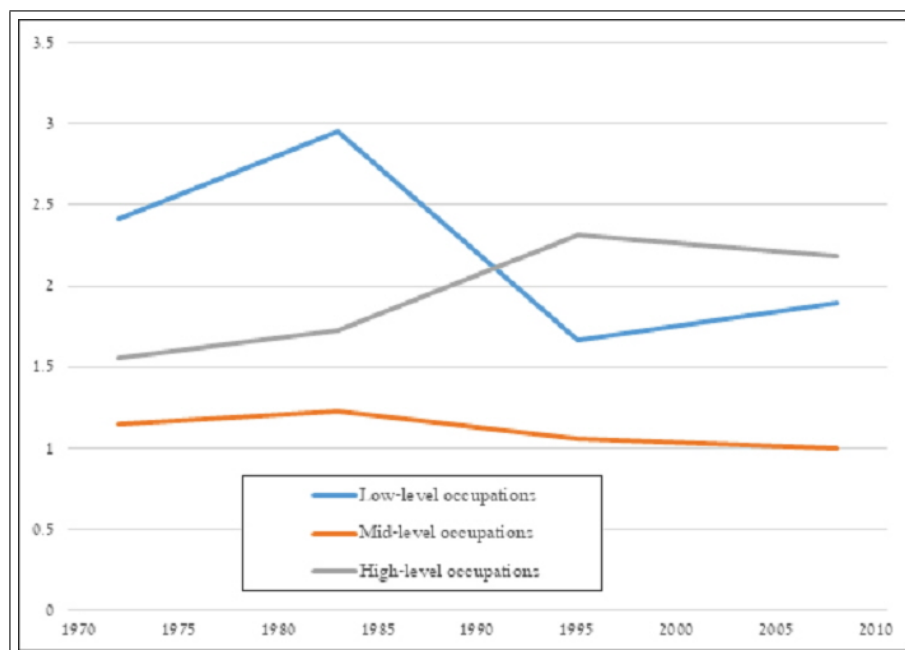


Figure 2: Human Capital and Labor Market Barriers

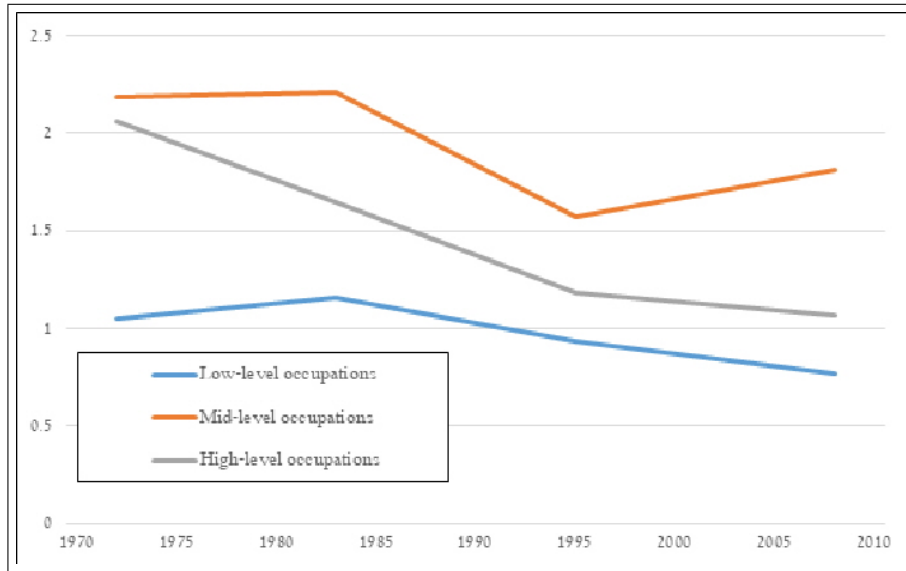
a. Human Capital Barriers, Arab men



b. Human Capital Barriers, Arab women



c. Labor Market Barriers, Arab men



d. Labor Market Barriers, Arab women

