



## **Arab Women in the Israeli Labor Market: Characteristics and Policy Proposals<sup>1</sup>**

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# **Arab Women in the Israeli Labor Market: Characteristics and Policy Proposals**

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## Abstract

This paper examines the characteristics of labor force participation among Arab women in Israel. The participation rates of Israeli Arab women are low relative to those of Israeli Jewish women and to women in Western countries. In a series of empirical tests, making use of intra-temporal and inter-temporal variation, the study characterizes the key determinants of the patterns of participation of these women. Higher education and marital status are important in explaining participation, as are modern attitudes and modern knowledge.

A key implication of the findings is that it is not enough to strengthen “explanatory variables”—such as education— so as to bring about an increase in participation. It is also necessary to take measures that will help overcome the difficulty in “translating” explanatory variables, such as education, into participation. This difficulty may be due to frictions, such as informational issues and obstacles to mobility, and to discrimination.

The paper proposes a series of policy measures to raise participation and simulates a number of future participation trajectories and their potential contribution to GDP.

## **נשים ערביות בשוק העבודה בישראל: מאפיינים וצעדי מדיניות**

**ערן ישיב וניצה (קלינר) קסיר**

תקציר

עבודה זו בוחנת את מאפייני ההשתתפות בכוח העבודה של הנשים הערביות בישראל. שיעור ההשתתפות של הנשים הערביות בישראל נמוך ביחס לרמות השוררות בקרב נשים יהודיות בישראל ונשים במדינות מערביות. בסדרת מבחנים אמפיריים, העושים שימוש בשונות בין נשים בנקודות זמן ובשונות על פני זמן, מאפיין המחקר את הגורמים החשובים בהסבר דפוסי ההשתתפות של נשים אלו. השכלה גבוהה ומצב משפחתי חשובים בהסבר ההשתתפות כמו גם עמדות מודרניות וידע מודרני. העבודה מציעה שורה של אמצעי מדיניות להעלאת שיעור ההשתתפות, וערכת סימולציה של מספר תסריטי השתתפות עתידיים ותרומתם הפוטנציאלית לתוצר.

## 1. INTRODUCTION

This paper examines the labor force participation of Arab women in Israel. It studies the determinants of the participation decision, including changes that took place over time and proposes measures for government policy. The paper builds on, and expands, our research on the topic that was reported in a previous study (see Yashiv and Kasir (Kaliner) 2010) but focuses on women only.

The paper is structured as follows: Section 2 presents background data. Section 3 delineates a labor force participation model. Section 4 presents econometric estimation of the participation equation, using data from the 2009 Labor Force Survey. Section 5 examines long-term changes in the behavior of the explanatory variables and their marginal value as estimated in this equation. Section 6 examines labor force participation using data from the 2005 Social Survey. Section 7 proposes policy measures on this topic and simulates future participation trajectories and their contribution to GDP. Section 8 concludes.

## 2. BACKGROUND DATA

### **a. Data sources**

The data in this study were taken from Labor Force Surveys (various years) and the Social Survey (for 2005), both carried out by the Israel Central Bureau of Statistics (CBS).

The quarterly Labor Force Survey includes information about participation, employment, and unemployment, and demographics. The survey refers to the permanent population of Israel aged 15 and older. In each quarter four panels comprising 2,700 households each are surveyed. Each panel is investigated over two successive quarters, is removed from the sample for two successive quarters, and returns to the sample for two successive quarters.<sup>1</sup>

The Social Survey is an annual survey which provides information about the living conditions and welfare of the adult Israeli population and asks how individuals in society perceive various aspects of their lives. The survey is composed of fixed topics that are investigated every year, and a specific topic which is investigated in detail and changes each year. In 2005, the survey included an in-depth investigation of labor force participation, which is the reason we chose it for this study. The Social Survey includes

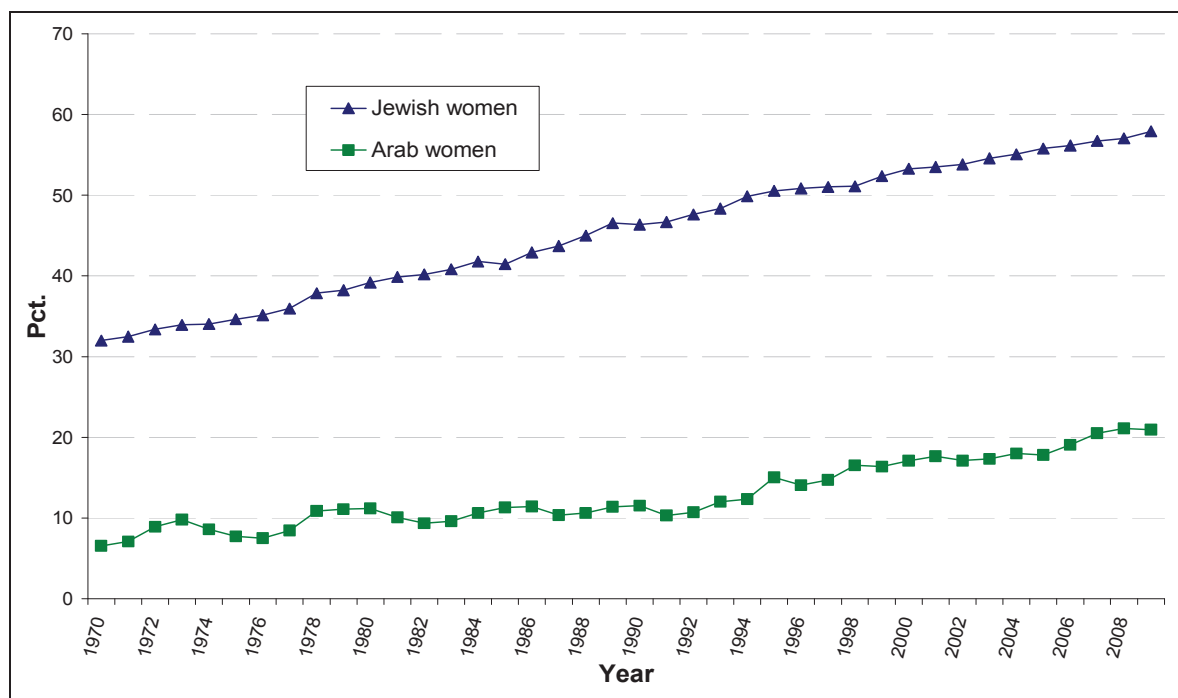
<sup>1</sup> The four panels exist only in relatively large Jewish localities and in several Arab localities, such as Nazareth and Eastern Jerusalem. In the other localities, only one or two panels exist.

numerous details that do not appear in the Labor Force Survey, including information on religious characterization, use of various kinds of technology, and relations with family members. The sample for the 2005 Social Survey consisted of 9,543 individuals aged 20+ who represent 4.3 million people in this age group. Approximately 500 of them were found not to belong to the survey population and 83 percent of the others took part in the survey, so the sample has 7,647 people in all.

**b. Arab women in the Israeli labor market**

The figures below present key stylized facts of Arab women’s participation.

**Figure 1: Participation Rate over Time, by Sector—Women, 1970–2009<sup>1,2</sup>**

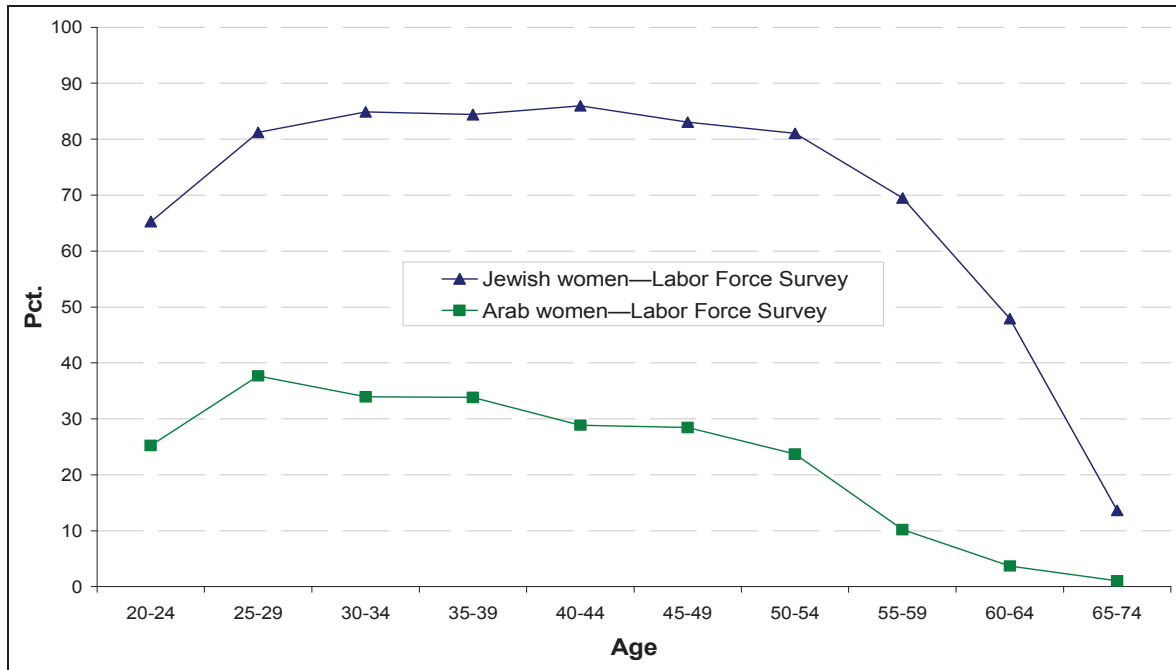


<sup>1</sup> An Arab woman was defined in 1967–1978 as a non-Jewish woman whose father is not Jewish and whose father’s continent of origin is neither Europe nor America. In 1979–2000, an Arab woman was defined as a Christian, Muslim, or Druze woman whose continent of birth, and whose father’s continent of birth, was neither Europe nor America. From 2001 on, an Arab woman may be profiled with greater precision due to the collection of new variables.

<sup>2</sup> In 1998, 2001, and 2009, a change was made in the method of extrapolating the CBS sample. The rates in those years were also calculated according to the old extrapolation method to facilitate comparison between the years.

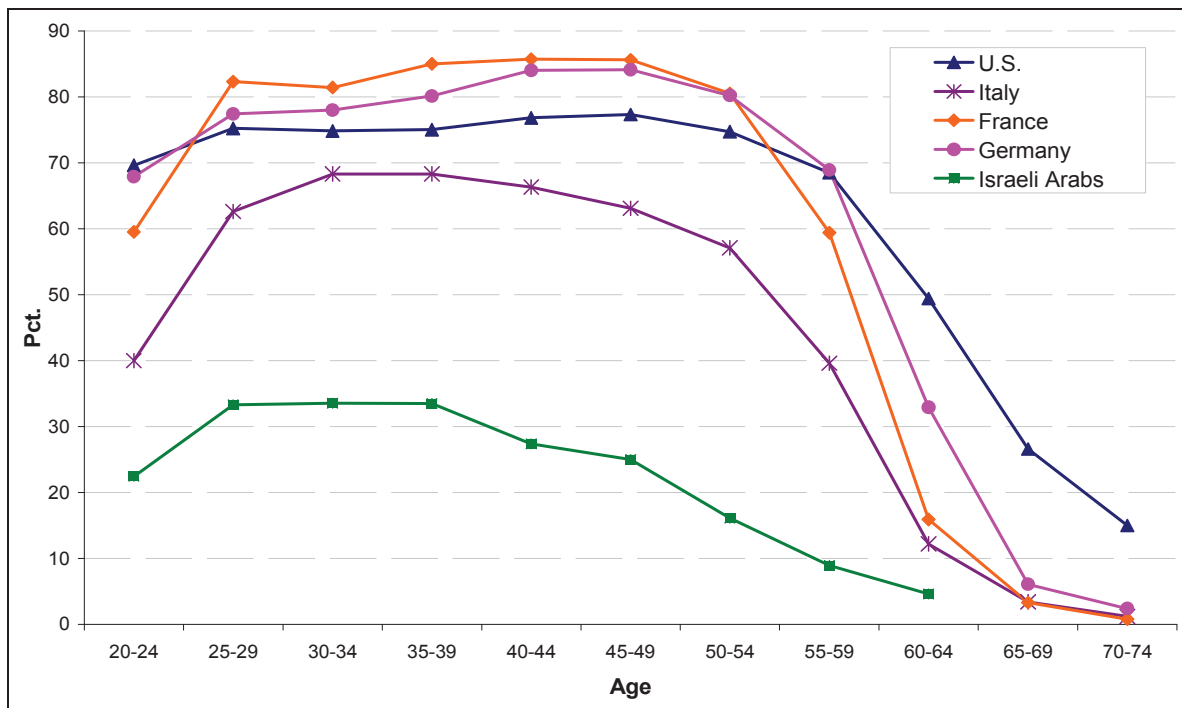
**Source:** calculations based on CBS Labor Force Surveys.

**Figure 2: Women Life Cycle Participation Rates, 2010**



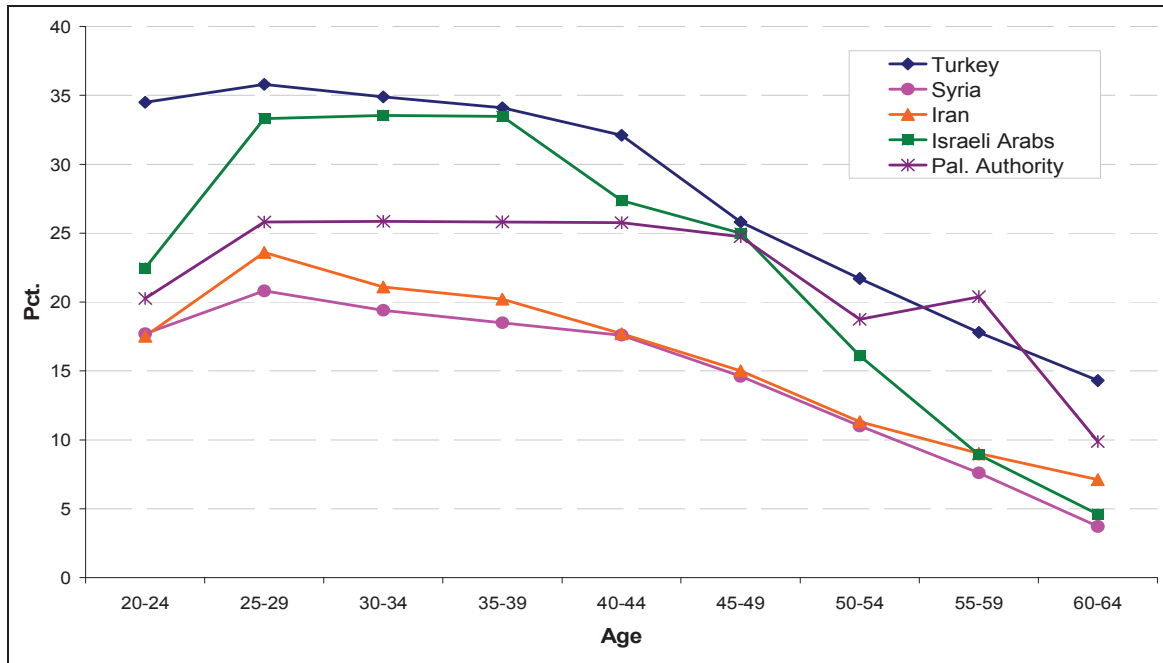
Source: calculations based on the CBS Labor Force Survey, 2010

**Figure 3a: Women Life Cycle Participation Rates, Selected Countries, 2008**



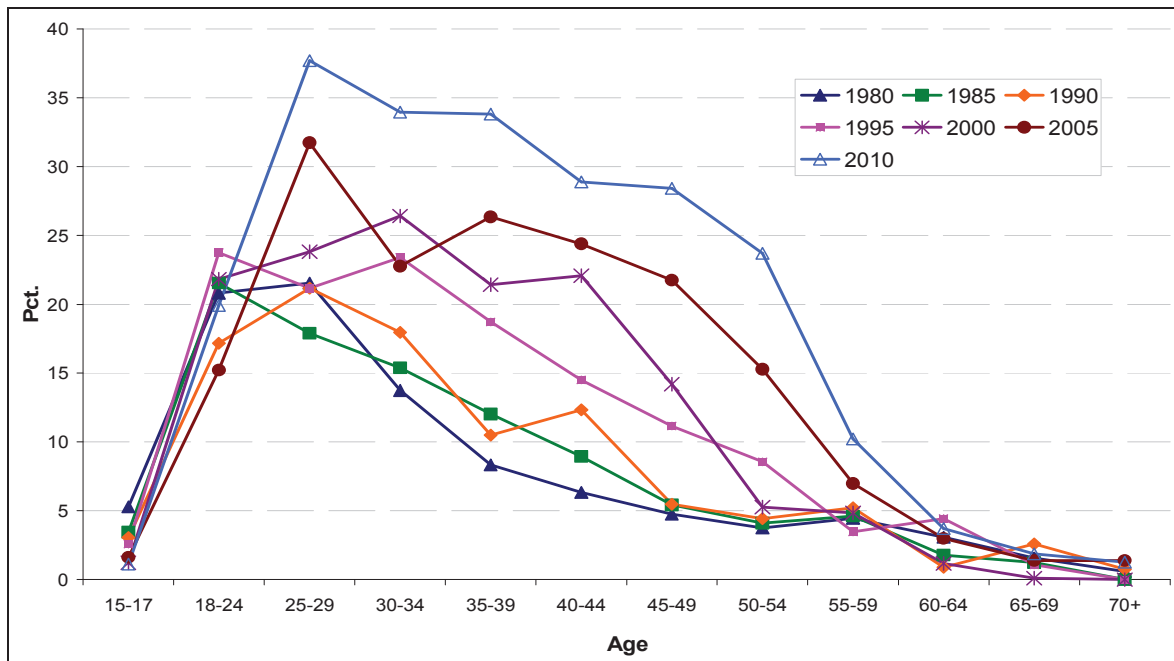
Source: calculations based on the CBS Labor Force Survey, 2008; www.oecd.org; www.ilo.org

**Figure 3b: Women Life Cycle Participation Rates, Comparison with Muslim and Arab Countries, 2008**



**Source:** Israeli Arabs—calculations based on the CBS Labor Force Survey, 2008.  
 Iran and Syria—www.ilo.org.  
 The data for Syria are current up to 2007. Palestinian Authority: <http://www.pcbs.gov.ps>

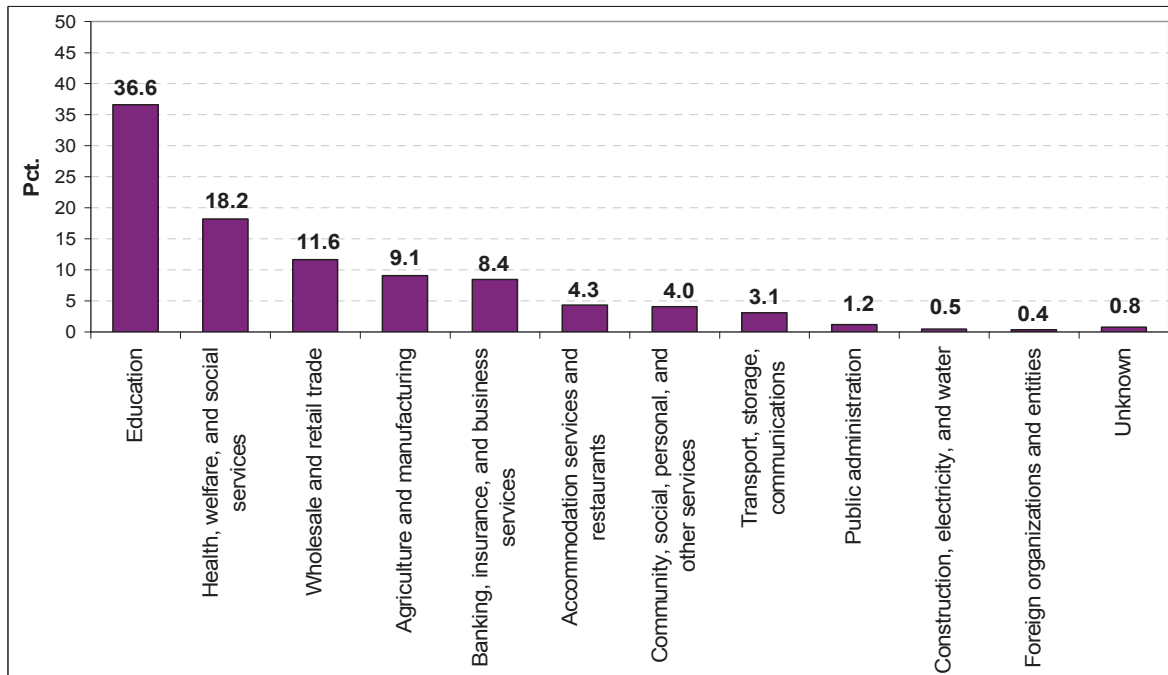
**Figure 4: Women Life Cycle Participation Rates over Time<sup>1</sup>**



<sup>1</sup> In 1980–2000, an Arab woman was defined as a Christian, Muslim, or Druze woman whose continent of birth, and whose father’s continent of birth, was neither Europe nor America. From 2005 on, an Arab woman has been defined on the basis of a new and more accurate variable that was first included in the Labor Force Survey in 2001.

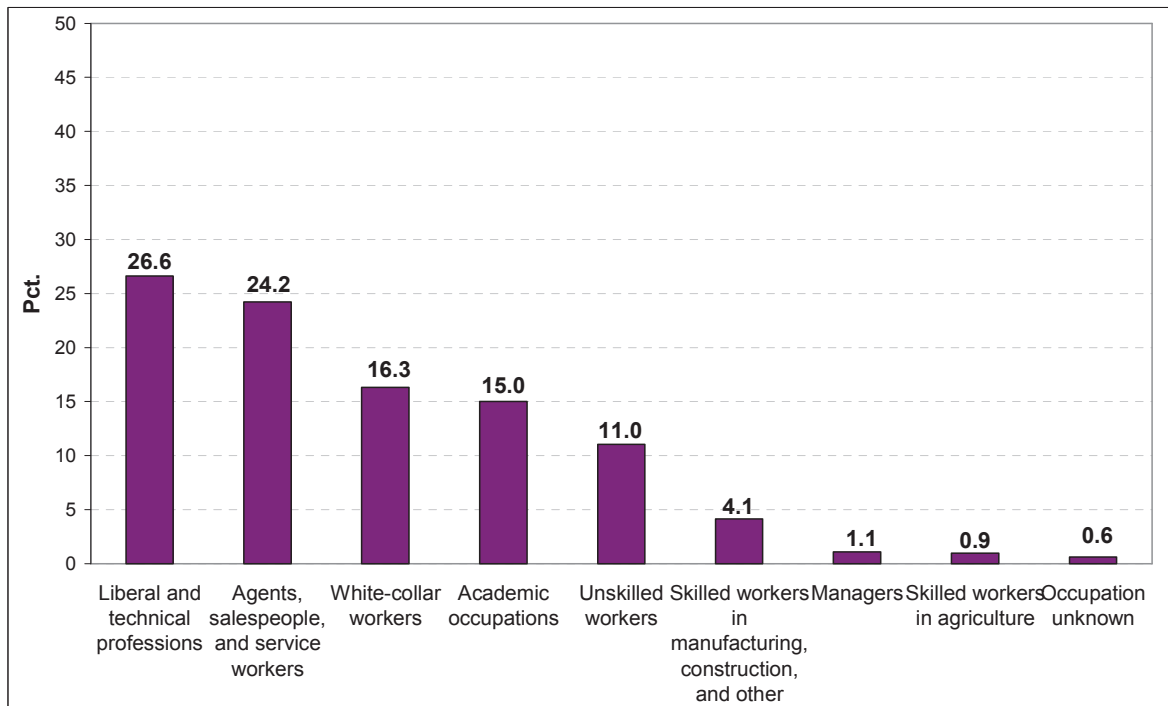
**Source:** calculations based on CBS Labor Force Surveys.

**Figure 5: Distribution of Employment by Industry—Arab Women, 2010**



Source: calculations based on the CBS Labor Force Survey, 2010.

**Figure 6: Distribution of Employment by Occupations—Arab Women, 2010**



Source: calculations based on the CBS Labor Force Survey, 2010.

The graphs indicate the following main points:

1. The participation rate of Arab women has been rising steadily over the years, as in many Western countries. The rate doubled between 1970 and 2010—from 10 percent to 20 percent—but remains low. Since their participation rate has increased more slowly than that of Jewish women, the gap between the two populations has widened.<sup>2</sup>
2. In terms of the age profile of participation, Arab women have a much lower profile than Jewish women. The participation rate of Arab women in Israel is also low by Western standards. However, the patterns of Arab women's participation are not materially different from the norm in various Arab and Muslim countries.
3. Over the years, the age profile among women has been trending up, especially in the 25–54 age group.
4. The data on occupations and employment by industries show a large concentration of Arab women in education and healthcare.<sup>3</sup>

### 3. THE PARTICIPATION EQUATION AND ESTIMATION

There is a voluminous literature on labor force participation.<sup>4</sup> The following is a basic model that appears widely in this literature, as specified, for example, in the survey paper by Blundell and MaCurdy (2008) which we follow here.

The individual has a quasi-convex utility function that rises with consumption ( $c$ ) and leisure ( $l$ ). The problem of the individual is to maximize utility, as follows:

$$(1) \quad \max_l U(c_i, l_i, v_i)$$

s.t.

$$(2) \quad c_i = y_i + w_i h_i$$

$$(3) \quad h_i + l_i = T$$

$$c \geq 0$$

$$h \geq 0$$

<sup>2</sup> See also *The Book of Arab Society in Israel (3)*, 2009, pp. 51–84 (in Hebrew).

<sup>3</sup> For more on the participation profile of Arab women, see Fichtelberg, 2004.

<sup>4</sup> For a detailed discussion, see Blundell, MaCurdy, and Meghir (2007) and, in particular, Section 2.



Where  $U$  is the utility function and  $v$  is the vector of the individual's characteristics. These characteristics may be observed or unobserved and may include cultural factors. The wage per hour is denoted  $w$ ,  $y$  is income from other sources,  $T$  is total hours available to the individual, and  $h$  is the number of work hours.

By solving this problem we obtain the supply of work hours,  $h$ , as a positive function of  $w$ , a negative function of  $y$ , and a function of characteristics vector  $v_i$ .

$$(4) \quad h_i^* = h_i(w_i, y_i, v_i)$$

The participation decision,  $p_i$ , is expressed by the following:

$$(5) \quad p_i = 1 \{h_i^* > h_i^0\}$$

When variable  $h_i^*$ , individual  $i$ 's desired number of work hours, exceeds the threshold  $h_i^0$ , the individual participates ( $p_i = 1$ ). Otherwise, she does not ( $p_i = 0$ ). The expressions  $h_i^*$  and  $h_i^0$  are derived from the specification of the utility functions. For discussion of various functional forms, see Blundell, MaCurdy, and Meghir (2007), particularly pp. 4672–4676.

### a. The participation equation

We adopt the following functional forms for  $h_i^*$  and  $h_i^0$ :

The individual's desired work hours are denoted by:

$$(6) \quad h_i^* = \delta_0 + z_{1i}\delta_1 + \ln w_i\delta_2 + \ln y_i\delta_3 + \zeta_i$$

Where  $\delta_0$  is constant;  $z_{1i}$  is a vector of exogenous explanatory variables such as gender, age, and marital status;  $\ln w_i$  is the log of the wage offered to the individual;  $\ln y_i$  is the log of the individual's income from other (i.e., non-labor) sources; and  $\zeta_i$  represents unobservable characteristics. The parameters in the equation are  $\delta_0$ ,  $\delta_2$ , and  $\delta_3$  and the vector  $\delta_1$ .

The threshold,  $h_i^0$ , is expressed by:

$$(7) \quad h_i^0 = \gamma_0 + z_{1i}\gamma_1 + \ln w_i\gamma_2 + \ln y_i\gamma_3 + \xi_i$$

Where  $\gamma_1$  is a vector of parameters that is not necessarily identical to  $\delta_1$ ;  $\gamma_0$  is a constant;  $\gamma_2$  and  $\gamma_3$  are parameters; and  $\xi_i$  unobservable characteristics.

Notably, the characteristics vector  $v_i$  is captured in Equations (6) and (7) by the constants  $\delta_0$  and  $\gamma_0$ , by the vector  $z_1$ , and by the unobserved terms  $\varsigma_i$  and  $\xi_i$ . We also note that the vector  $z_1$  may be broken down into two components, as follows:

$$(8) \quad z_{1i} = [z_{1i}^D, z_{1i}^C]$$

Where  $z_{1i}^D$  includes education and demographic variables and  $z_{1i}^C$  includes cultural variables.

Therefore, the participation decision,  $p_i$ , is described by the following equation:

$$(9) \quad p_i = 1 \{h_i^* > h_i^0\}$$

Since the wage is unobserved in the case of non-participants, we assume:

$$(10) \quad \ln w_i = \theta_0 + z_{1i}\theta_1 + z_{2i}\theta_2 + \omega_i$$

Where  $z_{2i}$  is a vector of exogenous variables;  $\theta_0$  is a parameter;  $\theta_1$  and  $\theta_2$  are vectors of parameters; and  $\omega_i$  are unobservable characteristics. We assume that the “other income” variable is determined as follows:

$$(11) \quad \ln y_i = \Pi(z_i) + \chi_i$$

Where  $[z_{1i}, z_{2i}, z_{3i}] = z_i$ —in other words, a vector of exogenous variables that includes both the variables mentioned above and additional ones.  $z_{3i}$  and  $\chi_i$  are unobservable characteristics.

Therefore, by combining Equations (9), (10), and (11), we obtain the following participation equation:

$$(12) \quad p_i = 1\{\beta_0 + z_{1i}\beta_1 + z_{2i}\beta_2 + z_{3i}\beta_3 + u_i > 0\}$$

Where  $\beta_0$  is a parameter;  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  are vectors of parameters; vectors  $z_{1i}, z_{2i}, z_{3i}$  are defined as above; and  $u_i$  are unobservable characteristics.

This equation may be estimated in various ways, depending on the assumptions made about the distribution of the unobserved characteristics. Below we estimate it using a Probit method.

## **b. The empirical method and the data**

The estimation reported below refers to equation (12). The data are taken from the Labor Force Surveys or the 2005 Social Survey, as noted in Section 2.1 above. The basic regressions use Labor Force Survey data; when cultural variables are added to the equations, the Social Survey is used instead.

### 4. THE PARTICIPATION REGRESSION

First we present the results of estimation of Equation (12) using data from the Labor Force Survey for 2009. The explanatory variables include the “classic” ones (education and age), demographic variables (marital status, number of children, type of locality), number of additional wage earners and religion.

The results of the regression show that the age coefficients yield a profile that rises and then falls in the course of the life cycle, much like the participation rates in Figures 2 and 4. Consequently, even when we use control variables, we obtain a hump-shaped participation profile across the life-cycle.

The education coefficients show, as expected, that the level of education has positive, strong, and significant effects on participation, with 16+ years of schooling having a much stronger effect than 13–15 years. These findings reflect the fact that the likelihood of finding work and the potential wage both increase in schooling. The regression shows that divorcees and never-married women tend to participate more; separated women also tend to participate more, but the effect is not as strong. These findings can be explained by the needs of the household according to its composition. The presence of additional wage earners in the household has a positive effect on participation. Ostensibly this finding clashes with the previous finding about marital status because the presence of additional wage earners in the household makes it less necessary to work outside the home (an income effect). However, it evidently reflects people’s tendency to marry those who are similar to them, including similarity in schooling (assortative matching).<sup>5</sup> The number of children up to age 17 has a negative effect; evidently this reflects the negative income effect of child allowances alongside the need for childcare. Although the presence of young children usually has a negative effect, it is not significant in the regression for 2009. (However, see below.) Women who live in large cities exhibit higher participation rates, evidently because

<sup>5</sup> Various studies in Israel that ran a participation or employment regression yielded a similar finding. See, for example, Flug and Kasir (Kaliner), 2003, 2006.

they have better access to transportation (especially important in a traditional society) and more employment opportunities.<sup>6</sup> However, living in Jerusalem has a negative effect, probably because it is a proxy for affiliation with the Palestinian economy. Finally, religion has a marginal effect with being Christian or Druze increasing the woman's likelihood of participation.

An alternative interpretation of the findings follows the dichotomy of “modern” versus “traditional” Arab women. “Modern” Arab women share the characteristics of contemporary Western women, including advanced schooling and high participation. “Modernity” has two aspects, one relating to culture and mentality and the other to the use of advanced technologies (“modern knowledge”). Obviously, the two are connected. Many studies have found that “modernity” variables affect participation in a manner distinct from other variables.<sup>7</sup> The findings in Table 1 also suggest a positive relation between “modernity” variables among Arab women and participation: there is a positive correlation between “modernity” and level of schooling which has a very strong positive effect on participation. Arab women who are divorced or single (above a certain age) are more likely not to be “traditional.” The findings on higher participation rates among these women are consistent with the perception that “modern” women participate more.

Does age have an effect when combined with the other explanatory variables? One may answer this question by dividing the regressions into age groups. The findings obtained (not reported) resemble those of the regression covering the entire population of Arab women, but in different intensities.

<sup>6</sup> An ethnic enclave has a positive effect on Muslim women and a negative one on Christian women. Christian Arabs are more urban than Muslims and Druze, who dwell in rural enclaves. See, for example, Khattab (2002).

<sup>7</sup> For example, Lifshitz (2004) found in all her simulations that “modern” women (defined as belonging to a family in which both spouses are perceived as equal) participate more than “traditional” women (those in families where the male is the main wage earner). See also Eckstein and Lifshitz (2011).

**Table 1: Arab Women's Labor Force Participation Regression**

2009 Labor Force Survey						
Variable	Column 1			Column 2		
	Coefficient	S.D.		Coefficient	S.D.	
<b>Age group (control: 35-39)</b>						
24-20	-0.55 ***	0.08		-1.08 ***	0.10	
29-25	-0.27 ***	0.08		-0.50 ***	0.09	
34-30	-0.10	0.08		-0.21 ***	0.08	
44-40	-0.02	0.08		-0.12 ***	0.08	
49-45	-0.01	0.09		-0.18 ***	0.09	
54-50	-0.25 **	0.10		-0.42 ***	0.11	
59-55	-0.57 ***	0.12		-0.92 ***	0.15	
64-60	-0.77 ***	0.17		-0.87 ***	0.19	
69-65	-1.00 ***	0.25		-1.28 ***	0.27	
74-70	-1.42 ***	0.32		-1.72 ***	0.33	
75+	-1.39 ***	0.17		-1.73 ***	0.24	
<b>Years of schooling (control: 11-12)</b>						
8-0	-0.87 ***	0.06		-0.91 ***	0.07	
10-9	-0.49 ***	0.07		-0.48 ***	0.08	
15-13	0.53 ***	0.06		0.44 ***	0.07	
16+	1.35 ***	0.07		1.39 ***	0.07	
<b>Marital status (control: married)</b>						
Separated				0.74 ***	0.21	
Divorced				0.66 ***	0.17	
Widowed				-0.23 ***	0.17	
Single				0.58 ***	0.07	
<b>N children up to age 9 in family</b>						
<b>N children up to age 17 in family</b>						
<b>Locality type (control: 50,000-100,000 population)</b>						
Jerusalem				-0.73 ***	0.11	
Tel Aviv				0.58 ***	0.18	
Haifa				0.33 ***	0.15	
100,000-200,000 population				0.49 ***	0.24	
Up to 50,000 population				0.02 ***	0.09	
Rural locality				0.09 ***	0.14	
<b>Other wage earners in household (control: none)</b>						
1				0.16 ***	0.07	
2+				0.35 ***	0.07	
<b>Religion (control: Muslim)</b>						
Christian				0.42 ***	0.07	
Druze				0.19 ***	0.07	
Constant	-0.48 ***	0.06		-0.51 ***	0.13	
N observations	7,130			7,130		
F-statistic	80.54			40.20		
Prob > F	0.00 ***			0.00 ***		

\* denotes 10% significance; \*\* denotes 5% significance \*\*\* ;denotes 1 percent significance

**Source:** 2009 Labor Force Survey. Labor force participation regression: 1-participated; 0-did not participate

What is the source of the differences between Arab women and Jewish women? One may run the same regression for Jewish women and examine the differences. Table 2 deconstructs the differences in these regressions in the manner proposed by Fairlie (2005), which differentiates between the effect of differences in the distribution of the explanatory variables (between Jewish women and Arab women) and the effect of the differences in the coefficients of these variables. Table 2 shows the probabilities of participation among Arab and Jewish women, how much of the gap in probability is explained by differences in the distribution of the explanatory variables, and the contribution of each explanatory variable to explaining the gap.

The analysis shows that differences in the distribution of the variables explain only 10 percent of the difference in the probability of participation between Arab women and Jewish women: 0.035 of a difference of 0.37 in the probability of participation. The implication is that most of the differences are associated with the *effect* of the explanatory variables on participation, as distinct from the *value* of the explanatory variables. It was also found that differences in education and number of children explain 0.11 of the participation gap. That is, if education and number of children (up to age 9 and up to age 17) were distributed identically among Arab women and among Jewish women, the participation gap would be 11 percentage points smaller. However, the effect of age and, particularly, age 55+, acts in the opposite direction, i.e., if Arab women and the Jewish women had the same age composition (that is, if the Arab women were older), the participation rate of the former would be even lower than it is.

**Table 2: Fairlie Decomposition, Women's Labor Force Participation Regression**

2009 Labor Force Survey		
Variable	Coefficient	S.D.
<b>Age (control: 35-39)</b>		
24-20	0.012 ***	0.0009
29-25	0.004 ***	0.0006
34-30	0.001 **	0.0004
44-40	0.000	0.0002
49-45	0.000 ***	0.0001
54-50	-0.001 ***	0.0002
59-55	-0.008 ***	0.0007
64-60	-0.029 ***	0.0009
69-65	-0.024 ***	0.0004
74-70	-0.020 ***	0.0003
75+	-0.018 ***	0.0004
<b>Years of schooling (control: 11-12)</b>		
8-0	0.041 ***	0.0031
10-9	0.004 ***	0.0008
15-13	0.009 ***	0.0011
16+	0.015 ***	0.0008
<b>Marital status (control: married)</b>		
Separated	0.000 ***	0.0001
Divorced	0.003 ***	0.0006
Widowed	0.000	0.0003
Single	0.000 ***	0.0002
<b>N children up to age 9 in family</b>		
	0.015 ***	0.0028
<b>N children up to age 17 in family</b>		
	0.026 ***	0.0039
<b>Locality type (control: 50,000-100,000 population)</b>		
Jerusalem	0.002 **	0.0010
Tel Aviv	0.001	0.0007
Haifa	0.000	0.0003
100,000-200,000 population	0.002	0.0018
Up to 50,000 population	0.000	0.0027
Rural locality	0.001 ***	0.0003
<b>Other wage earners in household (control: none)</b>		
1	-0.006 ***	0.0004
2+	-0.002 ***	0.0003

Total observations = 44,301

Total Jewish women = 37,394

Total Arab women = 6,907

Probability of labor force participation among Jewish women: 0.619836

Probability of labor force participation among Arab women: 0.24533877

Difference = 0.37449723

Total explained: 0.0346222

\* denotes 10% significance; \*\* denotes 5% significance; \*\*\* denotes 1 percent significance

**Source:** 2009 Labor Force Survey. Labor force participation regression: 1-participated; 0-did not participate

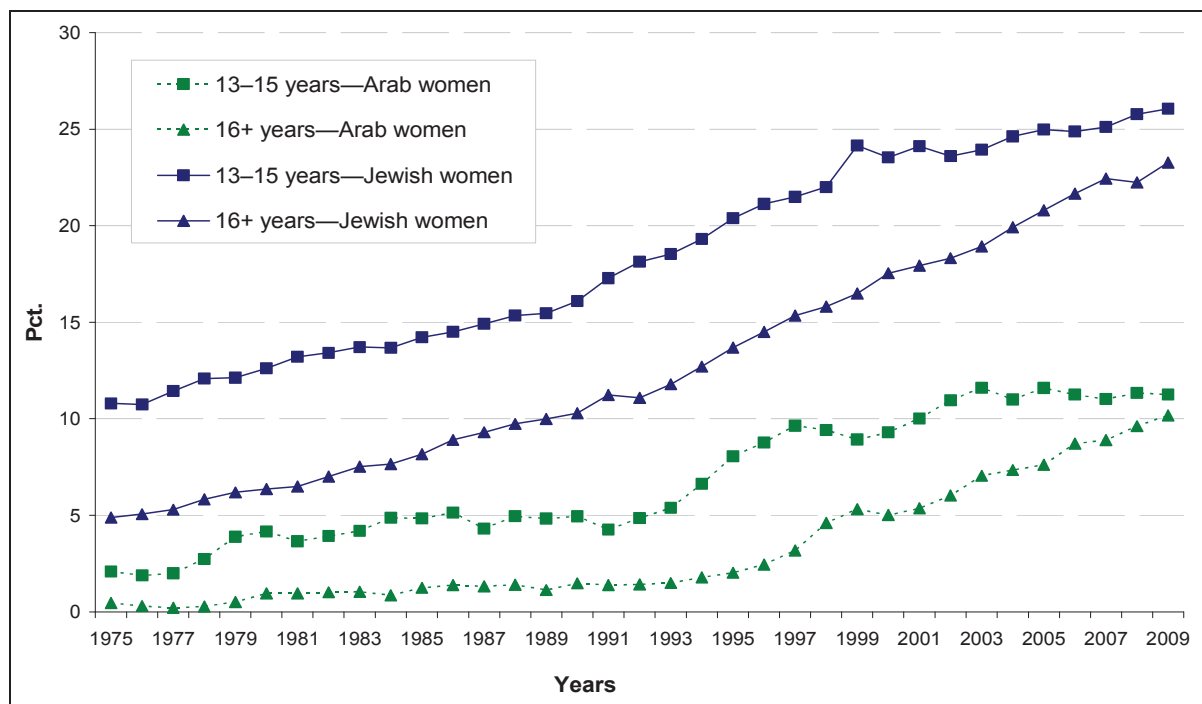
## 5. CHANGES OVER TIME

In the previous sections, we noted that Israeli Arab women have lower participation rates than Israeli Jewish women and women in Western countries. The participation regression (partly) explains these participation patterns, taking into account education, marital status, child allowances and place of residence. This account is valid for the analysis of a cross-section of women in a given year (2009), i.e., using the difference among women at a given point in time. In this section, we examine the difference over time. First, how did the explanatory variables in the aforementioned regression change over time? Second, how did their marginal effect (a function of the regression coefficients) change over time?

### a. Changes in explanatory variables

We begin by presenting graphs that show the differences in the explanatory variables over time.

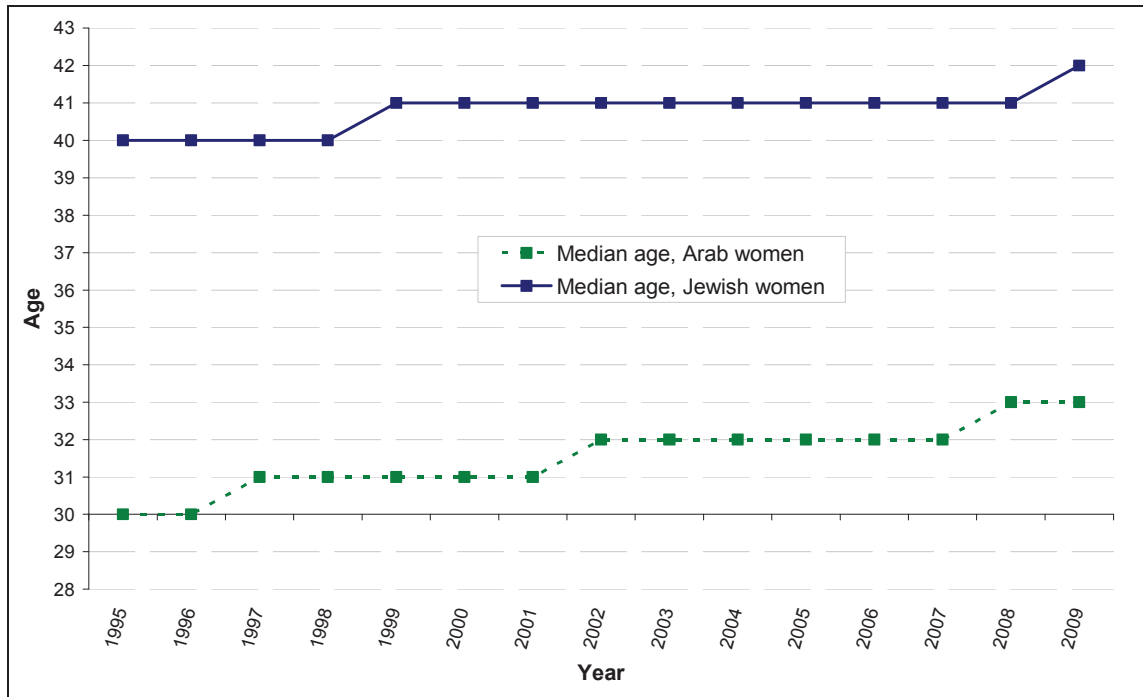
**Figure 7a: Rate of Arab Women with Post-Secondary Schooling, Over Time**



**Source:** calculations based on CBS Labor Force Surveys.

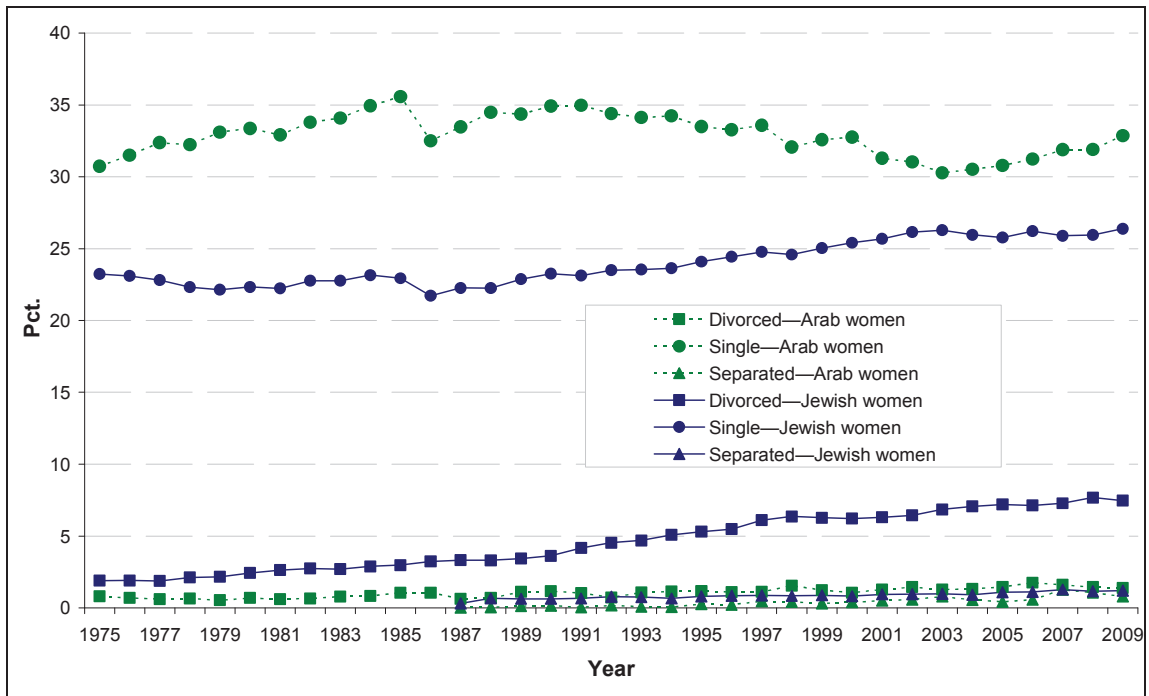


**Figure 7b: Median Age of Women Over Time**



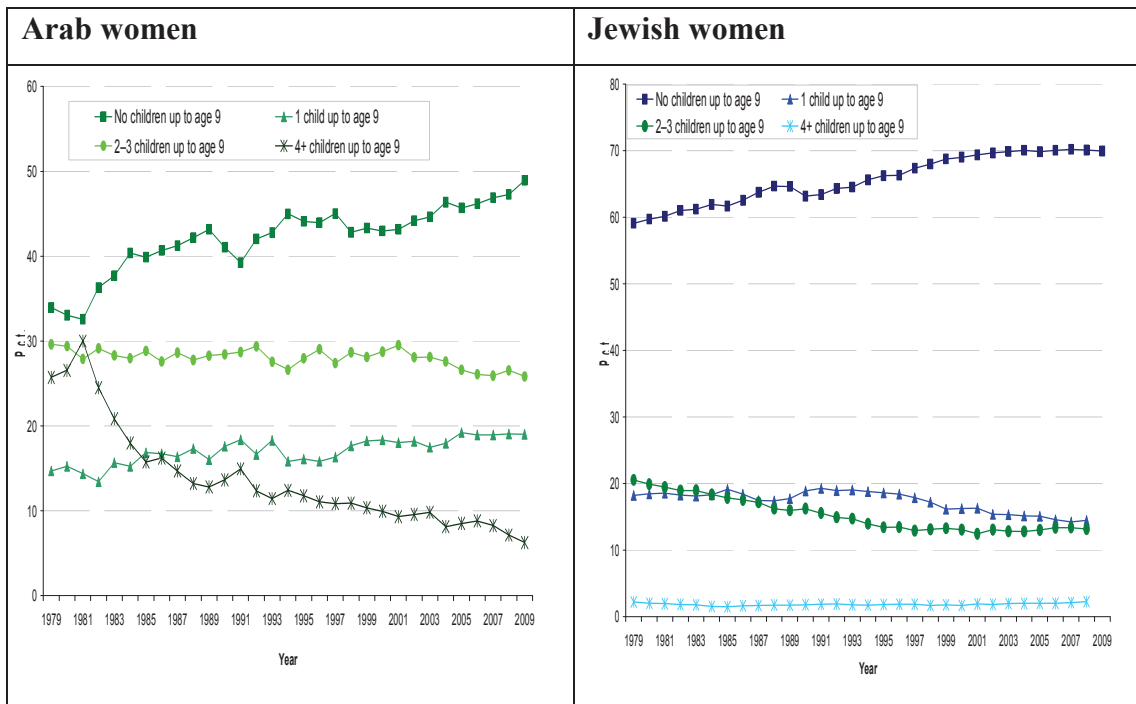
Source: calculations based on CBS Labor Force Surveys.

**Figure 7c: Distribution of Marital Status Over Time**



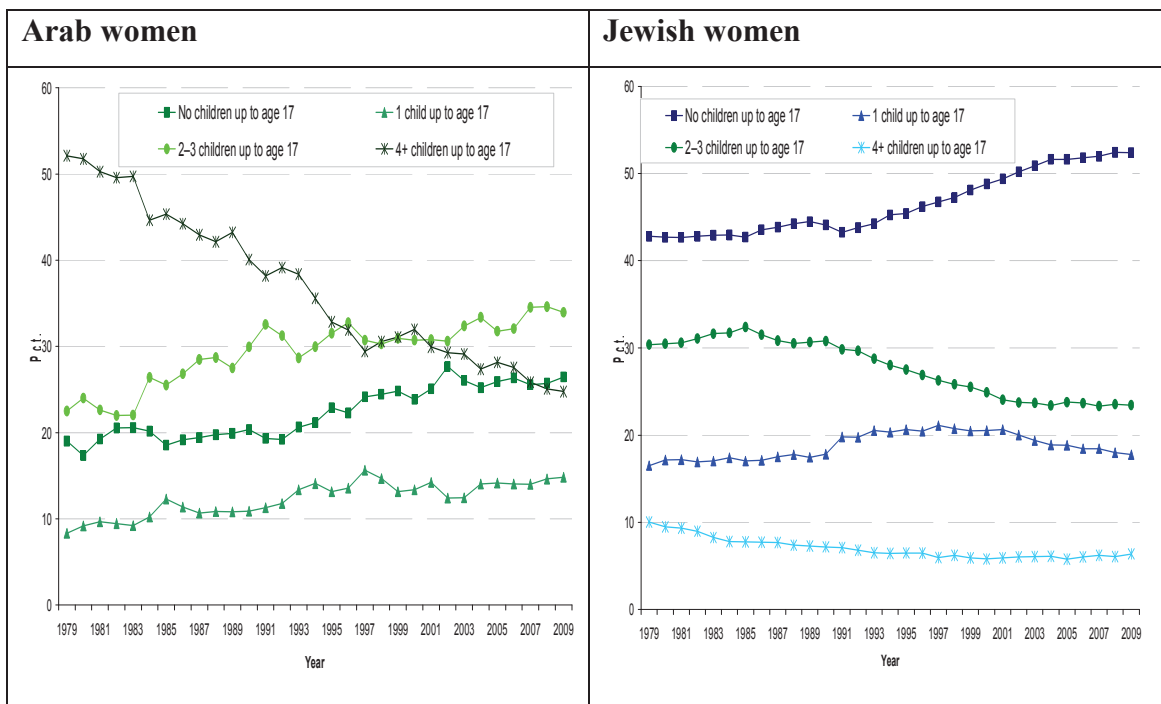
Source: calculations based on CBS Labor Force Surveys.

**Figure 7d: Share of Women with Children up to Age 9**



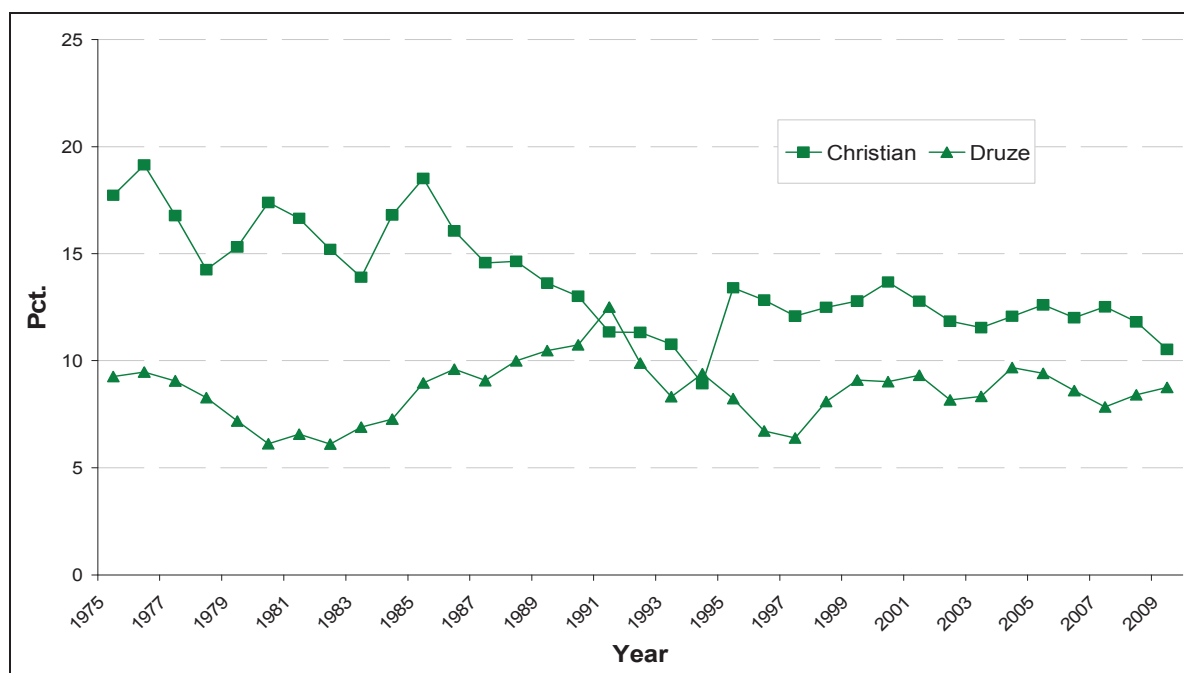
Source: calculations based on CBS Labor Force Surveys.

**Figure 7e: Share of Women with Children up to Age 17**



Source: calculations based on CBS Labor Force Surveys.

**Figure 7f: Religion**



**Source:** calculations based on CBS Labor Force Surveys.

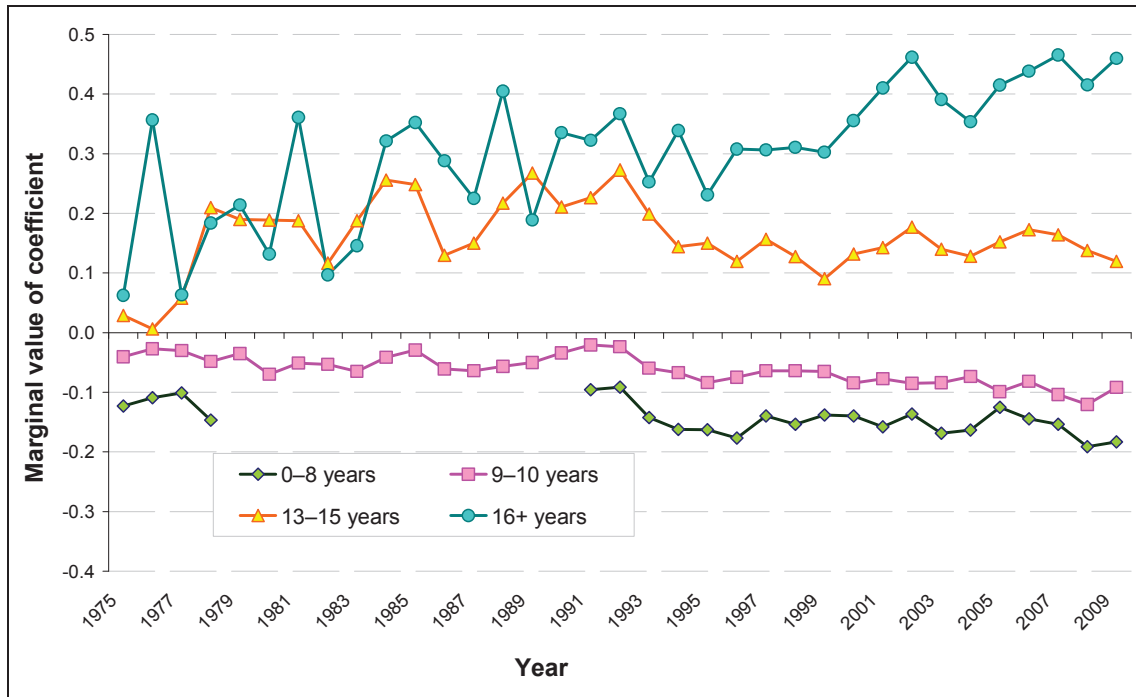
The graphs show a marked increase in the proportion of Arab women with higher education over the years<sup>8</sup>, some increase in the median age, a slight decline in the share of never-married women (after an increase in the 1970s), a decrease in the number of children including a smaller share of large families, a decline in the proportion of Christian women, and stability in the proportion of Druze. Most of these changes explain the upward drift of the participation rate over time; the increase in age and the decline in the proportion of Christian women have the opposite effect.

#### **b. Changes in the marginal effects of the explanatory variables**

Over the years, the regression coefficients have been changing and so has the marginal effect of each variable. The graphs below depict the development of the marginal effects of the variables over time.

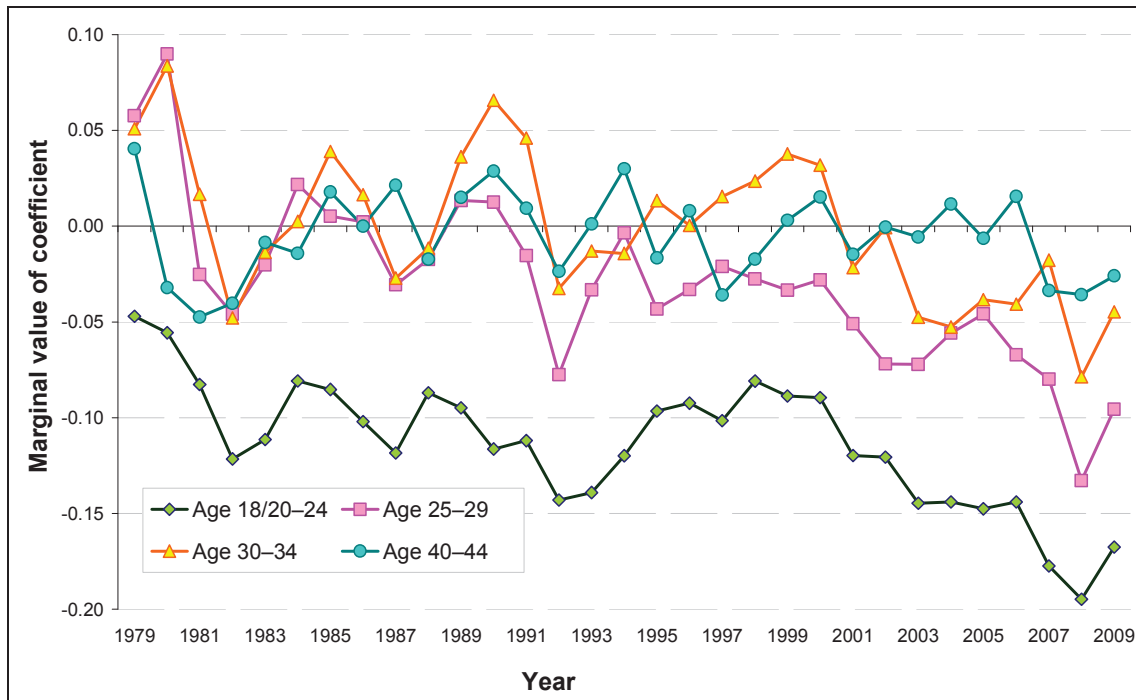
<sup>8</sup> For elaboration on the state of higher education in Israeli Arab society, see *The Book of Arab Society in Israel: Population, Society, Economy* (3), pp. 119–168.

**Figure 8a: Changes in the Marginal Effects of Schooling**



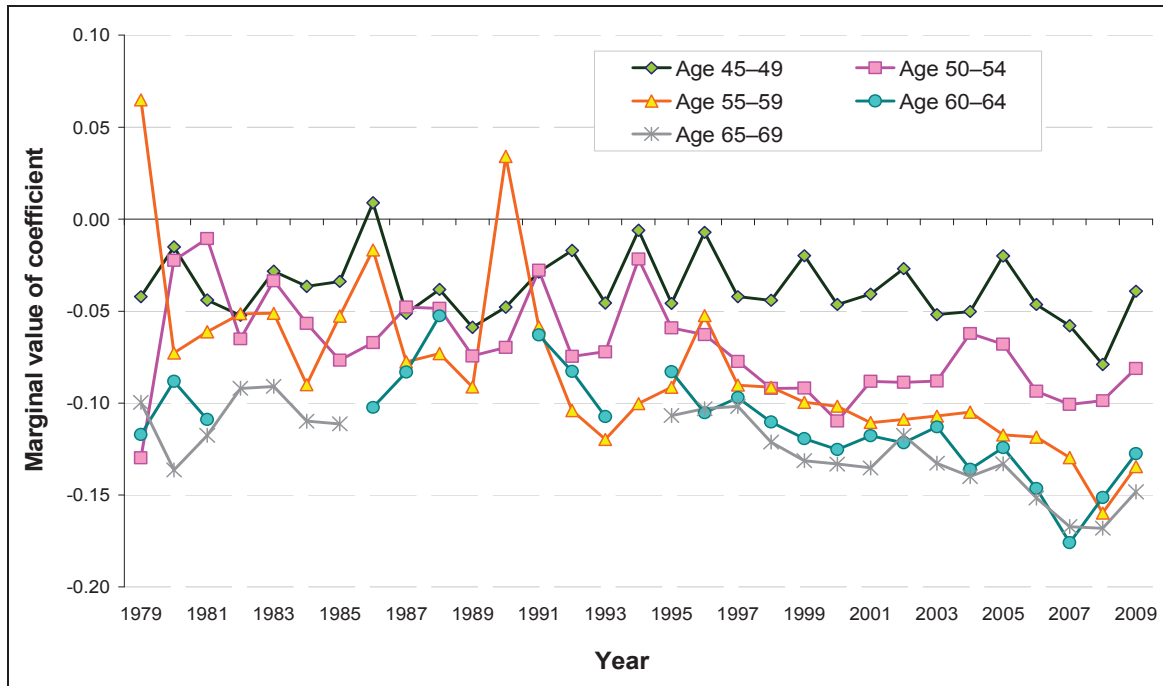
Source: calculations based on CBS Labor Force Surveys.

**Figure 8b: Changes in the Marginal Effects of Age 18-44**



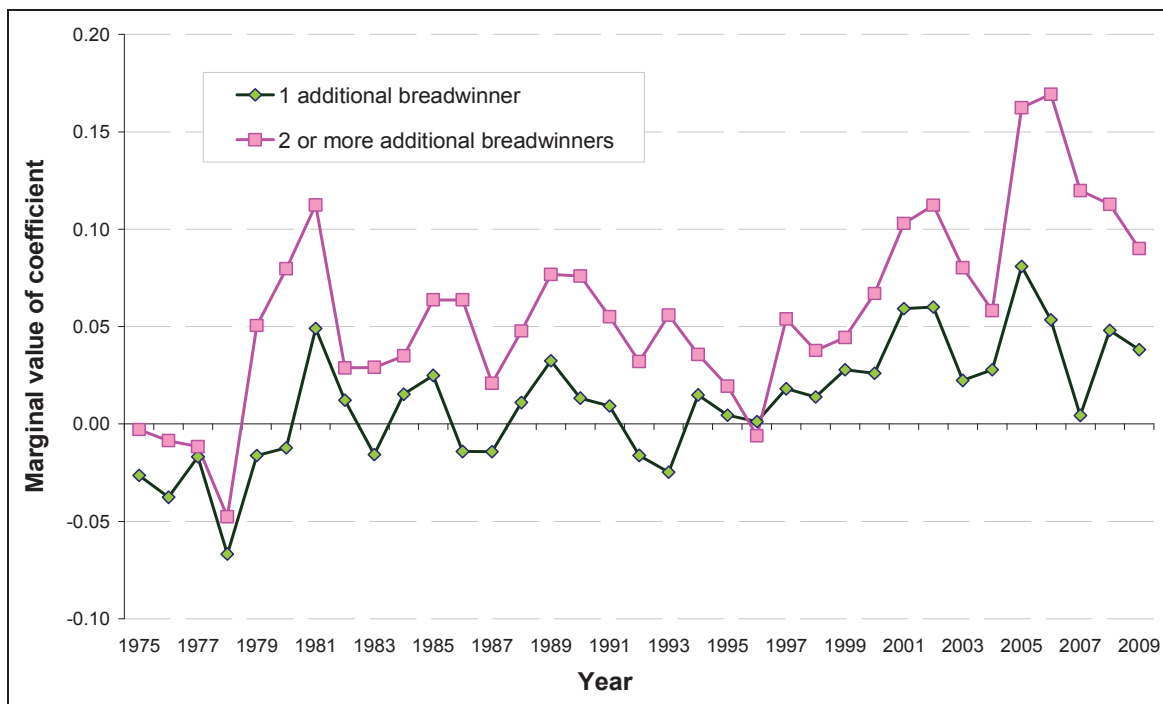
Source: calculations based on CBS Labor Force Surveys.

**Figure 8c: Changes in the Marginal Effects of Age 45–69**



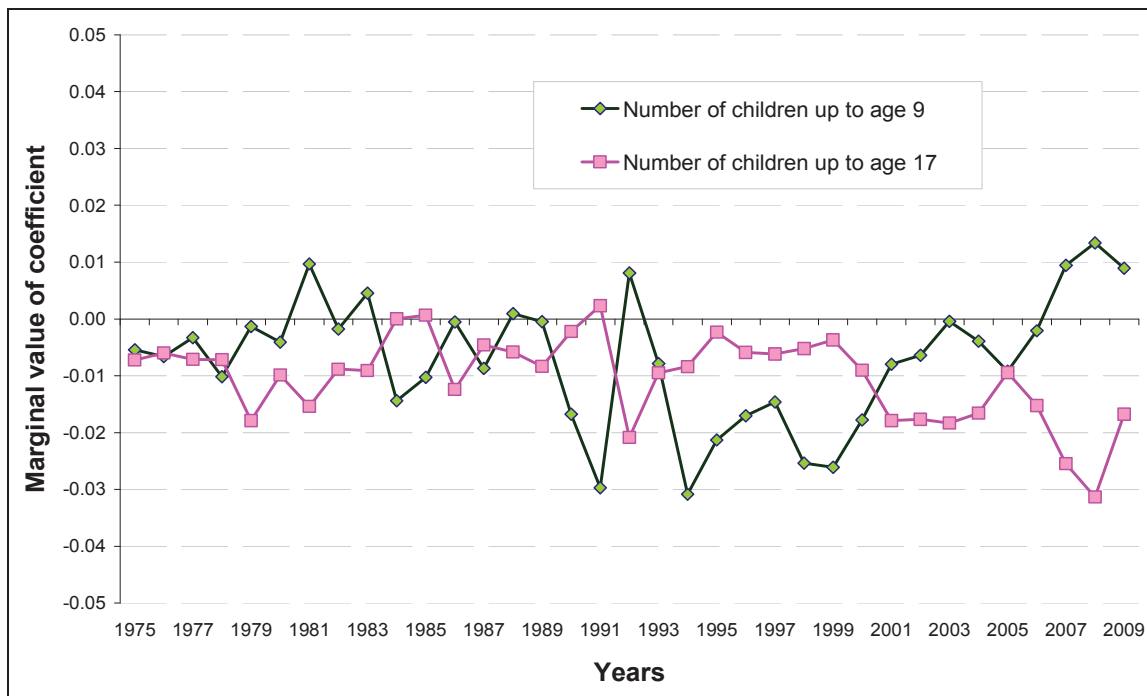
Source: calculations based on CBS Labor Force Surveys.

**Figure 8d: Changes in the Marginal Effects of Presence of Additional Wage Earners**



Source: calculations based on CBS Labor Force Surveys.

**Figure 8e: Changes in the Marginal Effects of Number of Children**



**Source:** calculations based on CBS Labor Force Surveys.

The figures indicate that higher schooling has become more important over time, especially among those who have 16+ years of schooling and even in comparison with those who have 13–15 years. The negative effects of being poorly educated (0–8 years of schooling) have also increased somewhat. Over the years, the hump shape of participation across the life cycle has become steeper (as in Figure 5, but here it is calculated on the basis of the age coefficients in the regression). The effect of the number of children up to age 9 was negative in most years; the effect of the number of children up to age 17 was usually negative and has become somewhat more so in the past decade. The effect of positive assortative matching has strengthened, evidenced by the increase in the positive effect of having additional wage earners. It should be noted though that a negative effect, existed at the beginning of the sample period.

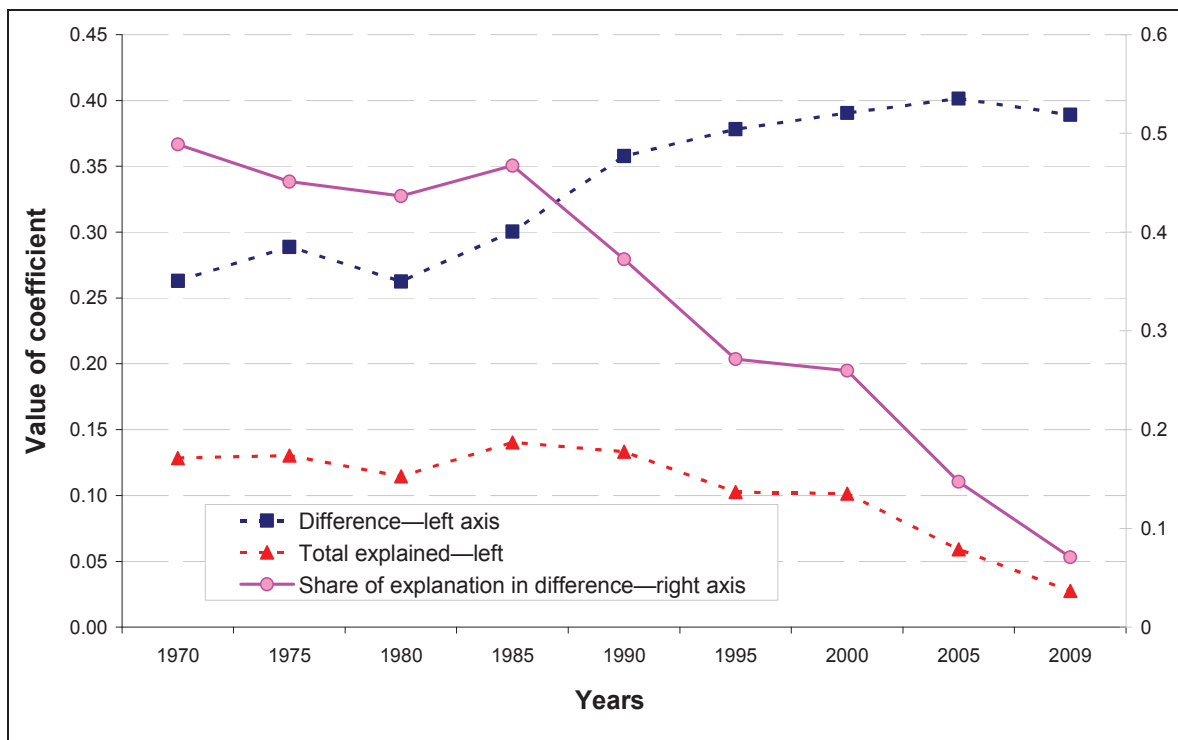
### **c. Changes over time—the Fairlie decomposition**

In this section, we examine how the distribution of the explanatory variables affects the differential between Arab women and Jewish women in the probability of labor force participation. For each explanatory variable, we also examine the variance *over the years* in the regression coefficients, decomposed by the method proposed by Fairlie (2005).

As we explained above, this method reveals how much of the participation gap can be traced to differences in the explanatory variables. In addition to this decomposition, we ran each year's participation equations in an OLS regression and performed a similar decomposition using the method proposed by Blinder (1973) and Oaxaca (1973). Notably, OLS estimation is more problematic when the dependent variable is binary, as it is here. The findings obtained, however, are very similar and both decomposition methods lead to the same conclusions.

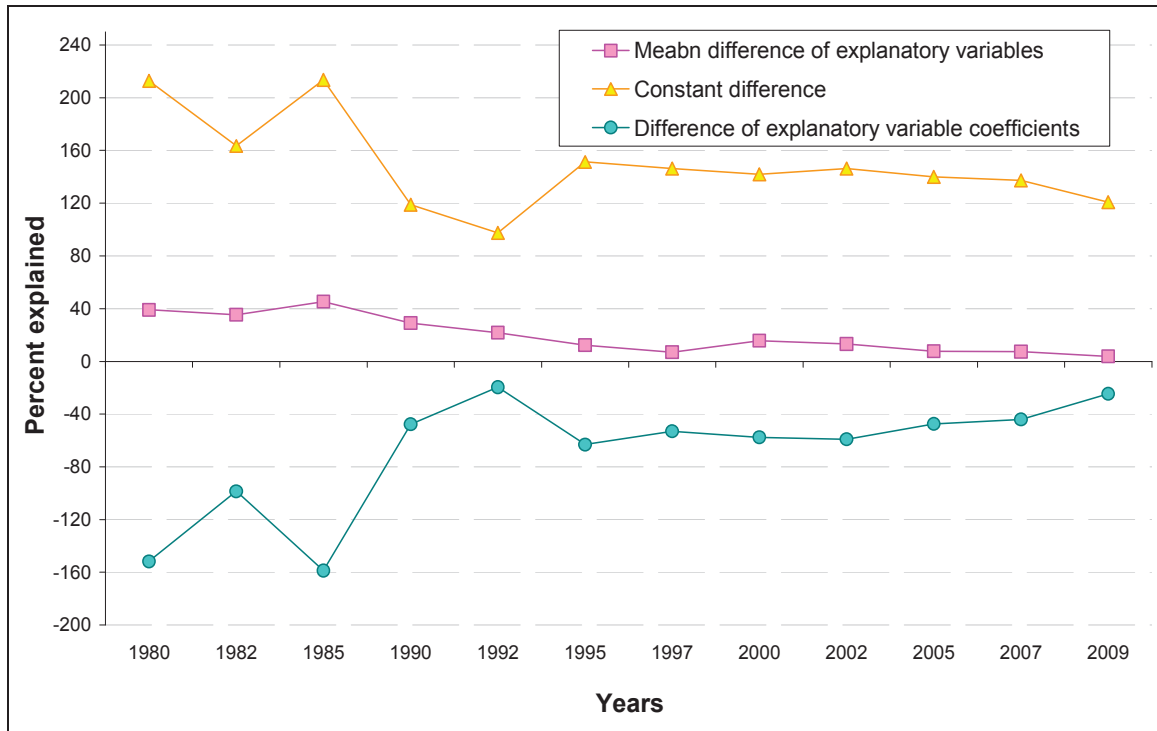
Figures 9a and 9b present the two decompositions.

**Figure 9a: Fairlie (2005) Decomposition**



Source: calculations based on CBS Labor Force Surveys.

**Figure 9b: Blinder (1973) and Oaxaca (1973) Decomposition**



**Source:** calculations based on CBS Labor Force Surveys.

Figure 9a shows that while the difference between Arab women and Jewish women in the probability of participation widened considerably over time—from 0.25 in 1970 to 0.40 in recent years—the part of the gap that is explained by differences in the distribution of the explanatory variables has contracted considerably. The differences in the distribution of the variables which explained about half the gap in 1970 explained less than 10 percent in 2009 according to the Fairlie (2005) method. Figure 9b indicates that according to the Blinder (1973) and Oaxaca (1973) decomposition, the explanatory power of differences in the distribution of the explanatory variables declined from 39.2 percent in 1980 to 3.8 percent in 2009.

What does this finding mean? The following equation shows the decomposition of the regressions following the OLS formula:

$$\bar{P}^J - \bar{P}^A = C^J - C^A + (\bar{X}^J - \bar{X}^A)\beta^J + (\beta^J - \beta^A)\bar{X}^J$$

where  $\bar{P}^A, \bar{P}^J$  are the means of the dependent variables, i.e., the probability of participation among Jewish women and Arab women, respectively;  $C^J, C^A$  are the constants in the Jewish and Arab regressions, respectively;  $\bar{X}^A, \bar{X}^J$  are the explanatory



variables in the Jewish and Arab regressions, respectively; and  $\beta^A, \beta^J$  are vectors of coefficients estimated in the regressions of Jewish and Arab women, respectively.

The decomposition yields three components: the difference in the constants of the regressions, the difference in the means of the explanatory variables (multiplied by the regression coefficients), and the difference in the regression coefficients (multiplied by the means of the explanatory variables). We address each component below:

For the first component, examining the gap between the regression constants, we find that this factor provides the main explanation for the participation differential. The difference between the constants has been narrowing slightly over time.

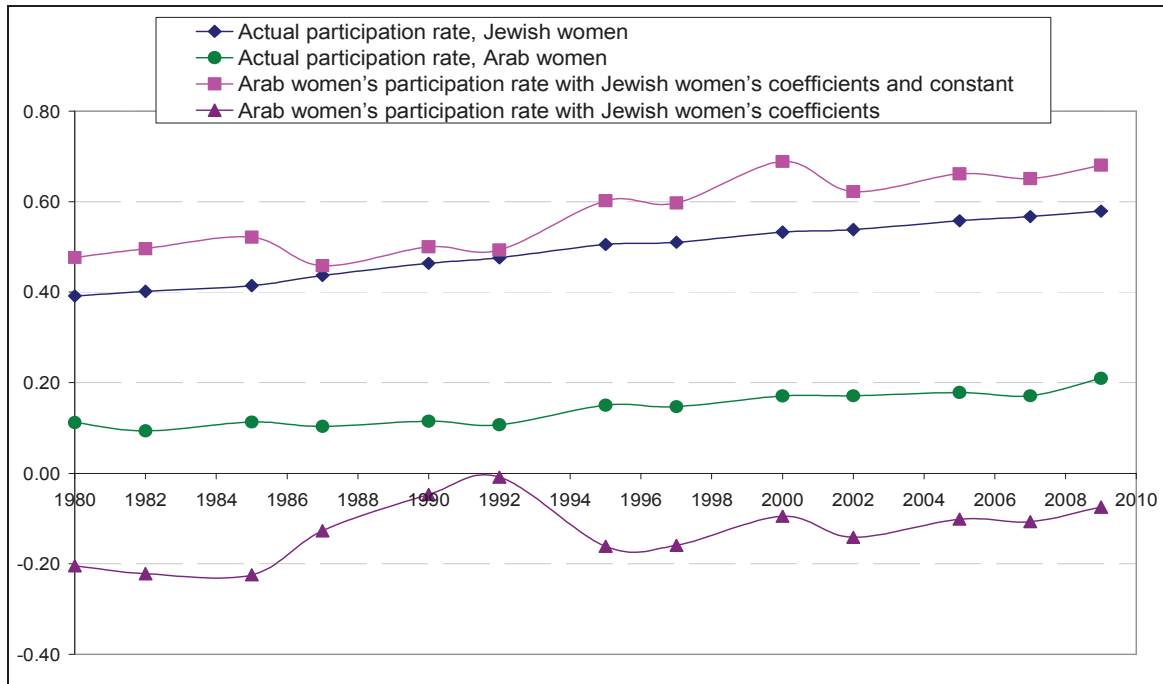
For the second component, the graphs above show a decrease in the explanatory power of the mean differential in the explanatory variables. Observing each variable separately, we find that the average differential has narrowed in some variables and widened in others, but the decrease in this component shows that the contraction effect was dominant.

The third component was negative; by this measure, the coefficients of the variables were higher for Arab women than for Jewish women. Had this component been dominant, Arab women would have had a higher participation rate than Jewish women. Over the years, this effect has been weakening, i.e., the negative spread of the coefficients has been narrowing.

What does this decomposition teach us? The increase in Arab women's participation rates may be traced, in the main, to the fact that they are becoming more educated, having fewer children, and forming more households that have an additional wage earner. Harder to explain is the concurrent widening of the participation *gap* in favor of Jewish women. According to the findings above, the main explanatory factor is the weakening of the effect of the third component. The question is how to understand this component, especially in comparison with the first one, which is dominant. One may say that the first component reflects the disparity between Jewish women and Arab women in matters of cultural difference, discrimination, or "frictions." For example, cultural factors, discrimination by employers, and "frictional" factors such as poor access to transport, lack of information, lack of day care centers, etc., may lead to lower participation by Arab women, *ceteris paribus*. This component has always been more dominant than the third one, according to which Arab women may have higher coefficients due to selectivity. Now that this last component has weakened, the disparity has widened because the first component has become even more dominant.

Figure 9c demonstrates this in graph form. It shows the actual participation rate of Jewish and Arab women, the rate predicted by the regression if Arab women’s coefficients were the same as those of Jewish women, and the rate predicted if Arab women had the Jewish women’s coefficients and also their constant. The graph shows that the Arabs’ participation rate in the last-mentioned case would have been 68% in 2009.

**Figure 9c: Simulation of Participation Rates by OLS Regressions**



**Source:** calculations based on CBS Labor Force Surveys.

In another noteworthy phenomenon, not all the explanatory variables “converge.” That is, Arab women did not become “like” Jewish women in any variable that positively explained the increase in the employment rate. Thus, the education gap widened (Figure 7a), the share of Christian women in the population declined, the proportion of the never-married decreased somewhat in recent years (after rising in the early 1970s), and the number of households that had at least two wage earners dropped. The findings about the weakening of the second component over time, however, show that the explanatory power of the spread between the explanatory variables has narrowed overall. The decrease traces mainly to the narrowing of the gaps as a result of the convergence of the age distribution and the number of young children, the narrowing of education gaps since the mid-1990s, and the increase in the number of Arab women living in households that have additional wage earners.

## 6. PARTICIPATION OF ARAB WOMEN: FINDINGS FROM THE 2005 SOCIAL SURVEY

### a. Findings from the participation regressions

The 2005 Social Survey allows us to relate to additional variables. In the participation regressions based on this survey, we added several explanatory variables that are unique to the survey: religious affiliation, variables attesting to modern knowledge (command of English, having a driver's license, or using a computer), and attitudes toward men and women in the labor market. Tables 3a–3c report the results, showing three regressions: one including variables specific to the Social Survey, one comprised of variables particular to the Labor Force Survey, and one that integrates the two.

**Table 3a: Arab Women Labor Force Participation Equation, "Culture" Variables Only--2005 Social Survey**

2005 Social Survey			
Variable	Coefficient		S.D.
<b>Religion (control: Muslim)</b>			
Christian	-0.01	***	0.24
Druze	0.46	***	0.22
<b>Religiosity (control: not religious)</b>			
Very religious	-0.28	***	0.30
Religious	-0.44	***	0.22
Not so religious	-0.17	***	0.25
Proficient in English	0.40	***	0.16
Has driver's license	0.94	***	0.15
Uses computer	0.40	***	0.16
<b>Attitudes</b>			
Man and woman retire at same age	0.30	***	0.16
Both work	0.38	***	0.19
In family with young children:			
One parent should work less	0.73	***	0.17
Both parents should work less	1.06	***	0.44
Both parents should work as usual	0.39	***	0.18
Constant	-2.02	***	0.29
N observations	532.00		
F-statistic	12.22		
Prob > F	0.00	***	

\* denotes 10% significance; \*\* denotes 5% significance; \*\*\* denotes 1 percent significance

**Source:** 2005 Social Survey. Labor force participation regression: 1-participated; 0-did not participate

**Table 3b: Arab Women Labor Force Participation Equation,  
"General" Variables Only**

2005 Social Survey			
Variable	Coefficient		S.D.
<b>Age (control: 35-39)</b>			
24-20	-0.91	***	0.32
29-25	-0.12		0.27
34-30	-0.51	*	0.29
44-40	0.25		0.30
49-45	0.34		0.32
54-50	0.54		0.36
59-55	0.18		0.42
64-60	-1.19	*	0.67
74-65	-0.17		0.50
<b>Years of schooling (control: 11-12)</b>			
8-0	-1.10	***	0.25
10-9	-0.83	***	0.25
15-13	0.41	**	0.20
16+	1.46	***	0.30
<b>Marital status (control: married)</b>			
Divorced	1.17		0.74
Widowed	0.04		0.42
Single	0.58		0.40
<b>N children (control: 0)</b>			
1	-0.11		0.40
2	-0.21		0.38
3	-0.55		0.39
4	-0.92	**	0.41
5	-0.95	**	0.45
6	-0.91	*	0.48
7+	-1.15	**	0.45
<b>Other wage earners in household (control: none)</b>			
1	0.49	**	0.22
2+	0.28		0.25
<b>Locality type (control: 50,000-100,000 population)</b>			
Jerusalem	-0.60	**	0.30
Haifa	-0.33		0.52
Tel Aviv	1.11	*	0.57
2,000-50,000 population	0.01		0.26
Rural locality	-0.06		0.40
<b>Satisfaction with public transit (control: do not use public transit)</b>			
Very satisfied	-0.06		0.35
Satisfied	0.04		0.25
Not so satisfied	-0.66	**	0.31
Not satisfied at all	0.07		0.25
Constant	-0.39		0.51
N observations	513.00		
F-statistic	4.61		
Prob > F	0.00	***	

\* denotes 10% significance; \*\* denotes 5% significance; \*\*\* denotes 1 percent significance

**Source:** 2005 Social Survey. Labor force participation regression: 1-participated; 0-did not participate

**Table 3c: Arab Women Labor Force Participation Regression, Most Variables**

2005 Social Survey		
Variable	Coefficient	S.D.
<b>Age (control: 35-39)</b>		
24-20	-0.84 ***	0.32
29-25	0.20	0.27
34-30	-0.32	0.29
44-40	0.35	0.28
49-45	0.21	0.32
54-50	0.57	0.35
59-55	-0.31	0.49
64-60	-1.79 **	0.79
74-65	0.68	0.55
<b>Receives benefit</b>		
<b>Marital status (control: married)</b>		
Divorced	1.79 ***	0.68
Widowed	0.14	0.57
Single	0.40	0.37
<b>N children (control: 0)</b>		
1	-0.31	0.39
2	-0.54	0.39
3	-0.96 **	0.38
4	-1.27 ***	0.40
5	-1.25 ***	0.42
6	-1.22 ***	0.45
7+	-1.52 ***	0.47
<b>Religion (control: Muslim)</b>		
Christian	0.11	0.29
Druze	0.48 **	0.24
<b>Proficient in English</b>		
<b>Has driver's license</b>		
<b>Uses computer</b>		
<b>Attitudes</b>		
Man and woman retire at same age	0.27	0.17
Both work	0.58 **	0.23
<b>In family with young children:</b>		
One parent should work less	0.73 ***	0.18
Both parents should work less	0.97 **	0.42
Both parents should work as usual	0.36 *	0.19
<b>Constant</b>		
<b>N observations</b>		
<b>F-statistic</b>		
<b>Prob &gt; F</b>		

\* denotes 10% significance; \*\* denotes 5% significance; \*\*\* denotes 1 percent significance

Source: 2005 Social Survey. Labor force participation regression: 1-participated; 0-did not participate

The tables indicate that the results for the ordinary variables correspond to those of the Labor Force Survey.

The findings show that women who have modern attitudes and knowledge are more inclined to participate in the labor market than others. (See also King, Naon, and Voldatzadik, 2009.) This finding is consistent with the results obtained by Spierings and Smits (2000), who examined the participation of Arab women in Egypt, Jordan, Syria, Morocco, and Tunisia.

Somewhat to our surprise, the regression based only on modern attitudes and knowledge yielded an explanation not much less powerful than that elicited by the ordinary regression. In this regression, modern knowledge and attitudes have a positive and significant effect. Religious affiliation, however, was not found to be significant. Another variable examined was satisfaction with public transportation. We included it due to the common argument that participation is impeded by difficulties related to public transportation. This variable, too, was not found to be significant.

#### **b. Fairlie decomposition**

Below we compare Jewish women with Arab women using the decomposition proposed by Fairlie (2005), described above.

**Table 3d: Arab and Jewish Women Labor Force Participation Equation**

"Culture" Variables		
Variable	Coefficient	S.D.
Religion (control: Muslim)		
Christian	-0.0046 ***	0.0007
Druze	(omitted) ***	0.0000
Religiosity (control: not religious)		
Very religious	(omitted) ***	0.0000
Religious	0.0289	0.0947
Not so religious	0.0291 *	0.0160
Proficient in English	0.0122 ***	0.0047
Has driver's license	0.0363 ***	0.0065
Uses computer	0.1031 ***	0.0072
Attitudes		
Man and woman retire at same age	0.0038	0.0035
Both work	0.0061 ***	0.0022
In family with young children:		
One parent should work less	0.0262 ***	0.0069
Both parents should work less	0.0031	0.0019
Both parents should work as usual	0.0037 ***	0.0014

Total observations = 3,838

Total, Jewish women = 3,306

Total, Arab women = 532

Probability of labor force participation among Jewish women = 0.60361448

Probability of labor force participation among Arab women = 0.19832682

Difference: 0.40528766

Total explained: 0.24753209

\* denotes 10% significance; \*\* denotes 5% significance; \*\*\* denotes 1 percent significance

**Source:** 2005 Social Survey. Labor force participation regression: 1-participated; 0-did not participate

**Table 3d: Arab and Jewish Women Labor Force Participation Equation**

"Culture" Variables			
Variable	Coefficient		S.D.
Religion (control: Muslim)			
Christian	-0.0046	***	0.0007
Druze	(omitted)	***	0.0000
Religiosity (control: not religious)			
Very religious	(omitted)	***	0.0000
Religious	0.0289		0.0947
Not so religious	0.0291	*	0.0160
Proficient in English	0.0122	***	0.0047
Has driver's license	0.0363	***	0.0065
Uses computer	0.1031	***	0.0072
Attitudes			
Man and woman retire at same age	0.0038		0.0035
Both work	0.0061	***	0.0022
In family with young children:			
One parent should work less	0.0262	***	0.0069
Both parents should work less	0.0031		0.0019
Both parents should work as usual	0.0037	***	0.0014

Total observations = 3,838

Total, Jewish women = 3,306

Total, Arab women = 532

Probability of labor force participation among Jewish women = 0.60361448

Probability of labor force participation among Arab women = 0.19832682

Difference: 0.40528766

Total explained: 0.24753209

\* denotes 10% significance; \*\* denotes 5% significance; \*\*\* denotes 1 percent significance

**Source:** 2005 Social Survey. Labor force participation regression: 1-participated; 0-did not participate



**Table 3e: Arab and Jewish Women Labor Force Participation Regression,  
Fairlie Decomposition**

General Variables			
Variable	Coefficient		S.D.
<b>Age (control: 35-39)</b>			
24-20	0.014	***	0.004
29-25	0.003		0.002
34-30	0.002		0.002
44-40	0.000		0.000
49-45	0.000		0.001
54-50	0.001		0.001
59-55	-0.007	***	0.002
64-60	-0.012	***	0.002
74-65	-0.040	***	0.002
75+	-0.015	***	0.001
<b>Years of schooling (control: 11-12)</b>			
8-0	0.026	**	0.013
10-9	0.013	**	0.006
15-13	0.016	***	0.005
16+	0.028	***	0.003
<b>Marital status (control: married)</b>			
Divorced	-0.001		0.003
Widowed	-0.003	**	0.001
Single	0.000		0.001
<b>N children (control: 0)</b>			
1	-0.006	**	0.003
2	-0.009		0.006
3	-0.005	**	0.002
4	0.004	***	0.002
5	0.015	***	0.005
6	0.012	***	0.004
7+	0.042	***	0.007
<b>Other wage earners in household (control: none)</b>			
1	-0.005	**	0.002
2+	0.000		0.000
<b>Locality type (control: 50,000-100,000 population)</b>			
Jerusalem	-0.003		0.004
Haifa	0.000		0.002
Tel Aviv	-0.002	**	0.001
2,000-50,000 population	0.009		0.007
Rural locality	(omitted)	***	0.000
<b>Satisfaction with public transit (control: do not use public transit)</b>			
Very satisfied	-0.001		0.002
Satisfied	-0.001	*	0.001
Not so satisfied	0.003	*	0.002
Not satisfied at all	0.002		0.005

Total observations = 3,838

Total, Jewish women = 3,306

Total, Arab women = 532

Probability of labor force participation among Jewish women = 0.60361448

Probability of labor force participation among Arab women = 0.19832682

Difference: 0.40528766

Total explained: 0.07502537

\* denotes 10% significance; \*\* denotes 5% significance; \*\*\* denotes 1 percent significance

**Source:** 2005 Social Survey. Labor force participation regression: 1-participated; 0-did not participate

**Table 3f: Arab and Jewish Women Labor Force Participation Regression,  
Fairlie Decomposition**

Most Variables		
Variable	Coefficient	S.D.
<b>Age (control: 35-39)</b>		
24-20	0.0121 ***	0.0030
29-25	0.0026 *	0.0015
34-30	0.0013	0.0014
44-40	0.0001	0.0004
49-45	-0.0001	0.0008
54-50	0.0016	0.0011
59-55	-0.0041 **	0.0018
64-60	-0.0065 ***	0.0016
74-65	-0.0225 ***	0.0025
75+	-0.0106 ***	0.0011
<b>Years of schooling (control: 11-12)</b>		
8-0	0.0144	0.0111
10-9	0.0067	0.0047
15-13	0.0085 **	0.0038
16+	0.0194 ***	0.0039
<b>Receives benefit</b>		
	-0.0172 ***	0.0020
<b>Marital status (control: married)</b>		
Divorced	0.0023	0.0022
Widowed	0.0006	0.0015
Single	0.0001	0.0005
<b>N children (control: 0)</b>		
1	-0.0033	0.0026
2	-0.0063	0.0053
3	-0.0036 *	0.0022
4	0.0022 **	0.0011
5	0.0090 **	0.0046
6	0.0066 *	0.0035
7+	0.0275 ***	0.0066
<b>Religion (control: Muslim)</b>		
Christian	-0.0033	0.0023
Druze	(omitted)	
<b>Proficient in English</b>		
	-0.0087 *	0.0050
<b>Has driver's license</b>		
	0.0063	0.0071
<b>Uses computer</b>		
	0.0607 ***	0.0076
<b>Attitudes</b>		
Man and woman retire at same age	0.0032	0.0041
Both work	0.0090 ***	0.0029
In family with young children:		
One parent should work less	0.0268 ***	0.0078
Both parents should work less	0.0017	0.0019
Both parents should work as usual	0.0026 ***	0.0008

Total observations = 3,838

Total, Jewish women = 3,306

Total, Arab women = 532

Probability of labor force participation among Jewish women = 0.60361448

Probability of labor force participation among Arab women = 0.19832682

Difference: 0.40528766

Total explained: 0.13572491

\* denotes 10% significance; \*\* denotes 5% significance; \*\*\* denotes 1 percent significance

**Source:** 2005 Social Survey. Labor force participation regression: 1-participated; 0-did not participate

The analysis shows that in the Social Survey, as in the findings elicited by the regressions based on the Labor Force Surveys, the different distribution of the standard explanatory variables such as education, age, marital status, number of children, and type of locality (Table 3e) explain only a relatively small part of the differential in participation of Arab and Jewish women. However, by running a regression on various “cultural” variables, including subjective ones, we found that they explain much (more than 60 percent) of the differential in participation rates. This outcome corresponds to other studies (Bertrand and Mullainathan, 2001) that found subjective variables highly effective in explaining behavioral differences among individuals.

## 7. POLICY IMPLICATIONS

The labor force participation rate of Arab women in Israel stands at around 20 percent, markedly below that of the rest of the country’s population and one of the lowest rates in the world. This is one of the most important challenges that the Israeli economy faces in helping the Arab sector integrate into the economy. This situation has many implications for both Arab society and the economy at large. They include impairment of the Arab sector’s economic development, the persistence of poverty and intersectoral economic gaps, the perpetuation of feelings of estrangement from Israel, and non-fulfillment of the growth potential of the economy generally. Together they underscore the need for a government policy that will help Arab women find their place in the labor market. This section outlines a series of policy measures derived from the foregoing analysis and performs simulations of Arab women’s participation in the labor force and contribution to GDP.

### **a. Policy Proposals**

The picture implied by the findings in the previous sections is one of particularly low participation among Arab women. Furthermore, the analysis reveals much variation in participation rates. Women who are “modern” in terms of education, marital status, number of children, and proficiency in advanced skills, such as English and computer use, tend to participate in the labor market. The low participation problem, as stated, focuses on poorly educated women; those lacking proficiency in modern skills; those with a large number of children, especially young ones; those who live in areas that have problems in accessing public transportation; and those who have “traditional” attitudes towards women’s work and men’s work.

The study shows, however, that it is not enough to strengthen “explanatory variables” such as education to induce an increase in participation, because various “frictional” factors impede the occupational integration of Arab women even if their characteristics are identical to those of Jewish women. Consequently, policy measures should attempt to mitigate these frictions.

In view of the findings, a range of policy measures to increase Arab women’s labor force participation should be applied—measures that will enhance education and skills; reduce the costs of going out to work; act to change social norms relating to women working outside the home; improve public transport; and improve physical access to workplaces.

In this section, we propose a series of policy measures that tackle the obstacles to participation that our study found. The measures address different time horizons; alongside those of near-term effect, it is important to include long-term measures which will change participation patterns in a sustainable way. (For elaboration, see Yashiv and Kasir (Kaliner) 2013.)<sup>9</sup>

1. Local employment matching centers—various NGOs already run these centers in several localities but they are small in scale. Such centers may provide information, connect employers with workers, and provide transport services to work. By doing so, they may help to overcome two significant hurdles—culture and transportation—which are often interrelated.
2. Vocational training—the sort that will equip women with advanced skills in consideration of their cultural characteristics and potential employers’ needs.
3. Subsidization of childcare—invoking “classical” policy measures of reducing costs of going to work: subsidizing daycare and afternoon care centers, caregivers, etc.
4. Promoting the physical accessibility of workplaces by investing in appropriate transport infrastructure and vehicles—a crucial problem among Arabs in Israel is related to geographic concentration and transport difficulties. Infrastructure in many Arabs localities is undeveloped, primarily in terms of public transportation. When it is hard to get to work, it is no wonder that participation and employment are low, especially among women. The difficulty at issue, which relates to both inter-urban and intra-urban travel, relates to poor road infrastructure and severe lack of means of transport. What is needed, then, is to enhance physical access by investing in

<sup>9</sup> For additional policy measures, see also Jabarin (2007) and Shtewy (2008).

appropriate transport infrastructure and vehicles. In the near term, a government subsidy for potential workers, employers, and transport companies may be helpful. In the longer term, these infrastructures need significant improvement to bring down the high cost of going to work. It is also important to invest in bringing workplaces to the existing centers. Encouraging firms to situate themselves in geographic areas accessible to Arabs may do much to promote Arab employment generally and that of Arab women particularly.

5. Occupational guidance in school—preparing curricular materials at the high school level to enhance awareness of labor-force participation and women’s rights, among both women and men. The integration of local leadership into the program will improve the chances of success.
6. Subsidizing education and higher studies—in the long term, the solution to increasing women’s participation is rooted in the education system. Basic and advanced studies are fundamental and highly significant in all matters related to the performance of the labor market: the participation decision, occupational choice, productivity on the job, etc. More should be invested at all levels of the Arab sector’s education system.
7. Legislation against discrimination and tougher enforcement—experience abroad shows that developed countries tend to have both anti-discrimination laws and strategies geared to make the public more aware of discrimination, the laws against it, and the rights of individuals who fall victim to it. It is important for Israel to broaden legislation that relates to employment discrimination against Arabs and to strengthen the enforcement of anti-discrimination laws in general.

#### **b. Simulation of participation rates and contributions to GDP**

How much utility should we expect the pro-employment measures to deliver? It should be borne in mind that the participation rates of Arab women have been rising persistently over time, even without specific policy measures that target Arab women explicitly. What we can do, then, is perform simulations of reasonable future scenarios. We need to remember, however, that any exercise of this kind has an inherent element of uncertainty. This uncertainty exists because changes in fertility, education, and cultural and social patterns, as well as economic incentives, all affect population increase and growth in participation, meaning that the uncertainty exists at many levels.

The following basic scenario assumes that the increase in the past four decades will continue, i.e., it indicates what may be expected if the existing trajectory persists. Two alternative scenarios credit the measures listed above with favorable effects. Thus, according to these scenarios, the proposed measures will enhance participation enough so that the rate of increase in Arab women's employment will exceed the existing trajectory. As it is impossible to quantify the exact effect of each of the measures proposed above, we chose two scenarios that specify, simply, a future increase that is 1.05 or 1.07 times greater than the increase that the current trajectory projects.

To put matters into perspective, we compared these scenarios with the target of Arab women's participation in 2020, included in the statement of recommendations of the Employment Policy Committee (June 2010) appointed by the Minister of Industry, Trade, and Labor.

The simulation is based on two alternative forecasts for the rate of increase in women's participation in the labor market (one from the CBS and one we calculated ourselves); it assumes that if these women were hired, their per-capita output would equal the average output per worker in Israel with some adjustments (see below).

Figure 10a plots the increase in the population of Arab women aged 15+. According to the CBS projection ("middle scenario"), the annual growth rate is forecast to be 3.5 percent between 2010 and 2015, 3.1 percent in 2015–20, 2.6 percent in 2020–25, and 2.3 percent in 2025–40. According to our forecast, the growth rates are 3.3 percent in 2010–15, 3.4 percent in 2015–20, 3.4 percent in 2020–25, and 2.8 percent in 2025–40.

Figure 10b charts the increase in the **number** of women participants on the basis of two alternative forecasts, both predicated on the actual number of participants in 1970–2010 and a projection of this number into the future. Technically, Alternative A was created by a regression on the number of participants on a third-order time polynomial, and Alternative B was created by the same regression in which the dependent variable is the number of participants smoothed by a Hodrick-Prescott filter.

Figure 10c shows the women's participation **rate**, i.e., the predicted number of participants divided by the predicted population. It is based on the forecasts in Figures 10a and 10b. Accordingly, it has four alternatives (not all of which appear in the graph) in accordance with the forecasts in the numerator (number of participants, two alternatives) and those in the denominator (population size, two alternatives). Two additional scenarios were calculated on the basis of the above considerations, i.e., if the government takes measures to encourage more women to participate, the pace will increase. One scenario was

calculated as a 1.05 multiple of the base scenario and the other as a 1.07 multiple (shown on the line with the triangle markings); the latter is based on the CBS population forecast and the smoothed forecast of the number of women participants.

According to the most pessimistic alternative (not shown in the graph), calculated on the basis of the participation and population forecasts that use smoothed data, the participation rates attained are 33 percent in 2030 and 41 percent in 2050. According to the most optimistic alternative (not shown in the graph), calculated on the basis of participation forecasts that use the actual number of participants (not smoothed) and the CBS population outlook, the rates will be almost 38 percent in 2030 and about 53 percent in 2050. *Notably, even in the optimistic scenario, the participation rate of Arab women forty years ahead will not attain the 60–70 percent levels that are prevalent in the West today. What this means is that the forecasts are cautious and conservative; they yield conservative estimates of the added GDP that the economy is expected to experience.*

The improved scenarios relate to the improvement that will occur relative to another alternative not as extreme as the two alternatives described above, i.e., those described in the line with the triangle markings. In the first improved scenario, shown by the line with the rectangle markings, the participation rates attained are 37 percent in 2030 and nearly 51 percent in 2050. In the second enhanced scenario, plotted on the line with the round markings, the rates will be 38 percent in 2030 and 52 percent in 2050.

The red square in Figure 10c shows the participation target envisaged by the report of the Employment Policy Committee. This target seems particularly ambitious.

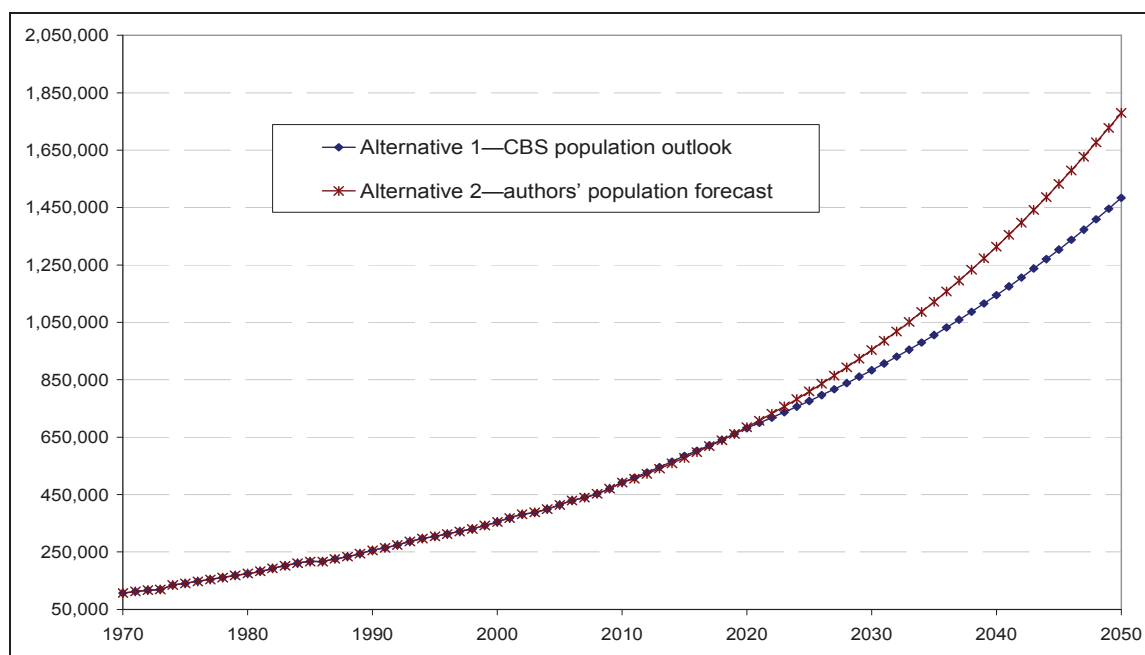
Figure 10d shows what the cumulative increase in GDP will be under these scenarios, using the same markings. GDP in the base year, 2010, is the GDP produced by Arab women assuming that each woman produces as much output as the average Israeli worker in 2010 terms, adjusted by a term to reflect the ratio of Arab women wage to the average wage (found to be 0.7). We assume this will grow at the average rate of increase of GDP per-worker of the past decade. We calculated the added output per working woman in 2010 prices by multiplying the absolute increase in employed women each year (taking into account the average unemployment rate) by the average output per worker (taking into account the average growth rate of per-worker product in the past decade, 0.81 percent per year and the 0.7 wage ratio). The formula is given below:

$$\Delta L * (1-u) * (F/E) * k * (1+g).$$

Where  $\Delta L$  is the change in the number of women working,  $u$  is the rate of unemployment,  $F/E$  is average output per worker,  $k$  is the wage ratio and  $g$  is the rate of growth of labor productivity.

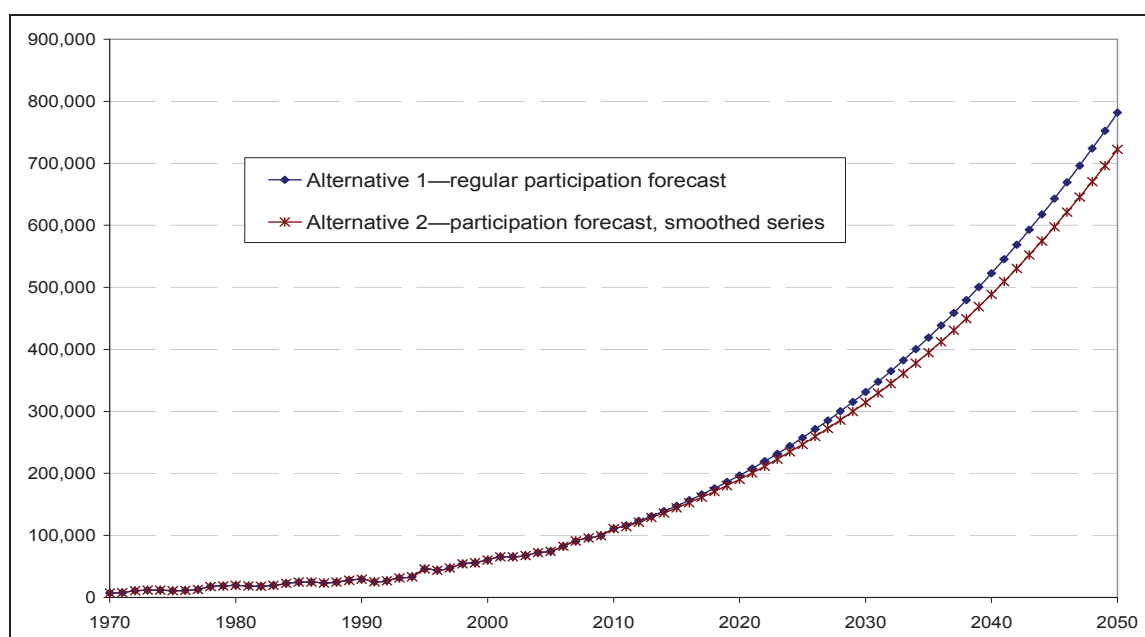
Figure 10e repeats the procedure in terms of per-capita product. The graphs show **the cumulative** increases in GDP. Table 4 summarizes the simulations.

**Figure 10a: Forecast of the Population of Arab Women aged 15+<sup>1</sup>**



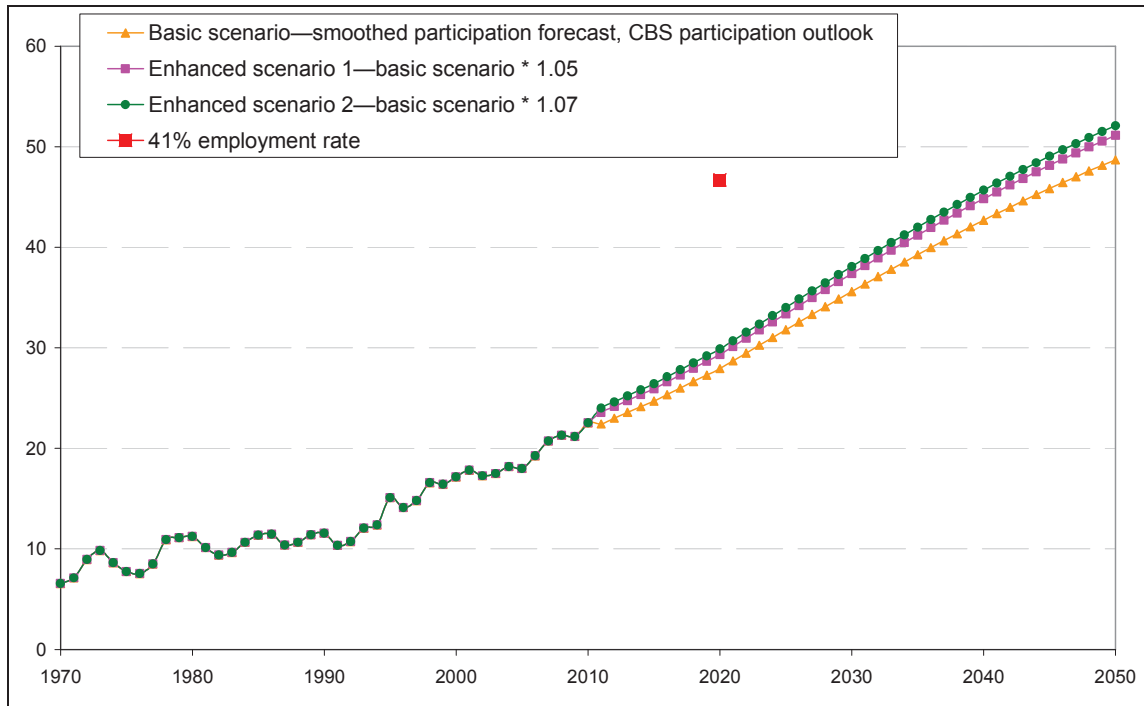
<sup>1</sup> Based on the medium alternative of the CBS population forecast and the authors' calculations.

**Figure 10b: Forecast of Arab Women Participating in the Labor Force**



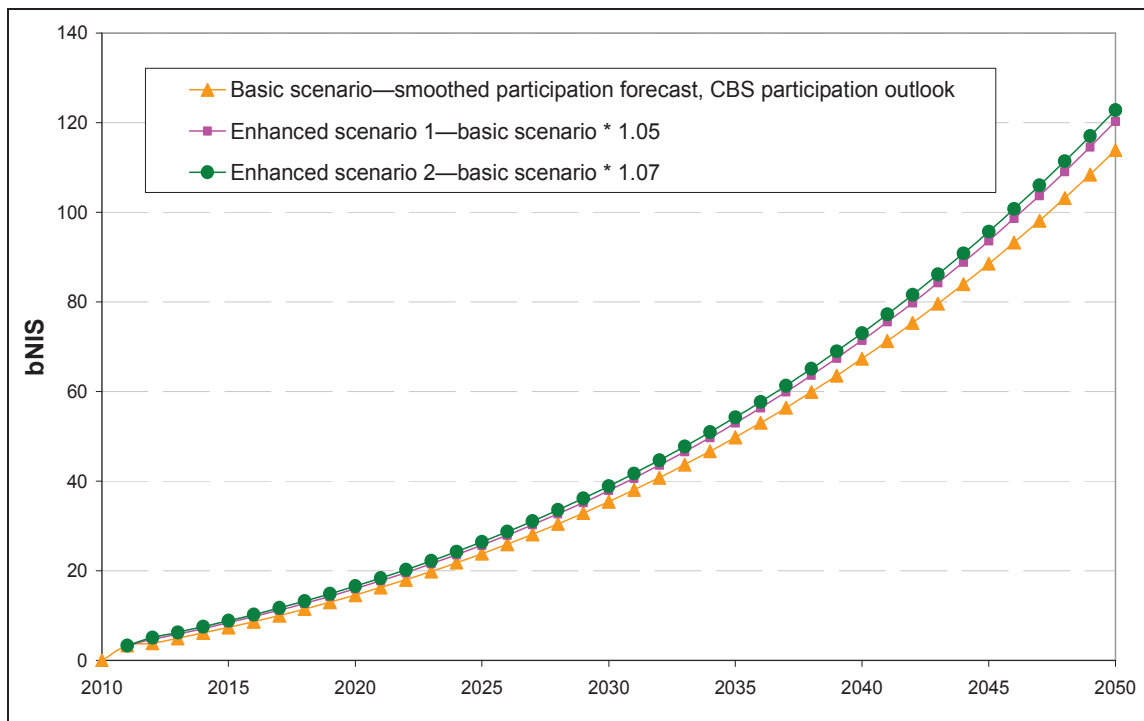


**Figure 10c: Simulation of Arab Women’s Labor Force Participation Rates<sup>1</sup>**

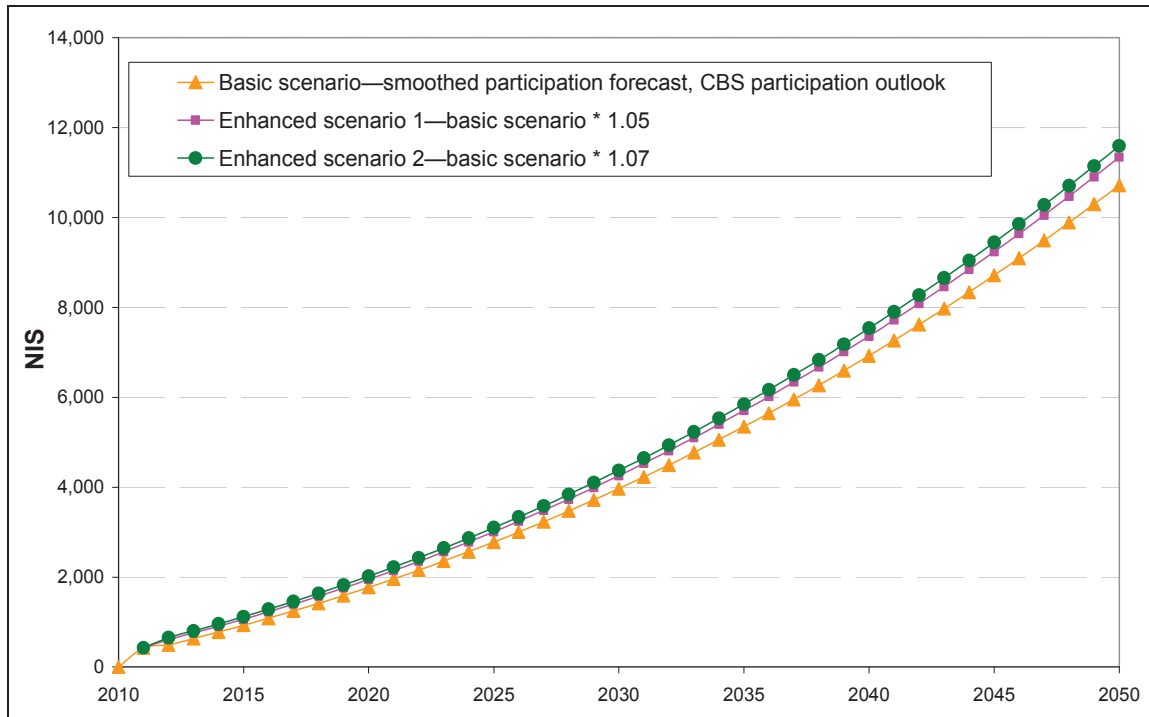


<sup>1</sup> Based on the increase in the participation rate of Arab women in the past decade and its multiples.

**Figure 10d: Simulation of the Cumulative Increase in GDP, 2010 Prices**



**Figure 10e: Simulation of Cumulative Increase in GDP Per Capita, 2010 Prices**



**Table 4: Simulation Results**

year	Participation rate (%)	GDP (bNIS)	Per capita GDP (NIS)		
2010	23	811	106669.0		
<b>Participation rate (pct.)</b>					
year	Basic scenario	Enhanced scenario 1	Enhanced scenario 2	Difference between enhanced scenario 1 and basic scenario	Difference between enhanced scenario 2 and basic scenario
2020	28	29	30	1	2
2030	36	37	38	1	2
2040	43	45	46	2	3
2050	49	51	52	2	3
<b>Cumulative increase in GDP (bNIS)</b>					
year	Basic scenario	Enhanced scenario 1	Enhanced scenario 2	Difference between enhanced scenario 1 and basic scenario	Difference between enhanced scenario 2 and basic scenario
2020	15	16	17	1	2
2030	35	38	39	2	3
2040	67	71	73	4	6
2050	114	120	123	6	9
<b>Cumulative increase in GDP (pct. change vs. 2010)</b>					
year	Basic scenario	Enhanced scenario 1	Enhanced scenario 2	Difference between enhanced scenario 1 and basic scenario	Difference between enhanced scenario 2 and basic scenario
2020	2	2	2	0.18	0.25
2030	4	5	5	0.30	0.43
2040	8	9	9	0.50	0.70
2050	14	15	15	0.79	1.10
<b>Cumulative increase in per capita GDP (NIS)</b>					
year	Basic scenario	Enhanced scenario 1	Enhanced scenario 2	Difference between enhanced scenario 1 and basic scenario	Difference between enhanced scenario 2 and basic scenario
2020	1,771	1,949	2,020	177	248
2030	3,968	4,256	4,371	287	402
2040	6,926	7,361	7,535	435	609
2050	10,717	11,341	11,591	625	875
<b>Cumulative increase in per capita GDP (pct. change vs. 2010)</b>					
year	Basic scenario	Enhanced scenario 1	Enhanced scenario 2	Difference between enhanced scenario 1 and basic scenario	Difference between enhanced scenario 2 and basic scenario
2020	2	2	2	0.17	0.23
2030	4	4	4	0.27	0.38
2040	6	7	7	0.41	0.57
2050	10	11	11	0.59	0.82

<sup>1</sup> The basic scenario is the Alternative B scenario shown by the orange line with triangular markings

The graphs and the table indicate the following:

- a. In the base scenario (the line with the triangular markings), the number of participating women increases from slightly over 100,000 to 315,000 in 2030 and 720,000 in 2050, yielding participation rates of 36 percent and 49 percent in the respective years. This would result in a cumulative increase of NIS 3,900 in GDP per capita in 2030 and NIS 10,700 in 2050. In total output, the cumulative increase is NIS 35 billion in 2030 and NIS 114 billion in 2050.
- b. In the first “improved” scenario (the line with the rectangular markings), the number of participating women increases from slightly over 100,000 to 330,000 in 2030 and 759,000 in 2050, resulting in participation rates of 37 percent in 2030 and 51 percent in 2050. This means a cumulative increase of NIS 4,200 in GDP per capita in 2030 and NIS 11,300 in 2050. In total output, the cumulative increase is NIS 38 billion in 2030 and NIS 120 billion in 2050.
- c. In the second “improved” scenario (the line with the circle markings), the number of participating women increases from slightly over 100,000 to 336,000 in 2030 and 773,000 in 2050, resulting in participation rates of 38 percent in 2030 and 52 percent in 2050. This means a cumulative increase of NIS 4,300 in per-capita output in 2030 and NIS 15,600 in 2050. In total output, the cumulative increase is NIS 39 billion in 2030 and NIS 123 billion in 2050.

## 8. CONCLUSIONS

This study examined the participation of Arab women in the Israeli labor market, proposed a number of policy measures, and quantified their possible effects in simulations. The marked variation in the participation rate of these women, despite the low average of 20 percent, makes it possible to examine participation patterns empirically and should encourage the government to take policy action.

The study offers several main conclusions. The conventional factors—education, marital status, number of children, and access to transportation—have conventional effects. Along with and in addition to them, there is a cultural effect: the more “modern” a woman is, the more she participates.

Over time, these factors have been changing so as to increase participation. For example, Arab women are acquiring more education and are having fewer children, so most of the explanatory variables are converging. However, the differential in participation

between Jewish women and Arab women is widening. This derives from an increase in the importance of the explanation of the differential that lies in the regression constants differential. The implication is that it is not enough to strengthen “explanatory variables”—such as education— so as to bring about an increase in participation. It is also necessary to take measures that will help overcome the difficulty in “translating” explanatory variables, such as education, into participation. This difficulty may be due to frictions (e.g., informational issues and obstacles to mobility) and to discrimination.

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