FEMALE LABOR FORCE PARTICIPATION IN TURKEY: THE ROLE OF SKILL PREMIUM AND GENDER WAGE GAP

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Abstract

In this study, I investigate the effects of skill premium, and gender wage gap on female labor force participation in Turkey. I examine in particular the answers to two questions, namely, how females' labor participation decisions would change if there were no gender wage gap and how it would be in the absence of female skill premium. I build a general equilibrium model populated by married households. Households differ by educational attainment levels of their members and they decide the labor supply of members and savings. I select parameter values so that the benchmark economy resembles features of the Turkish economy in 2006 in terms of gender wage gap, skill premium, tax structure, and female labor force participation across education groups and ages. In this thesis, I find that both changes in gender wage gap and female skill premium have substantial effects on the female labor force participation rate. The increase that occurs in female labor force participation after gender wage gap elimination and female skill premium elimination are 52.7% and 253.5% respectively. Furthermore, in both alternative economies the increase in female labor force participation rates have occurred due to a significant increase in the labor force participation rates of low-skilled females.

TÜRKİYE'DE KADINLARIN İŞGÜCÜNE KATILIMI: CİNSİYETE DAYALI ÜCRET FARKLILIKLARI VE VASIF PRİMİNİN ROLÜ

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Özet

Bu tezde, vasıf priminin ve cinsiyete dayalı ücret farklılıklarının Türkiye'deki kadın işgücüne katılımına etkileri analiz edilmektedir. Asıl olarak cinsiyete dayalı ücret farklılıkları ve vasıf primi olmasaydı kadınların işgücüne katılım oranları nasıl değişirdi sorularına cevap verilmeye çalışılmıştır. Sunulan model, evli hanehalklarından oluşan genel denge modelidir. Hanehalkları üyelerinin yaş ve eğitim seviyeleri açısından farklılık gösterip, onların işgücü katılımlarına ve tasarruflarına karar vermektedir. Model, ana model 2006 Türkiye ekonomisini cinsiyete dayalı ücret farklılıkları, vasıf primi, vergi yapısı ve yaşlar ve eğitim seviyelerindeki kadın işgücü açısından yansıtacak şekilde kalibre edilmiştir. Bu tezde cinsiyete dayalı ücret farklılıklarının ve vasıf priminin kadınların işgücüne katılım oranlarında büyük etkileri olduğu bulunmuştur. Cinsiyete dayalı ücret farklılıklarının ve vasıf priminin ortadan kalktığı durumlarda kadınların işgücüne katılım oranları sırasıyla %52.7 ve %253.5 artmıştır. Ayrıca, iki alternatif ekonomide de kadınların işgücüne katılım oranlarındaki artış, düşük vasıflı kadınların işgücüne katılımlarındaki önemli artıştan kaynaklanmıştır.

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1 Introduction

Female labor force participation rates have increased considerably in developed countries in recent years. In contrast, in Turkey it shows a declining trend in the last 30 years from a level of 48% in the 1980s and today it is remarkably low compared to OECD and EU-19 countries. Furthermore, there are significant variations in female participation rates in various regions of the country (World Bank, 2009, 2010).

Available studies indicate that factors such as level of education, number of children, migration, marital status, socio-cultural factors, and wage levels are determinants of female labor force participation in Turkey. In recent years, women have become more educated; they are getting married at a later age; fertility rates are declining, and social attitudes towards working women are changing. However, despite these factors, the ratio of women who are seeking jobs in Turkey is still decreasing.

In some studies, it is indicated that the main reason that women do not participate the labor force is that market wage level is below the reservation wage level, which corresponds to the total value of home production for women (Kasnakoglu and Dayioglu, 2002). In other words, the earnings potential for low-skilled women in urban areas might not be high enough in Turkey to motivate them to leave home for work. The high opportunity cost of home production–such as high childcare fees and lower wage levels compared to men in the labor market–for these women may explain the more dominant economic reasons for their low participation levels. Some of these studies (Kasnakoglu and Dayioglu, 1997) argue that wage differences among genders keep women out of the labor market. There is a large gap in hourly wages between low skilled men and women in Turkey although this gap is not observable for high-skilled workers. Women without university degrees generally have only access to jobs which offer low wages, require long and hard working hours, and do not provide social security.

Given the importance and recent emphasis on skill premium and the fact that valuable skills are mostly acquired through schooling, education remains vital for examining wage distribution. Although education cannot explain all of the wage gaps between genders, it is shown that the returns from an extra year of schooling are proportionately higher for women than for men, particularly at the secondary school level (Duman, 2010). Moreover, there is evidence to indicate that as the level of education increases, the probability of women entering the labor market also increases (Kasnakoglu and Dayioglu, 1997) and the effect of female education on female labor force participation appears to be stronger for developed provinces compared to less developed ones in Turkey (Tansel and Gungor, 2012).

To my knowledge, this thesis is among the first to discuss the relationship between skill

premium, gender gap, and female labor force participation in Turkey by using a macroeconomic model. In this study, I investigate the answers to two questions. First, if females earn the same wages that males earn, how much does the participation rate of females increase? Secondly, how do female labor force participation rates change if low-skilled females earn the same wages as high-skilled females? By answering these questions, I analyse how much wage discrimination against women, and female skill premium affect female's labor force participation decisions.

In order to investigate the impacts of skill premium and gender wage gap on female labor force participation, I construct a general equilibrium model populated by finitely lived, married households. In the model, agents differ according to gender and skill levels (education). In their working stage of life, households make labor, consumption and savings decisions of their members. Husbands who are not retired always work, but wives can choose not to work. Also, if both the husband and wife participate in the labor market, the household incurs a fixed utility cost, and there is no uncertainty about a worker's future productivity. Besides income, consumption and capital taxes, working people pay social security taxes. Additionally, individuals retire after the mandatory retirement age and their income consists of private savings and social security benefits, which are functions of their past labor earnings. The calibrated model economy resembles features of the Turkish economy in 2006 so that the model economy is consistent with observations in terms of gender wage gap, skill premium, income tax structure, and female labor force participation across education groups and ages.

In this study, I find that both gender wage gap and skill premium have significant effects on the labor force participation of married women. When gender wage gap is eliminated, female labor force participation increases by 52.7%. Furthermore, skill premium elimination also increases female labor force participation and the increase in the second alternative economy is bigger than the increase in the first one. Finally, in both economies the increase occurs mostly because of the increase in the labor force participation of low-skilled females.

The rest of the thesis is organized as follows: Section 2 discusses the related literature. Section 3 reports some trends in the female labor force participation, wages, distribution of individuals by educational attainment in Turkey in 2006. Section 4 describes the model while Section 5 details the calibration process. In Section 6, I present the results of the benchmark economy and alternative economies and do a comparison. Finally, Section 7 concludes.

2 Literature Review

This thesis is related to the literature that examines the relationship of female labor force participation, wages and educational attainment. Ince and Demir (2006) investigate how the

determinants of adult female literacy rate; the ratio of graduated women from primary, secondary, tertiary and higher education; fertility rate, and female unemployment rate affect female labor force participation in a period from 1980 to 2004 in Turkey. Econometric estimates show that there is a negative impact of unemployment and literacy while there is a positive impact of fertility and higher education on female labor force participation. They find that when the education level of females increases, they start to get more share in the labor force; hence, increasing school enrollment has a positive effect on the labor force participation of females.

Time series is another way to examine aspects of female labor force participation rates in Turkey. Tansel (2002) looks at econometric estimates of the determinants of female labor force participation rates across the 67 provinces for the years 1980, 1985 and 1990 in Turkey. She explains the relationship between female labor force participation and the level of economic development, concentrating on the U-shaped hypothesis of female labor force participation. As a result of these studies, she finds that both the rate of economic growth and level of female education have a strong positive effect on female labor force participation.

Furthermore, in another paper, Tansel (1999) discusses the factors that explain employment choice and wage differentials between genders in public administration, state-owned enterprises and formal wage sector in Turkey by using the 1994 Household Expenditure Survey in the analyses. She finds that the higher the educational level, the higher its contribution to the participation in a sector. The marginal effects of experience and education are much larger for men than for women. On the other hand, while the wages of women and men are at parity in public administration, there is a large gender wage gap in the private sector.

There are also studies that focus on the female labor force participation in the US. Attanasio et. al (2007) construct a life-cycle model with endogenous female labor force participation, consumption, and saving choices to investigate the increase in the labor supply of mothers between 1940 and 1950. The dynamics of labor supply depends on child care costs, returns to experience and the level of female wages. They calibrate the model to match the behavior of the 1940 cohort and investigate which changes in the main determinants of labor supply account for the increase in the labor supply of females. They conclude that a decrease in childcare cost explains the increase in the participation of mothers of young children and an increase in the level of wages also leads to a substantial increase in the labor supply of women. Moreover, they find that an increase in the return to experience does not increase the participation rate of mothers as observed in the data.

Gottschalk and Pizer (1999) explore whether the skill intensity of recent cohorts show any evidence of the rising skill premium in the US. They analyse ORG and IPUMS data and look specifically at the college intensity of recent labor market entrants. They find that both

females and males are likely to have college degrees, but the college intensity is larger for women than for men. The findings suggest that females go to college in greater numbers than males because their options in high school jobs are more limited. In other words, while a male high school graduate may find a good job, the corresponding jobs for females may be more limited.

In order to investigate the basic forces behind the changes in female labor force participation and education, Fernandez and Wong (2011) focus on the role of divorce. They develop a dynamic stochastic life cycle model to evaluate how changes in family structure and economic environment between 1935 and 1955 lead to changes in the education choices and labor force decisions of women. The model is calibrated by using data for the cohort born in 1935 and they change the characteristics of the environment in order to mimic the 1955 cohort. They show that the increased probability of divorce that is seen in the 1955 cohort is a key driver of the increase in women's work, and it significantly reduced the education gender gap. In terms of welfare, they present that conditional on education level, men greatly benefited from the changing economic environment, but both high school and college women incurred welfare losses as a result of these changes. Thus, it is shown that both changes in family and wage structure have significant effects on labor force participation of married women and these changes account for a small proportion of the labor force participation gap for high school women.

Gatti and Dollar (1999) investigate in their paper the relationships among gender inequality, income and growth, using data for over 100 countries over the past three decades. Their primary focus is on gender inequality in educational attainment. They find that gender inequality in secondary schooling is bad for growth, but only for countries at lower middle income status and above, and increases in per capita income lead to reductions in gender inequality.

3 Trends in Female Labor Force Participation

In this part, I report statistics about female labor force participation, wages and educational attainment of married households in 2006. All statistics that are documented here are composed from TURKSTAT Household Labor Force Statistics, 2006 and TURKSTAT Household Budget Survey, 2006.

In order to analyze individuals who are in the labor force, I consider people who are 20 to 64 years old. I consider only married individuals to study the labor force behavior of married women. In the analysis, only full-time workers are included while people who are self-employed or unpaid workers are excluded.

I consider the population in three educational categories which are less than or equal to primary school (ps), secondary school or high school (shs) and greater than or equal to college (col). The first category consists of people who have degrees that are less than or equal to a primary school degree; the second category consists of people who have a degree between secondary school and high school; and, the final category consists of people who have at least college degree. Thus, based on these categories, there would be nine household types.

Table 1: Classification of Skill Types

Skill Type	Educational Attainment
ps	<=primary school degree
shs	secondary school degree, high school degree
col	>=college degree

Table 2 gives an idea about the labor force participation rates of married females and males. It can be seen that female labor force participation is increasing according to their education. It increases sharply after high school degree and the highest rates are achieved at the university level. This indicates the importance of education in increasing labor force participation of women.[1]For men, the highest participation rates are at the secondary school-high school degree and university level. At the university level, participation rates do not differ much between genders where the rates are highest for both men and women. It is crucial that there is a huge gap in labor force participation rates between genders at primary school and secondary school-high school degree.

Table 2: Labor Force Participation Rates by Educational Attainment, 2006 (%)

Educational Attainment	Female	Male
ps	4.22	52
shs	9.8	70.63
col	47.62	77.89

In this period, the average labor force participation rate of married women is 9.01%.[2]

[1]This is also demonstrated by other studies (Tansel 1994 and 2002).

[2]I consider married females who are 20 to 64 years old. Only full-time workers are included, and married females who are self-employed or unpaid workers are excluded.

Table 3 shows the labor force participation rates of married women and men by age groups in 2006. Female labor force participation rates increase until the ages 35-39, then begin to decline afterwards. After the ages 40-44, female labor force participation rate declines almost by half. The early retirement scheme introduced in the early 1980s may be a factor that contributes to this declining participation rate.[3]For males, labor force participation rates are very high compared to females and they begin to decrease after ages 45-49.

In 2006, average working hours per married working men is 0.47 hours per week whereas the average hours per married working women is 0.41 hours per week.[4]

Table 3: Labor Force Participation by Age, 2006 (%)

Age	Female	Male
20-24	6.1	66.55
25-29	11.39	76.4
30-34	13.02	79.34
35-39	14.4	77.9
40-44	11.57	76.47
45-49	7.79	62.29
50-54	4.28	39.08
55-59	1.83	22.5
60-64	1.06	11.82

Table 4 shows age-earning profiles for 2006, constructed by using TURKSTAT Household Budget Survey in 2006. I find average hourly wages for females and males in each age group. Heckman selection correction procedure is used in order to correct for sample selection bias, and I impute wages for females who do not work by implementing a Heck-

[3]According to early retirement scheme introduced in the early 1980s, women after 20 years of service or at age 50 and men after 25 years of service or at age 55 were eligible for retirement. This is changed and longer years of service and a higher age limit were introduced in 2001.

[4]According to TURKSTAT 2006 Household Labor Force Statistics, on average a woman works 46.49 hours, and a man works 52.76 hours in a week. I assume that 112 hours is the total amount of time available for work in a week.

man selection model.[5] I calculate monthly working hours by multiplying weekly working hours with four. Then, in order to find hourly wages of individuals I divide monthly wages by monthly working hours that I calculated before. I normalize them with the hourly wage for the entire sample to make the wages comparable. Table 4 gives idea about the gender gap and skill premium for men and women.

Table 4: Productivity Values by Types, 2006

	Males			Females		
Age	ps	shs	col	ps	shs	col
20-24	0.792	0.960	1.743	0.403	0.810	1.712
25-29	0.903	1.168	2.407	0.522	1.102	2.398
30-34	0.942	1.398	2.845	0.606	1.252	2.850
35-39	1.004	1.544	3.124	0.646	1.350	3.093
40-44	1.106	1.708	3.044	0.650	1.407	3.097
45-49	1.097	1.841	3.465	0.633	1.389	2.881
50-54	0.951	1.699	3.173	0.566	1.319	2.664
55-59	0.752	1.504	3.031	0.491	1.164	2.465
60-64	0.628	1.363	3.465	0.416	1.102	2.133

For almost all education-age cells, wages of married women are lower than the wages of married men. As education level increases, wages of both genders increase and highest wages are achieved at college level. Meanwhile, the young and unskilled females experience the lowest wages.

Next, I find gender gap values according to education by using the data on wages. The critical fact that could be observed from these gender gap values is that as education of women increases, gender wage gap decreases.[6]Moreover, the college premium for women is bigger than the one for men.

[5]For the equation for wages, I assume that log wages of women depend on education, age, and age-squared. For the selection equation, I assume that the probability of participation in the labor market for a female depends on her marital status, education and age.

[6]Gender gap is calculated as the ratio of females' hourly wage and males' hourly wage.

In Table 5, the educational composition of married households in 2006 is shown. The fraction of the married households with both members having at least primary school degree is the biggest one. However, the proportion of the married households with both members having at least college degree is one of the lowest fraction.

Table 5: Distribution of Married Households by Educational Attainment, 2006 (%)

	Female			
Male	ps	shs	col	Total:
ps	47.91	3.73	0.1	51.74
shs	20.83	12.3	1.22	34.35
col	3.59	5.58	4.74	13.91
Total:	72.33	21.61	6.06	100

4 The Model

In this part, I describe the general equilibrum life-cycle model populated by heterogeneous agents in detail.

4.1 Demographics

The economy consists of finitely lived individuals who live at most T periods, and they do not face any mortality risk during their life time. Each agent enters economic life as married and there is no divorce over the life. I assume that husband and wife are of the same age. Households differ by labor market productivity (education) of their members. They begin life as workers and retire after the mandatory retirement age t_R.

4.2 Productive Heterogeneity

Each member of the household is characterized by a given productivity level. $x(k,t)$ denotes the labor productivity of a female of skill level k and age t, $z(i,t)$ denotes the labor productivity of a male of skill level i and age t. I assume that $z(i,t)$ and $x(k,t)$ take a finite number of possible values in the sets Z and X. Each agent is born with a skill type that does not change over the life. Moreover, there is no uncertainty about a worker's future productivity.

4.3 Preferences

In this economy, agents value consumption and dislike labor. At each period, individuals are endowed with one unit of time that husbands who are not retired always work, but wives can use this time for leisure or market work.

The utility function of a household is assumed to take the form

$$U(c, l_f, l_m, q) = 2\ln(c) - \phi\frac{l_f^{1+\frac{1}{\gamma}}}{1+\frac{1}{\gamma}} - \phi\frac{l_m^{1+\frac{1}{\gamma}}}{1+\frac{1}{\gamma}} - \mu(l_f, l_m)q \tag{1}$$

where γ is the Frisch elasticity of labor supply, ϕ>0 is taste parameter for labor, q is the per period utility cost of joint work, c is consumption and $l_i, i \in \{f, m\}$ is labor supply. When $\mu(l_f, l_m) = 1$ i.e. both wife and husband supply labor, the household incurs a fixed utility cost $q \geq 0$.

Households know their utility costs before making decisions. They draw their utility cost at age 1 from a cumulative distribution function $\Phi()$ and it is constant over the life.

4.4 Income

The income sources are labor earnings, capital income and retirement benefits. Agents participate in a competitive labor market where w is the wage rate per efficiency unit of labor. Households can save in the form of a risk-free asset and earn a rental rate r. Further, I assume that individuals are born with no assets and they are not allowed to borrow.

When the female and male work l_f and l_m hours in the market, a t-year old household's income $(t \leq t_R)$ with a units of asset holdings is $x(k,t)l_f w + z(i,t)l_m w + ra = I$. Moreover, income of a retired household is the sum of retirement benefit payments and interest income.

4.5 Social Security

The government operates a pay-as-you-go pension system similar to system in Turkey. It taxes working individuals' labor earnings at a fixed rate, θ, and uses all of them to pay for the retirement benefits. Individuals cannot begin to receive retirement benefits unless they supply labor for t_R years. If an individual supply labor for t_R years, she will get retired in the next year for sure. Once an individual gets retired, she cannot get back to work and supply labor for the rest of her life. The retirement benefit is fixed for an agent throughout the retirement.

A female worker's social security tax payment is $T_s(x(k,t)l_f w) = \theta x(k,t)l_f w$ and a male worker's social security tax payment is $T_s(z(i,t)l_m w) = \theta z(i,t)l_m w$ where θ is the

social security tax rate. For a female agent who supplies labor for R years, the retirement benefit is $b_f = \sum_{t=1}^{R} \varphi_t x(k,t) l_f w$ where $x(k,t) l_f w$ is the labor earning of female at period t, φ_t is the replacement rate of period t and it is similiar for males.[7]

Total benefit payment that the household receives is

$$b_f + b_m = \sum_{t=1}^{R} \varphi_t x(k,t) l_f w + \sum_{t=1}^{R} \varphi_t z(i,t) l_m w \tag{2}$$

4.6 Taxation

In this economy, the tax procedure mimics the current tax structure in Turkey. The flat tax rates are used for consumption at rate T_c and for capital income at rate T_k . However, there is a progressive income tax that increases with respect to the income level.

Let $I_{0,} I_{1,}..., I_M$ be the income bend points with corresponding tax rates $T_{1,} T_{2,...,} T_M$. An agent with income $I \in (I_{m-1,} I_m)$ pays the amount $T(I) = T_1(I_1 - I_0) + T_2(I_2 - I_1) + ... + T_m(I - I_{m-1})$.

4.7 Production Technology

There is a single representative firm which hires capital and labor. K denotes the aggregate capital and L denotes the aggregate labor. The production technology of the firm is given by a constant returns to scale Cobb-Douglas function $Y = K^{\alpha} L^{1-\alpha}$ where $\alpha \in (0,1)$. The aggregate capital stock depreciates at a constant rate $\delta \in (0,1)$.

4.8 Decision Problem

Worker households make labor supply, consumption, saving decisions, and retirees make consumption and saving decisions. A t-year old household with $t \leq t_R$ decide on labor supply of the male l_m, labor supply of the female l_f, future asset holdings a' and current consumption c each period. The wife has a skill type k, and the husband has a skill type i, they hold a units of asset and q is the utility cost of joint work for the household. Before making any decisions, the household observes the retirement benefits of the husband and wife (b_f and b_m) that they would receive this period if they retired last period.

[7] I ignore the fact that it is required to work for 20-25 years in order to receive social security benefit.

The problem of the household is

$$V_t(k,i,q,a,b_f,b_m) = \max_{c,a',l_f,l_m} U(c,l_f,l_m,q) + \beta V_{t+1}(k,i,q,a',b'_f,b'_m) \tag{3}$$

subject to

$$\begin{aligned}(1+T_c)c + a' = x(k,t)l_f w + z(i,t)l_m w + (1+r)a - T_s(x(k,t)l_f w) - \\ T_s(z(i,t)l_m w) - T(x(k,t)l_f w) - T(z(i,t)l_m w) - T_k r a\end{aligned} \tag{4}$$

$$b'_f = b_f + \varphi_t x(k,t) l_f w, \quad b'_m = b_m + \varphi_t z(i,t) l_m w \tag{5}$$

$$0 \leq l_m \leq 1, 0 \leq l_f \leq 1, c \geq 0, a' \geq 0.$$

The problem of a t-year old retired household is

$$V_t(k,i,q,a,b_f,b_m) = \max_{c,a'} U(c,0,0,q) + \beta V_{t+1}(k,i,q,a',b_f,b_m) \tag{6}$$

subject to

$$(1+T_c)c + a' = (1+r)a - T_k r a + D(b_f,b_m) \tag{7}$$

where $D(b_f,b_m)$ is the benefit payment that the household receives. $D(b_f,b_m)$ is equal to $b_f + b_m$ if female participated in the labor force before the age t_R and is equal to b_m otherwise.

5 Calibration

In this section, I describe the calibration process of the benchmark economy and parameter values that I used.

5.1 Demographics and Heterogeneity

The model economy is calibrated to Turkish economy for the year 2006. In the model, length of a period is set to be 5 years. Age 1 corresponds to ages between 20 and 24 years. Agents

retire after age 9 (t_R=9) and live at most 16 periods (T=16).[8] All agents die at the end of the final period and agents do not face any mortality risk throughout their life.

I assume that a skill type is represented by education and there are 3 productivity types in the model economy which correspond to 3 educational groups defined in Table 1. For each educational group I set the values of x and z to their corresponding values in Table 4.

5.2 Preferences

The discount factor, β, is determined endogenously to match the capital to output ratio, that is estimated as 2.48 by Tuncay (2011). The choice of labor parameter, ϕ, targets the average working hours in the Turkstat 2006 Household Labor Force Statistics. In particular, a worker spends on average 45.59% of her/his time for labor in the model economy, while the same number is 46.2% in the data.[9]

I choose Frisch elasticity of labor supply, γ, as 0.4 which is estimated by Domeij and Floden (2006). Finally, I assume that utility cost parameter, q, is distributed according to an exponential distribution function. As discussed in Kaygusuz (2011), I parametrize the utility cost parameters, so that the labor force participation rates of women in the benchmark economy, match the participation rates of women in the data that is shown in Table 6.

Table 6: Labor Force Participation of Women, 2006 (%)

	Female		
Male	ps	shs	col
ps	4.82	11.05	20
shs	3.17	9.21	33.90
col	2.30	10.33	51.74

5.3 Production Technology

On the production side, there are two parameters to be determined. There seems to be an absence of consensus for the estimate of capital share of output, α.[10] I set α as 0.30 that is

[8] Females can always choose not to work at, or before age t_R.

[9] I consider people who are between 20 and 64. According to TURKSTAT 2006 Household Labor Force Statistics, on average a person works about 51.76 hours in a week. I assume that 112 hours is the total amount of time available for work per week.

[10] Cihan (2002) estimates capital share of output as 0.53, TURKSTAT estimates are 0.63, 0,53, 0.61, and 0.49 for years 1988, 1991, 1995, and 2001 respectively.

estimated by Bahadir and Gumus (2011). Additionally, I choose the depreciation rate, δ, as 0.0436 which is calculated by Tuncay (2011).

5.4 Social Security

In the benchmark economy, the replacement rate is $\varphi_i = 0.02$ for all ages up to retirement.[11]

The social security tax rate, θ, is set endogenously to balance the budget of the social security system. Thus, every period the sum of deductions from workers' labor income is equal to the sum of the retirement benefits of retired individuals. Finally, the mandatory retirement age, t_R, is set equal to period 9 which corresponds to age range 60-64 in the data.

5.5 Taxation

I set consumption tax rate, T_c, to match endogenously the average value of the ratio of total tax burden on consumption and services to output, that is found by Tuncay (2011) as 0.0498 for the period 1992-1995. Similarly, capital tax rate, T_k , is chosen to match the ratio of total corporate tax to output, which is again as in Tuncay (2011), 0.0104 for the period 1992-1995.

For benchmark calculations, I construct income taxation according to the income tax practices in Turkey, 2006. In 2006, first 7000 YTL of annual income is multiplied with 0.15. Next part of annual income, which is between 7000 YTL and 18000 YTL is multiplied with 0.20. The part of annual income that is between 18000 YTL and 40000 YTL is multiplied with 0.27. Finally, the part of annual income that exceeds 40000 YTL is multiplied with 0.35.

In the model, income bend points $I_{0,}I_{1,}...,I_M$ are established as multiples of average household labor income, Φ, in order to mimic the income taxation bend points in Turkey 2006, as shown in Table 7.[12]

Table 7: Income Tax Rates

Taxable Income	Tax Rate
0-0.37Φ	15%
0.37Φ-0.95Φ	20%
0.95Φ-2.11Φ	27%
2.11Φ and above	35%

[11] This rate is used in Emekli Sandigi in 2006 Turkey.

[12] Average household labor income is determined endogenously in the model.

6 Findings

6.1 Benchmark Economy

Table 8 shows the basic statistics for the benchmark economy. In the next section, these results will be used for comparison with alternative policies. To balance the budget of the social security system, social security tax needs to be 7.2%. Similarly, consumption tax and capital tax are required to be 12.2% and 5.3% in order to match the values that are found by Tuncay (2011) as 0.0498 and 0.0104.

Table 8: Descriptive Statistics for Benchmark Economy

K	1.857
Y	0.759
K/Y	2.447
L	0.517
r	7.7%
Discount rate	1.06
Capital tax rate	5.3%
Consumption tax rate	12.2%
Social Security tax rate	7.2%

The model is able to capture the pattern of participation rates by age and education. As in the data, the participation rate increases with age and declines significantly after age 5 (corresponds to 40-44). As I discussed in Section 3, the early retirement scheme introduced in early 1980s may have caused this decrease; thus, the model is successful in generating this decline. Both in the model and data, the participation rate rises with education, and the highest participation rate is achieved at the university level. Moreover, the model is able to generate the hours per worker for the economy, for males, and for females that are observed in the data. In the model, workers spend on average 51.06 hours in a week while its counterpart in the data is 51.75. Hours of working males is 51.97 in the model, which is 52.52 in the data.

I consider two alternative economies. These alternative economies differ from the benchmark economy in the following ways. In the first economy, I assume that females have the same productivity values with males, that is to say, there would be no gender wage gap and females would have same hourly wages as males. In the second alternative economy, females do not have same wages with males; however, first (ps) or second skill type of females (shs) would have same wages as females, who are from third skill type (col), i.e. all types of females would be considered as they earn the same wages as females who have less than or equal to college degree.

Table 9: Simulation Results for Benchmark Economy

	2006 Data	Model
Aggregate FLFP (%)	9.01	8.08
Mean hours (male)	52.52	51.97
Mean hours (female)	47	39.88
FLFP by Age (%)		
1	6.1	9.86
2	11.39	10.42
3	13.02	11.82
4	14.4	10.83
5	11.57	9.01
6	7.79	7.02
7	4.28	5.83
8	1.83	4.28
9	1.06	2.96
FLFP by Skill Type (%)		
ps	4.22	4.33
shs	9.8	9.6
col	47.62	47.78

6.2 Alternative Economy I

In this alternative economy, I simulate the model by changing the productivity levels of females with males, i.e. I assume that females earn the same wages that males earn. Table 10 shows the descriptive statistics for the model under the first alternative policy. The social security tax rate is required to be 6% to balance the budget of social security system. Also, in order to balance the tax revenues of government, consumption tax and capital tax need to be 11.8% and 5.1%. As Table 10 shows, this policy leads to decrease in capital, consumption, and social security tax rates, which are 3.77%, 3.28%, 16.66% respectively, and 3.69%, 5.33%, and 3.09% increase in output, aggregate capital, and aggregate labor.

Table 10: Descriptive Statistics for Alternative Economy I

K	1.956
Y	0.787
K/Y	2.483
L	0.533
r	7.7%
Discount rate	1.06
Capital tax rate	5.1%
Consumption tax rate	11.8%
Social Security tax rate	6%

Table 11 reports the differences between the benchmark economy and Alternative Economy I. These results suggest that if females have the same wages as males, aggregate female labor force participation rate would have been 12.34%, increasing by 52.7%. In this alternative economy, average weekly working hours would be 51.08 for males, decreasing by 1.70%, and 43.18 for females, increasing by 8.35% respectively according to the benchmark economy. Also, there is an increase in women's weekly working hours in every age group, while in every age the opposite situation occurs in men's working hours. On average, a worker spends 50.22 hours for work, while this number is 51.06 in the benchmark economy.

Furthermore, while the increase in female labor force participation is analyzed according to age groups, it is shown in Table 11 that the biggest increases occur in older ages. Since in older ages, most males continue to work and earn wages, females choose to work when they get these wages. Also, in this economy the increase in participation rates for females with ps degree and shs degree are 93.53% and 40.62% respectively. This is an important result since less productive females respond most to the changes in wages and they begin to work more. Finally, in this alternative economy, in every age while consumption almost does not change according to benchmark economy although savings increase.

Table 11: Alternative Economy I

	Benchmark	Alternative	%△
Aggregate FLFP (%)	8.08	12.34	52.72
Mean hours (male)	51.97	51.08	-1.70
Mean hours (female)	39.88	43.18	8.35
FLFP by Age (%)			
1	9.86	13.89	40.87
2	10.42	15.03	44.24
3	11.82	16.05	35.78
4	10.83	15.83	50.33
5	9.01	14.59	61.93
6	7.02	13.44	91.45
7	5.83	9.71	66.55
8	4.28	6.24	45.79
9	2.96	6.18	108.78
FLFP by Skill Type (%)			
ps	4.33	8.38	93.53
shs	9.6	13.5	40.62
col	47.78	55.85	16.89

This alternative economy demonstrates that gender wage gap has a significant impact on female labor force participation. Many females choose to work when they earn the same wage with males since their opportunity cost of staying at home increases. Moreover, since low-skilled females earn less than low-skilled males, their participation rates increase when they earn the same wages with males. However, for high-skilled females this increase is not as much as it is for low-skilled ones because the wage gap between high-skilled males and females is not huge. Finally, since females who are out of labor force are largely less productive, a larger fraction of them respond to this change and the aggregate female labor force participation rate increases.

6.3 Alternative Economy II

In the second alternative economy, wages of low-skilled females changes with the wages of high-skilled females and all other parameters are kept as they are in benchmark economy. Descriptive statistics for this economy is shown in Table 12. Again I balance the budget of social security system and government's tax revenues, and in order to balance them social

security, consumption, and capital tax rates need to be 11.5%, 9.2%, and 5.5%. All else being equal with the new economy, this exercise increases the social security tax rate, capital tax rate, output, and aggregate labor, but decreases consumption tax rate and aggregate capital according to the benchmark economy by 59.72%, 3.77%, 17.79%, 27.95%, and 24.19%, 2.14% respectively.

Table 12: Descriptive Statistics for Alternative Economy II

K	1.817
Y	0.894
K/Y	2.029
L	0.661
r	7.7%
Discount rate	1.06
Capital tax rate	5.5%
Consumption tax rate	9.2%
Social Security tax rate	11.5%

Table 13 reports the differences between the benchmark economy and Alternative Economy 2. When there is no skill difference between females, female labor force participation rate increases to 28.57%. The changes in wages have an important role in the change of the working hours of women; the hours of female workers increases and becomes 45.55. In contrast, working hours of male workers decrease by 14.54%. When this increase in working hours is analyzed in terms of age groups, it is seen that females' working hours increase in every age, and it is the opposite for male workers. Moreover, as Table 13 shows, the labor supply response of low-skilled females is stronger. Lastly, in this alternative economy, while consumption increases according to benchmark economy in every age group, savings decrease.

Table 13: Alternative Economy II

	Benchmark	Alternative	%△
Aggregate FLFP (%)	8.08	28.57	253.5
Mean hours (male)	51.97	44.41	-14.54
Mean hours (female)	39.88	45.55	14.22
FLFP by Age (%)			
1	9.86	28.74	191.4
2	10.42	32.07	207.7
3	11.82	35.26	198.3
4	10.83	39.74	266.9
5	9.01	36.50	305.1
6	7.02	31.62	350.4
7	5.83	24.47	319.7
8	4.28	19.59	357.7
9	2.96	8.84	198.6
FLFP by Skill Type (%)			
ps	4.33	26.84	519.8
shs	9.6	28.86	200
col	47.78	48.27	1.02

These findings suggest that female skill premium has a strong positive effect on female labor force participation rate, and when it disappears more females are encouraged for labor force participation. Also in this economy, the increase in female labor force participation rate is bigger than the one in the first alternative economy, which means female skill premium has more impact on women's labor decisions than gender wage gap. Finally, again since there are many low-skilled females who are out of labor force, a sizeable fraction of them respond to this change, hence this significant increase in aggregate female labor force participation rate occured.

7 Conclusion

This paper has been motivated by the low level of female labor force participation in Turkey, concentrating on the effect of the gender wage gap and female skill premium on female labor force participation rates. In this study, I built a general equilibrium model with two member households in which households make work and saving decisions for its members. I used this model to evaluate the difference in female labor participation rate in the absence

of gender wage gap and female skill premium respectively. The simulations have shown that when there is no gender wage gap, the participation rate of women increases by 52.72%. Furthermore, the change in female skill premium accounted for 253% increase in female labor force participation.

The findings have shown that in both alternative economies, more females are encouraged for market participation–especially low-skilled ones–and their participation in the labor force results in a significant increase in female labor force participation rate. Thus, the study shows that female skill premium has a bigger effect on women's participation decisions than gender wage gap, i.e. as the level of education increases, women gain skills and the probability of women entering labor market increases with the increase in the return of education.

Findings in this thesis are key for understanding the reasons of low participation rates of low-skilled women in the labor market in Turkey. There is a large gap in earnings for low-skilled women and men in Turkey, which may be reducing incentives for low-skilled women to participate in the labor market. In the absence of affordable childcare, low-skilled women face a high opportunity cost of working. Also, there is a lack of job opportunities for low-skilled females in the urban sector compared to low-skilled males. Therefore, policies that focus on amending the situation of low-skilled women in the Turkish labor market would increase the female labor force participation rate in Turkey.

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