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ARAŞTIRMA MAKALESİ RESEARCH ARTICLE

Marital Status Differences in Women's Labor Force Participation in Turkey: Nonlinear Decomposition Approach

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Abstract

The present study investigates the differences in the likelihood of prime working-age married and unmarried women's labor force participation and examines the labor force participation gap between them. Using Turkish Household Budget Survey data of 2018, this study estimates the probit model and employs a nonlinear decomposition method. To the best of my knowledge, this is the first study to address the labor force participation gap via the nonlinear decomposition method. The findings suggest that there is a 14% labor force participation gap between married and unmarried women in favor of unmarried women. Furthermore, nonlinear decomposition findings reveal that if the married and unmarried women had the same characteristics in terms of age, education, household economic status, and household demographic characteristics, 96.92% of the labor force participation gap between them would have disappeared. By understanding the driving forces behind the labor force participation gap, this study may help to develop policies to reduce the gap and increase married women's involvement in the economy.

Keywords: Marital Status, Nonlinear Decomposition, Probit Model, Turkey, Women's Labor Force Participation.

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Türkiye'de Kadınların İşgücüne Katılımında Medeni Durum Farklılıkları: Doğrusal Olmayan Ayrıştırma Yaklaşımı

Özet

Bu çalışma, çalışma çağındaki evli ve evli olmayan kadınların işgücüne katılım olasılıkları arasındaki farklılıkları ve aralarındaki işgücüne katılım farkını incelemektedir. 2018 yılı Türkiye Hanehalkı Bütçe Anketi verilerini kullanan bu çalışmada, probit modeli tahmin edilmekte ve doğrusal olmayan ayrıştırma yöntemi kullanılmaktadır. Bilgim çerçevesinde bu çalışma, işgücüne katılım farkını doğrusal olmayan ayrıştırma yöntemiyle ele alan ilk çalışmadır. Çalışmanın bulguları, evli ve evli olmayan kadınlar arasında, evli olmayan kadınlar lehine, %14'lük bir işgücüne katılım farkı olduğunu ortaya koymaktadır. Doğrusal olmayan ayrıştırma bulguları ise evli ve evli olmayan kadınların yaş, eğitim, hanenin ekonomik durumu ve hanehalkı demografik özellikleri bakımından aynı koşullara sahip olmaları durumunda, aralarındaki işgücüne katılım farkının %96,92'sinin ortadan kalkacağını ortaya koymaktadır. Bu çalışma, işgücüne katılım farkının arttıran belirleyicileri tespit ederek, işgücüne katılım farkını azaltmak ve evli kadınların ekonomiye katılımını artırmak için politikalar geliştirmeye yardımcı olabilir.

Anahtar Sözcükler: Doğrusal Olmayan Ayrıştırma, Kadınların İşgücüne Katılımı, Medeni Durum, Probit Modeli, Türkiye.

1. Introduction

Women participating in the labor force is an important driver of sustainable economic growth and development (Verick, 2014). Although an increase in women's labor force participation especially after the late 1940s in some labor markets, low labor force participation of women is still a serious problem especially for the emerging market economies. Therefore, low women's labor force participation is a crucial and current phenomenon that economies need to pay special attention to. Women's labor force participation has been of interest to many economists and a subject of many studies over the years across the countries, and most of them point out a low women labor supply. The main barrier towards women's labor force participation originates from the conventional social norms and cultural values of the society. In fact, the papers examining the women's labor force participation with social and cultural values (e.g., (Atasoy, 2016; Contreras & Plaza, 2010; Diwan & Vartanova, 2017; Gedikli, 2014; Goksel, 2013)) indicate that social norms, conservatism, traditionalism, machismo, patriarchy, and conventional cultural values influence the women's decision to participate in the labor force. Along with the social norms and cultural values, the institutional settings not covering family and child care leads to fewer women in the labor force with the idea of women should stay home, engage in chores, and take care of the children. In this case, the structure of the household, social, economic, and demographic features of women can be considered as the major determinants of women's labor force participation. In fact, many studies in the literature find a significant relationship between the likelihood of labor force participation and marital status, age, education, number of children, etc.

Most of the studies on labor force participation prove that there is a significant gap in labor force participation between men and women. However, this is not the only gap; there is also an important gap in labor force participation between married and unmarried women due to different reasons, other than the reasons every woman faces regardless of marital statutes such as social norms and conventional cultural values of the societies. One of the pioneer studies by Mincer (1962) brings forward married women do not only choose between participating in the labor force or leisure time but also have to consider the unpaid work in the home such as chores and childcaring. In fact, the existing literature on the labor force participation of women by marital status is considerably wide and the studies examining different labor markets documents a significant labor force participation gap between married and unmarried women. For instance, Lee, Jang, & Sarkar (2008) analyze the relationship between Korean women's marital status and labor force participation and find that married women are less likely to participate in the labor force than their unmarried counterparts. Contreras & Plaza (2010) examine the women's labor force participation determinants in the Chilean labor market with both classical and cultural values. They provide several important findings in terms of labor force participation determinants and findings related to the marital status indicate that the likelihood of labor force participation significantly reduces in case of women having a partner. A recent paper by Xiao & Asadullah (2020) analyzes the gender gap in labor force participation between Chinese men and women and the results indicate that being married reduces the probability of working for Chinese women.

Findings of another recent paper by Petrakis (2021) for the Greece labor market suggest that marital status has a significant and reducing effect on women's labor force participation decision.

Since Turkey has a conventional household structure in which individuals get married and have children in the early stages of their lives, marriage is one of the most significant constraints on women's labor supply. In fact, Ilkkaracan (2012) reveals that marriage is a more significant pattern on women's labor force participation than the presence of small children as a reason of gender roles. As Dayioglu & Kirdar (2010) indicate, since being married is considered a universal thing in Turkey, examining married women's labor force participation decision carries importance in terms of the labor market. Given the evidence that women's marital status is highly correlated to labor force participation, this study has two main objectives. First, it examines the differences in the likelihood of labor force participation of married and unmarried[1] women and diagnoses the patterns that could affect labor force participation decisions with a special focus on marital status. Second, it analyzes the labor force participation gap between them and reveals the determinants that could wider or narrow it. In order to achieve these objectives, this study adopts a probit model and nonlinear decomposition method. Although there is a wide literature on women's labor force participation in Turkey, to the best of my knowledge, this is the first study analyzing the labor force participation gap between married and unmarried women via the nonlinear decomposition method.

The next section covers women's labor force participation in Turkey and builds the background. Section 3 explains the dataset and sample used in this study. Section 4 contains the methodological issues and Section 5 reveals the empirical findings. Lastly, Section 6 provides further discussion and concludes remarks.

2. Women in Turkish Labor Force

This section builds an institutional background via national statistics and existing literature related to women's labor force participation in Turkey. Figure 1 illustrates the prime working-age[2] women's labor force participation and unemployment rates compiled by the Turkish Statistical Institute (TURKSTAT) in 2018.

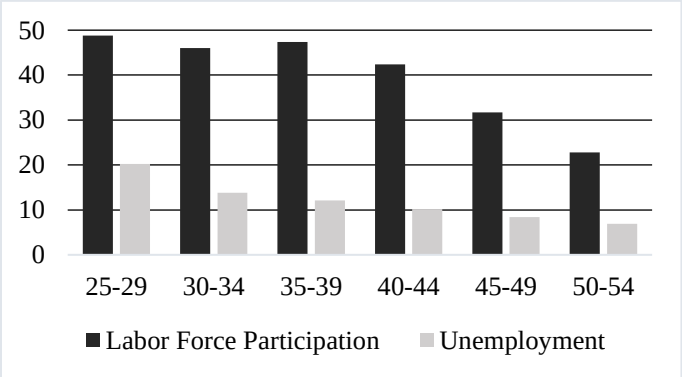

Figure 1. Women's labor force participation and unemployment rates

Source: TURKSTAT labor force statistics.

According to the statistics, younger women are more likely to participate in the labor force. Since the younger women who are especially in their mid-twenties seek jobs more, the unemployment rate is higher for them. The likelihood of labor force participation and therefore the possibility of being unemployed decreases as women get older. Turkey has a young and dynamic population, however, the average of the recent rates in Figure 1 reveals that almost 60 percent of the prime working-age women do not join the labor force and only 12 percent of them are unemployed. This suggests that 48 percent of women do not join the labor force in 2018 for several reasons other than unemployment even though they are in their prime working-age period. Moreover, the labor force participation rates of women are still considerably below most of the economies. World Bank's World Development Indicators reveal that women's labor force participation rates[3] in the European Union, the United States, the average of the world are 67.51, 67.23, and 52.54 percent, respectively. Surprisingly, despite the strong

[1] Unmarried women are single, divorced, separated, or widows.
[2] The prime working-age interval determined by the International Labour Organization (ILO) is 25 and 54.
[3] Calculated for the women aged between 15 and 64 by the ILO.

workforce with the young and dynamic population of Turkey, women's labor force participation rate is considerably below both developed economies and the average of the world.

The possible several reasons for women not participating in the labor force are maybe conventional cultural values, social norms influencing marriage in the early stages of their lifetime, higher fertility rates, lower educational attainment, institutional settings, household, and spouse characteristics (Verick, 2014). According to the marriage statistics of Turkey obtained from TURKSTAT, women's average age at first marriage is 24.8 in 2018 which can be considered as the beginning of the prime working-age period. Marriage is a reducing pattern on labor force participation of women, therefore, if marriage reduces the labor force participation of women, Turkish women get married instead of working in their mid-twenties. A similar finding from Palaz (2010) indicates that women join the labor market after graduation in their early twenties, however, the labor force participation decreases in their 24 and 34 due to marriage and childcare duties. Furthermore, Kasnakoglu & Dayioglu (1997) investigate the female labor force participation by exploiting the 1987 survey data and reveal that being married and having children tend to reduce the likelihood of labor force participation of Turkish women. Ozar & Gunluk-Senesen (1998) bring out that the role of wife and mother in the household are the important determinants of Turkish women's non-participation in the labor force. Tansel (2002) examines the labor force participation rates of both men and women by regions of Turkey. The rates of labor force participation by marital status indicate that unmarried women are more likely to participate than married women between 1998-2000 period. According to the findings of Ince & Demir (2006), marriage negatively affects Turkish women's labor force participation between 1988 and 2002 and causes women to be economically inactive and unpaid family workers. Dayioglu & Kirdar (2010) perform detailed analyses for the women's labor force participation in Turkey between 1988 and 2006. The findings indicate that married women are less likely to participate in the labor force than unmarried women. By examining the women's labor force participation for 1998, 2000, and 2008 Turkish data, Ilkkaracan (2012) defines marriage as an obstacle to women's labor force participation. However, marriage has become relatively less binding to labor force participation over the years. Varol (2017) examines the World Values Survey of 2007 for the Turkish labor force and suggests that since being married causes more responsibility to women, marriage harms the decision of women's labor force participation. Baslevent & Onaran (2003) adopt a different viewpoint and analyze the effect of the employment status of husbands on wives' labor force participation decisions in Turkey. The findings suggest that the two decisions are negatively correlated and if the husband is employed, women do not join the labor force. Similar to the international studies on women's labor force participation, national studies support that there is a significant gap between married and unmarried women in labor force participation.

Besides relatively early marriages in Turkey, demographic statistics compiled by TURKSTAT show that the fertility rate is 15.4 percent and the average total fertility in terms of the number of children is 2 per woman in 2018. Since fertility is a crucial reducing factor on women's labor force participation decisions with long maternity leaves and expensive and inaccessible childcaring, these relatively high fertility rates may lead women not to work. If we look at the education rates as another significant pattern on labor force participation, the rates indicate that only 23 percent of the prime working-age women have bachelor's or postgraduate degrees in 2018. 77 percent of the women of their prime working-age do not have a qualified degree in a particular labor force and consequently, they may have to decide between either obtaining unqualified jobs or being an unpaid family worker.

3. Data Description and Sample

Household Budget Survey (HBS) conducted by the TURKSTAT includes a rich data covering information about social, economic, demographic patterns of the households in Turkey. Therefore, HBS data are convenient for this study which analyzes women's decisions to take place in the labor force who have different characteristics. HBS has been applied since 2002 by TURKSTAT and this study exploits more recent data that was administered in 2018. A stratified two-stage cluster sampling method for the households in Turkey was employed to collect HBS data and the survey was administered to 15,551 households in 2018. By following the previous studies on women's labor force participation, to receive more relevant results, the sample of this study was restricted to the prime working-age women. The main reason for this is to obtain more accurate results by excluding women who do not take part in the labor force due to preferences such as education or retirement and prevent the misleading effect of age. After applying the restrictions, the sample of this study contains 8,582 women aged between 25 and 54. The HBS data used in this study are licensed and can only be used with permission from TURKSTAT.

4. Methodology

This study adopts a probit model and nonlinear decomposition methods. The following sub-sections contain methodological explanations of these methods.

4.1. Probit Labor Force Participation Model

As discussed above, one of the objectives of this study is to determine the probability of women participating in the labor force, diagnose the patterns that could affect this probability, and examine the differences between married and unmarried women in terms of labor force participation. Therefore, this study estimates the probit model of labor force participation for married and unmarried women separately. The dependent variable of the model is a categorical variable that takes the value of 1 if the woman currently works or does not work but the connection with the working place is still on[4] in the last week of the survey. The labor force participation variable takes the value of 0 if the woman does not join the labor force due to several reasons. The likelihood of labor force participation for married and unmarried women is estimated by $\Phi(X\beta)$, where X is the NxK matrix of explanatory variables, $\Phi(\cdot)$ is the cumulative standard normal distribution probability density function, and β is the $Kx1$ vector of coefficients. The probit model constructed in this study can be expressed as below.

$$p_i = \Phi\left(\beta_0 + \sum_{j=1}^{5} \delta_j \, Age_{ij} + \sum_{j=1}^{5} \gamma_j \, Education_{ij} + \beta_1 HouseholdWage_i + \beta_2 NonlaborIncome_i + \beta_3 Children(0-5)_i + \beta_4 Children(6-14)_i + \beta_5 ReferencePerson_i\right) \quad (1)$$

The left side of the equation (p_i) indicates the conditional probability of participation in the labor force on explanatory variables. The probit model constructed in the Equation 1 contains age categories, education levels, household economic status, and household demographic variables as the determinants that could affect labor force participation decisions. Women may have different preferences obtaining jobs in different periods of their lives. To capture this specific relationship between the age and the likelihood of joining the labor force age categories are divided into six categorical variables as 25-29, 30-34, 35-39, 40-44, 45-49, and 50-54. Education increases the cost of not participating in the labor force, thus, it raises the likelihood of seeking a job (Chin, 1995). Therefore, since education can be considered as an investment in terms of human capital, labor force participation is highly determined by education. Insomuch that educational attainments have more influence on women's decision to labor force participation than men (Komuryakan & Yilgor, 2021). In order to receive more detailed results about the influence of women's education on their likelihood of labor force participation, schooling is divided into categorical variables as no schooling, compulsory education, high school education, associate degree, bachelor's degree, and postgraduate degree.

Household economic structures along with the conservative and patriarchal values of society may cause women to stay out of the labor force. In most conventional households, women are encouraged to stay home, do household chores, and take care of children. This structure may cause if the household annual wage earned from the other people in the household is high, especially by men, the likelihood of labor force participation of the women may be lower. Therefore, the natural logarithm of the annual household wage excluding woman is added to the labor force participation model to analyze the probability of labor force participation of the woman in the case of a higher wage of the household other than woman. Another income determinant that could lower the possibility of women's working is the nonlabor income of the household. If the nonlabor income such as scholarship, interest, yield, fund, etc. other than wages is higher, women may not prefer to work. Hence, the labor force participation model contains the natural logarithm of the annual household nonlabor income including women's income. Household demographic features such as the number of children are one of the most significant determinants of the women's decision to participate in the labor market. The presence and the age of the children in the household are some of the major determinants of the women's decision to work. Since the presence of the preschooler and the older children have different impacts on the labor force participation, the model contains two continuous variables as the number of children aged between 0-5 and 6-14. Lastly, the model contains a categorical variable that denotes if the woman is the reference person in the household. The reference person is the person who is responsible for most of the expenditure of the household and may be referred to as the breadwinner and the head of the household. Being the head of the household is a significant factor in the decision of labor force participation.

It is highly expected that the impacts of the determinants that could affect the labor force participation decision vary by the marital status of the women. Age, education, household economic status, and household demographic structure may differ for married and unmarried women. For instance, education may be more significant for unmarried women whereas the number of children in the household may be more crucial for married women since childcaring may be considered her duty. Therefore, the probit model is constructed for separately married and

[4] The women who are on maternity leave, suspended, do not work due to such reasons as slowdown, on vacation, etc. are considered as working.

unmarried women to bring out the differences in the labor force participation decisions of married and unmarried women.

4.2. Nonlinear Decomposition

Decomposition is one of the most important statistical tools to analyze the differences between categories such as gender, occupation, age, marital status, etc. Decomposition was firstly introduced to the literature for the standard linear regression by Oaxaca (1973) and Blinder (1973). Therefore, this decomposition technique is mostly known as Oaxaca-Blinder (OB) decomposition. Over the years, the OB decomposition method was also developed for nonlinear regression models such as logit, probit, complementary log, etc. In order to decompose the differences in labor force participation between married and unmarried women after the estimation of the probit model aforementioned above, this study adopts the nonlinear decomposition method based on Yun (2004, 2005a, 2005b, 2008). This nonlinear decomposition method has two contributions to the literature. First, it handles the path dependency problem which originates because of a sensitivity of the nonlinear models in terms of the entrance order of the explanatory variables in the decomposition. Second, it overcomes the identification problem with the reference categories of explanatory dummy variables (Yun, 2005). After estimating the labor force participation (LFP) model for both married (m) and unmarried (u) women, the differences in the average likelihood of labor force participation between married and unmarried may be decomposed as follows:

$$LFP = \Phi(X\beta) \tag{2}$$

$$(\overline{LFP_u} - \overline{LFP_m}) = \overline{\Phi(X_u\beta_u)} - \overline{\Phi(X_m\beta_m)} \tag{3}$$

$$(\overline{LFP_u} - \overline{LFP_m}) = \left\{\overline{\Phi(X_u\beta_u)} - \overline{\Phi(X_m\beta_u)}\right\} + \left\{\overline{\Phi(X_m\beta_u)} - \overline{\Phi(X_m\beta_m)}\right\} \tag{4}$$

where LFP is a $Nx1$ dependent variable vector, X is an NxK matrix of explanatory variables, β is a $Kx1$ vector of coefficients, and Φ is the cumulative normal distribution function. The first and second components in the right hand of Equation 4 indicate characteristics effects and coefficients effects, respectively. Basically, the characteristics effect reflects the composition in labor force participation by marital status and indicates the contributions to the marital status differences in labor force participation due to explanatory variables. The coefficient effect, however, indicates contributions associated with marital status differences who share the same characteristics in the differences in the likelihood of labor force participation by marital status. Furthermore, in order to calculate the contributions of these effects, after calculating the overall decomposition from Equation 4, the equations below need to be employed

$$W_{\Delta X}^{k} = (\bar{X}_u^k - \bar{X}_m^k)\beta_u^k \Big/ (\bar{X}_u - \bar{X}_m)\beta_u \tag{5}$$

$$W_{\Delta \beta}^{k} = \bar{X}_m^k(\beta_u^k - \beta_m^k) \Big/ \bar{X}_m(\beta_u - \beta_m) \tag{6}$$

$$(\overline{LFP_u} - \overline{LFP_m}) = \sum_{k=1}^{K} W_{\Delta X}^{k}\left[\overline{\Phi(X_u\beta_u)} - \overline{\Phi(X_m\beta_u)}\right] + \sum_{k=1}^{K} W_{\Delta \beta}^{k}\left[\overline{\Phi(X_m\beta_u)} - \overline{\Phi(X_m\beta_m)}\right] \tag{7}$$

where $\sum_{k=1}^{K} W_{\Delta X}^{k} = \sum_{k=1}^{K} W_{\Delta \beta}^{k} = 1$ (Pritchett & Yun, 2009). According to the explanations, this study aims to analyze how much of the differences in labor force participation between married and unmarried women can be explained by differences in the determined indicators above.

5. Empirical Findings

The following sub-sections contain a four-fold analysis: an examination of descriptive statistics, the estimation of probit model, findings of the nonlinear decomposition method, and conduction of the sensitivity analysis.

5.1. Descriptive Statistics

Table 1 reveals the summary statistics of the explanatory variables explained in Equation 1 by women's labor force participation and marital status. The table also reports the Variance Inflation Factor (VIF) values to analyze the relationship between the explanatory variables and diagnose the possible multicollinearity.

Table 1. Descriptive statistics and VIF by labor force participation and marital status

	$LFP = 1$		$LFP = 0$		VIF	
	Married	**Unmarried**	**Married**	**Unmarried**	**Married**	**Unmarried**
Age categories						
25 - 29	0.09	0.33	0.14	0.27	2.12	3.20
30 - 34	0.17	0.17	0.18	0.13	2.47	2.12
35 - 39	0.21	0.13	0.19	0.13	2.38	1.91
40 - 44	0.22	0.13	0.17	0.13	2.04	1.81
45 - 49	0.18	0.16	0.16	0.15	1.79	1.83
50 - 54	0.13	0.08	0.16	0.19	-	-
Education degrees						
No schooling	0.11	0.05	0.18	0.19	-	-
Compulsory	0.54	0.28	0.59	0.42	2.15	2.64
High school	0.13	0.19	0.15	0.17	1.79	2.2
Associate	0.04	0.09	0.03	0.06	1.25	1.65
Bachelor's	0.15	0.35	0.04	0.15	1.55	2.7
Postgraduate	0.03	0.04	0.00	0.01	1.09	1.24
Household economic status						
Household annual wage* (*in logarithmic Turkish Liras*)	7.30	4.11	7.79	4.85	1.09	1.17
Household annual nonlabor income* (*in logarithmic Turkish Liras*)	5.54	7.35	5.51	9.06	1.17	1.15
Household demographic characteristics						
Children aged 0-5*	0.34	0.09	0.53	0.15	1.41	1.07
Children aged 6-14*	0.75	0.23	0.87	0.31	1.31	1.12
Reference person	0.05	0.41	0.03	0.32	1.03	1.50
Observations	2,606	720	4,544	712		
Diagnostics tests						
Pearson chi-square			96.16 (0.000)			
Fisher's exact test			(0.000)			

Notes: (i) * denotes continuous variable; other variables are categorical. (ii) The probability of the tests is in brackets.

The observation numbers show that the labor force participation rates for married and unmarried women are 36% and 50%, respectively. According to the ratios, there is a 14% gap between married and unmarried women in the labor force participation. Pearson independence chi-square and Fisher's exact tests which were used to statistically examine this labor force participation gap between married and unmarried women indicate that there is a significant statistical relationship between the women's labor force participation and their marital status. As for the VIF values in Table 1, there is no significant multicollinearity among explanatory variables detected.

Table 1 reveals that younger married women are less likely to take place in the labor force may be because of having children at mid-twenties, however, as they get older, their likelihood of working increases. As for unmarried women, this situation is reversed and unmarried women in the prime working-age group are more likely to take place in the labor force at early ages. Education categories show that most of the prime working-age married women have only compulsory education in 2018 regardless of taking place in the labor force. There is a slight difference between working and not working married women in terms of compulsory education and not working married women almost 60% likely to have compulsory education. While married women have less education, unmarried working women have 35% likely to have bachelor's degrees. This ratio is 15% for unmarried women

who do not work whereas the ratio is only 4% for married women. Higher education drives women to join the labor force more. Within the context of the household's economic situation, more income in the household causes less women's labor force participation since the women's labor force participation is considered as a choice rather than a necessity for both married and unmarried women. This means that if other people especially men in the household earn, women do not have to work so they can stay home and engage with the chores and childcaring. According to the household characteristics, if the number of children in the household is high, the married woman is 1.4 times more likely not participating in the labor force. This ratio is lower for unmarried and working married women. As expected, being a reference person in the household increases the likelihood of working for both married and unmarried women. However, being a reference person in the household is highly correlated with marital status; unmarried working women are referred to 41% likely to be a reference person whereas only 5% of married working women are considered as a reference person in the household. This structure only changes for unmarried women.

The questionnaire used in this study contains a question as "reason for not seeking a job" regarding the reasons for not participating in the labor force. This question has eleven different answers such as "found a job-established a business; but waiting to start", "doing a seasonal work or waiting to be back to the old job", "previously sought for a job but could not find", "does not believe that she can find a suitable job in her skills", "education or training continues", "engage with the household chores (taking care of children, elderly, sick, etc., are included)", "retired", "disabled or ill", "elderly", "income recipient", or "other". Engaging with the household chores is the highest selected answer to this question with the ratios of 91.5% and 51.1% for married and unmarried women, respectively[5]. Although the highest selected reason is the same for married and unmarried women, there is a significant difference between the ratios. Married women are most likely not in the labor force to do chores, take care of children, or take care of other people in the household.

5.2. Probit Model Findings

Table 2 reveals the estimation results of the probit model for married and unmarried women.

Table 2. Probit regression findings by marital status

	Married ($n = 7{,}150$)		**Unmarried** ($n = 1{,}432$)	
	OR	**ME**	**OR**	**ME**
Age categories				
25 - 29	0.0932 (0.0720)	0.0328 (0.0253)	0.3215** (0.1435)	0.1086** (0.0481)
30 - 34	0.2418*** (0.0667)	0.0852*** (0.0234)	0.5138*** (0.1498)	0.1735*** (0.0499)
35 - 39	0.3207*** (0.0619)	0.1130*** (0.0217)	0.3311** (0.1475)	0.1118** (0.0495)
40 - 44	0.3431*** (0.0576)	0.1209*** (0.0201)	0.4175*** (0.1411)	0.1410*** (0.0471)
45 - 49	0.2198*** (0.0555)	0.0775*** (0.0195)	0.4683*** (0.1352)	0.1581*** (0.0450)
50 – 54 (reference)				
Education degrees				
No schooling (reference)				
Compulsory	0.1235*** (0.0469)	0.0435*** (0.0165)	0.4915*** (0.1252)	0.1660*** (0.0415)
High school	0.1163* (0.0597)	0.0410* (0.0210)	0.8623*** (0.1395)	0.2912*** (0.0452)
Associate	0.4822*** (0.0932)	0.1699*** (0.0326)	1.1691*** (0.1806)	0.3947*** (0.0582)
Bachelor's	0.9649*** (0.0701)	0.3399*** (0.0237)	1.2859*** (0.1395)	0.4342*** (0.0427)
Postgraduate	1.2725*** (0.1597)	0.4483*** (0.0555)	1.8065*** (0.2942)	0.6100*** (0.0961)

[5] 173 women did not answer this question.

Household economic status				
Household annual wage	-0.0179***	-0.0063***	-0.018**	-0.0061**
	(0.0036)	(0.0013)	(0.0076)	(0.0026)
Household annual nonlabor income	-0.00044	-0.00016	-0.0886***	-0.0299***
	(0.0037)	(0.0013)	(0.0113)	(0.0036)
Household demographic characteristics				
Children aged 0-5	-0.2515***	-0.0886***	-0.0370	-0.0125
	(0.0298)	(0.0103)	(0.0921)	(0.0311)
Children aged 6-14	-0.0605***	-0.0213***	-0.0687	-0.0232
	(0.0195)	(0.0069)	(0.0622)	(0.0210)
Reference person	0.1550*	0.0546*	0.3603***	0.1217***
	(0.0830)	(0.0292)	(0.0909)	(0.0303)
Constant	-0.4798***		-0.3994**	
	(0.0699)		(0.2041)	
Goodness of fit				
Pseudo R^2	0.06		0.14	
McKelvey and Zavoina's R^2	0.12		0.29	
Pearson chi-square test	6,898.56		1,408.19	
Link test	1.0488		0.9961	
	(0.0542)		(0.0657)	
	0.107		0.0364	
	(0.0681)		(0.0773)	
	-0.0092		-0.0108	
	(0.0224)		(0.0421)	

Notes: (i) OR stands for odds ratio; ME stands for marginal effects. (ii) ***p<0.01, **p<0.05, *p<0.1. (iii) Numbers in brackets are the robust standard errors for the odd ratios and are delta-method standard errors for the marginal effects. (iv) The three variables in the link test indicate the prediction, the prediction squared of the dependent variable, and the constant. The numbers in the brackets present the standard errors of the variables.

The Pearson chi-square test indicates that the data come from a specified distribution and the model fits well enough. According to the link test, since the prediction square of the dependent variable is not statistically significant, link tests do not reveal any problem with the specification for both models[6].

Probit model findings for married women demonstrate an inverted U-shaped relationship between age and labor force participation and that married women are more likely to join the labor force between the ages of 40 and 44. This supports the conventional Turkish household structure; when the children start a higher education level mother may start to seek a job to support the children's education expenditures. Yet, unmarried women are most likely to participate in the labor force at an early age between the ages of 30-34. Although higher education leads to more labor force participation, education is a more significant pattern in unmarried women's labor force participation decision. Unmarried women with compulsory education, high school, associate, bachelor's, and postgraduate degrees are almost 12%, 25%, 22%, 9%, and 16% more likely to join the labor force than married women, respectively. The gap in labor force participation is the highest among the women with a high school degree and is the lowest among the women with a bachelor's degree. As expected, the annual household wage and nonlabor income decrease the likelihood of labor force participation for both married and unmarried women. While the numbers of children in the household are significant and causes a decrease in the labor force participation of married women, it is insignificant in the labor force participation decision of unmarried women. The presence of a preschooler/s in the household reduces the likelihood of working for married women maybe because of the high childcare services costs. As expected, being responsible for the household has a contribution to the likelihood of taking place in the labor force, yet this contribution is higher for unmarried women.

5.3. Nonlinear Decomposition Findings

Table 3 reports detailed nonlinear decomposition findings by marital status in the labor force participation based on the probit nonlinear model expressed in Equation 1.

[6] For more information, please see Pregibon (1980).

Table 3. Detailed nonlinear decomposition findings

	Characteristics effect	
	Estimate	**Contribution**
Age categories		
25 - 29	0.0072** (0.0029)	-5.18
30 - 34	0.0003 (0.0003)	-0.24
35 - 39	0.0027*** (0.0008)	-1.98
40 - 44	0.0027*** (0.0007)	-1.99
45 - 49	0.0001 (0.0003)	-0.1
50 – 54	-0.0011*** (0.0002)	0.84
Education degrees		
No schooling	-0.0073*** (0.0007)	5.28
Compulsory	-0.0288*** (0.0028)	20.85
High school	0.0052*** (0.0006)	-3.73
Associate	0.0001 (0.001)	-0.11
Bachelor's	-0.0285*** (0.0032)	20.61
Postgraduate	-0.0036*** (0.0006)	2.64
Household economic status		
Household annual wage	-0.0204*** (0.0041)	14.78
Household annual nonlabor income	0.0004 (0.0037)	-0.32
Household demographic characteristics		
Children aged 0-5	-0.032*** (0.0033)	23.17
Children aged 6-14	-0.0124*** (0.0038)	8.94
Reference person	-0.0186* (0.01)	13.46
Aggregate effect	-0.1340*** (0.0126)	96.92

Notes: (i) ***p<0.01, **p<0.05, *p<0.1. (ii) The dummy variables in the model are normalized to overcome the identification problem.

As presented in the last row of Table 3, the aggregate characteristics effect[7] accounts for 96.92% of the difference in labor force participation between married and unmarried women. This means, if the married and unmarried women had the same characteristics in the determined patterns such as age, education, household economic status, and household characteristics, then 96.92% of the labor force participation gap between them would have disappeared. Table 3 also shows that most of the sub-aggregate characteristics effects are statistically different from zero at the 1%, 5%, and 10% levels of significance. Significant characteristics effects for the age categories reflect that the marital status differences among people who are in 25-29 (5.18%), 35-39 (1.98%), and 40-44 (1.99%) age intervals contribute to a reduction in marital status differences in labor force participation whereas who are in 50-54 age interval contribute promotion. The characteristics effects of education for no schooling, only

[7] Since the coefficient effect is around 3% and mostly insignificant, only characteristics effect findings are presented. Characteristics effect findings are available upon request.

compulsory education, bachelor's, and postgraduate degrees are statistically significant at 1% significance level and their characteristics effects are 5.28%, 20.85%, 20.61%, and 2.64% percent, respectively. The education level of unmarried women is relatively higher than married women and this increases the labor force participation gap. On the contrary, small differences in marital status in high school degrees (3.73%) contribute to a smaller labor force participation gap. The characteristics effect for household annual logarithmic wage equals to 14.78% and is statistically significant at the 1% significance level. The differences in household annual logarithmic wage between married and unmarried women contribute to the labor force participation gap between married and unmarried women and increase the size of the gap. Household characteristics indicate that having children between the ages of 0-5 and 6-14 increases the labor force participation gap by 23.17% and 8.94%, respectively. The contribution of the number of preschooler/s is 14.23% higher than the number of older children. Lastly, the difference between married and unmarried women being the reference person in the household contributes to the 13.46% increase in the labor force participation gap.

5.4. Sensitivity Analysis

This study also conducts a sensitivity analysis to investigate the robustness of the findings in Tables 2 and 3. To do so, four different probit models were estimated and decomposed. All sensitivity analysis findings are available in Appendix A. The first model changes the reference group of education categories from no schooling to postgraduate degree and there is no significant change in the coefficients other than education variables which depend on the change in the reference category. The second model adds continuous age and squared age variables instead of the dummy variables of the age categories in the model. These continuous variables confirm that there is an inverted U-shaped relationship between age and labor force participation just like the age categories. The third model combines the two variables that indicate the numbers of children aged between 0-4 and 6-14 and the findings remain robust in the case of adding this variable in the model. The last model changes the dummy variables of education categories to one continuous schooling variable. In the course of this change, the coefficients remain robust. According to the nonlinear decomposition results of these four models, although there are small changes in the percentages presented below the standard errors, the aggregate characteristics effects are robust against the change in the variables.

6. Conclusion

The first task of this study was to estimate the probit model structured for the labor force participation decision for prime working-age married and unmarried women and to reveal the differences in the determinants of the labor force participation decision by marital status. As indicated in this study, although the marginal effects are higher for unmarried women, higher education degrees and being the reference person in the household increase labor force participation whereas household wage decreases the labor force participation of both married and unmarried women. However, the labor force participation age differs by marital status. Married women tend to involve in the labor force at later ages whereas unmarried women tend to involve earlier. Furthermore, neither the number of preschooler/s nor children aged between 6 and 14 have a significant influence on unmarried women's decision to labor force participation. On the other hand, the number of children is a major reducing factor on married women's decision to join the labor force, considering child care. Moreover, having younger children reduces the likelihood of labor force participation more. The second task of this study was to examine the labor force participation gap between married and unmarried women by employing a nonlinear decomposition method. The aggregate decomposition findings reveal that the differences among women by marital status lead to a labor force participation gap and if the married and unmarried women had the same characteristics, then 96.92% of the labor force participation gap between them would disappear.

The educational attainment gap between married and unmarried women and unmarried women being more educated is one of the most important determinants that increase the size of the labor force gap between them. Facilitating access to education, expanding opportunities for competence in different business sectors, and encouraging married women are the relevant ways of reducing this gap by increasing married women's education level. In recent years, the Ministry of Education has introduced an important opportunity named Public Education Centers, especially for housewives. These centers provide free courses and supply most women to gain competence in certain areas such as computer use, beauty and hair care services, skin care, massage, food and beverage services, photography, painting, crafts, foreign language, gardening, animal breeding, music, sports, etc. In line with the demands, Public Education Centers can provide 3,701 different courses in 72 areas. These centers help women not only to gain competence in certain workforces and benefit from these competencies but also help to gain self-confidence. Expanding these Public Education Centers in more areas considering the labor market demands, encouraging especially married women to participate in the labor force after they gain this specific competence,

and supporting them to become an entrepreneur by giving interest-free loans and reducing taxes, may increase labor force participation of married women. In this way, the labor force participation gap between educated unmarried women and uneducated married women can be reduced.

Turkey has a conventional household type and social values that support both men and women to marry and have children in their early life. Yet, encouraging especially women to participate in higher levels of education rather than marrying at an early age may lead to a higher labor force participation. Having children in the household is one of the most significant determinants of the size of the labor force gap and it increases the gap among married and unmarried women. Although long maternity leaves assure women, it is considered as a disadvantage for employers. If the woman is married, the employers consider that she will soon become a mother. Since they consider this as a long-time labor loss for them, they reduce the likelihood of hiring them and prefer to hire men and single women. An arrangement of maternity and paternity leaves as in mostly equal, increasing kindergarten opportunities, making them accessible and affordable are of great importance in terms of increasing married women's labor force participation. Most importantly, discrimination against especially married women in the labor market should be eliminated in order to reduce the labor force participation gap. In addition, increasing the mobility of women and increasing the labor force participation of married women should be encouraged by the authorities at every opportunity.

Understanding the driving or reducing forces behind the labor force participation gap between married and unmarried women is crucial to developing policies and campaigns to reduce the gap and increase women's involvement in the economy. This study may provide a framework in which women's marriage and labor force participation decisions can be examined.

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Appendix A. Sensitivity analysis

	Married				**Unmarried**			
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Age categories								
25 - 29	0.0932 (0.0720)	-	-0.0032 (0.0692)	0.0168 (0.0719)	0.3215** (0.1435)	-	0.3199** (0.1433)	0.2330 (0.1451)
30 - 34	0.2418*** (0.0667)	-	0.2166*** (0.0661)	0.2044*** (0.0669)	0.5138*** (0.1498)	-	0.5124*** (0.1496)	0.4288*** (0.1514)
35 - 39	0.3207*** (0.0619)	-	0.3313*** (0.0617)	0.3019*** (0.0617)	0.3311** (0.1475)	-	0.3295** (0.1472)	0.2863* (0.1494)
40 - 44	0.3431*** (0.0576)	-	0.3694*** (0.0573)	0.3385*** (0.0572)	0.4175*** (0.1411)	-	0.4144*** (0.1402)	0.3803*** (0.1427)
45 - 49	0.2198*** (0.0555)	-	0.2340*** (0.0552)	0.2243*** (0.0554)	0.4683*** (0.1352)	-	0.4665*** (0.1350)	0.4444*** (0.1365)
50 – 54	-	-	-	-	-	-	-	-
Age	-	0.1586*** (0.0214)	-	-	-	0.1642*** (0.0399)	-	-
Age^2	-	-0.002*** (0.0003)	-	-	-	-0.0022*** (0.0005)	-	-
Education degrees								
No schooling	-1.2725*** (0.1596)	-	-	-	-1.8065*** (0.2942)	-	-	-
Compulsory	-1.1491*** (0.1550)	0.1196** (0.0470)	0.1299*** (0.0467)	-	-1.3149*** (0.2783)	0.4892*** (0.1255)	0.4909*** (0.1254)	-
High school	-1.1562*** (0.1586)	0.1119* (0.0595)	0.1128* (0.0595)	-	-0.9441*** (0.2818)	0.8766*** (0.1402)	0.8616*** (0.1396)	-
Associate	-0.7904*** (0.1735)	0.4834*** (0.0932)	0.4693*** (0.0930)	-	-0.6374* (0.3000)	1.1893*** (0.1815)	1.1684*** (0.1808)	-
Bachelor's	-0.3077* (0.1621)	0.9605*** (0.0699)	0.9408*** (0.0696)	-	-0.5205** (0.2788)	1.3055*** (0.1411)	1.2857*** (0.1396)	-
Postgraduate	-	1.2588*** (0.1596)	1.2394*** (0.1581)	-	-	1.7992*** (0.2986)	1.8058*** (0.2942)	-
Schooling	-	-	-	0.0409*** (0.0033)				0.0797*** (0.0073)

Appendix A. Continued

Household economic status								
Household annual wage	-0.0178*** (0.0036)	-0.0179*** (0.0036)	-0.0188*** (0.0036)	-0.0167*** (0.0036)	-0.018** (0.0076)	-0.0179** (0.0076)	-0.0179** (0.0076)	-0.0181** (0.0076)
Household annual nonlabor income	-0.0004 (0.0037)	-0.0002 (0.0037)	-0.0007 (0.0037)	0.0003 (0.0037)	-0.0886*** (0.0113)	-0.0902*** (0.0113)	-0.0884*** (0.0113)	-0.0882*** (0.0113)
Household demographic characteristics								
Children aged 0-5	-0.2515*** (0.0298)	-0.2475*** (0.0298)	-	-0.2416*** (0.0294)	-0.0370 (0.0921)	-0.0480 (0.0927)	-	-0.0322 (0.0930)
Children aged 6-14	-0.0605*** (0.0195)	-0.0682*** (0.0193)	-	-0.069*** (0.0196)	-0.0686 (0.0622)	-0.0821 (0.0623)	-	-0.0751 (0.0621)
Total number of children	-	-	-0.1216*** (0.0169)	-	-	-	-0.0578 (0.0488)	-
Reference person	0.1550* (0.0830)	0.1513* (0.0831)	0.1551*** (0.0826)	0.1510* (0.0828)	0.3603*** (0.0909)	0.3519*** (0.0915)	0.3591*** (0.0908)	0.3725*** (0.0913)
Constant	0.7927*** (0.1649)	-3.2131*** (0.4207)	-0.4723* (0.0697)	-0.5428*** (0.0611)	1.4071*** (0.3259)	-2.9328*** (0.7722)	-0.3993*** (0.2041)	-0.3397* (0.1822)
Aggregate Nonlinear Decomposition								
Aggregate characteristics effect *Model 1*	-0.1339*** (0.0126) 96.92							
Aggregate characteristics effect *Model 2*	-0.1291*** (0.0127) 93.33							
Aggregate characteristics effect *Model 3*	-0.1225*** (0.0125) 88.6							
Aggregate characteristics effect *Model 4*	-0.1128*** (0.0128) 81.85							

Notes: (i) ***p<0.01, **p<0.05, *p<0.1. (ii) Numbers in brackets are the robust standard errors for the odd ratios.