LABOR FORCE PARTICIPATION OF WOMEN AND MARITAL STATUS: THE CASE OF AZERBAIJAN

By

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Abstract

The aim of this paper is two-fold: 1) to examine the relationship between the Labor Force Participation (LFP) of women and marital status among young women aged 25-39; 2) to identify the primary determinants affecting the LFP of married women aged 20-49 in Azerbaijan. For estimating the LFP of women, I use a probit model. The empirical results show that married women are about 22-24% less likely to participate in the labor force than unmarried women. Further investigation reveals that age, schooling, child (aged 5 or less), residence status (urban vs rural), and age at first marriage are significant factors that affects the LFP of married women.

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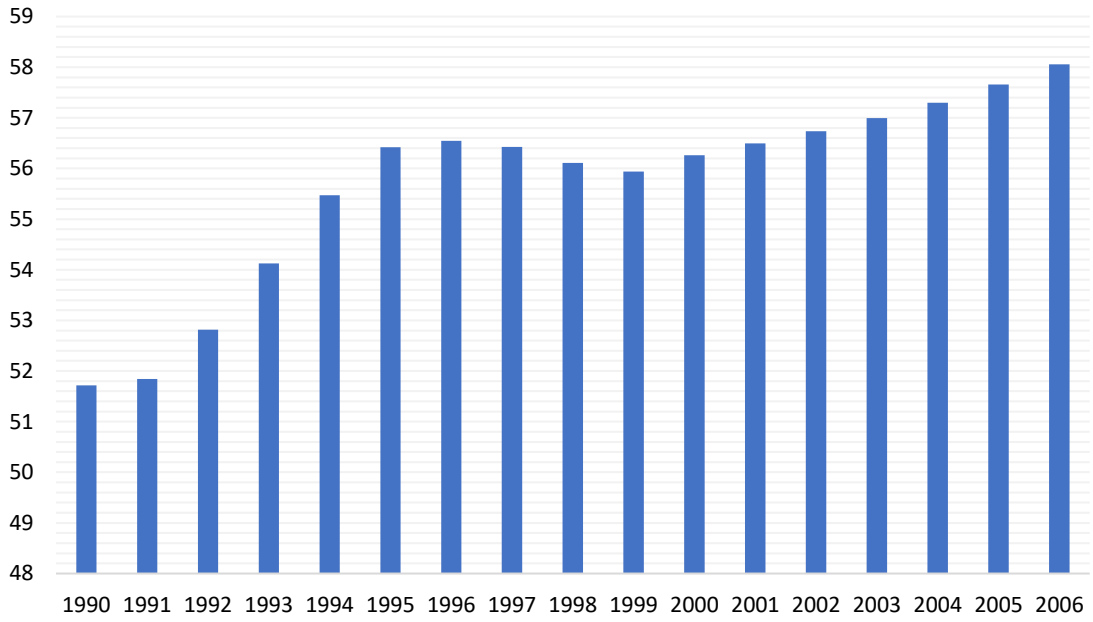
1. Introduction

Gaining independence in 1991 after the collapse of the Soviet Union, Azerbaijan shifted from a centralized economy of the Union to a market economy. In 1991, the Female Labor Force Participation was around 51% (**Figure 1**). From 1991 till 1997, the FLFP increasing at an average speed of 0.92% ($\frac{\%56.5_{1997}-\%51_{1991}}{6}$) $= \%0.92$) and reached around 56.5% in 1997.

Figure 1. Female Labor Force Participation Rates between 1990-2006, in Azerbaijan



Source: World Bank, Labor Force Participation Rate, Female (% of female population aged 15 above).

Rather than associated with an independent market economy, this increasing trend can be associated with the Nagorno-Karabakh conflict existing between Armenia and Azerbaijan during 1988-1994 with the peak war phase of 1992-1994. A considerable number of middle-aged men were involved in the war, so they left the labor force during 1992-1994. Considering the traditional and cultural perception of women as a mother and household and of men as the primary breadwinner of their families in Azerbaijani society, three years of war period forced

the female relatives of men involved in the war to overtake the role of breadwinner of their families. Even after the ceasefire was signed in May 1994, the increasing FLFP trend still continued until 1997. The continuation of the trend was due to the permanent impacts of war on the health of the men (those who died or got wounded and, as a result, lost their working abilities) and also partially due to the availability of new employment opportunities under the independent market economy.

Starting from 1998, FLFP starts to decline for the next three years and then increase. This U-shaped behavior of FLFP is supported by the previous studies done by Goldin, Mammen, and Paxson, who analyzed the relationship between FLFP and early economic development in developing countries. Despite gaining independence in 1991, the leading economic development in Azerbaijan happens to be after the Oil Contract of Century[1].

In September 1994. The implementation of the Contract a few years after 1994 gave rise to the new manufacturing sector in the oil and gas industry with creating a significant amount of economic opportunities. Goldin (1995) pointed out that at its early stages, economic development in the form of a new manufacturing sector creates more employment opportunities for men than women in low-income countries.[2] It can be explained by the existing social norms preventing women from accepting the offered *blue color*[3] jobs during the early industrialization period. Due to the nature of these jobs, one of the possible norms might be that women do not like them. Another possible explanation is the social stigma on the husbands of married women against a blue-color job. In Azerbaijan, this stigma also affects the LFP of unmarried women since society also stigmatizes the male household heads of those women. For married women, another reason for the decline in their LFP is the amount of the offered market wage for blue color jobs is not enough to compensate for their costs associated with

[1] The contract consists of Production Sharing Agreements on the development of "Azeri – Chirag - Guneshli" oil fields in Azerbaijan and was signed on September 20, 1994, by the participation of 13 companies from 8 countries, http://www.aayda.gov.az/en/pages/244.

[2] Although Azerbaijan is now considered an upper-middle-income country, it was not the case during the 90s.

[3] Blue -color jobs are the ones that require manual labor and usually preferred by males.

housework and childcare. Until the early industrialization period, in Azerbaijan, men were usually involved in the agricultural sector, such as running family farms or enterprises where their wives could work. During industrialization, men moved to newly created jobs, which reduced women's participation. Nevertheless, in 2001, the LFP of women in Azerbaijan started to rise again. As the economic development progressed in Azerbaijan, the nature of the jobs changed, and more employment opportunities (such as in-office/clerical jobs) became available. Moreover, FLFP in Azerbaijan has not been low compared to other neighboring Post-soviet countries (such as Georgia, Armenia).[4] Between 1995-2006, the female labor force participation rate (% of all 15+ women) in Azerbaijan ranged from 56% to 58%. This range is 46%-45% for Armenia, 61%-51% for Georgia. The increasing trend starting from 2001 is persistent until 2017.

In general, women's labor force participation is determined by economic, social, and demographic factors. In addition to those mentioned above economic (due to the implementation of the Oil Contract of the Century) and social factors (in the form of social forms), the marital status is also a crucial factor in women's labor supply decisions. Ever married women (including widowed and divorced) constitute the very higher share of economically active women, which makes them essential in understanding the dynamics of the LFP of all women. Married women typically leave the labor force in order to take care of their families. It is mainly because of the traditional

social norms in most countries, including Azerbaijan, that defines women's primary duties as running a household and caring for all family members. Moreover, age, education, the number of children, and the type of place of residence are also crucial determinants of FLFP (Lee et al. (2008), Rana and Azid (2010), Chen et al. (2014)).

[4] In 2005, out of 2,111,300 economically active women, 1,957,600 women 92% were employed. *Sources: State Statistical Committee of Azerbaijan, World Bank data*

Considering the abovementioned factors, in this study, I first analyze the effect of marriage on labor force participation of young Azerbaijani women aged 25-39. I use a non-linear probability model – probit to estimate the LFP of women. The results of the analysis show that married women are 22-24% less likely to participate in the labor force than unmarried women. Due to the endogenous nature of marriage, I apply the Instrumental Variable (IV) approach to correct for the potential endogeneity and obtain IV estimation results for the effect of marriage. Based on the related literature (Francis 2005, Lee et al. 2008), I obtained the sex ratio of men to women aged 15-39 in a region and the unemployment rate for the population aged under 30 in the same region as two instruments to estimate adjusted marriage probabilities. Nevertheless, due to unavailability of city-level data for instruments and for respondents' demographic characteristics, the sex ratio and unemployment rate of young people turn to be bad instruments for solving the endogeneity of marriage so that it is not possible to get a reliable result regarding the sign of the coefficient of adjusted marriage probabilities after applying IV (Refer to **Table 11**).

Secondly, I further examine the main determinants of LFP for married women aged 20-49. The results (Refer to Table 12) show that age, education, and living in rural have a positive effect on the LFP of married women. Also, the study finds out that having a child aged five and less and getting married before age 20 decreases the likelihood of participating in the labor force for a married woman.

In sum, the objective of this study is two-fold. Firstly, I examine the effect of marital status on LFP of young women in Azerbaijan. Secondly, I identify the driving factors affecting the LFP of Azerbaijani married women. Identifying those factors is crucial from a policy perspective and might be useful to reduce the inequity in employment opportunities for women.

2. Literature Review

There is vast literature regarding female labor force participation and its driving factors, including marital status. In this section, I will review the relevant literature for the study from 2 angles: 1) the dynamics of female labor force participation (FLFP) and the major determinants of FLFP; and 2) potential endogeneity problem and application of the instrumental variable approach.

Many researchers have studied the dynamics of FLFP through the process of economic development in several countries. Sinha (1967) is the first researcher who suggested the U-shaped behavior of female labor force participation during economic development in low-income countries. He pointed out that during the early economic development of a country (such as industrialization), the FLFP follows a temporally decreasing trend. He gave three main possible reasons for the observed decrease. Firstly, before industrialization starts in a low-income country, the big share of women works in agricultural sectors, including family farms and enterprises. Once industrialization creates new job opportunities (especially in the manufacturing sector such as factory work), men leave their family businesses in the agricultural sector and move to paid employment to increase the family income. As a result, urbanization increases, and the number of family enterprises in agriculture decreases. Therefore, available jobs for women decreases. Secondly, the decrease in FLP might be because women do not prefer new job opportunities in the manufacturing sector due to the nature of the jobs. Thirdly, there might be stigmatization on the husbands if their wives work in a factory.

Nevertheless, Sinha also figured out that as the development progresses, the education of women increases (becoming attractive to newly offered jobs), the nature of jobs changes[5], and the stigmatization melts down which causes LFP of women to increase again. As a result, the FLFP happens to follow the U-shaped curve. The link between FLFP and economic development is very well empirically studied in later periods by Goldin (1995), Mammen and Paxson (2000) for the case of the US, and Fatima and Sultana (2009) for the case of Pakistan.

Apart from factors regarding economic development, the impacts of the socio-economic factors on the LFP of women are well studied by many researchers, including Lee et al. (2008), Rana and Azid (2010), Sasaki (2002) and others. In this manner, Lee et al. (2008), in his study, analyze the effect of marriage on the LFP of young women aged 25-34 in South Korea. Considering the endogenous nature of marriage, the authors use the probit model with the IV approach to estimate the effect of marriage. They choose the sex ratio of men to women aged 15-39 and the unemployment rate for the young population under age 30 in a city where a woman resides as two instruments for marriage. The authors find out that an average married woman is about 40-60% less likely to be employed than a single woman in Korea.

Moreover, the estimation results with and without applying the IV approach show that not correcting for the endogeneity of marital status causes a downward bias in the estimation of the effect of marriage on the LFP of young women. The authors further investigate LFP patterns of young (25-34) and middle-aged (35-44) married women in Korea and found out that married women's age, schooling, having a child under age 6, and husband's age, occupation is the main driving factors for married women's work.[6]

Rana and Azid (2010) examine the factors affecting the decision of married women aged 16-60 in Pakistan. Using the probit model for the estimation, the authors figure out that married women's age, education, family size, the number of girls aged 5-15, the husbands' low-

[5] In later phases of industrialization, more jobs requiring less manual labor are created such as office jobs
[6] See also Chen et al. (2014), Odland & Ellis (1998)

income level, and rural locality positively affect LFP of those women. The results of the study also show that the husband's education level, the number of sons aged 15 and above, the number of children aged five and less have a negative effect on the labor force participation of married women.

In terms of understanding the effects of family size on married women's work, Sasaki (2002) investigated how living with a woman's own or in-law parents (a husband's parents) affects the labor force participation of Japanese married women. Firstly, he used the instrumental variable approach to correct for the endogeneity of family size. Later, the author estimated the determinants of labor force participation of married women using the logit model. The major finding of his study suggests that living with own or in-law parents has a positive impact on the labor force participation of married women since co-residence allows them to share the burden of household work and family care with their parents.

Furthermore, the other relevant literature for this study is about the endogeneity of marital status and IV approach applied to correct it. Nevertheless, finding a good instrument has been a major obstacle for researchers. In this manner, Francis (2005) successfully uses the sex ratio of men to women aged 15-39 in a region when a woman was at her 20 as an instrument to predict marriage probabilities. Following Francis (2005), Lee et al. (2008) also use the sex ratio as an instrument. Moreover, the authors also include the unemployment rate of people aged under 30 in a region when a woman was at her 20 as a second instrument to obtain corrected marriage probabilities. The result of the applying IV procedures shows that not correcting for the endogeneity of marital status causes a downward bias in the estimation of the effect of marriage on FLFP.

3. Data Description and Initial Analysis:

The primary data source that I have used for the study is the Azerbaijani Demographic and Health Survey (DHS) conducted by WorldBank in 2006. The survey contains a microdata of 8444 Azerbaijani women aged 15-49 and living in one of 9 economic regions. This individual dataset provides information on women's demographic characteristics, education, residence status, job occupation, marital and working status, religion, ethnicity, household size, and health conditions. Moreover, it also provides information on the characteristics of partners of married women. The secondary data source used for the study is the State Statistical Committee of Azerbaijan (SSCA). Data regarding regional demographic and labor market factors are obtained from SSCA.

The major drawback of the primary data source is that the most recent DHS for Azerbaijan is conducted in 2006. Considering the significant economic changes between 2006-2017[7] happened in Azerbaijan and worldwide, the estimation results based on 2006 microdata might not represent the current LFP behavior of Azerbaijani women. Moreover, DHS does not provide city-level data (such as a respondent's city of birth, a city where a respondent/partner works). As a result, it creates an obstacle to identify the local differences inside a region. Furthermore, the major drawback of the secondary data source (SSCA) is the missing data for demographic and economic characteristics of regions, especially before 2001.

3.1. The First Objective: The Relationship between FLFP and Marital Status

To present the relationship between marital status and FLFP (which is the first objective of the study), I limit the data to those women who are currently married or never married. Since the

[7] Such as Financial Crisis of 2007-2008, the sharp Depreciation of Azerbaijani national currency between 2015- 2017

majority of women have their first marriage before 30[8] I further restrict the sample of women to those aged 25-39. Although in the related literature, researchers usually consider the age interval of 25-34 for young women, I extend the upper boundary of the interval from 35 to 39. I apply this extension considering the similar labor supply behavior of Azerbaijani women between the ages of 35 and 39. **Table 1** displays the summary statistics for women in the 25-39 age group, including the variables used for the first part of the analysis.

Socio-Demographic Factors:

In terms of socio-demographic factors, **Table 1** includes age, schooling years, and having a child under age 5. Age is considered as potential work experience and is expected to increase the likelihood of participating in the labor market for young women (Lee et al. 2008) Age might also have a negative impact on the reservation wage of a woman so that as age increases, a woman's reservation wage declines which increase her participation probability due to more low ranked employment opportunities.

[8] Out of 3047 women aged 25-39, 2534 are married, and 2454 women out of 2534 have their first marriage before age 30.

Table 1: Summary statistics for women aged 25-39 and the description of variables.

Variables	*Observations*	*Mean*	*SD*	*Description of variables*
LFP	*3047*	0.21	0.41	Dummy variable equal to 1 if a respondent currently works, and zero otherwise[9]
Age	*3047*	31.97	4.42	Age of a respondent
Schooling	*3047*	10.8	2.49	The number of total years spent in education
Child	*3047*	0.42	0.49	Dummy variable equal to 1 if a respondent has at least one child age<5
Marriage	*3047*	0.83	0.37	Dummy variable equal to 1 if a respondent is currently married
Rural	*3047*	0.49	0.50	Dummy variable equals one if a respondent lives in a rural place[10]

Higher educational attainment is expected to have a positive influence on the probability of being in the labor force due to the better employment opportunities that highly educated women might have (Chen et al., 2014). Another factor that affects the LFP of women is having a child. Since a child needs more care during the pre-school years[11], having a child specifically under age 6 is considered the main obstacle for women's work outside of the home.

[9] The variable includes both full-time and part-time work

[10]Urban place typically implies capital, big cities, while rural place implies the town and countryside.

[11]In Azerbaijan, compulsory schooling (primary school) starting at age 6.

Therefore, the CHILD variable shows the number of children under age 6 that a woman has. The effect of this variable is not very straightforward. For married women, it is likely to be with a negative sign since married women spend more time at home due to childcare related work. However, for never-married women, it might enhance the likelihood of being in the labor force considering the fact the very majority of those women are either head of the household or daughter/sister of the male head of the household.

Regional Labor Market Conditions:

Then, in **Table** 2, I calculate LFP by marital status for the abovementioned restricted sample of women across 9 different economic regions of Azerbaijan. As a result, **Table 2** shows that the gaps in labor force participation rates between married and unmarried women with the same age group of 25-39 and similar educational backgrounds[12] are quite different across the economic regions.

[12] Out of 3,047 women, 2,999 have secondary education

Table 2: The number of women based on Marital and Working Status across the regions

N=3,047	Marital status (*persons*)				
	Married		Never Married		*Share of respondents across the regions (%)*
Economic Regions	*Working*	*Not Working*	*Working*	*Not Working*	
Baku	68	319	38	21	*14.64*
Absheron	37	228	24	38	*10.73*
Ganja-Qazax	56	196	12	10	*8.99*
Shaki-Zagatala	70	189	20	23	*9.91*
Lankaran	19	271	14	57	*11.85*
Guba-Khacmaz	40	184	20	48	*9.58*
Aran	83	327	32	53	*16.25*
Yukhari Garabag	37	168	29	25	*8.50*
Dakhlik Shirvan	34	208	13	36	*9.55*
Total	444	2,090	202	311	*100%*

In general, the regions' distinct local labor market conditions have a significant impact on women's labor supply decisions by providing opportunities in particular occupations/industries and by wage differences (Odland and Ellis, 1998). In this manner, the very low LFP for both married and unmarried women in the Lankaran region might be explained by fewer employment opportunities existing for women irrespective of their marital status. Moreover, the public occupations such as teacher, education professionals, health

professionals (nursing, doctor, and others.) increase the chances of being employed both married and unmarried women which might explain the relatively high LFP rates (43%-24%) for women in Shaki-Zaqatala region where the abovementioned public occupations are a common choice for further specialty among high school graduates. The existence of public education and health institutions in all the regions makes the related occupations more accessible and attractive for women. Besides, gender discrimination is very low in those institutions due to the traditional involvement of women in such institutions. In sum, regional labor market conditions variables are also crucial for the analysis. Therefore, apart from socio-demographic variables, I also include unemployment rates across economic regions, which might be a good indicator of local labor market conditions for young women. Intuitively, the local unemployment rate is expected to have a negative impact on female LFP. Nevertheless, it might have a positive influence on married women because of unemployment among the male heads of households.

Moreover, type of place of residence[13] as an indicator for local differences inside a region can also be considered a significant factor in understanding the LFP of women**.** Never-married women are more likely to be employed in urban cities, considering the availability of more employment opportunities for them than married ones. Oppositely, married women are more likely to be in the labor force in rural cities due to the higher employment opportunities in the agricultural sector and easy access to low ranked jobs.

3.2. The Second Objective: The determinants of LFP for Married Women

As the second objective of the study, I investigate the main determinants of labor force participation rate for married women. I restrict the data to the ever-married women sample

[13] Either urban or rural places

aged 20-49. Ever-married sample of women contains either currently or formerly[14] married women at the time of the survey. **Table 3** shows the LFP of women from both categories. As seen from **Table 3**, formerly married women (currently divorced or widowed) are more likely to participate in the labor force since they are typically the primary breadwinner of the family due to the loss of the husband (either due to divorce or death).

Table 3: LFP of never, currently, and formerly married women. *N=6,916*

	Working Status (*%*)		Share of respondents across marital status (*%*)
Marital Status	*Not Working*	*Working*	
Never Married	72.47	27.53	*18.7*
Currently Married	80.59	19.41	*73.7*
Formerly Married	58.52	41.48	*7.6*

Nevertheless, the focus group of my study is currently a married woman. Therefore, I further restrict the survey data to the group of women currently married and aged 20-49 at the time of the survey. T**able 4** shows a summary of the necessary variables used for the second part of the analysis.

[14] Formerly married category includes both divorced and widowed women.

Table 4: Summary statistics for married women aged 20-49 and the description of variables

Variables	*Observations*	*Mean*	*SD*	*Description of variables*
LFP	5005	0.19	0.40	Dummy variable equal to 1 if a respondent currently works, and zero otherwise
Age	5005	35.25	8.23	Age of a respondent
Schooling	5005	10.75	2.58	The number of total years spent in education
Child	5005	0.37	0.48	Dummy variable equal to 1 if a respondent has at least one child age<5
Age at first marriage	5005	0.38	0.49	Dummy variable equal to 1 if a respondent age at first marriage is before age 20
Rural	5005	0.48	0.49	Dummy variable equal to 1 if a respondent lives in a rural place

Socio-Demographic Factors:

Table 5 shows the LFP for women based on the age at their first marriage. LFP of women having first marriage before the age of 20 is around 14%, while this rate is 22% and 28% for women having the first marriage between 20-24 and 25-34, respectively. Early marriage before the age of 20 seems to have a negative influence on women's labor participation.

Table 5: *LFP of married women based on their age at the first marriage. N=5,005*

Age at First Marriage	Working Status (%)		The number of respondents (*persons*)
	Working	*Not Working*	
10-19	13.69	86.31	1,912
20-24	21.83	78.17	2,282
25-34	26.77	73.23	747
35-47	81.48	18.52	54

One of the explanations might be that women who are married at a very early age stop their educational career at secondary school. In this manner, **Table 6** shows the highest educational attainment of women across their ages at the first marriage. About 4% of women who got married before the age of 20 obtain higher education, where 54% of them do not even complete their secondary education.

Table 6: Share of women with different educational attainment across their first marriage age.

Age at first marriage	Highest Educational Attainment (%) *N=5,005*					
	No Education	*Incomplete Primary*	*Complete Primary*	*Incomplete Secondary*	*Complete Secondary*	*Higher*
10-19	1.51	0.78	0.83	53.98	39.04	3.85
20-24	0.75	0.26	0.44	48.79	35.29	14.47
25-34	1.34	0.40	0.40	41.1	39.76	17.00
35-47	0.00	0.00	0.00	24.07	64.81	11.12

Regional Labor Market Conditions:

Moreover, the labor market conditions across 9 regions have also impact on the LFP of married women (**Table 7)**. The similar patterns discussed for **Table 2** can also be seen in **Table 7.** The similar reasons mentioned above can explain the variations existing in **Table 7** across regions. So, the Lankaran region is the one with the lowest LFP of married women, which is due to the lack of employment opportunities for married women. Moreover, culture and religion might be another reason for the low LFP. The highest LFP of married women is in the Shaki-Zagatala region, which can be explained by the fact that the majority of married women in the region are specialized as an agricultural employee or "higher status" (professional, teacher, manager, others.) and obtained at least secondary education.

Table 7: LFP of married women across 9 economic regions. *N=5,005*

Economic Regions	Working Status (%)		The number of respondents in the regions (*persons)*
	Working	*Not Working*	
Baku	24.17	75.83	*749*
Absheron	15.84	84.16	*505*
Ganja-Qazax	21.39	78.61	*533*
Shaki-Zagatala	28.09	71.01	*506*
Lankaran	5.90	94.10	*593*
Guba-Khacmaz	15.72	84.28	*407*
Aran	20.95	79.05	*802*
Yukhari Garabag	25.79	74.21	*411*
Dakhlik Shirvan	15.20	84.80	*499*

Furthermore, the decomposition of married women based on their working status and type of place of residence (**Table 8)** shows that married women living in the capital and big cities of the regions compared to the ones living in towns or countryside are more likely to be involved in the labor force. It can also be explained by the opportunities offered to married women in the cities.

Table 8: LFP of married women across their place of residence. *N=5,007*

The place of residence	Working Status (%)		The number of respondents in the regions
	Yes	*No*	
Capital, Large City	24.17	75.83	749
Small City	21.40	78.60	673
Town	18.55	81.45	1170
Countryside	19.39	80.61	2413

In sum, based on the discussion of socio-demographic and regional labor market conditions for both the first and second objective of the study, I aim to find answers for the following research questions:

FIRST OBJECTIVE:

1) Does marital status discourage the LFP of women?

2) Are the impacts of socio-demographic and regional labor market variables (such as age, schooling, child, rural) the same for both married and never-married young women?

SECOND OBJECTIVE:

1) What is the nature of the main determinants affecting LFP of married women?

4. Model specification

I have a binary dependent variable (LFP) representing labor force participation, which is equal to 1 if a woman currently works, and zero otherwise. Women decide to participate in the labor market if the utility of working outside (i.e., market wage) exceeds the utility of staying at home (the reservation wage). In this manner, LFP represents a latent variable defined as follows:

$$LFP = \begin{cases} d, & x > 0 \\ d, & x \leq 0 \end{cases} \text{, where} \quad d = W_m - W_r$$

Considering all socio-demographic and labor market variables in **Table 1** and **4** as the explanatory variables (affecting the difference in the gap between W_m and W_r), the main equations of the interest for the study becomes:

FIRST OBJECTIVE: $$LFP = \boldsymbol{I}(\theta * marr + \sum_i X_i * \beta_i + u_i > 0) \quad (1)$$

SECOND OBJECTIVE: $$LFP = \boldsymbol{I}(\sum_j X_j * \beta_j + u_j > 0) \quad (1a)$$

, where $marr$ indicates the marital status, X_i and X_j include all explanatory variables from **Tables 1** and **4,** respectively. u_i and u_j show the error terms. Moreover, $\boldsymbol{I}(.)$ shows the indicator function, which is equal to if the term inside the bracket is positive, and zero otherwise. To estimate Equation (1) and Equation (1a), I use non-linear probability model – *probit*. The probit model is more suitable than the linear probability model due to the potential non-linearity of a conditional expectation function of LFP on explanatory variables. Moreover, probit estimation provides predicted probabilities ranging between 0 and 1, which is not the case under LPM. Under the probit model, the probability of women's participating in the labor force is given by:

$$P(LFP = 1|marr, X_i) = 1 - F(-\theta * marr - \sum_i X_i * \beta_i) \qquad (2)$$

where F is the cumulative distribution function. In the next subchapter, I give a theoretical framework to define the LFP probability of women based on the theory of labor supply.

4.1. A Theoretical Framework for Female Labor Force Participation

As discussed in Section **2**, the theory of labor supply suggests that the LFP of women is defined based on the relationship between the reservation wage and the market wage. Following the theory and its application in recent literature (Riboud 1985, Lee 2008), I will define wages as follows:

$$W_m = Z_i * \delta + \varepsilon_m \qquad (3)$$

$$W_r = Q_i * \rho + \varepsilon_r \qquad (4)$$

W_m and W_r are the market and reservation wages of women, respectively. Z_i contains variables that affect Wm. The market wage is theoretically determined based on the human capital of a person, which can be empirically measured in terms of one's schooling, work experience. Marital status can also be one of the variables included in Z_i in case marriage affects women's productivity, or there exists discrimination against young married women by individual firms. Moreover, Q_i is a vector of variables that affects the reservation wage of women. In addition to human capital (schooling, work experience), marital status, family composition (the number of children, living with elderly parents), age of children, and husband's income has a substantial impact on the reservation wage. Furthermore, E_m and E_r are representing random variations in W_m and W_r, and they are assumed to be normally distributed with zero mean and constant variance.

A woman decides to participate in the labor force if the offered market wage exceeds her reservation wage:

$$W_m > W_r$$

$$=> \quad Z_i * \delta + \varepsilon_m > Q_i * \rho + \varepsilon_r \qquad (5)$$

$$=> \quad Z_i * \delta - Q_i * \rho > \varepsilon_r - \varepsilon_m \qquad (6)$$

Since it is assumed that for $i = r, m,\ E(\varepsilon_i) = 0$ and $Var(\varepsilon_i) = constant,$ we can write $\varepsilon = \varepsilon_m - \varepsilon_r$ which is also normally distributed with $E(\varepsilon) = 0$ and $Var(\varepsilon) = \sigma$. Moreover, the probability of women's participation in the labor market is determined based on Z_i and Q_i. Then, rewriting (4):

$$\frac{(Z_i * \delta - Q_i * \rho)}{\sigma} > -\frac{\varepsilon}{\sigma}$$

replacing $\mu = Z_i * \delta - Q_i * \rho$, the above inequality becomes:

$$\frac{\mu}{\sigma} > -\frac{\varepsilon}{\sigma}$$

Assuming $\frac{\mu}{\sigma}$ is normally distributed, the probability that a woman works is given by:

$$P(LFP = 1|\,\mu) = P(-\tfrac{\varepsilon}{\sigma} < \tfrac{\mu}{\sigma}) = 1 - F(-\tfrac{\mu}{\sigma}) \qquad (2a)$$

, where F is the cumulative normal distribution function. Since the cumulative function is a non-decreasing function, the higher value of $\frac{\mu}{\sigma}$ implies the lower value of $F(-\frac{\mu}{\sigma})$ which in turn

implies the higher probability of participation. As we can see, Equation (2) is a specific case of Equation (2a).

4.2. The Endogeneity problem and Instrumental Variable approach

The explanatory variable's potential endogeneity due to its correlation with error term might give rise to biased estimates of the effect of those variables. T**able 9** displays the control variables used in the analysis with their likelihood of being exogenous or endogenous.

Table 9: The Control Variables and their likelihood of endogeneity

Explanatory variables	***Nature of variables***
Age	exogeneous
Schooling	Likely exogeneous
Child[15]	***Likely endogenous***
Marital Status	***Likely endogenous***
Type of place of residence: urban/rural	exogeneous

As also supported by the literature, marital status is more likely to be endogenous. The endogeneity of marital status can arise from the fact that marriage and LFP decisions of women are not independent. Moreover, the preference heterogeneity might also result in an endogeneity problem because women with stronger preferences for market work (such as having higher educational attainment) tend to have stronger than average preferences for postponing their marriages (to make their years spent in education worth). As mentioned earlier, I have two empirical objectives. The first one is to investigate whether marriage discourages young women's participation in the Azerbaijani labor market. For that, I estimate

[15] Child is also likely an endogenous variable. Nevertheless, it is tough to find an instrument for it, and the literature has put more focus on the endogeneity of marital status due to its importance.

Equation (1), where the marital status is a potential endogenous explanatory variable. To solve the endogeneity issue, I use the Instrumental Variable Approach, which is a powerful tool and frequently used in the recent literature for the endogeneity problem.

Nevertheless, it is quite tricky to find the appropriate instrument variable. Firstly, the candidate variable for IV should satisfy the instrument relevance and exogeneity assumptions. Considering Equation (1) (the central equation of the first objective), we can theoretically define IV as follows:

$$LFP = \boldsymbol{I}(\theta * marr + \sum_i X_i * \beta_i + u_i > 0) \qquad (1)$$

$$Marr = \boldsymbol{I}(z_i * \gamma + \sum_i X_i * \vartheta + \epsilon > 0) \qquad (7)\ ,$$

where z_i is an IV and should satisfy the following conditions:

Instrument Relevance: $Cov(z_i, marr) \neq 0$

Instrument Exogeneity: $Cov(z_i\ , u_i\ ) = 0$

In other words, the appropriate IV should directly affect marriage probability but not to the labor force participation probability directly. In this manner, following Francis (2005), I am using the sex ratio as IV for marriage probability. Francis defines the sex ratio as the number of men aged 15-39 as a percentage of women at the same age interval and uses the sex ratio in the region at the time women were at the age of 20 as an instrument for marriage probability. However, in the case of Azerbaijan considering the significant number of early marriages and very low probability of men's marrying before their 20s, I define the sex ratio as the number of men aged 20-39 as a percentage of women aged 15-39 in the region. The choice of sex ratio as an instrument is also applied very successfully by Lee (2008) in his analysis of the impacts

of marriage on the LFP of young women. Indeed, it is fair enough to assume that the sex ratio in the region affects the likelihood of a woman's marital status.

Moreover, it can also be assumed that the sex ratio affects LFP probability only through the marriage variable. In addition to sex ratio, Lee et al. (2008) use the unemployment rate among the population aged under 30 as the second instrument variable. It is supported by the fact that a higher unemployment rate among the young population might have a positive effect on women's marriage decision considering the unavailability of employment opportunities for focusing on their career development. Considering the differences in the economy of 9 regions, I also include the unemployment rate as a second instrument for adjusting marriage probability.

Secondly, it is crucial to have reliable and detailed data for instruments to get reliable estimations. The primary data source does not provide information on which specific city of an economic region a woman resides. Therefore, I referred to SSCA for only regional sex ratio data for each woman at the age of 20. Since women's age range from 25 to 39 and the survey was conducted in 2006, the regional sex ratio data is required for 1989-2001. The data provided by SSCA has a few years missing for some regions (especially for 1989-1994). I replaced those missing years with the closest available year's sex ratio value for the region.

In the same way, I obtained data for unemployment rates of the population under age 30 across regions for 1989-2001 from SSCA. I replaced missing values for some years in a region with the unemployment rate of the closest year in that region. Consequently, together with missing data problems, not having a city-level data for sex ratio and unemployment rate (neither city level microdata for women's demographic characteristics) classify those instruments bad for the analysis. In **Section 5.1.1**, I discuss the estimation results after applying the IV approach (**Table 11)** and the possible reasons for the failure of the approach in detail.

5. Estimation Results

5.1. The Results for the First Objective

Based on the discussions of the variables in Section **3.1** and **3.2**, I estimate Equation (1) by ignoring the potential endogeneity of marital status. **Table 10** presents the probit estimation for the sample of women aged 25-39 residing in 9 different regions of Azerbaijan in 2006 (using the same sample of women, **Table 11** shows the probit results after applying the IV approach for the endogenous marriage dummy). In **Table 10**, the reported estimated coefficients are marginal effects. The reason for displaying marginal effects is that the individual probit regression coefficients are not very useful for interpretation. **Table 10** presents 4 different models of Equation (1) where columns (3) and (4) include interaction terms. Columns (3) and (4) are useful to identify the effects of the explanatory variables on married and unmarried women separately in case the variables are expected to have different signs and sizes of effect on each group of women.

Nevertheless, Columns (3) and (4) show that the coefficients of the interacted terms, including marriage dummy, are not significant. Other variables such as Child and Rural also become insignificant when the interaction terms are added. It might be due to the small number of observations (i.e., the number of women equal to 3,047) in the dataset. So, adding interaction terms divide those observations into different clusters, and as a result, the number of observations in those clusters becomes much smaller. Hence, the probit estimation cannot provide significant results for the interacted variables.

In columns 1 and 2, the coefficient of age is positive, which implies that as age increases, the likelihood of LFP of a woman also increases. As discussed in Section **3.1**, it might be due to the fact that age is considered as a proxy for potential work experience, which in turn increases employment opportunities for older women. In Column (1), the marginal

coefficient of age 0.0081 implies that when all other variables (*schooling, child, marriage dummy, and rural*) are at their mean, 1-year positive deviation from mean age increases the LFP probability by about 0.8%. When other controls are added, the marginal effect of age on LFP probability decrease to 0.6% (Column 2). Moreover, in Columns (3) and (4), we can see the separate effect of age for married and unmarried women. Both coefficients of age are positive for both groups of women through the coefficient of interacted age term is not significant.

Secondly, schooling also has a positive influence on the LFP of women as expected. It is aligning with the fact that higher educational background makes women much attractive for employers and creates more employment opportunities for them. In Column 3, we can see the separate effect of schooling for married and never-married women. The coefficient of schooling is positive for never-married women, while it is negative for married ones. This negative impact might be due to the impacts of higher schooling on married women's reservation wages. Married women typically have higher reservation wages than unmarried ones due to household work and family care, and having more schooling makes that wage even higher. As a result, the offered wages by the employers do not compensate for their reservation wages, and they decide not to participate in the labor force. Nevertheless, the coefficients of interacted schooling terms are still significant in Column 3 and 4.

Table 10. Probit Estimation Results for LFP of women aged 25-39 before IV applied

N=3,047	***COLUMNS***			
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**
Age	0.0081*** (0.0017)	0.0059*** (0.0018)	0.0059* (0.0035)	0.0059* (0.0035)
Agexamarriage			0.0031 (0.0040)	0.0003 (0.0041)
Schooling	0.0461*** (0.0031)	0.0488*** (0.0032	0.0528*** (0.0069)	0.051*** (0.0072)
Schoolxmarriage			-0.0086 (0.0077)	-0.0023 (0.0080)
Marriagedummy	-0.2278*** (0.0237)	0.2070*** (0.0241)	-0.2269 (0.21393)	-0.2287 (0.2271)
Child		-0.0326*** (0.0098)		-0.0544 (0.0355)
Childxmarriage				0.0005 (0.0409)
Rural		0.0493*** (0.0151)		-0.0034 (0.0334)
Ruralxjmarriage				0.0681* (0.0391)

*Notes: (1) The reported coefficients are the marginal effects (2) "x" indicates interaction terms (3) Standard errors are in the parentheses. (4) *, **, *** shows the significance at levels 1%, 5%, 10%, respectively.*

Thirdly, the coefficient of marriage – the primary variable of interest for the first objective – is negative for all 4 models. The coefficient of -0.2278 in Column 1 implies that holding other variables (age and schooling) at their means, marriage decrease LFP of women by around 23%. When additional controls (child, urban) are included, the effect of marriage on LFP probability becomes about 21% (Column 2). Moreover, in Columns 3 and 4, the marginal coefficients of marital status are still negative, but not significant.

Moreover, the number of children aged under 5 seems to have a negative influence on the LFP of women as expected (Column 1). Due to the insignificance coefficients of CHILD variable in Column (4), the separate effects of CHILD on married and never-married women are not apparent. The positive coefficient of CHILD for married women might imply that those women have particular help from their family members (such as a husband, mother-in-law, sister-in-law) for their housework and family care. As a result, it gives married women an option to decrease their time spent at home because of family care and to participate in the labor force.

Furthermore, living in rural cities seems to have a positive influence on the LFP of all women. However, the decomposition of this effect for never married and currently married women in columns 3 and 4 implies that living in rural cities decreases the LFP probability of never married (the negative coefficient of RURAL). At the same time, it increases the LFP probability of married women. Although the coefficients are not significant, the signs of coefficients are expected based on the discussion of the type of residence factor in Section 3.1.

5.1.1. The Application and Possible Reasons for the failure of IV

Since I have a binary choice model (with the binary dependent variable of LFP) with a binary endogenous variable of marital status, I applied a two-stage instrumental variable method following Dubin and McFadden (1984). Based on it, I, firstly, estimated Equation (7) using the sex ratio and regional unemployment rate as two instruments along with some other exogenous

variables that affect women's marital status to get the fitted values of marriage probabilities. After obtaining the fitted marriage probabilities, I adjust them using linear probability equations for marriage by including its non-linear fitted probabilities (from the first probit regression) as an additional explanatory variable. The adjustment is crucial since the non-linear estimates from the first equation might result in inconsistent estimates of marital status if it is included as a regressor in the second equation without adjustment. After getting adjusted fitted marriage probabilities, I estimate Equation (1) *(second stage)* for this study's first objective. **Table 11** shows the estimation results for Equation (7) **(***first stage)* and Equation (1) *(second stage)*. Column (1) (the estimation results for the first stage) shows that the sex ratio instrument is not significant. It might be because the sex ratio variable contains regional sex ratio values. Because the sex ratio in a city rather than in a region is the main factor that affects the likelihood of marriage for women, it might not be a useful instrument for marriage. Moreover, the young population's regional unemployment rate (aged 15-30) seems to have a significant adverse effect on the marriage probability of a woman.

Table 11. Probit Estimation Results for LFP of women aged 25-39 after applying IV

N=3,047	***FIRST STAGE***	***SECOND STAGE***	
VARIABLES	**(1)**	**(2)**	**(3)**
Age	0.0120*** (0.0015)	0.0068** (0.0031)	0.0096 (0.0326)
Agexadjmarr			
Schooling	-0.0087*** (0.0028)	0.0446*** (0.0033)	0.1482*** (0.0367)
Schlxadjmarr			-0.1185*** (0.0435)
Adjmarriage		-0.3714*** (0.2119)	1.451 (1.227)
Child		-0.0516*** (0.0098)	-0.1953** (0.087)
Chilxadjmarr			0.1781* (0.1067)
Rural			0.1840 (0.1554)
Ruralxadjmarr			-0.1490 (0.1851)
Sex ratio	0.001 (0.0015)		
Unemployment under age 30	-0.015*** (0.0034)		

*Notes: (1) The reported coefficients are the marginal effects (2) "x" indicates interaction terms (3) Standard errors are in the parentheses. (4) *, **, *** shows the significance at levels 1%, 5%, 10%, respectively.*

Although it is not the effect we expected, it might be explained by the fact that regional unemployment rates are a more useful measure for men's employment. So, the higher unemployment rate among young males affects their marriage decision negatively, which in turn decrease the likelihood of young women to be married. Although Column (2) shows that the marginal coefficient of adjusted marriage variable is negative and significant, it becomes insignificant with the opposite sign in Column (3) after interaction terms are added.

5.2. The Results for the Second Objective

As per the second objective of the study, **Table 12** presents the estimation results for married women aged 20-49.[16] Firstly, the effect of age is positive as expected. As mentioned earlier, age is considered a proxy for potential work experience. Moreover, for middle-aged married women, this positive influence might be explained by the fact that aging decreases their reservation wage. As a result, they are more likely to be involved in lower salaried occupations, which are more accessible in all regions. The negative coefficient of age squared variable implies that the positive effect of age increase on the LFP of a woman has a decreasing trend (i.e., marginal effects of age follows concave curve).

Secondly, schooling seems to improve the LFP of married women. As discussed, it is considered a proper measurement for the human capital of a woman. The more human capital makes married women more attractive for the employees, which in turn creates more job opportunities for them.

Thirdly, the presence of a child aged 5 and under seems to have a negative effect on the LFP of married women. This significant effect also persists after adding the type of residence and marriage age dummies to the estimation. Therefore, having young children age 5 and under is a significant barrier for mothers who are willing to participate in the labor force.

[16] Since the focus group for the second objective of the study is married women, the endogeneity of marital status cannot be our concern; therefore, I do not have IV procedure in this section.

Table 12: Probit Estimation Results for the LFP of married women aged 20-49.

N=3,047	***COLUMNS***		
VARIABLES	**(1)**	**(2)**	**(3)**
Age	0.0231*** (0.0066)	0.0222*** (0.0066)	0.0219*** (0.0066)
Age-squared	-0.0002** (0.0001)	-0.0002** (0.0001)	-0.0002** (0.000)
Schooling	0.0387*** (0.0022)	0.0394*** (0.0023)	0.0388*** (0.0024)
Child (<5)	-0.0297** (0.0131)	-0.0326** (0.0131)	-0.0326** (0.0131)
Age at first marriage		-0.0189* (0.0118)	-0.0196* (0.01177)
Rural		0.0318*** (0.0112)	0.0358*** (0.0116)
Regional unemployment			-0.0029 (0.00264)

*Notes: (1) The reported coefficients are the marginal effects (2) Standard errors are in the parentheses. (3) *, **, *** shows the significance at levels 1%, 5%, 10%, respectively.*

Moreover, getting married before age 20 seems to have a negative impact on the LFP of married women. It supports the discussion in Section 3.2 based on **Tables 5** and **6**. So, early marriage (before age 20) is likely to decrease LFP of married women because women married before age 20 have typically incomplete primary or secondary education and dedicate most of their time for housework and family care.

Another satisfying result is the significant impact of residence type on the LFP of married women. Since in residence dummy variable "rural" is equal to 1 and "urban" to 0, the positive influence of the variable implies that in rural regions, the married women are more likely to be in the labor force. It might be because, in urban cities, the size of firms (especially the private ones) is large compared to that in rural ones. While large firms prefer young unmarried women to married ones, that is not the case in rural regions. Moreover, in rural regions, there are more agricultural jobs compared to urban cities, which prefer married women, possibly because of the low reservation wage that those women have.

In terms of controlling local labor market conditions, I added the regional unemployment rate as an additional regressor. The negative coefficient implies that the regional unemployment rate has a negative influence on the LFP of married women. However, the marginal coefficient is not significant. Firstly, it might be due to the small variation in the regional unemployment variable (since there are only 9 economic regions, there are 8 different values of the unemployment rate). Secondly, the regional rates are not very accurate measurements since they do not capture the dynamics of the labor market conditions inside a region (across cities of a region). Regional rates might be necessary for women's labor supply decisions considering that a married woman might be employed in another city than the one she has been residing or a woman move to another city due to marrying a man from another city in the same or different region. Nevertheless, these cases constitute a small portion of the population, so the unemployment rates across cities of the region are crucial for better estimations.

6. Conclusion

Applying a probit-model framework, this study first empirically examines the effect of marital status on the probability of LFP among young women aged 25-39 in Azerbaijan. The results of the examination show that married women are 22-24% less likely to participate in the labor force than unmarried women. The empirical results also reveal that schooling and type of residence (urban versus rural) have an opposite effect on the LFP of married and never-married women. So, having more schooling and living in urban places seem to increase the likelihood of young never-married women, while those factors have a negative influence on young married women (**Table 10**).

Secondly, the study analyzes the main determinants of LFP for married women aged 20-49 in Azerbaijan using a probit-model estimation. In this manner, age and schooling have a positive impact on the LFP of married women. The results also show that childbearing is a big obstacle for LFP and the career development of married women (Refer to **Table 12)**. Furthermore, getting married before age 20 decreases women's likelihood of participating in the labor force.

Based on the aforementioned empirical results, several policy implications can be inferred. Firstly, marriage and childbearing (children with pre-school age) create a huge obstacle for married women's LFP. The lack of low cost and good quality public childcare services in Azerbaijan prevents women from continuing to participate in the labor market after childbirth. Therefore, the government can intervene by providing access to low-cost public childcare services to stimulate the LFP of married women.

Moreover, the results yield that married women are less likely to be employed in urban places compared to never-married women. The negative effect of living in urban places on the LFP of married women may reflect large private firms' reluctance to hire married women. Hence, flexible employment contracts and legal enforcement might be useful for married women living in urban places to continue their participation in the labor force.

Apart from the factors discussed above, a woman's own and her husband's occupations, the employment share of specific occupations in a region are also crucial indicators of LFP for married women (Lee et al. 2008). In Azerbaijan, married women are largely confined to work in the public, educational, and medical sectors due to the low discrimination against women in those institutions. Therefore, it would be interesting to consider the impact of those factors on the LFP of married women for further investigation.

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