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10 January 2016

Online at <https://mpra.ub.uni-muenchen.de/77140/>

MPRA Paper No. 77140, posted 27 Feb 2017 09:40 UTC

**Education and Labor Force Participation of Women in North Cyprus: Evidence from
Binomial Logit Regression Model**

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Abstract

This study investigates not only the role of education but also identifies the extent to which educational profile of women could explain their Labor Force Participation (LFP) in North Cyprus. Using a cross-sectional data on Household Survey 2011 by the North Cyprus State Planning Organization, our binomial logit regression result suggests that education is significant in explaining the likelihood of women to participate in the labor force in North Cyprus. The result also shows that residence and age of women significantly affect their labor force participation. While places of residence negatively affect LFP of women, age increases their LFP up to a given level, after which their participation would begin to decline. This validates the inverse U-shaped pattern of LFP of women in North Cyprus. More so, a strong evidence emerges that marital status, non-market income and family size negatively affect LFP of women in North Cyprus.

Keywords: Education, Labor Force Participation, Binomial Logit Regression, Women,

JEL CODES: J21, J22

1.0 Introduction

One of the most serious issues that have attracted global attention today is the low Labor Force Participation (LFP) of women. The participation of women in the paid jobs has been very low especially in the developing countries. The UNDP statistics for 2001 shows that there were 68 women per 100 men participating in the world labor force. This was attributed to a host of factors such as cultural and traditional beliefs of society, educational background, age, marital status, residence etc. (Güven-Lizaniler and Bhatti, 2005; Blau and Kahn, 2007; Ackah *et al.* 2009; Mujahid 2014). In North-Cyprus, statistics have shown that the LFP of women is considerably very low. According to TCUWA (2001), the LFP of women in North-Cyprus in 2001 was 40% which perhaps lower than the world average of 55.2 by UNDP (2003:325). Similarly, the recent statistics on the Household Employment Survey (2014) reveals that out of the women's total population of 117468, only 35.5% participated in the labor market compared with about 61.0% of the total population of 119675 for men. This implies that the labor force participation of women in North Cyprus is still remained substantially low. More so, there are distinct differences in the kinds of occupation both women and men do. Women tend to be largely engaged in administrative, clerical, teaching, personal services and sales jobs. Whereas, jobs in medicine and surgery, law, engineering, accountancy, ICT etc. have been dominated by men (SPO, 2014).

Theoretically, the LFP of women is apparently affected by their own wage and their non-market income wage (i.e. the wage of their spouses). This means that as women productivity increases as their educational profile increases and their non-market income wage shrinks (Blau and Kahn, 2007, Sashardes and Polycarpou 2010, Mujahid 2014, Nagac and Nuhu, 2016). A large body of empirical evidence have emerged across the world and the results provided are

quiet interesting. In the case of North Cyprus, empirical studies on the LFP of women started coming to the limelight in the new millennium with the scholarly works of Guven-Lisaniler and Ugural (2001), Aldemir (2002), Guven-Lisaniler (2003), Bhatti (2004), Guven-Lisaniler and Bhatti (2005), Ugural *et al.* (2008). Predictably, there is still the need not only to examine the role of education in the determination of labor force participation of women but also to identify the extent to which different educational categories could explain the LFP of women in North Cyprus. Therefore, the study sets to address the following issues:

- (i) To shed new lights on the relationship between education and labor force participation of women in North Cyprus
- (ii) To examine the role of different educational categories of women in explaining their labor force participation in North Cyprus
- (iii) To determine the evidence of U-Shaped pattern of labor force participation in North Cyprus.

In addition to re-examining the role of education in the labor force participation of women, this study disaggregated the sample across educational categories in our models with the aim of analyzing the impacts of each educational category on the labor force participation of women while still controlling for the independent variables. To achieve the stated objectives, the paper has been structured into the following sections. Section one is the introduction. Section two basically reviews the theoretical and empirical literature. It briefly describes some stylized facts about the participation of women in North Cyprus's labor market. Section three states clearly the methodology and data for analysis. Section four analyzes the results while section five summarizes and makes concluding remarks.

2.0 Theoretical Framework and Empirical Literature

The theoretical underpinning the LFP of workers is based on the neoclassical theories of allocation of time and human capital investment advocated by Becker (1957) and Mincer (1958). These theories clearly explain how increased in educational level increases the wage rate thereby affecting the LFP. Specifically, the time allocation theory explains from the angle that individual preferences play a central role in the determination of labor force participation. As worker's income effectively increases, he/she demands more leisure and supplies fewer labor hours if leisure is a normal good. If wage rate changes, for example it rises, a worker would increase the work hours and reduce leisure hours. On the other hand, the human capital investment theory emphasizes how resources invested on individuals (education) increases their future productivities and earnings. This high earning tends to increase LFP.

A large amount of empirical studies have used the neoclassical theories to explain the determinants of LFP of women; the results have provided interesting accounts. For example, Guven-Lisaniler (2003) assesses the status of women as a step towards equality by focusing on the condition of gender inequality in education and economic life. The result shows that unequal distribution of unpaid work in the family, earning differentials, occupational segregation, attitudes towards working with women and gender gap in education are the systemic factors that have undermined the participation of women in labor force. Bhatti (2004) in her own empirical study, examines gender (in)equality in North-Cyprus labor market among the European Union member and candidate countries. She found that the lower participation of women are due to lower earnings of women, gender occupational segregation, gender gap in education, gender division of labor within the family, lack of care facilities for children and elders, and the negative perceptions on the impact of women in the family life and children's education. In a more recent

study, Guven-lisaniler and Bhatti (2005) examine the determinants of female labor force participation in North-Cyprus using a survey data from TCUWA (2001). The result suggests that women's education is the main factor increasing the likelihood of women participation in labor market. The result also provides evidence that age and residence of women have significant effect on their labor supply.

There are also evidences on the determinants of women's LFP across other countries. Pashardes and Polycarpou (2010) examine the labor supply function for males and females in Cyprus, drawing their data from the 2007 EU-SILC database. The results showed that labor supply is relatively more responsive to wage changes among women especially among those with young children, and persons between 55-64 age groups. Their results also revealed that the total (income and substitution) effect of a wage rate increase on labor supply is negative for men and positive for women. This means that in-work benefits to women can increase working hours, while the opposite hold for men. Similarly, Mujahid (2014) examines the determinants of both personal and household of female labor supply in Pakistan. He employs probit model and cross sectional data on females between the ages of 10 – 65 drawn from labor force survey for the year 2005/2006. The finding shows that woman with higher education are more likely to participate and involve in the productive activities. Thus, the probability of participation increases substantially with the increase in the levels of education. Also, age and experience of women have a sizeable impact on the decision to participate in labor market.

Nagac and Nuhu (2016) recently investigate the role of education on the labor force participation of females in Nigeria. Using the general household survey of 2013 from National Bureau of Statistics, the result of the logit model employed shows that the effect of education on female labor force participation increases up to high school but then decreases with a higher

education degree. Likewise, Nwaka, et al. (2016) investigate the gender wage differences in self- and paid- employment in Nigeria with respect to the effect of marriage and children. Among the findings is the fact that there is a wage penalty for married women with children in the paid employment. More so, motherhood is also negatively associated with income levels for self-employed women. These fact could account for low participation of women in the labor market.

3. Some Stylized facts about Labor Force Participation of Women in North Cyprus

North Cyprus is a small secular island located in the Eastern Mediterranean Sea with a total population of 289,252 as revealed by the 2014 Household Survey by the State Planning Organization. According to this survey, the labor force was 112,468 which constituted 48.6 percent of the total population. The number of employed labor was 103,149 while the number of unemployed labor was amount to 9,321 (8.3%). The population not in the labor force was 118,956 whereas the population of under-15 who are not in the labor force was 57,828.

It is worthy of note that the turn up of women in the labor market has been so low and decreasing in North Cyprus. In 1996, the labor force participation of women was 34%. It rose to 40% in 2001 and declined to 35.4% in 2014. If these statistics are compared with their men counterparts whose labor force participation was 66% in 1996, 60% in 2001 and 61.6% in 2014, one would understand that the dramatic growth in the labor force participation of women in the recent times around the world has no effect in the North-Cyprus. A significant number of women employed are concentrated in the jobs that are classified as “jobs for women” and these jobs are mostly found in service sector which are low productive, low paid and low ranked (Güven-Lisaniler, 2003). As Aldemir, (2002) notes, about 30.6% of the women work as clerical and related workers while 44.2 % of men work in non-agricultural production, transport equipment

operators and laborers. Furthermore, the unemployment rate of women has been very high even though skills of women have been increasing compared to the men. In 2004, about 6.9% of women population of labor force had no any diploma. This declined to 3.8% in 2014 compared to men who stood at 4.7% in 2004 and 3.7% in 2014. Similarly, for high level of education, it is noticeable that women improved significantly between 2004 and 2014. In high school, faculty or higher education and master, doctorate, there is evidence that the rates increased from 38.9%, 23.8% and 3.0% in 2004 to 34.5%, 34.2% and 4.4% in 2014 for women and 31.7%, 16.5% and 2.0% in 2004 to 31.4%, 23.9% and 2.6% for male in 2014. Despite this improvement in education level which, according to Guven-lisaniler and Bhatti (2005), is one of the main determinants of labor force participation of women in North Cyprus, the rate of unemployment of women stood at 12.8% which was high than 5.8% for men in 2014.

4. Data and Methodology

This study uses data on the Household Employment Survey 2014 collected by the State Planning Organization of the Turkish Republic of North Cyprus. This survey includes citizens between the ages of 15-65 (work force) selected from all the district areas, namely; Lefkosa, Gazimagusa, Girne, Guzelyurt and Iskele. The terminal date 2014 is chosen because the data for the study are available only up to 2014.

In order to achieve the objectives of this study, following the empirical work of Guven-Lizaniler and Bhatti (2005), we use binomial logit regression models. This is because our dependent variable, (LFP) is measured via binary numbers. Using OLS may not be a good estimate as it causes some problems in a probabilistic model such as the estimated probabilities being greater than one or less than zero, non-normally distributed of error terms, heteroscedastic

or variance of error terms (Stock and Watson, 2015). Therefore, the binomial logit regression model used is stated as follows:

$$\Pr(LFP = 1 | X_1, X_2) = \Phi(\beta_0 + \beta_1 Educ + \beta_2 Age + \beta_3 MStatus + \beta_4 Resdet + \beta_5 Nonmktincm + \beta_6 Famsize + \mu) \quad (1)$$

Where:

LFP = Labor Force Participation (LFP) is measured via dummy variable by taking the value of 1 if the respondent is participating in the labor force and 0 if otherwise.

Educ = Education is measured by categorizing it into four levels, namely; Primary, Secondary Tertiary and None. The ‘none’ implies those without formal education. They are included in the model as omitted variable. The reason for categorizing education is to prevent error in measurement and help to identify how different educational categories affect LFP of women. All the categories of education are expected to have positive relationship with the LFP, meaning as women educational profile increases, their wage rate increases thereby increasing their LFP.

Age = Age is measured by the age of labor in force North Cyprus, i.e. 15 – 65 years. In our models, age is not categorized into different groups since the main emphasis is on how educational categories affect LFP of women. This is expected to have a positive relationship with the labor force participation of women based on the a-priori expectation. Age squared (Age^2) is included in the models so as to determine whether there is an evidence of inverse “U shaped” pattern for North Cyprus. Theoretically, age^2 is expected to have a negative relationship with labor force participation of women.

Marital Status = This is measured by taking the value 1 if an individual is married and 0 if otherwise. It is expected to have a negative relationship with labor force participation of women.

Residence = Residence is measured by considering individuals from the five districts in North-Cyprus, namely, Lefkosa, Famagusta, Girne, Guzelyurt, and Iskele. However, Lefkosa district is an omitted variable in the model.

Non-Market Income and Family Size = Non-market income is measured directly measured by the family income, while family size is measured by the number of children by the households. These are expected to have a negative effect on labor force participation of women.

μ = Error term (assumed to have zero mean and independent across time period).

Finally, we disaggregated the sample across education categories in our models with the aim of analyzing the impacts of each category on labor force participation of women while still controlling for the independent variables.

5. Empirical Results and Discussions

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Primary	3127	.2878158	.4528172	0	1
Secondary	3127	.4659418	.4989185	0	1
Tertiary	3127	.1742885	.379418	0	1
None-Educ	3127	.0719539	.258453	0	1
Age	3127	38.51327	13.78033	15	65
Family size	3127	.7134634	.9533695	0	6
NonMketIncm	3127	1361.592	1536	0	14000
Lefkosa	3127	.3057243	.4607872	0	1
Famagusta	3127	.2334506	.4230941	0	1
Girne	3127	.2088264	.4065351	0	1
Guzelyurt	3127	.123441	.3289953	0	1
Iskele	3127	.1285577	.3347633	0	1
Marital Status	3127	.3066837	.4611907	0	1
Labor force	3127	.6933163	.4611907	0	1

Source: Output computed by the authors, STATA 12.0

Table 1 shows the descriptive statistics of all the variables that are used in this study. From this table, it is clear that the proportion of women with secondary education is higher compared to other educational categories. More so, the average age in the sample is 39 years. The family size tends towards one, which implies that at least every household is represented by one person. The nonmarket income measured by family income is averaged 1361.59 Turkish Lira per household. In the sample size of 3127 selected from the five districts in North Cyprus, about 31% (969.4) is drawn from Lefkosa, 23% (719.2) from Famagusta, 21% (656.7) from Girne, 12% (375.2) from Guzelyurt and 13% (406.5) from Iskele. There is also evidence that about 31% of the women selected in the sample are married while the total percentage of women in the labor force is about 69%.

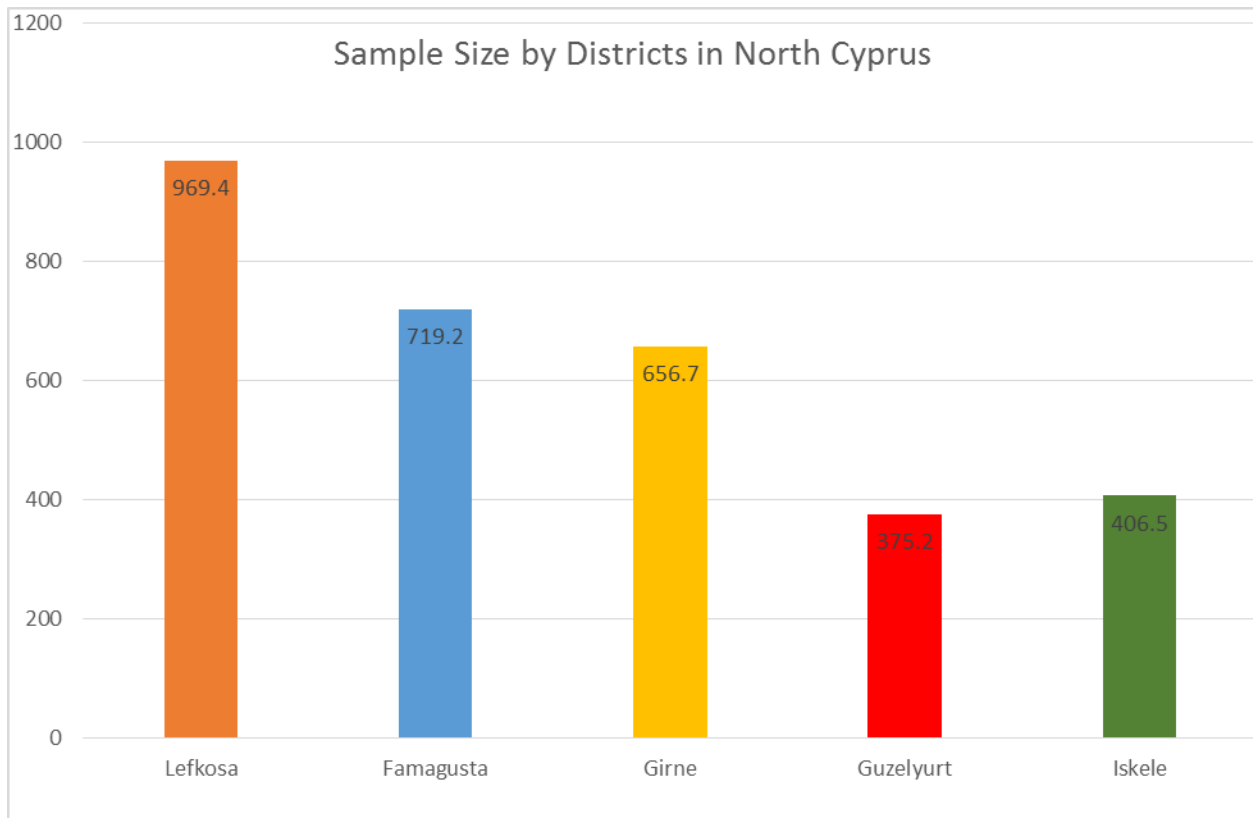


Fig: 5.1

Table 2: Result of the Binomial Logit Regression

Variables	(1) All	(2) Primary	(3) Secondary	(4) Tertiary	(5) None
Primary	0.246** (0.123)				
Secondary	0.572*** (0.120)				
Tertiary	1.474*** (0.130)				
Age	0.217*** (0.0135)	0.147*** (0.0229)	0.300*** (0.0248)	0.329*** (0.0426)	0.0891* (0.0491)
Age ²	-0.00276*** (0.000166)	-0.00193*** (0.000265)	-0.00431*** (0.000329)	-0.00377*** (0.000519)	-0.00114** (0.000493)
Mstatus	-0.0643 (0.0703)	-0.182 (0.142)	-0.0682 (0.103)	-0.251 (0.157)	0.409 (0.316)
Famagusta	-0.274*** (0.0697)	-0.0870 (0.140)	-0.294*** (0.0996)	-0.469*** (0.166)	-0.677** (0.332)
Girne	-0.0478 (0.0699)	0.126 (0.145)	-0.117 (0.0992)	-0.223 (0.162)	0.0750 (0.313)
Guzelyurt	-0.235*** (0.0862)	-0.00592 (0.157)	-0.359*** (0.132)	-0.372* (0.206)	-0.515 (0.365)
Iskele	-0.356*** (0.0878)	-0.211 (0.160)	-0.371*** (0.135)	-0.326 (0.231)	-0.716** (0.341)
Husinm	-0.0000199 (0.0000172)	-0.0000151 (0.0000383)	8.76e-07 (0.0000247)	0.0000876** (0.0000378)	-0.0000301 (0.0000896)
Famsize	-0.0449 (0.0311)	-0.0682 (0.0553)	-0.153*** (0.0493)	0.0753 (0.1000)	0.0507 (0.113)
Constant	-4.661*** (0.270)	-3.026*** (0.465)	-5.739*** (0.409)	-4.641*** (0.761)	-2.744** (1.197)
Observations	3,127	1,137	1,505	557	435
Adjusted R2	0.2597	0.1334	0.2276	0.1679	0.1775
LR Chi2 (12)	1141.15	134.30	314.64	123.89	47.28
Log Likelihood	-1626.6555	-436.18817	-779.52163	-287.0384	-80.245293

Standard errors in parentheses

Source: Binomial Regression Outputs, STATA 12.0;

Significant at *** p<0.01, ** p<0.05, * p<0.1

From table 2, the result suggests that education is a significant factor in explaining the labor force participation of women in North Cyprus. Specifically, all the educational categories are positive and significant. This implies that as the total number of women who have completed

their primary, secondary and tertiary education increases there is a likelihood that women's labor force participation will increase. Furthermore, the result of the disaggregated models indicates that the participation of women in labor force is higher with tertiary education than other categories of educational profiles. This suggests that the labor force participation of women depends on their educational profile. Therefore, the result concurs with the findings of Blau and Kahn (2007); Ackah et al. (2009); Mujahid (2014) and Nagac and Nuhu (2016) which all hinged on the human capital theory which suggests that the worker's wage depends on the educational profile, and hence woman with high education tends to increase her participation in labor force.

From the control variables included, it is clear that age is positive and significant in all the models. This means that the result conforms to the a-priori expectation. It therefore suggests that as age increases, the probability of labor force participation among women increases. This result supports the finding of Guven-Lizaniler and Bhatti (2005). However, after controlling a squared term of age, the result shows in all the models that as age increases, the LFP of women increases up to a given level, after which, the LFP would begin to decline. This accounts for the "U-Shaped" pattern of labor force participation of women in North Cyprus. Furthermore, there is evidence from our result that residence could explain the LFP of women. While Lefkosa is considered as omitted variable among the five districts used as proxy for residence, the result suggests that the LFP of women who are living in Famagusta, Guzelyurt, and Iskele are likely to decrease significantly irrespective of their educational levels except those in Girne which is not significant and also positive at primary and none educational levels. Interestingly, the marital status and family size are negatively affecting women's LFP. This implies that women prefer to stay with their family and therefore engage themselves in the non-market activities such as domestic activities. This finding supports the neoclassical theory of allocation of time Guven-

Lisaniler and Bhatti (2005) and Blau and Kahn (2007). Finally, non-market income is negatively affecting LFP of women in North Cyprus. The plausible explanation for this finding is based on the income effect of the neoclassical theory that an individual would reduce labor supply if non-market income increases and vice versa.

The Pseudo (R^2) results show that the regressors in each of the models explain a good percent of the systematic variations in the labor force participation of women in North Cyprus in 2011. Interestingly, the value of LR Chi^2 which is the measure of the overall significance of the estimated models can easily pass through one level of significance test in all the models.

6. Concluding remarks

The broad objective of this paper is not only to examine whether education is a determinant of labor force participation of women but also to identify the extent to which different educational profiles could explain the LFP of women in North Cyprus. In summary, our results suggest strong evidence in support of the human capital theory that women LFP depends on their educational profile. As the level of education increases, the participation of women in the labor market increases. More so, age could explain the LFP of women up to a certain level, after which the participation of women in the labor force begins to decline. This confirms the U-shaped pattern of LFP of women in North Cyprus. Furthermore, the empirical evidence provide us with information that residence has insignificant negative relationship with LFP of women except in Girne which is positive but yet insignificant. Interestingly, the marital status, non-market income and family size have a negative and insignificant effect on women LFP. This implies that as these control variables increase, the labor force participation of women would begin to decline and vice versa.

Therefore, it is pertinent and unequivocal to conclude that, since women tend to increase their labor force participation as education level increases in North Cyprus, government policies and programs should tend towards encouraging female education as a surest way of bridging the occupational gap between male and female. More so, even though education tends to increase LFP of women, there is still the need to maintain the keen love and care owed by the women to their families as homemakers and caretakers.

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