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The Unemployment Rate and Labor Force Participation Rate Nexus for Female: Evidence from Turkey

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Abstract

This paper investigates the relationship between unemployment rate and labor force participation rate for urban women in Turkey. By conducting our cointegration analysis on the aggregate and education-specific data, we find that there is a long-run relationship between the two variables for better-educated urban women, but not for total and less-educated urban women. Thus, our analysis reveals no evidence that high unemployment rate is a main driving force behind both the puzzle of low female labor force participation and the under-participation trap. Long-run estimates for better-educated urban women show that a 1% increase in unemployment rate causes an increase in labor force participation rate between of 0.64% and 0.74%. The finding implies that there exists the added-worker effect for better-educated female in urban areas. Furthermore, the results of tests on causality show evidence of both short- and long-run unidirectional causality running from unemployment rate to labor force participation rate, but not vice versa.

Keywords: unemployment, female labor force participation, cointegration, discouraged-worker effect, added-worker effect, under-participation trap, causality

1. Introduction

The responsiveness of the labor force participation to changes in unemployment has been questioned both theoretical and empirical literature during the last decades. In the theoretical literature, there are two hypotheses regarding how labor force responds to fluctuations the degree of labor market slack measured unemployment rate (Note 1). First, the discouraged-worker hypothesis suggests that a large degree of labor market slack, a high unemployment, leads workers to withdraw from labor force. According to this hypothesis, the workers give up the labor force during the periods of a large degree of labor market slack or a high unemployment because of low possibility of finding a satisfactory job and lower potential wages that they face. Thus, this hypothesis implies that there is a negative correlation between unemployment rate and labor force participation rate. Second, the added-worker hypothesis argues that secondary workers will enter the labor force to compensate reductions in family income when unemployment rate increases. With regard to this hypothesis, the secondary workers join the labor force during the periods of high unemployment because the main breadwinner may face a wage cut or lose the job in the periods. Hence, the hypothesis suggests that labor force participation rate increases as unemployment rate rises.

There has been a growing empirical literature that focuses on the relationship between unemployment rate and labor force participation rate within macroeconometrics framework. In the pioneering empirical study, Österholm (2010) adopts Johansen cointegration approach as empirical methodology to examine this linkage for Sweden. The author uses both aggregated and gender-specific data, and reaches the conclusion supporting discouraged-worker effect. Emerson (2011) and Kakinaka and Miyamoto (2012) also study this relationship between the variables within the same methodological framework for United States and Japan, respectively. Like Österholm (2010), using aggregated and gender-disaggregated data, Emerson (2011) finds discouraged-worker effect in the United States. Kakinaka and Miyamoto (2012) differ from the two studies by considering age-specific data as well as aggregated and gender-specific data. They conclude discouraged-worker effect for middle-aged and old male groups, and added-worker effect for young male. Hence, their results imply that fluctuations in unemployment rate differently affect labor force participation decision of different age groups. Apart from the three studies, there are some researches adopting different methodological tools such as a threshold cointegration analysis, an unobserved-components model and panel cointegration analysis. For example, Congregado, Golpe, and Van Stel (2011) and Fuchs and Weber (2013) employ different time series techniques. Former study examines the two hypotheses by using a threshold cointegration analysis in Spain while later study employs an unobserved-components model to examine the hypotheses for Germany. Furthermore, Filatriau and Reynes (2012) and Özerkek (2013) investigate the linkage between labor force participation and unemployment within panel cointegration framework for OECD and European countries.

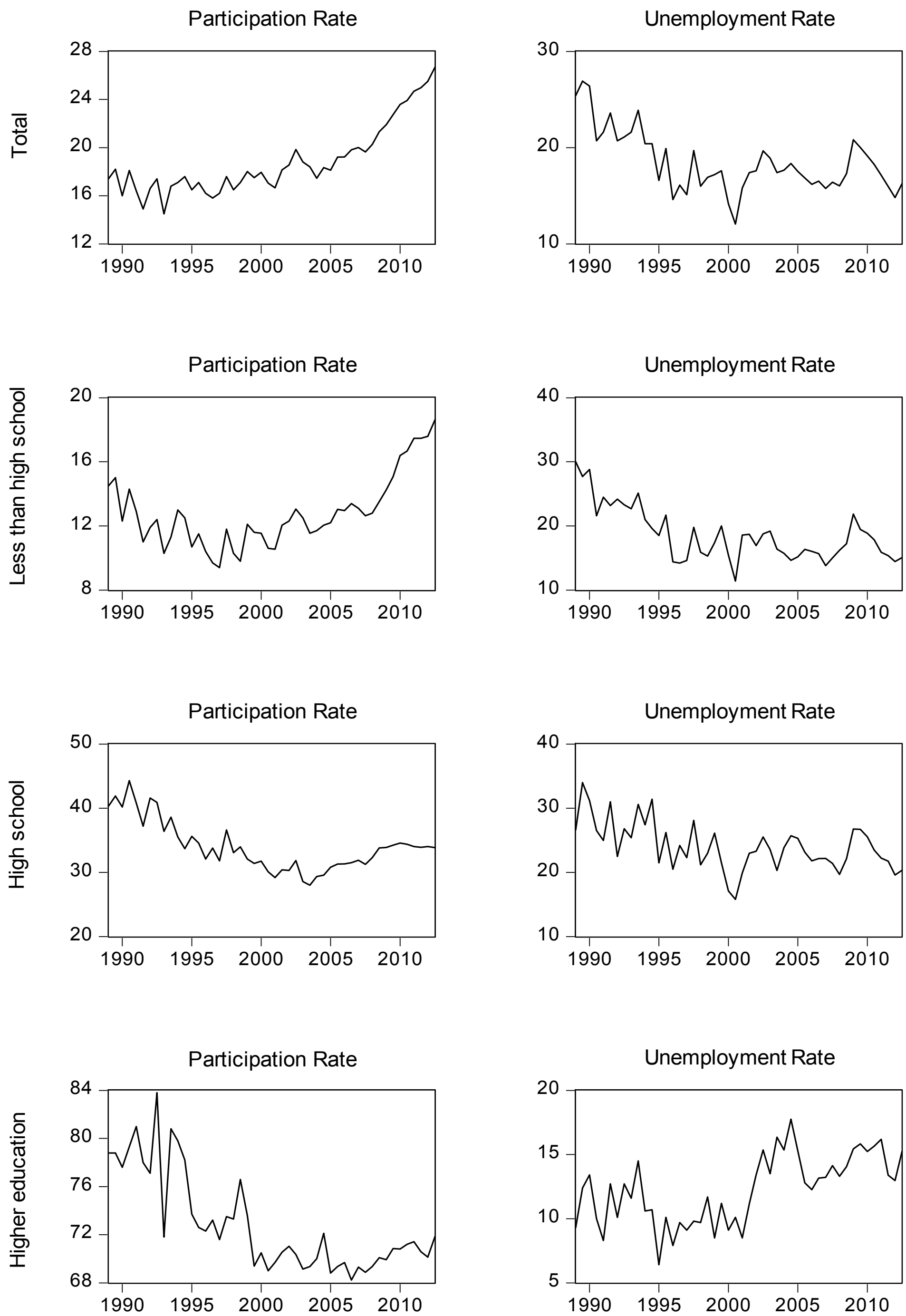

Figure 1. Unemployment and labor force participation rates for female in the urban areas

Severely low and decreasing female labor force participation in urban areas in Turkey is one of the most important problems that Turkish policy makers have faced. The lower labor force participation rates of women have primarily stemmed from considerable low participation rates among less-educated women, which comprise a substantial part of female labor force in the urban areas. Therefore, the poorly educated urban women are more likely to face an under-participation trap (Note 2). However, participation rates among better-educated urban women are relatively high (See Figure 1). This pattern of female labor force participation in Turkey indicates that there is a strong positive correlation between education level and female labor force participation. Consistent with Turkish female labor force participation data, Tansel (2002) and Kıral and Şengül (2013) find that education has a substantial positive impact on female labor force participation.

The low female labor force participation rates have distorted not only the Turkish labor market efficiency by weakening employment generation capacity, but also growth performance by affecting negatively national saving rate (Note 3). Hence, the question what are the factors that lead to this problem is crucial for policy makers, researchers and labor economists. In previous empirical studies on Turkish female labor force participation rates, the problem have been associated with various factors, including social and cultural factors, early retirement, childcare, migration, civil status, education, wage levels and business cycle (Note 4). However, there are very little empirical studies on the relationship between unemployment rate and female labor force participation rates (Note 5). This paper aims to fulfill this gap in light of the main literature presented above. We focus mainly on whether the puzzle of low female labor force participation in the urban areas stems from the discouraged-worker effect triggered high unemployment rate. We consider education-specific data as well as aggregated data as the literature indicates that the link between unemployment rate and labor force participation rate may be different for women with different levels of education. Disaggregating by education level also enables us to examine whether the under-participation trap is associated with high unemployment rate.

The remainder of this paper is organized as follows. Section 2 delineates the data and discusses the empirical analysis and findings, and section 3 concludes the paper.

2. Data and Empirical Analysis

We employ semi-annual data on unemployment (u_t) and labor force participation (p_t) for urban women, whose ages are 15 and over. Aside from the aggregate data, we also use education-specific data (Note 6) to analyze the impact of education level on the relationship between u_t and p_t. Thus, we divide female into two groups: less-educated female and better-educated female. The first group includes female with less than a high school education and a high school education while the second group includes female with a higher education. The variables come from Turkish Statistical Institutes (TUIK) and cover the period 1989:S1-2012:S2 (Note 7). Figure 1 shows time series plot of the variables.

2.1 Unit Root Tests

Although the main literature generally adopts a system-based cointegration test, we use a single equation cointegration test (Autoregressive Distributed Lag (ARDL) bounds testing approach) to examine whether there exist cointegration as our sample size is small. The ARDL bounds testing approach does not necessitate pretesting the variables to determine their order of integration. However, to identify robustness of our results, the orders of integration of variables are determined by using two conventional unit root tests: Augmented Dickey-Fuller and Phillips-Perron tests. Table 1 presents the results from the unit root tests. The two unit root tests confirm that the variables are non-stationary, but their first differences are stationary.

Table 1. Unit root tests

	Total		**Less-Educated Female**				**Better-Educated Female**	
			Less than a High School		**High School**		**Higher Education**	
Test Stat.	p_t	u_t	p_t	u_t	p_t	u_t	p_t	u_t
ADF stat.	1.55 (2)	1.67 (1)	2.61 (0)	2.63 (0)	2.10 (1)	2.14 (3)	2.53 (0)	1.65 (2)
PP stat.	2.30 (2)	2.37 (1)	2.52 (1)	2.63 (0)	2.17 (2)	3.43** (3)	2.21 (2)	2.68 (2)
	Δp_t	Δu_t	Δp_t	Δu_t	Δp_t	Δu_t	Δp_t	Δu_t
ADF stat.	7.62*(1)	5.37*(2)	8.90* (0)	5.70* (0)	10.96* (0)	6.23* (2)	10.87* (0)	4.80* (2)
PP stat.	10.79*(1)	10.67*(2)	8.90* (0)	11.9* (2)	9.92* (1)	22.11* (2)	9.82* (1)	10.70* (2)

Note. ADF and PP test equations include deterministic term (constant). Figures in parenthesis are lag lengths selected by AIC. ADF and PP critical values at 1% and 5%, respectively, are 3.70, 2.92 and 3.57, 2.92. *, ** denote statistical significance at 1% and 5%, respectively.

2.2 Cointegration

To implement the bounds test, we estimate the following unrestricted error correction model (UECM).

$$\Delta p_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{k} b_{1i} \Delta p_{t-i} + \sum_{i=0}^{k} b_{2i} \Delta u_{t-i} + b_3 p_{t-1} + b_4 u_{t-1} + \varepsilon_t \quad (1)$$

The ARDL method of cointegration analysis includes two-step procedures. First step entails determining lag length of the unrestricted error correction model and testing null hypothesis of no-cointegration H_0: $b_3 = b_4 = 0$ by F test. Peseran, Shin and Smith (2001) report two sets of critical values (CVs) for the F test with and without time trend. Nonetheless, the critical values are not suitable for a small sample size because they are generated from a large sample size. Therefore, we consider critical values documented by Narayan (2005) for small sample size. Comparing the calculated F statistic with the respective critical values can be made decision on cointegration among the variables. If the F statistic is higher than upper bound critical value, there exists a long-run relationship. Second step requires determining lag length of ARDL model and estimating long-run coefficients, respectively.

Table 2. Statistics for selecting lag length in bounds tests equation with constant and trend

Total						
p	AIC	SBC	$\chi_{SC}^{(1)}$	p-val	$\chi_{SC}^{(2)}$	p-val
1	2.941	**3.138**	5.802	0.016	7.909	0.019
2	2.900	3.178	0.076	0.781	5.566	0.061
Less than a High School Education						
p	AIC	SBC	$\chi_{SC}^{(1)}$	p-val	$\chi_{SC}^{(2)}$	p-val
1	2.860	**3.057**	3.038	0.081	6.867	0.032
2	2.874	3.153	0.903	0.341	9.445	0.008
High School Education						
p	AIC	SBC	$\chi_{SC}^{(1)}$	p-val	$\chi_{SC}^{(2)}$	p-val
1	4.264	4.461	8.096	0.004	14.104	0.0009
2	4.100	**4.378**	0.030	0.861	7.298	0.026
Higher Education						
p	AIC	SBC	$\chi_{SC}^{(1)}$	p-val	$\chi_{SC}^{(2)}$	p-val
1	4.700	**4.897**	4.673	0.030	8.787	0.012
2	4.654	4.932	0.303	0.581	1.304	0.520

The long-run relationship between labor force participation and unemployment is analyzed by the bounds testing approach. First, we select lag length of the UECM by considering Schwarz Bayesian Criterion (SBC). The SBC shows that optimal lag lengths are one for total and female with a higher education and less than a high school education and two for female with a high school education (See Table 2). Second, we test null of no-cointegration by employing F test. Table 3 presents two crucial findings: (i) there is no cointegration between labor force participation and unemployment for total female (ii) there is a long-run relationship between two variables for better-educated female, but not less-educated female. Thus, the cointegration analysis suggests that the under-participation trap, which is a serious problem for poorly educated urban women, is not due to high unemployment rate (Note 8).

Table 3. Bounds test for cointegration

		Calculated F-statistics [lag]	Critical value bounds of the F statistics (T=50) Lower Bound I(0)		Upper Bound I(1)	
Total		4.11 [1]				
Female Education Level			1%	5%	1%	5%
Less Educated	Less than a high school	7.54 [1]	9.89	6.98	10.96	7.86
	High school	3.20 [2]				
Better Educated	Higher education	**9.52**[1]**				

Notes. Cointegrating equation includes constant and deterministic trend. Lower and upper bound critical values for bounds test are derived from Narayan (2005:p1990), Case V: unrestricted intercept and unrestricted trend (k=1).

2.3 Long-Run Estimates

Since cointegration analysis shows that there is only long-run relationship between labor force participation rate and unemployment for better-educated female, we estimate following ARDL model for female with a higher education.

$$p_t = \beta_0 + \beta_1 t + \sum_{i=1}^{n} \beta_3 p_{t-i} + \sum_{i=0}^{m} \beta_4 u_{t-i} + \varepsilon_t \tag{2}$$

Table 4 reports the results from ARDL (2, 0) selected by SBC as well as DOLS and FMOLS to analyze whether the results are robust. The table clearly shows that the estimates of β from the techniques are statistically significant and similar. The estimates reveal unemployment rate has a positive impact on labor force participation. Therefore, we argue that our results can be interpreted as favoring added-worker effect.

Table 4. Long-run estimates

Education Level	Techniques	β(s.e)	L_C [prob]	SubF [prob]	MeanF[prob]
	ARDL	0.74 (0.44)	-	-	-
Higher Education	DOLS	0.64 (0.32)	-	-	-
	FMOLS	0.64 (025)	1.14[0.010]	11.38 [>0.20]	8.95[0.010]

Notes. Long-run model consists of deterministic terms (constant and trend). Estimated cointegrating relationship is only given the table, omitting the deterministic terms. DOLS estimate is based on one lead and one lag of first differences. To obtain FMOLS estimate, covariance parameters are estimated by employing a Parzen kernel on residuals pre-whitened with a VAR (1) and bandwidth parameter is automatically selected.

To examine parameter stability of the estimated model, we employ both Hansen stability test (Note 9) based on FMOLS estimation reported in Table 4 and CUSUM and CUSUMSQ tests (Note 10) based on ARDL (2,0) estimation shown Figures 2 and 3. All tests reveal the model parameters are stable.

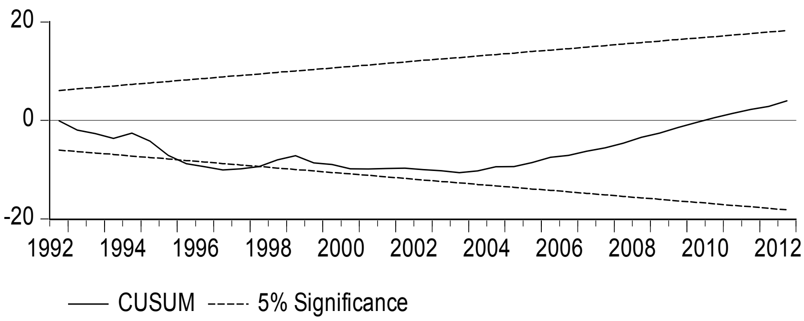

Figure 2. CUSUM test for ARDL (2,0)

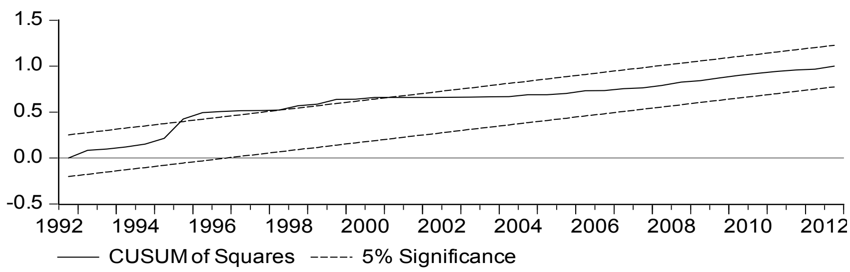

Figure 3. CUSUMSQ test for ARDL (2,0)

Both the results of the cointegration test and the long-run estimates clearly show no evidence of the discouraged-worker effects for urban women in Turkey. This implies that high unemployment rate is not a main driving force behind the very low and declining female labor force participation. Furthermore, our analysis conducted on the education-specific data reveals two important findings. First, the under-participation trap does not emanate from high unemployment rate. Second, there is an added-worker effect for better-educated urban women in Turkey.

2.4 Causality

Finally, we examine the causal link between unemployment and labor force participation. To identify the direction of causality between the variables, we employ a Granger causality test. We estimate following error correction models (ECMs) with one lag to implement the test,

$$\begin{aligned}\Delta p_t &= \alpha_{p0} + \alpha_{p1}\hat{\varepsilon}_{t-1} + \alpha_{p2}\Delta p_{t-1} + \alpha_{p3}\Delta u_{t-1} + \varepsilon_{pt} \\ \Delta u_t &= \alpha_{u0} + \alpha_{u1}\hat{\varepsilon}_{t-1} + \alpha_{u2}\Delta p_{t-1} + \alpha_{u3}\Delta u_{t-1} + \varepsilon_{ut}\end{aligned} \tag{3}$$

where $\hat{\varepsilon}_{t-1}$ is the error correction term derived from ARDL (2,0) model and ε_{pt} and ε_{ut} are serially uncorrelated error terms.

The significance of t-statistic related to coefficients of the error correction term, α_{p1} and α_{u1}, implies the long-run causality. The significance of F-statistic on coefficients of first difference of variables, α_{p3} and α_{u2}, also implies the short-run causality between variables of interest. Table 5 presents the results of Granger causality test. The results reveal that there exists a unidirectional short- and long-run causality between unemployment rate and labor force participation rate, which runs from the former to the later.

Table 5. Causality

Dependent Variables	**Direction of Causality**		
	Short-run Causality		**Long-run**
	Δp	Δu	$\hat{\varepsilon}_{t-1}$ (t-st.)
	F-st.		(t-statistic)
Δp	-	**3.81****	**-0.51 (3.18)***
Δu	0.71	-	0.013(0.093)

Note. *, ** denote statistical significance at 1% and 5% levels, respectively.

3. Conclusion

In this paper, we explore the linkage between unemployment rate and labor force participation rate for female in the urban areas in Turkey using semiannual time series data for period 1989:S1 to 2012:S2. The existence of a long-run relationship between the two variables is investigated employing ARDL bounds test technique. With the aggregate rates of unemployment and labor force participation, cointegration analysis finds that there is no long-run relationship between unemployment and labor force participation rates for urban women. Thus, the analysis suggests that the puzzle of the low female labor force participation rates is not associated with high unemployment rate. Results based on education-specific data also show that there exists a cointegration relationship between unemployment rate and labor force participation rate for better-educated female but not for less-educated female. This finding implies that there is no evidence that the under-participation trap relates with high unemployment rate. To obtain long-run estimate of the impact of unemployment rate on labor force participation rate for better-educated female, we use ARDL, FMOLS and DOLS techniques. The techniques confirm that unemployment rate has a statistically significant positive effect on labor force participation rate. Dependent on the result, we argue that there exists added-worker effect for better-educated female. We also analyze the casual link between unemployment rate and labor force participation rate and find that there are short- and long-run causality from the former to the later, but not vice versa. Overall, we find no evidence of the discouraged-worker effect for urban women in Turkey.

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Notes

Note 1. See Lundeberg (1985), Borjas (2005), Isserman, Taylor, Gerking and Schubert (1987).

Note 2. See Booth and Coles (2007) for the under-participation hypothesis.

Note 3. See Taymaz (2012) and IMF (2012).

Note 4. See World Bank (2009) for a survey about the empirical literature.

Note 5. There are only two papers examining this linkage in the literature. Başlevent and Onaran (2003) have examined this relationship for married women using a bivariate probit model. Their results have indicated that added-worker effect prevails the discouraged worker effect. In contrast, Tansel (2002) have suggested that unemployment rate has a sizeable discouraging effect on female labor force participation.

Note 6. The empirical literature clearly shows that different age groups react differently to fluctuations in unemployment rate (see for example: Kakinata & Miyamato, 2012; Filatriau & Reynes, 2012; Fuchs & Weber, 2013). Therefore, we also want to employ age-specific data to shed further light on the issue. However, we do not access the age-disaggregated female labor force data.

Note 7. Data set depends on the Household Labor Force Survey. Female labor force data in the survey are measured semi annul until 2000, quarterly for period of 2000 to 2005 and monthly since 2005. To analyze longer period, we transform quarterly and monthly data into semiannual data.

Note 8. Taymaz (2012) emphasizes that the main sources of the under-participation trap are the large share of informal sector and low access higher education. In the World Bank (2009), it is also stressed that the under-participation trap comes from the social and economic barriers that the less-educated female face.

Note 9. See Hansen (2002) for detail.

Note 10. CUSUM and CUSUMSQ procedures are depend on the cumulative recursive sum of recursive residuals and the cumulative sum of squares of recursive residuals, respectively. The CUSUM and CUSUMSQ statistics are updated recursively and plotted against the breaks points. If the statistics stay within at 5% critical bounds, then the model is stable.