WOMEN'S LABOR PARTICIPATION RATES AND COMPETITIVENESS IN THE G7 COUNTRIES

Yrd. Doç. Dr. Fatma Fehime AYDIN,
Yüzüncü Yıl Üniversitesi İktisadi ve İdari Bilimler Fakültesi, fatmafehimeaydin@yyu.edu.tr

ABSTRACT
In this paper we investigate the relationship between women's labor participation rates and the international competitiveness for the G7 countries. We applied panel data analysis for the years from 2001 to 2009 by using the amount of female labor force participation data which have obtained from Key Indicators of the Labor Market (KILM) publication and competitiveness index data which was created by myself by using data from International Association for Management Development (IMD). The main hypothesis of this study is that "there is a positive relationship between women's participation in labor force and national competitiveness". On the basis of our work we conclude that the rise of women's labor participation rate increases the national competitiveness; and the rise of international competitiveness increases women's labor participation rate in the G7 countries.

Key Words: *Women's employment, national competitiveness, panel data analysis, Granger Causality, G7 Countries.*

G7 ÜLKELERİNDE KADINLARIN İŞGÜCÜNE KATILIM ORANLARI VE REKABETÇİLİK İLİŞKİSİ

ÖZET
Çalışmada G7 ülkeleri için kadınların işgücüne katılım oranları ile uluslararası rekabetçilik arasındaki ilişki incelenmiştir. İşgücü Piyasasının Temel Belirleyicileri (KILM) yayınından elde edilen kadınların işgücüne katılım miktarı verileri ve Uluslararası Yönetim Geliştirme Derneği (IMD)'den elde edilen veriler yardımıyla tarafımızca oluşturulan rekabetçilik endeksi verileri kullanılarak 2001-2009 yılları arası için panel veri analizi uygulanmıştır. Çalışmanın temel hipotezi "kadınların işgücüne katılımları ile uluslararası rekabetçilik arasında pozitif bir ilişki olduğudur." Çalışmanın temel sonucu; G7 ülkelerinde kadınların işgücüne katılım oranlarındaki artışın uluslararası rekabetçiliği; uluslararası rekabetçilikteki artışın da kadınların işgücüne katılım oranlarını artırdığıdır.

Anahtar Kelimeler: *Kadın istihdamı, ulusal rekabetçilik, panel very analizi, Granger nedensellik analizi, G7 ülkeleri.*

1.INTRODUCTION

When we check the employment rate of the developed countries and the developing countries, we see that in the developing countries the employment rate is less than the developed countries. Women's labor participation rate is one of the most important reasons of that case: women's employment rate is less in the developing countries.

In many studies prepared so far, factors affecting women's employment have been discussed. Economic development, unpaid family labor, education level, wages, informal employment, age, legal arrangements, marital status, number of children, employment structure, income inequality, social stratification are the factors discussed so far. Another factor that is not considered in these factors up to now, but is thought by us to have effects is the international competitiveness. In this paper, an empirical application made on this subject and the results are evaluated. When considering the factors that influence women's employment, another subject forgotten is the factors that women's employment may affect. One of these factors is the international competitiveness. Therefore, in this paper both the effect of women's employment on international competitiveness and the effect of international competitiveness on women's employment are examined.

In this paper we examine women's labor participation rate and the international competitiveness relationship in the G7 countries. G7 countries are the economic and political group of seven largest developed countries: Canada, France, Germany, Italy, Japan, United Kingdom and United States.

2.THEORETICAL BACKGROUND

First economic analyses of female labor force participation are the studies of Mincer (1962) and Cain (1966). Following these studies, several studies have discussed the relationship between women's employment and economic development. Goldin (1995), Durand (1975), Psacharopoulos and Tzannatos (1989), Schultz (1990, 1991), Pampel and Tanaka (1986) and Kottis (1990) argue that there is a U-shaped relationship between labor force participation rates of women and economic development.

Another important issue about women's employment is the relationship between women's employment and economic growth. There are limited numbers of studies on this issue. Writers such as Tzannatos (1999), Dollar and Gatti (1999), Seguino (2000), Klasen (2000) and Klasen and Lamanna (2009) argue that education and labor discrimination between men and women would reduce economic growth. Tzannatos (1999) argued that continuous improvements in women's labor market and narrowing gender gap could increase the output and the welfare of women and men. Dollar and Gatti (1999) concluded that making less investment in women as human capital is not an effective preference for developing countries and also concluded that training, wage and employment inequality between men and women would have negative consequences for economic growth.

In literature we could not find any work observing the relation between women's employment and national competitiveness. In our study we observed the relation between women's employment and national competitiveness by applying panel data analysis to contribute to the literature.

3.THE RELATION BETWEEN WOMEN'S EMPLOYMENT AND NATIONAL COMPETITIVENESS

When we search about women's employment and competitiveness, we meet competitiveness concept only as the competition between women and men workers. But we think there is a relation between women's employment and national competitiveness. For example according to the European Union Commission's definition, national competitiveness is the countries' high labor force creating ability and increasing the returns of production factors in hard competition (Commission of the European Communities, 2002). As half of the world population occurs from women, to create high labor force, women's employment needs to be increased.

One of the indicators used to measure the competitiveness of countries is indicator of employment. An increase in employment will lead to an increase in the competitiveness. The most appropriate way to increase employment is to increase women's employment.

According to the World Economic Forum's Global Competitiveness Index 2010-2011, the most important factor in Turkey's international competitiveness in the labor market weakness is the lack of active labor market (World Economic Forum, 2010). The most important sub-variable reducing the effectiveness of the labor market is the women's labor force participation rate. Therefore by increasing labor force participation rate of women in the labor market activity, the effectiveness of labor market may be provided and thus international competitiveness may be increased.

4.EMPIRICAL FINDINGS AND COMMENTS

4.1. PANEL DATA ANALYSIS

Panel data analysis is a type of analysis based on the estimation of economic relations using time series of a large number of cross-sections or cross-sectional data of time dimension (Grene, 2003). As can be seen from the definition, time series and cross-sectional data are been together in panel data analysis. Panel data are defined as balanced panel data if occurred from time series of equal lengths; are defined as unbalanced panel data if occurred from time series of different lengths for each cross-section in the form of household, consumers, firms, sectors, regions or countries (Özer and Çiftçi, 2009).

Panel data analysis has several advantages compared with other analysis. The first one is it provides the possibility to use more data than the use of only time series only cross-sectional data to the researcher. This also provides the estimations to be more efficient by increasing the degree of freedom in estimations. The second one is panel data analysis provides better control of the effects of heterogeneity between groups. The last one is it serves to reduce multi link between the explanatory variables (Çeviş, 2005).

Panel data model is defined as follows:

$$Y_{it} = \alpha + \beta_{1it} X_{1it} + ... + \beta_{kit} X_{kit} + e_{it} \quad \left((i = 1, ..., N), (t = 1, ..., T) \right)$$

In this equation i refers to the cross section and t refers to the time period. When Y variable is a dependent variable taking different values from unit to unit and from a time period to consecutive time period, it is being expressing with two sub indices as for the cross sectional size i and for the time period size t. This general model allows constant parameter and regression parameter to be separate for each period and each individual.

In the above model, coefficients take different values for different units in different time periods. In this case, the estimated parameter number exceed number of used observations, so the model cannot be estimated. Therefore in the studies using panel data, different models can be obtained rather by making different assumptions about features of error terms and variability of coefficients (Pazarlıoğlu and Gürler, 2007).

In this paper we examine women's labor participation rate and the international competitiveness relationship in the G7 countries. G7 countries are the economic and political group of seven largest developed countries: Canada, France, Germany, Italy, Japan, United Kingdom and United States. But as competitiveness data of United States of America was taken as the base, it is fixed at 100. Therefore we have done the analysis by leaving America excluded from the analysis.

For the 2001-2009 period, the amount of female labor force participation data for G7 countries have been obtained from Key Indicators of the Labor Market (KILM) publication which is a research tool created by the International Labor Organization (ILO). Competitiveness index data used in this study have been obtained from IMD (International Association for Management Development) World Competitiveness Center.

In this section women's employment relationship with competitiveness is examined through an analysis of balanced panel data. First panel unit root tests are applied to find if the data is stationary. After investigating unit roots panel cointegration tests are applied in order to investigate if in the long term there is a mutual relation between the series. Thirdly, Panel Granger causality test is used to examine if there is causality between the series. And lastly, The Least Squares Method (OLS), Fixed Effects Model and Random Effects Model are used to estimate the coefficients of relationship between the series. Eviews 7.1 program is used for our analysis.

Two econometric models have created. For the impact of the amount of female labor force participation on the competitiveness index:

$$\text{COMPET} = \alpha_i + \beta_1 \ \text{LNWLPR} + e_{it}$$

For the impact of competitiveness on the female labor force participation:

$$\text{LNWLPR} = \alpha_i + \beta_1 \ \text{COMPET} + e_{it}$$

In these models COMPET refers to the competitiveness index, LNWLPR refers to the logarithmic form of the amount of labor force participation of women.

4.1.1.Panel Unit Root Test Findings and Evaluation

In panel data models, the leading studies proposed unit root test are Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Maddala and Wu (1999) and Choi (2001). In our study these unit root tests are applied.

Levin, Lin and Chu (LLC) and Breitung tests assume that there is a common unit root process. And these tests employ a null hypothesis of a unit root. LLC and Breitung tests consider the following basic ADF specification:

$$\Delta y_{it} = \alpha y_{it-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{it-j} + X'_{it}\delta + \varepsilon_{it} \, .$$

Here y indicates the series to be done unit root test, Δ indicates the first order difference processor, i indicates cross section units or series, t indicates periods, X'_{it} indicates the exogenous values in the model and ε indicates errors.

The null and alternative hypotheses for the tests may be written as:

$H_0 : \alpha = 0$

$H_1 : \alpha < 0$

Under the null hypothesis there is a unit root, under the alternative hypothesis there is no unit root (Levin et al., 2002; and Breitung, 2000).

The Im, Pesaran and Shin (IPS) and the Fisher ADF and PP tests assume that there is an individual unit root process. These tests are characterized by the combining of individual unit root tests to derive a panel-specific result.

The null and alternative hypotheses for the IPS test may be written as:

$H_0 : \alpha_i = 0, \textit{ for all } i$

$$H_1 : \begin{cases} \alpha_i = 0, \textit{ for } i = 1,2,\cdots,N_1 \\ \alpha_i < 0, \textit{ for } i = N+1, N+2,\cdots,N \end{cases}$$

which may be interpreted as a non-zero fraction of the individual processes is stationary (Im et al., 2003).

Maddala and Wu (1999) used the Fisher (1932) test results which are based on combining the p-values of the test statistic for a unit root in each cross section. If we define π_i as the p-value from any individual unit root test for cross section i, that π_i are U[0,1] and independent, and $-2\log_e \pi_i$ has a χ^2 distribution with 2 degrees of freedom. The null and alternative hypotheses are the same as in the IPS test. Applying the ADF estimation equation in each cross-section, we can compute the ADF t-statistic for each individual series, find the corresponding p-value from the empirical distribution of ADF t-statistic, and compute the Fisher-test statistics and compare it with the appropriate χ^2 critical value (Hoang and McNown, 2006).

(Table 1)

As can be seen from table 1, according to the LLC and Breitung unit root tests results, applied to the levels of variables, t stats and probability results indicate that compet series that will be used in the econometric analysis is stationary in its level [I(0)], and according to the other unit root tests results compet series is not stationary in its level. For this reason, the first difference of the series is researched, and looking at the first difference of compet series, it is seen that its first difference [I(1)] is stationary according to all of the unit root tests results. And it is seen that lnwlpr series is stationary in its level [I(0)] according to the LLC ve PP tests, but according to the other unit root tests results it is not stationary. For this reason, the first diference of the series is researched, and looking at the first difference of lnwlpr series, it is seen that its first difference [I(1)] is stationary according to all of the unit root tests results.

4.1.2.Panel Cointegration Test Findings and Evaluation

In our study Pedroni and Johansen Fisher panel cointegration analyses were used after investigating unit roots in order to investigate if in the long term there is a mutual relation between the series. Pedroni (1999) developed residuals-based tests of the null of no cointegration, which are appropriate for heterogeneous panels in which both N and T are of moderately large dimension. Pedroni's tests are of two types. First type is called as 'panel' statistics and pools over the within dimension. Numerator and denominator components of the test statistics are summed separately over the N dimension. The second type is called as 'group' statistics and pools over the between dimension, obtaining the ratio of numerator to denominator for each country prior to aggregating over the N dimension. In both cases, under the null hypothesis, the variables are not cointegrated for each panel member; the alternative hypothesis asserts that a cointegrating vector exists for each individual, although this vector may be unique for each individual (Perman and Stern, 2003).

The other cointegration test used in the study is Johansen Fisher panel cointegration test. Johansen Fisher panel cointegration test is developed by Maddala and Wu (1999). As an alternative test for cointegration in panel data, Maddala and Wu used Fisher's result to propose a method for combining tests from individual cross-sections to obtain a test statistic for the panel data. Two kinds of Johansen Fisher tests have been developed: the Fisher test from the trace test and the Fisher test from the maximum eigen-value test (Sheigeyuki and Yoichi, 2009).

(Table 2)

According to Pedroni panel cointegration test, in which we investigate long term relationship between compet and lnwlpr series, H_0 hypothesis (there is no cointegration between the series) is rejected in three of seven test types. Panel ADF-statistic is significant at the 10% significance level, and the Group PP-statistic and Group ADF-statistic are significant at the 1% significance level. Hence, results of three of seven tests, generating both panel and group statistics in the Pedroni cointegration test, indicate a strong cointegration relation between series. And according to Johansen Fisher panel cointegration test, H_0 hypothesis (there is no cointegration between the series) is rejected. Therefore the alternative hypothesis (there is cointegration between the series) is accepted and it can be concluded that in the long term there is cointegration between compet and lnwlpr series. In this context, in the long term in six of G7 countries (America is excluded), compet and lnwlpr series move together. And the results of cointegration tests results indicate that there is long term relationship between the variables.

4.1.3.Panel Granger Causality Test Findings and Evaluation

In our study Panel Granger causality test is used to examine if there is causality between female labor force participation and national competitiveness. Panel Granger causality test is developed by Granger (1969) for the question of whether x causes y. Granger's method aims to see how much of the current y can be explained by past values of y and then to

see whether adding lagged values of x can improve the explanation. If x helps in the prediction of y or if the coefficients on the lagged x's are statistically significant then y is said to be Granger-caused by x. There can be also bi-directional causality, x Granger causes y and y Granger causes x (Granger, 1969). There are many ways to examine for Granger causality because of the assumptions of heterogeneity across countries and time (Chen et al., 2013).
The simple two-variable causal model is as follows:

$$X_t = \sum_{j=1}^{m} a_j X_{t-j} + \sum_{j=1}^{m} b_j Y_{t-j} + \varepsilon_t$$

$$Y_t = \sum_{j=1}^{m} c_j X_{t-j} + \sum_{j=1}^{m} d_j Y_{t-j} + \eta_t$$

Here X_t and Y_t are two stationary time series with zero means. ε_t and η_t are two uncorrelated white-noise series.
The null hypothesis is that x does not Granger-cause y in the first regression and that y does not Granger-cause x in the second regression (Granger, 1969).
(Table 3)
As can be seen from table 3, according to the Granger Causality Test Results, lnwlpr is Granger Cause of COMPET at the 5% significance level, and COMPET is Granger Cause of LNWLPR at the 10% significance level. Therefore we can say there is bidirectional causality here. Both COMPET is Granger Cause of LNWLPR and LNWLPR is Granger Cause of COMPET.

4.1.4.Findings and Evaluations of OLS, Fixed Effects Model and Random Effects Model

In our study three different models for panel data are used to estimate the coefficients of relationship between female labor force participation and national competitiveness. First model is ordinary least squares. If z_i contains only a constant term, then ordinary least squares provides consistent and efficient estimates of the common α and the slope vector β. But if z_i is unobserved, but correlated with x_{it}, then the least squares estimator of β is biased and inconsistent as a consequence of an omitted variable. However, in this instance, fixed effects model provides consistent and efficient estimations. Fixed effects model can be written as follows:

$$y_{it} = x_{it}'\beta + \alpha_i + \varepsilon_{it}$$

Here $\alpha_i = z_i'\alpha$ embodies all the observable effects and indicates an estimable conditional mean. Fixed effects approach takes α_i as a group-specific constant term in the regression model.
If the unobserved individual heterogeneity can be assumed to be uncorrelated with the included variables then random effects model provides consistent and efficient estimations. Random effects model may be formulated as follows:

$$y_{it} = x_{it}'\beta + E[z_i'\alpha] + \{z_i'\alpha - E[z_i'\alpha]\} + \varepsilon_{it}$$
$$x_{it}'\beta + \alpha + u_i + \varepsilon_{it}$$

This formulation shows that as a linear regression model with a compound disturbance that may be consistently estimated by least squares. Random effects model indicates that u_i is a group-specific random element, similar to ε_{it} except that for each group, there is a single draw that enters the regression identically in each period (Greene, 2010).

Model 1: COMPET = F (LNWLPR)

(Table 4)

According to table 4, the effect of female labor force participation on the competitiveness is statistically significant in fixed effects and random effects models.

To investigate which one of these two models is more appropriate, Hausman (1978) specification test is commonly employed. Under the null hypothesis that the unobservable, individual-specific effects and the regressors are orthogonal, Hausman specification test is based on the idea that the set of coefficient estimates obtained from the fixed-effects estimation should not differ systematically from the set obtained from random-effects estimation. If the test results suggest rejecting the equality of both coefficient sets, then it can be said that fixed effects estimation results is more appropriate than random effects estimation results. If this is the case than random effects estimations are ignored (Frondel and Vance, 2010).

In panel data models, to test the validity of the classic model (OLS); i.e. there is whether the unit and/or time effects, likelihood ratio test can be applied. Likelihood ratio test, that is used to test classical model against the fixed effects model, is applied to determine in which model framework the equation will be estimated. Likelihood ratio test research if standard errors of unit effects are equal to zero; in other words, if the basic hypothesis that classical model is appropriate ($H_0 : \sigma_\mu = 0$). If H_0 is rejected than it can be said that classical model is not appropriate (Gerni et al., 2012).

Likelihood ratio and Hausman tests have been applied to find the fittest of these models. Likelihood ratio test has been applied to find the appropriate one of the OLS model and fixed effects model. Hausman test has been applied to decide to use which one of the fixed effects and random effects models. It is examined if the difference between the two model's parameters is statistically significant. Accordingly the results of the likelihood ratio test under the null hypothesis of "the OLS estimator is correct" and the Hausman test under the null hypothesis of "the random effects estimator is correct" are shown in table 5.

(Table 5)

When we look at the likelihood ratio test results, H_0 hypothesis is rejected because the probability is less than 0. Because of this, fixed effects model is more favorable for this dataset. And if the Hausman test results are taken into account, as the probability is less than 0.05, H_0 hypothesis is rejected. So the fixed effects model is more appropriate for the dataset. According to both Hausman and likelihood ratio tests, fixed effects model is more appropriate.

According to the cross section fixed effect model, equation is like that:
COMPET = -473,5702 + 56,7294 LNWLPR
The coefficients are statistically significant at the 1%, 5% and 10% significance level. R^2 has a high enough value as 88%. A one category increase in female labor force participation leads to an increase of 56,7294% in competitiveness index.
Model 2: LNWLPR= F (COMPET)
(Table 6)
According to the table 6, the effect of competitiveness on female labor force participation is statistically significant in fixed effects and random effects models. Likelihood ratio and Hausman tests have been applied to find the fittest of these models. Likelihood ratio test has been applied to find the appropriate one of the OLS model and fixed effects model. Hausman test has been applied to decide to use which one of the fixed effects and random effects models. It is examined if the difference between the two model's parameters is statistically significant. Accordingly the results of the likelihood ratio test under the null hypothesis of "the OLS estimator is correct" and the Hausman test under the null hypothesis of "the random effects estimator is correct" are shown in table 7.
(Table 7)
When we look at the likelihood ratio test results, H_0 hypothesis is rejected because the probability is less than 0. Because of this, fixed effects model is more favorable for this dataset. And if the Hausman test results are taken into account, as the probability is greater than 0.05, H_0 hypothesis is accepted. So the random effects model is more appropriate for the dataset. According to Hausman test random effects model is more appropriate, but according to likelihood ratio test fixed effects model is more appropriate. When the three model's results are taken together random effects model is the most appropriate model.
According to the cross section random effect model, equation is like that:
LNWLPR = 9,309505 + 0,003444 COMPET
The coefficients are statistically significant at the 1%, 5% and 10% significance level. R^2 has taken a very low value as 18%. A one category increase in competitiveness index leads to an increase of 0,0034440% in female labor force participation.

5.CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

In this paper the relationship between women's employment and competitiveness is examined. For this purpose, firstly factors affecting women's employment and then the relationship between women's employment and competitiveness are discussed theoretically. After that some information is given on panel data analysis and then balanced panel data analyses are applied to G7 countries. First panel unit root tests are applied to find if the data is stationary. It is seen that both compet and lnwlpr series' first differences [I(1)] are stationary according to all of the unit root tests results.
After investigating unit roots panel cointegration tests are applied in order to investigate if in the long term there is a mutual relation between the series. It is seen that in the long term in six of G7 countries (America is excluded), compet and lnwlpr series move together. And the results of cointegration tests results indicate that there is long term relationship between the variables.

Thirdly, Panel Granger causality test is used to examine if there is causality between the series. According to the results, we can say that there is bidirectional causality here. Both compet is Granger Cause of lnwlpr and lnwlpr is Granger Cause of compet.
And lastly, The Least Squares Method (OLS), Fixed Effects Model and Random Effects Model are used to estimate the coefficients of relationship between the series. According to the results, a one category increase in female labor force participation leads to an increase of 56,7294% in competitiveness index. %. And a one category increase in competitiveness index leads to an increase of 0,0034440% in female labor force participation.
According to the results of panel data analyzes, both female labor force participation has positive effect on competitiveness and competitiveness has positive effect on female labor force participation. So our basic hypothesis of "there is a positive relationship between women's participation to labor force and competitiveness" is accepted for G7 countries.
For a research agenda in the future, it would be useful to make panel DOLS and FMOLS tests to see the relationship in country base.

6.REFERENCES

Becker GS. 1985. Human capital, effort, and the sexual division of labor. *Journal of Labor Economics* **3** (1): S33-S58.
Bertulfo L. 2011. Women and the informal economy. http://www.ode.ausaid.gov.au/current_work/documents/women-informal-economy-lota-bertulfo.pdf. Date of Access: 29.03.2013.
Breitung J. 2000. The local power of some unit root tests for panel data. In *Nonstationary Panels, Panel Cointegration, and Dynamic Panels*. Baltagi B. (ed.). Advances in Econometrics **15** Amsterdam: JAI Press; 161–178.
Chen W, Clarke JA and Roy N. 2013. Health and wealth: Short panel granger causality tests for developing countries. *The Journal of International Trade & Economic Development: An International and Comparative Review.* http://dx.doi.org/10.1080/09638199.2013.783093. Date of Access: 03.07.2013.
Commission of the European Communities. 2002. Communication from the commission to the council, the European Parliament, the Economic and Social Committee and the Committee of the Regions, Industrial Policy in an Enlarged Europe. *COM 2002.* 714 final. Brussels.
Çeviş İ. 2005. An ampirical approach to currency crises. *PhD Thesis*. School of Social Sciences. Pamukkale University.
Dalyanoğlu D. and Gümüş P. 2009. İş yaşamında kadınlara yönelik ayrımcılığa dair. http://www.bukak.boun.edu.tr/?p=82. Date of Access: 16.12.2009.
Frondel M and Vance C. 2010. Fixed, random, or something in between? A variant of Hausman's specification test for panel data estimators. *Economics Letters* **107**: 327-329.
Gerni M, Emsen ÖS, Özdemir D and Buzdağlı Ö. 2012. Determinants of corruption and their relationship to growth. *International Conference on Eurasian Economies: Session 1B: Growth and Development I.* 11-13 October 2012, Almaty, Kazakhstan.
Granger CWJ. 1969. Investigating causal relations by econometric models and crossspectral methods. *Econometrica.* **37**: 424-38.

Grene W. 2003. *Econometric Analysis.* 5th ed. New Jersey: Prentice Hall.

Grene W. 2010. Models for panel data, *Econometric Analysis.* http://pages.stern.nyu.edu/~wgreene/DiscreteChoice/Readings/Greene-Chapter-9.pdf. Date of Access: 03.07.2013.

Hayghe HV and Bianchi SM. 1994. Married mothers' work patterns: The job- family compromise. *Monthly Labor Review*: 24-30.

Hoang NT and McNown RF. 2006. Panel data unit roots tests using various estimation methods. *Working paper*. Department of Economics, University of Colorado at Boulder.

Im KS, Pesaran MH, and Shin Y. 2003. Testing for unit roots in heterogeneous panels. *Journal of Econometrics* **115**: 53–74.

International Labor Office. 2011. *Key Indicators of the Labor Market (KILM)*. 7th ed.

International Labor Office. 2012. Global employment trends for women 2012. http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_195447.pdf. Date of Access: 11.04.2013.

Levin A, Lin CF, and Chu C. 2002. Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of Econometrics* **108**: 1–24.

Malhotra A and Mather M. 1997. Do schooling and work empower women in developing countries? Gender and domestic decisions in Sri Lanka. *Sociological Forum* **12** (4): 599-630.

OECD Family Database. 2012. Employment profiles over the life-course. http://www.oecd.org/els/soc/LMF1.4%20Employment%20profiles%20over%20life%20course%20-%20updated%20081212.pdf. Date of Access: 05.04.2013.

Özar Ş and Günlük-Şenesen G. 1998. Determinants of female (non-) participation in the urban labour force in Turkey. *METU Studies in Development* **25** (2): 311-328.

Özer M and Çiftçi N. 2009. Ar-Ge harcamaları ve ihracat ilişkisi: OECD ülkeleri panel veri analizi. *Dumlupınar University Journal of Social Sciences* **23**: 39-49.

Pazarlıoğlu V and Gürler Ö. 2007. Telekomünikasyon yatırımları ve ekonomik büyüme: panel veri yaklaşımı. *Finans Politik & Ekonomik Yorumlar* **44** (508): s35-s43.

Perman RJ and Stern D. 2003. Evidence from panel unit root and cointegration tests that the environmental Kuznets curve does not exist. *Australian Journal of Agriculture and Resource Economics* **47** (4): 325-347.

Psacharopoulos G and Tzannatos Z. 1989. Female labour force participation: an international perspective. *Research Observer* **4** (2): 187-201.

Semyonow M. 1980. The social context of women's labour force participation: a comparative analysis. *The American Journal of Sociology* **86** (3): 534-550.

Shigeyuki H and Matsubayashi Y. 2009. Empirical analysis of export demand behavior of LDCs: panel cointegration approach, *MPRA Paper* **17316**, University Library of Munich, Germany.

Şentürk A and Erdemir C. 2010. Kredibilite kuramında panel veri modelleri ve trafik sigortası için bir uygulama. *İstatistikçiler Dergisi* **3**: 17-36.

World Bank. 2012. Removing barriers to economic inclusion, *Women, Business and the Law, 2012,*

http://wbl.worldbank.org/~/media/FPDKM/WBL/Documents/Reports/2012/Women-Business-and-the-Law-2012.pdf. Date of Access: 08.04.2013.
World Economic Forum. 2010. *The Global Competitiveness Report 2010-2011*. Geneva, Switzerland.

7.APPENDIX

Table 1: Panel Unit Root Tests Results (Level and 1st Differences)

	COMPET			
	Intercept			
	t-stat I(0)	***Prob I(0)***	***t-stat I(1)***	***Prob I(1)***
Levin, Lin&Chu	-6,35683***	0,0000	-8,34986***	0,0000
Breitung	-3,33569***	0,0004	-4,37926***	0,0000
Im, Pesaran&Shin	-1,17981	0,1190	-3,20118***	0,0007
ADF- Fisher Chi-square	18,5064	0,1012	35,3863***	0,0004
ADF- Choi Z-stat	-0,85518	0,1962	-3,86724***	0,0001
PP- Fisher Chi-square	5,79935	0,9259	41,4500***	0,0000
PP- Choi Z-stat	1,07989	0,8599	-4,21601***	0,0000
	LNWLPR			
	Intercept			
	t-stat I(0)	***Prob I(0)***	***t-stat I(1)***	***Prob I(1)***
Levin, Lin&Chu	-5,42566***	0,0000	-5,90157***	0,0000
Breitung	0,55616	0,7109	-1,43957*	0,0750
Im, Pesaran&Shin	-1,05684	0,1453	-2,07962**	0,0188
ADF- Fisher Chi-square	18,3500	0,1055	26,8321***	0,0082
ADF- Choi Z-stat	-0,80366	0,2108	-2,67546***	0,0037
PP- Fisher Chi-square	21,8947**	0,0387	29,0333***	0,0039
PP- Choi Z-stat	-1,77586**	0,0379	-3,15782***	0,0008

***, **, * indicate significance at the level of 1, 5 and 10 percent, respectively. Optimal lag length is chosen according to the Schwarz information criterion. In LLC and PP tests Bartlett Kernel method is used and the width of Bandwidth is determined by Newey-West method.

Table 2: Panel Cointegration Tests Results

$COMPET_{it} = \alpha_{it} + \beta_1 LNWLPR_{it} + u_{it}$				
Pedroni Panel Cointegration Test Results				
(Within-Dimension)				
	Statistic	Prob.	Weighted t Statistic	Prob.
Panel v-statistic	0.840871	0.2002	-0.152998	0.5608
Panel rho-statistic	0.138748	0.5552	0.139132	0.5553
Panel PP-statistic	-0.693625	0.2440	-2.174590**	0.0148
Panel ADF-statistic	-1.526647*	0.0634	-3.310229***	0.0005
(Between-Dimension)				
	Statistic		Prob.	
Group rho-statistic	1.028215		0.8481	
Group PP-statistic	-3.331553***		0.0004	
Group ADF-statistic	-3.323015***		0.0004	
Johansen Fisher Panel Cointegration Test Results				
Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	50.71***	0.0000	47.96***	0.0000
At most 1	14.07*	0.0800	14.07*	0.0800

***, **, * indicate significance at the level of 1, 5 and 10 percent, respectively. Optimal lag length is chosen according to the Schwarz information criterion.

Table 3: Panel Granger Causality Tests Results

Null Hypothesis:	Obs	F-Statistic	Probability
LNWLPR does not Granger Cause COMPET	18	5.70930**	0.03771
COMPET does not Granger Cause LNWLPR		3.73085*	0.08499

***, **, * indicate significance at the level of 1, 5 and 10 percent, respectively. Lag length is chosen as 6.

Table 4: Implementation Results of the Effect of Female Labor Force Participation on the Competitiveness

	OLS	Cross Section Fixed Effects	Cross Section Random Effects
Constant	48,18898 (0,2022)	-473,5702 (0,0049)	-146,1508 (0,1438)
LNWLPR	2,054973 (0,6011)	**56,7294 (0,0015)**	**22,41956 (0,0341)**
R^2	0,005294	0,880849	0,075808
F	0,276733 (0,601087)	57,9097 (0,0000)	4,265391 (0,043898)

Table 5: Likelihood Ratio and Hausman Tests Results in Examining the Effect of the Competitiveness on the Female Labor Force Participation

Test Summary	Statistic	d.f.	Prob.
Cross-Section F	69,074018	5,47	0,0000
Cross-Section Chi-Square	114,591127	5	0,0000
Cross-Section Random	6,707819	1	0,0096

Table 6: Implementation Results of the Effect of Competitiveness on the Female Labor Force Participation

	OLS	Cross Section Fixed Effects	Cross Section Random Effects
Constant	9,368369 (0,0000)	9,309308 (0,0000)	9,309505 (0,0000)
Compet	**0,002576 (0,6011)**	**0,003447 (0,0015)**	**0,003444 (0,0014)**
R^2	0,005294	0,994224	0,183188
F	0,276733 (0,601087)	1348,421 (0,0000)	11,66217 (0,001245)

Table 7: Likelihood Ratio and Hausman Tests Results in Examining the Effect of the Competitiveness on the Female Labor Force Participation

Test Summary	Statistic	d.f.	Prob.
Cross-Section F	1609,490253	5,47	0,0000
Cross-Section Chi-Square	278,034470	5	0,0000
Cross-Section Random	0,002866	1	0,9573