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Explaining the Relationship between Female Labor Force Participation and Divorce in Turkey by means of Panel Regression and Granger Causality

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Abstract: This study examines the relationship between the course of divorce and women's labor force participation in Turkey during 2004-2013 Period. While Trabzon has the highest rate, Mardin has the lowest rate of women participation in the labor force. A significant correlation between the participation of women in the labor force and per capita income, crude divorce rate, and added value exists. There is a significant relationship between the participation of women in the labor force and the crude divorce rate. Bi-directional causal relationships between the participation of women in the labor force and the crude divorce also exists.

JEL Classification: J10, J21, J12, C33
Keywords: Turkey, Women Participation in Labor Force, Divorce, Panel Regression, Causality.

1. Introduction

The developed economies, especially the US, have been the scene of major economic and social transformations after the Second World War. The two important issues that came to the forefront during this

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period are; the first, the successive entry into force of unilateral divorce laws and the participation of women in the labor force. There have been a number of studies regarding that participation of women in the labor force, itself, has had positive effects on the divorce rates (Bracher et al., 1993; Cherlin, 1979; De Rose, 1992; Jalovaara, 2003; Poortman and Kalmijn, 2002; South, 1988; Tzeng and Mare, 1995). Along with the industrialization of Turkey, which is one of the developing countries, and after entry into force of unilateral divorce laws, a possible relationship between the participation of women in the labor force and divorce have been investigated. Turkey has made significant economic progress since 2001; GDP in the given period has increased more than threefold, urbanization has reached a very advanced level. Meanwhile, in the framework of the EU harmonization process, a number of political, economic and social regulations took place including the enactment the new Civil Code (2001) which has facilitated divorce. It has been determined that there is a significant increase in the divorce rate with the adoption of the Civil Code. To what extent this increase complies with variables such as female participation in the labor force and decline in fertility rate will be addressed on a regional basis.

In this study, the causal relationship between divorce rates and female labor force participation rates in the 26 regions of Turkey within the scope of Nomenclature of Territorial Units for Statistics (NUTS) Level 2 was explored. According to Turkish Statistical Institute data, Turkey's population was 76.67 million people as of 2014 (TUIK, 2015). The proportion of the population living in cities and district centers increased to 91 % in 2013. When the population statistics is analyzed on a provincial basis, it can be seen that Istanbul, with 18.5 % share, had the most populous province. According to the 2013 statistics of marriage and divorce; the number of married couples in 2013 decreased 0.6 % when compared to the previous year; the crude marriage rate remained at 7.89 ‰. The number of divorced

couples increased by 1.6 % when compared to the previous year and the crude divorce rate remained at 1.65 ‰.

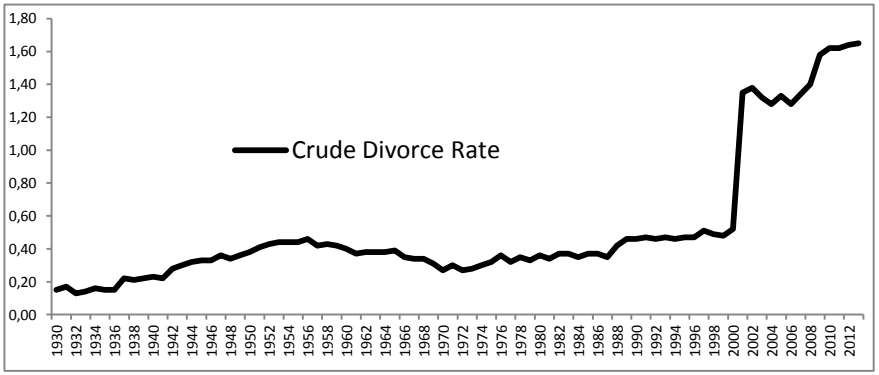
According to TSI (Turkey Statistics Institute) data; the employment rate of men increased to 2.4 times of women employment rate. According to the Household Labor Force Survey, in 2013, the employment rate in the population aged 15 and over in Turkey was 45.9%; this rate was 65.2 % for men and 27.1 % for women.

In order to indicate the importance given to the family in Turkey, Turkish government established the Ministry of Family and Social Policies with a Legislative Decree in 2011. The reasons for divorce were investigated by a survey conducted by the Family and Social Research General Directorate. In this study (Demirkan and Günindi, 2009) the factors that lead to divorce are listed as; lack of communication between spouses, economic problems, increased responsibility of working women, violence against women and children, male's dominant role on female, other factors that are non-effective in the establishment of the marriage but get activated later. In particular, the Civil Code law no. 4721, adopted in 2001 includes the regulations that facilitate divorce. Unilateral and non-fault divorce have been legalized (TBMM, 2001).

The impact of the new law can be seen when the crude divorce rate between 1930 and 2013 was analyzed. As Figure 1 shows, mass divorces after 2001 is the signal of a change which is also observed in several European Countries (González-Val and Marcén, 2012). Their study reveals that structural fraction and reforms in family laws happen at the same time. The crude divorce rate, reaching a record level by 160 %, rose to 1.35 per thousand in 2001 whereas this rate in Turkey was noted to be 0.52 per thousand in 2000. However, between 1930 and 2000 this increase was only about 71 %. Although, before 1950-60s, the divorce rate was about 0.30 per thousand, this rate was noted to be 0.40 per thousand during this period. Nonetheless, after 1960 a decline occurred, that is, the rate dropped below 0.4 per thou-

sand. Considering the period between 2001 and 2013, the average increase of crude divorce rate changed from 1 % to 2.2 % annually. In other words, when compared to the period before 2000, the divorce rate doubled after the first shock. The figure presents this sharp divorce rate change. Although after the first shock a decline was observed between 2003 and 2007, the rate continued to rise after this period.

Figure 1. Crude Divorce Rate in Turkey



2. Theoretical Discussion and Literature

Four sources are underlined to be reasons for divorce: wife's employment, financial situation of the household, presence of children, and quality of match (Kalmijn and Poortman, 2006). In their study, Kalmijn and Poortman (2006) also examine the validity of these sources on the basis of divorce theories. When compared to the employment of the husband, the employment of the wife is noted to be more influential on divorce.

Four main perspectives (socioeconomic development, women's status and female labor force participation, sex ratios, and religion) are considered to be associated with social divorce rate in the study

of South and Trent (1988) who differ from the theoretical studies on determinant factors of divorce (Goode, 1963, 1971; Lee, 1982; Glenn & Suspancic, 1984)

The economic theories of Becker (1974, 1981) focus on the idea that the main complementary function in a family depends on the sex-differentiated economic roles. Theories of marriage and family behavior (Becker, 1981) indicate that the participation of women to the increasing labor force has a vital role on family. In the event of fertility, "indirect" cost (in other words, the cost of mother's time) is the major component of the cost of children (Becker, 1981). Thus, the more women's income increases, the more children' cost increases. This situation causes a fertility decline which is experienced by industrial societies in the long-term. Additionally, marriage becomes less desirable issue due to declining fertility since children are seen as additional costs. In this sense, the rate of marriage reduces as a result of fertility decline. Additionally, Becker contends that another way of gaining economic independence for women is welfare payments; considering women's rising employment, the growth of the welfare state dissuades marriages to be steady ones.

A potential tension may be claimed to be between spouses over the household division of labor in the case of wives' employment. In their study, Frisco and Williams (2003) observed that there was a correlation between perceived unfairness in the division of household labor and decreased marital happiness among spouses.

Based on 25-year data, a study by Stevenson (2008) in which US census data were used shows an increase in not only married but unmarried female employment which reaches the highest point five years after unilateral divorce becomes familiar. This increase is 2% higher when compared the states that appropriate unilateral divorce (Stevenson, 2008).

Van Damme and Kalmijn (2014) who addressed the relationship between women's labor force participation and the dissolution of the

family, examined 20-year family adventures of 50790 women living in 16 different countries. The findings of their study indicate that a correlation occurs between women's employment and divorce and that societal context plays an important role relatively. Poortman and Kalmıjn (2002) have addressed the relationship between women working and divorce risk using data from the Netherlands. As stated in their study, women who work are observed to have a higher risk of divorce (22%) than those who do not work. Afterwards, the results of their study show that women's economic occupational status has no significant positive effect on divorce; yet, little effect is observed with regard to labor market opportunities. Additionally, the influence of the division of labor on divorce is neither relative nor symmetric, and domestic labor is not extended, either. Overall, economic interpretations of the work effect are not supported by these findings. Instead they support earlier criticisms which argue that sociological interpretations are favorable. As seen in the relevant study, our finding confirm that unlike the decreasing effect of wife's work on divorce, the impact of husband's contribution to domestic work on divorce keeps increasing over time.

Schoen et al. (2002) who addressed the relationship between women's labor force participation and domestic unrest and the disruption of family togetherness have used "Role Specialization Hypothesis" and "Economic Opportunity Hypothesis" in their study. In the study, they carried out happiness-centric analyses at two different time periods using data from US National Survey of Families and Households. Findings differed from the hypothesis that the risk of marital dissolution is widened by wives' employment. There seemed to be no divorce when it was the wife who earned more than half of the income. In the case of having no marital happiness, it was wife's employment that contributed the divorce. Results provide evidence for the economic opportunity hypothesis which argues that unlike happy marriages, it is unhappy marriages that may be affected by wives' employment. If couples are

happy, wives labor force participation does not cause divorce. Considering unhappy couples, when situations in which the wife is employed or not employed are compared, the rate of divorce is common among those who are employed. These findings show that one of the main reasons for the contemporary divorce patterns is the women's employment although this employment does not make marriage unstable.

Bargaining over divorce and bargaining within marriage are influenced by existing partnership divorce law changes such as negotiations over female labor force participation and fertility. The observed positive effect in Western Europe needs to be commented as an overall effect which consists of direct and indirect effects, contributing a constant increase in divorces. (Kneip and Bauer, 2009)

According to Gray (1998), female labor supply was not directly affected by unilateral divorce; instead, its effect is based on effective laws regulating property division. The fact that there seems no effect of unilateral divorce on female labor supply in the former analysis revealed omitted variable bias and heterogeneity in treatment for women based on marital duration.

Gündüz-Hoşgör and Smits (2008) study paid work for women's empowerment in Turkey. Having a job helps women to get rid of being in need of their family and to overcome the patriarchal ideologies. Nonetheless, only one-third of married women are gainfully employed and 50% of them are farm workers. The characteristics of women engaged in the formal economy can be interpreted as followings: they are far away from traditional gender role attitudes, both they and their husbands are educated, their husbands are in good jobs, they have fewer children, they live in modern places, and they are less suppressed by their families. Regarding economic independency for ethnic women, not speaking Turkish is the main problem.

Women's environment influences their decisions. Especially, in conservative and traditional areas, women act the role expected by society, that is, they are housewives and they spend their whole time

at home since men are the decision-makers. The main reason for the decline of female labor force participation is urbanization because women have job opportunities in cities. Likely, differences occur between urban and rural areas in terms of men's preferences. There is a positive correlation between higher urbanization and higher conservatism. It decreases female labor force participation. For increasing female labor force participation, Turkey needs to pay attention to education, both for children and adults (Göksel, 2013).

In the study (Kutlar et al, 2012) in which the long term relationship between the variables of women's participation in the labor force and wage index, and between the demographic characteristics divorce and fertility in the period covering the last 21 years of Turkey were addressed, it was determined that the wage index and fertility moved in the same direction in the long term. Another salient point in the long-term relationship was the existence of a same-direction relationship between divorce and women's labor force participation rate. This situation can be explained by women's gaining economic freedom.

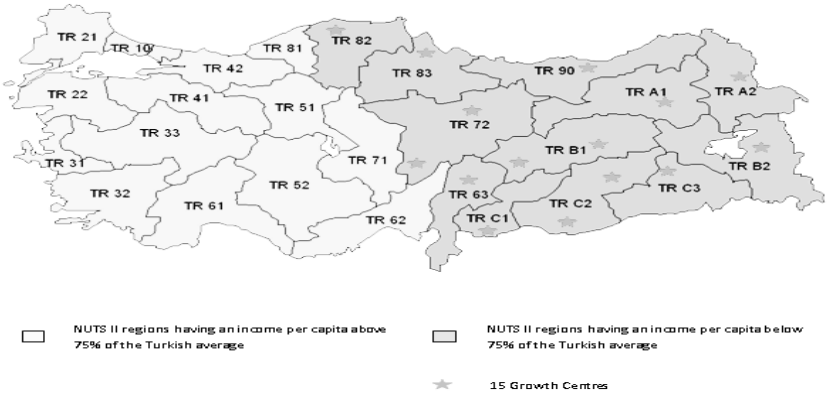
3. Method and Empirical Study

"National Programs for the Adoption of the Acquis'' is agreed on 24th March 2001 in the EU integration process, and NUTS[4] (Nomenclature of Territorial Units for Statistics) has been founded in Turkey in accordingly. NUTS 2 regions in Turkey are illustrated in the following map (IPA, 2015) which shows that the eastern Turkey has

4. http://www.abgs.gov.tr/files/SBYPB/, ''National Programs for the Adoption of the Acquis'' is accepted on 24th March 2001 within the EU harmonization process, NUTS (Nomenclature of Territorial Units for Statistics) is established in Turkey in accordance. In Turkey there are no administrative units corresponding to Level 1 and Level 2, therefore, provinces are organized in three levels. There are 81 provinces within Level 3, 26 sub-regions within Level 2 and 12 regions within Level 1. According to reports presented to European Commission, development planning of sub-regions and socioeconomic development of provinces are used for stratification of residential areas.

lower income per capita. Considering the average income per capita in Turkey, nearly three-quarters of eastern Turkey has lower income.

Figure 2. NUTS 2 Regions in Turkey



The divorce rate changes and the social and economic factors affecting these rates in 26 regions within the NUTS 2 Level between 2004 and 2013 were analyzed. TUIK defines CDR (crude divorce rate) as "The number of divorces per 1000 population in a given year." Data also demonstrate serious rate changes among regions[5]. The study examines the fallowing variables; crude divorce rate (*CDR*), crude fertility rate (CFR), female labor force participation rate (FER), female unemployment rate (FUR), total unemployment rate (UR), gross value added (GVA) per capita. In addition, independent variables used in the model are agriculture, industry and service industry included in regional economic gross value added. The abbreviations AC, PR, and PR are used for value added agriculture, valued added industry, and value added services, respectively.

5. For example, according to TUIK data, CDR value of TRB2 region (Van, Muş, Bitlis, Hakkari) is 0.16 while it is 1.34 Turkey-wide.

First data obtained from 26 regions were analyzed through descriptive statistics within the NUTS 2 Level. Then, relationships of variables were examined in terms of individual correlation and panel correlation. Due to the limitation of data set, panel regression analysis is applied rather than multiple regression analysis. The causality relationships of variables on regional basis and Turkey-wide were examined through Granger (1969) test.

Table 1. Descriptive Statistics

	FER	**FUR**	**UR**	**CDR**	**CFR**
Mean	26.62	10.38	10.25	1.34	17.85
Median	27.40	9.90	10.10	1.40	16.04
Maximum	54.00	26.10	22.00	2.81	32.85
Minimum	3.10	0.90	1.80	0.13	10.76
Std. Dev.	9.91	5.28	3.83	0.61	5.58
Skewness	-0.10	0.51	0.61	-0.17	1.07
Kurtois	2.80	2.80	2.87	2.51	3.04
Jarque-Berra	0.84	11.55	16.13	3.75	50.06
Probability	0.66	0.00	0.00	0.15	0.00
Sum	6920.50	2700.00	2665.40	349.27	4641.14
Sum Sq. Dev.	25460.43	7207.10	3795.93	96.44	8062.01
Observation	260	260	260	260	260
	LNINC	**AV**	**AC**	**PR**	**SR**
Mean	9.14	44.86	3.83	3.92	3.90
Median	9.19	42.24	3.78	2.10	2.20
Maximum	10.12	100.00	8.48	28.70	32.00
Minimum	7.88	11.41	0.56	0.30	0.60
Std. Dev.	0.48	20.60	1.92	5.36	5.88
Skewness	-0.23	0.69	0.34	3.33	3.89
Kurtois	2.54	2.87	2.25	14.72	18.23
Jarque-Berra	4.55	20.80	11.03	1967.53	3168.16
Probability	0.10	0.00	0.00	0.00	0.00
Sum	2376.26	11663.00	996.40	1018.14	1013.25
Sum Sq. Dev.	60.08	109861.70	953.59	7429.62	8950.08
Observation	260	260	260	260	260

3.1. Descriptive Statistics

Table 1 shows the descriptive statistics for all variables. It is seen in the table that only three data are normally distributed. On the other hand, there are great differences between the maximum and minimum values. PR and SR variables are the variables having the greatest deviation. There is a serious difference of sectoral added value between the regions. It is interesting that there is a 17-fold difference, a 22-fold difference, a 30-fold difference between the minimum and maximum of women's labor force participation rates, of crude divorce rate, and of women unemployment respectively. However, when regional economic added value is examined, a far more different result is obtained. The maximum value of the SR variable is 53-fold greater than its minimum value, and the maximum value of the SR variable is 95-fold greater than its minimum value. Regional differences in economic fluctuation are a few-fold of social fluctuation differences. It is an important indicator of economic disparity that the difference is almost 100-fold in terms of the added value of the industry. That is, economic income disparity is far beyond the social one across Turkey. The added value of the industry in TR10 region is about a hundred-fold greater than that of the region TRA2.

A 53-fold difference in the service industry reveals the unequal distribution of the service industry in the country. TRA2 region (Ağrı, Kars, Iğdır, Ardahan) falls 53-fold more behind compared to TR10 region (İstanbul) in terms of the services industry. On the other hand, that the agricultural added value difference is only 15-fold means that added value in agriculture displays a more equal distribution among regions. While the highest added value in the agriculture sector belongs to TR33 region (Manisa, Afyon, Kütahya, Uşak), the lowest added value belongs to TR10 region (Istanbul). In the given period, While TR90 Trabzon region has the highest rate of women participation in labor force, TRC3 Mardin region has the lowest female partici-

pation in the labor force. However, while TR31 Izmir Region ranks first in terms of the divorce rate, TRB2 Van region has the lowest divorce rate among all regions.

When the table is examined, it can be seen that the country's CDR and CFR averages are 1.34 and 17.85 per thousand, respectively. There is almost no difference between the unemployment rate of women and average unemployment rate of the country. It means that the rate of women's participation in the labor force is at par that of men's. It can be said that this is influenced by the low rate of women's desire to work. lninc variable is used as the logarithm of income per capita. There is a more than nine-fold difference between the minimum and maximum income per capita. TR10 (İstanbul) and TRC3 (Mardin, Batman, Şırnak, Siirt) are the regions with the highest and the lowest income per capita.

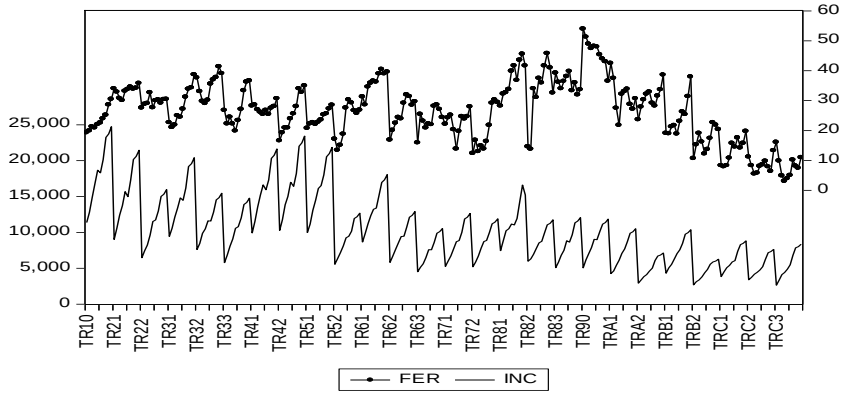
3.2. Female Labor Force Participation Rate and Income Per Capita

The value of income per capita (INC) and women's labor force participation are discussed in the Figure 3 below. While it is seen that the rate of women's participation in labor force is high in NUTS Level 2 regions located in the Western and the Northern Anatolia, it is apparent that this rate as well as the rate of income per capita in Level 2 regions in Eastern and South Eastern Anatolia are low. The women's labor force participation especially in the regions TR83 and TR90 which are located in the northern region of Anatolia is quite high. This means that the income in these regions is low, but women's participation in labor force is high. For example; while the income per capita in the region TR90 was at about 5 thousand dollars in 2004, this figure for Istanbul was eleven thousand, and for TRC3 Mardin it was only about the 2500 dollar.

It can be asserted that the ethnic structure of the Eastern and the South Eastern Anatolia as a social factor has a determinative role as

well as its low value-added economy, its lack of industrialization, and its low participation rate of women in the labor force in shaping the characteristics of the region. While the difference between the highest and lowest fertility rates is three-fold; the difference in the crude divorce rate is exact 22-fold in this region.

Figure 3. Female Labor Force Participation Rate and Income Per Capita



3.3. Female Labor Force Participation Rate and Crude Divorce Rate

Figure 4 shows the course between the participation of women in the labor force and the crude divorce. Not each region shows the same similarities. It is seen that both divorce and women's participation in the labor force have high rates in the Western Anatolian regions with high added value. The fact that not only the participation of women in the labor force but also divorce rates is significantly higher especially attracts attention in the regions TR31 and TR32. In contrast, in the Northern region of Anatolia such as in TR83 and TR90, despite the relatively high participation of women in the labor force, it is seen that the divorce rate is quite low.

Figure 4. Female Labor Force Participation Rate and Crude Divorce Rate

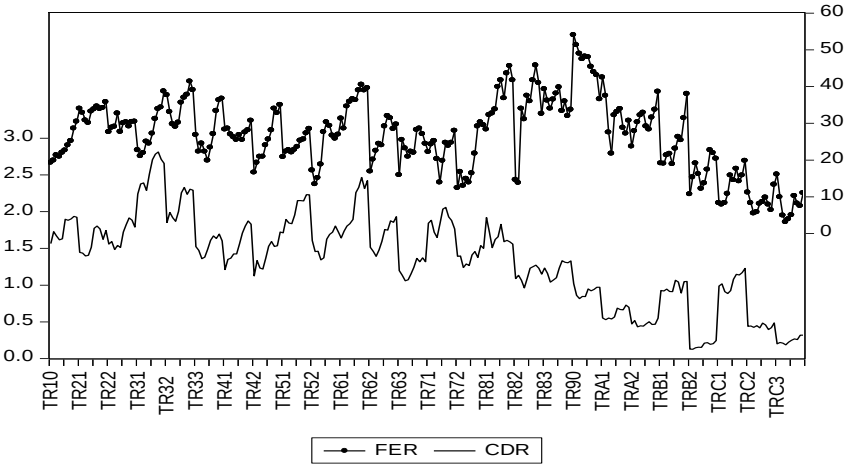
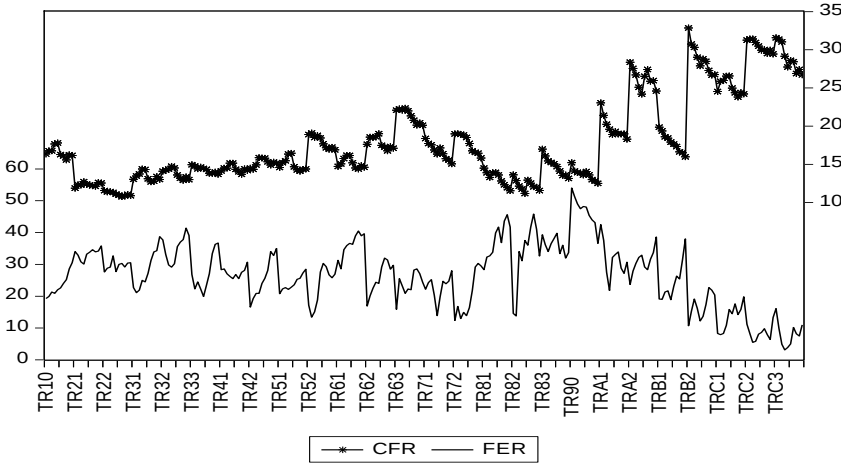


Figure 5. Female Employment and Fertility



Increase in the difference between the values in the figure means that divorce decreases and women's participation in the labor force increases. In this case, while these two values are high and close to each other in the Western Anatolian Regions, the women's participa-

tion in the labor force is high but the divorce rate is relatively low in the North Eastern regions. As can be seen in the last part of the figure, that both values are low is outstanding. The relationship between women's participation in the labor force and crude divorce displays three different trends. This situation corresponds to the economic development of the regions. Level 2 regions in the Eastern and the South Eastern Anatolia have lower level of income.

3.4. Women Employment Rate and Crude Fertility Rate

The Women Employment Rate and Crude Fertility Rate values are given in figure 5. It is displayed in the figure that fertility rate is on the rise from TRA1 region (Erzurum, Erzincan, Bayburt). TR63 (Hatay, Kahramanmaras, Osmaniye) and TR10 (Istanbul) regions follow this region respectively. In TR83 (Samsun, Tokat, Çorum, Amasya) and TR90 (Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane) regions it was observed that there has been serious decline in fertility with a significant increase in women's participation in the labor force. These two series get closer to each other in Figure 3 which means that one series falls, and the other increases. Although the employment has increased in TRB2, there has been a decline in the fertility rate.

3.5. Correlation

The correlation between FER and other variables was displayed in the table in such a way that only the ones which are significant to a maximum of 5 % level of significance are included. First we looked at the correlation value based on region, then at the Turkey-wide correlation values. In Table 2, correlations between the participation of women in the labor force and all other variables in the regions covered by NUTS level 2 are illustrated both on a region basis and across the country. The values in the table include those ones with correlation values that are at least +/- 60%, and p (probability) values that are significant at a level of 5% and less.

Table 2. Regional Correlation (FER, $p \leq 0.05$)

	CDR		CFR		FER		FUR		UR		AV		AC		PR		SR		LNİNC	FuR	
	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-		+	-
TR10	1										1			1		1		1	1		
TR21	1																				
TR22																					
TR31	1										1								1		
TR32	1			1																	
TR33	1									1	1								1		
TR41																					
TR42	1										1		1			1			1		
TR51	1									1	1								1		1
TR52	1			1							1		1			1		1			
TR61	1										1								1	1	
TR62	1			1							1				1			1	1		
TR63											1								1		1
TR71																					
TR72	1			1							1								1		
TR81				1							1			1		1		1	1		
TR82											1		1		1		1		1		
TR83																					
TR90			1									1	1							1	
TRA1													1		1		1				
TRA2				1							1					1			1	1	
TRB1	1			1					1				1						1	-	1
TRB2				1							1		1						1		
TRC1	1										1				1				1		
TRC2																					
TRC3													1				1			1	
Total	**13**		**1**	**8**					**1**		**15**	**1**	**8**	**1**	**5**	**5**	**3**	**4**	**15**	**4**	**3**

Turkey general correlation value is located at the bottom of the table. Between women's labor force participation and crude fertility rate are only negative significant correlation. On a region basis, FER variable are correlated most significantly with CDR, AV and LNINC variables. There is a significant correlation between women's participation in the labor force (FER) and crude divorce rate (CDR) in thirteen regions; and added value (AV) and LNINC value in fifteen regions.

Women's participation in the labor force (FER) is not correlated with any variables in the regions of TR22 (Balıkesir, Çanakkale), TR41 (Bursa, Eskişehir, Bilecik), TR71 (Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir), TR83 (Samsun, Tokat, Çorum, Amasya) and TRC2 (Şanlıurfa, Diyarbakır). In the 13 of the rest 21 regions, FER is positively correlated with CDR. Similarly, FER is positively correlated with AV variable in 14 of 15 regions, and negatively correlated with the rest one which is TR90 region (Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane). Subsequenty, FER is positively correlated with LNINC variable in 15 regions. Female participation in the labor force is positively paralleled to income per capita, crude divorce rate and added value on a region basis across Turkey. However, when all regions are considered together, such a result does not occur.

3.6. Dynamic Change in the Variables

Table 3 gives the percentage change in the variables for each region during the period under investigation. Thus, it will be deduced which region has a more dynamic process for which variable. In Table 3, the percentage rate of change of all variables in the decade is displayed (Y2013-Y2004)*100/Y2004). While the highest increase in FUR variable, that is female unemployment rate, occur in TRC3 region (Mardin, Batman, Şırnak, Siirt) with a percentage of 1634, the largest decline took place in TRB1 region (Malatya, Elazığ, Bingöl, Tunceli) with 61 percent. So, the unemployment rate for women in the last decade in TRC3 has increased very much. This may be result of the fact that service industry has developed and that the demand of women to work has increased in the region.

The decrease in terrorist attacks in the Eastern and the South Eastern Anatolia in recent years has not only animated the economy, but also put forward the demands of families, especially working women. Incentives for tourism, and also microfinance loans effectively implemented in this region may have intensified the demand for

women's work. This region is followed by the Eastern Anatolia region due to the same reason. Unemployment decreased and employment of women increased in TRB1 region, as well as in TR82 (Kastamonu, Çankırı, Sinop).

The increase in female employment is explained by the fact that more women have been employed in the industrial agriculture production. Especially in Malatya region, apricot production and packaging process in which women are employed definitely boosts employment. The highest increase and decrease in women employment (dwer) took place in TRC1 region (Gaziantep, Adıyaman, Kilis) with a rate of 138%, and in TR90 region (Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane) with a rate of -32 % respectively while the change in TR62 (Adana, Mersin) lies in between. As mentioned above, the increase in industrial agriculture increases female employment.

The investments made in the textile sector in this region especially in Gaziantep and Adıyaman provinces may also have increased women's employment. Again, since women's employment has been gradually increased in this region, it seems like a lot of women have been employed. The fact that employment in TR90 region is low is in fact due to very high job demands of women. Thus, the rate of labor force participation of women in this region has been quite high as 54%.

The biggest change in divorce in ten years took place in TRB2 region (Van, Muş, Bitlis, Hakkari) by 87.5 % percent, and the biggest decline was observed in TR10 (Istanbul) region with a rate of -27 %. Although Istanbul region doesn't have the highest divorce rate, it is one of the regions in which this rate is very high. However, the decrease in divorce in this region in the last decade has shown a quite high declining trend. Istanbul region has become more conservative about divorce. It is supposed that the causes of an increase of divorce up to ninety percent in TRB2 region (Van, Muş, Bitlis, Hakkari) which has one of the lowest divorce rate is a phenomenon that is worth investigating. Another indicator that should be examined is the change in

the crude fertility rate. The biggest change in fertility in ten years took place in TR42 region (Kocaeli, Sakarya, Düzce, Bolu, Yalova) by 4.5 % percent, and the biggest decline was observed in TR83 region (Samsun, Tokat, Çorum, Amasya) with a rate of -22.5 %.

On the other hand, the increase in fertility in TR42 region can be explained by that the region is geographically located in Marmara region, that it is a neighbor of Istanbul, and that there have been conservative attempts for the families for the last decade. In addition, the region is famous for its support to the economic and social policy of the current political power. Therefore, the increase in fertility can be seen as a reflection of the value that the conservative government gives to the family (Family and Social Policy Minister is a deputy of the region). Although the fertility rate in the region has increased, CDF in the region in the last decade rose as high as 53%. As can be seen from the table, just in four regions has been a decline in divorce rate in the last decade. These regions are TR10 İstanbul region, TR81 region (Zonguldak, Karabük, Bartın), TR71 region (Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir), and TR90 region (Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane) respectively. In addition to these, while TRC3 region (Mardin, Batman, Şırnak, Siirt) has the highest value-added growth with a rate of 242%, TR32 region (Aydın, Denizli, Muğla) has the lowest one with a rate of 98%.

Table 3. Percentage Changes

Regions	ΔAV	ΔUR	ΔFUR	ΔWER	ΔCDR
TR10	104.37	-9.68	-0.67	58.03	-29.61
TR21	129.33	13.64	40.00	5.29	20.55
TR22	140.92	-7.69	1.41	10.51	14.84
TR31	109.14	-1.91	11.39	70.48	18.64
TR32	98.35	-10.39	-15.15	3.71	23.85
TR33	148.97	-28.95	5.00	36.94	5.27

TR41	110.85	-24.73	-6.48	8.48	51.01
TR42	116.97	-22.83	14.75	110.84	52.93
TR51	116.35	-33.33	-31.65	37.02	30.35
TR52	142.20	-47.19	-20.00	56.40	7.48
TR61	109.36	12.86	29.49	26.52	47.55
TR62	135.62	-14.09	-9.84	75.74	27.62
TR63	141.83	-29.89	-32.77	53.46	10.08
TR71	151.82	-36.27	7.14	26.13	-4.29
TR72	145.65	-3.03	3.70	137.90	7.85
TR81	115.05	-39.34	28.57	47.35	-18.86
TR82	105.90	-40.19	-19.81	123.29	5.65
TR83	146.97	4.84	53.70	-14.25	7.91
TR90	147.31	-1.45	1.96	-32.22	-4.83
TRA1	167.40	83.33	114.29	-27.76	26.59
TRA2	153.63	272.22	333.33	62.87	16.66
TRB1	152.92	-59.90	-60.98	98.95	13.28
TRB2	150.80	0.00	91.67	90.65	87.51
TRC1	142.47	-51.66	-14.61	138.55	24.48
TRC2	139.03	48.31	69.86	18.75	10.80
TRC3	241.74	245.90	1654.55	-31.68	59.43

Regions	ΔTPOPULA	ΔMARRIAGE	ΔDIVORCE	ΔFERTILITY	ΔCFR
TR10	16.45	24.92	43.21	15	-1.01
TR21	15.48	3.98	39.22	22	5.71
TR22	9.66	-8.83	25.93	3	-5.85
TR31	13.21	8.40	34.31	13	-0.05
TR32	13.26	-3.40	40.28	4	-7.75
TR33	6.63	-16.43	12.25	-2	-8.36
TR41	15.52	6.83	74.45	16	0.41
TR42	17.05	4.41	79.00	22	4.52
TR51	17.49	14.12	53.15	16	-1.42

TR52	10.65	-13.65	18.92	-1	-10.57
TR61	18.71	14.99	75.15	18	-0.74
TR62	11.73	-1.97	42.58	8	-2.91
TR63	12.95	-9.89	24.33	3	-9.01
TR71	7.12	-28.32	2.52	-12	-18.03
TR72	8.27	-24.78	16.76	-10	-16.63
TR81	6.06	-25.42	-13.94	-16	-20.49
TR82	7.52	-33.19	13.59	-9	-15.15
TR83	5.29	-25.36	13.63	-18	-22.51
TR90	8.09	-16.94	2.87	-11	-17.88
TRA1	5.37	-20.38	33.39	-16	-20.58
TRA2	7.23	-18.50	25.10	-7	-13.23
TRB1	10.64	-17.99	25.33	-11	-19.62
TRB2	12.32	-9.24	110.61	-9	-18.57
TRC1	17.74	7.85	46.57	16	-1.34
TRC2	18.81	-5.93	31.63	12	-5.79
TRC3	14.43	-7.49	82.43	-3	-15.38

3.7. Panel Regression Analysis

Panel regression analysis with 26 sub-regions and 10 years was applied in order to analyze the factors determining the regional differences between crude divorce rates. Nine independent variables consisting of economic and social indicators were used in the model.
Panel regression equation in vector form is as follows;

$$y_{it}=\alpha+X'_{it}\beta+u_{it}$$

In the equation values of i, t, and α represent the horizontal section (i=1…..N), the time (t=1…..T), and a scalar respectively. β gives Kx1 vector, and X_{it} gives itth observation of K explanatory variables (Baltagi, 2008).

The variables in the model were women's labor force participation rate (FER), the crude birth rate (CFR), the Female unemployment rate (FUR), the total unemployment rate (UR), gross added value per capi-

ta (AV), sectoral interests in regional Gross Added Value. Agriculture sector is represented with (AC), the industrial sector with (PR), and services industry with (SR). It was determined that the best estimation model was panel fixed effects with the help of the Hausman Test. The model is significant at the level of 1% significance in the estimates, and R^2 is around 85%. It is seen that CDR and UR of independent variables are significant at 5% and 1% significance levels respectively.

Table 4. Panel Regression Dependent Variable: FER

Dependent Variable: FER				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CDR	6.770388**	2.698441	2.509000	0.0128
CFR	-0.264784	0.403833	-0.655676	0.5127
UR	-0.528974***	0.197650	-2.676316	0.0080
FUR	0.035691	0.164200	0.217361	0.8281
LNINC	1.213577	3.462855	0.350456	0.7263
AV	0.095364	0.079938	1.192966	0.2341
AC	0.660244*	0.345627	1.910281	0.0574
PR	-0.139521	0.474827	-0.293835	0.7692
SR	-0.257489	0.455182	-0.565682	0.5722
C	10.95149	34.17944	0.320412	0.7490
Effects Specification				
Cross-Section Fixed (Dummy Variables)				
R-squared	0.853476	Mean dependent var		26.61731
Adjusted R-squared	0.831335	S.D. dependent var		9.914778
S.E. of regression	4.071883	Akaike info criterion		5.770738
Sum squared resid	3730.553	Schwarz criterion		6.250060
Log likelihood	-715.1959	Hannan-Quinn criter.		5.963432
F-statistic	38.54675	Durbin-Watson stat		0.798079
Prob(F-statistic)	0.000000			
Correlated Random Effects - Hausman Test				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		19.590804	9	0.0206

(***) p≤0.01, (**) p≤0.05, (*) p≤0.10

Panel regression estimation suggest that FER has positive relationship with CDR and negative relationship with UR and these statisti-

cally meaningful results coincide with the theoretical assumptions. AC variable indicating the added value of agriculture is significant at 10 % significance level with the participation of women in the labor force. It is known that women are frequently employed at such works as hoeing, picking, and packing in the agricultural sector of Turkey. It is expected that the added value of agricultural sector has an influence on the employment of women.

3.8. Granger Causality (Pairwise Granger Causality Tests)

The causality relationships between the rate of women's participation in the labor force and the other variables in the model in each region were analyzed through Granger Causality Test developed by Granger (1969). The causality relationships between the rate of women's participation in the labor force and the other variables were discussed at two different planes which are the Individual Granger Causality and the Panel Granger Causality (lag=4). Each region is discussed one by one in the Individual Granger Causality analysis. The causality relationship in this analysis is as: "X_i *does not Granger Cause FER***"** or "*FER does not Granger Cause* X_i".

H_o is hypothesized as; Y is not the Granger cause of X, or X is not the Granger cause of Y. Ho is hypothesized as; Y is not the Granger cause of X, or X is not the Granger cause of Y. In this sense, acceptance of Ho hypothesis means that there is no causality relationship between the variables.

3.9. Individual Causality and Panel Causality

Table 5 shows the causal relationship of each individual region. When the individual causality relationships are examined, it is understood that a total of 60 variables have a significant Granger causality with one another at $p \leq 0.10$ significance level. 29 of these causal relationships are as *FER does not Granger Cause* X_i, and 31 of them are as X_i *does not Granger Cause FER*. There is no causal relationship between

the variables of TR10 (Istanbul) and TR61 (Antalya, Isparta, Burdur) regions. An important point in the causal relationship: The number where FER (women's labor force participation rate) variable is Granger cause of the other variables and the number where the other variables are Granger cause of FER variable is almost the same. That is, FER variable affects, and is affected by, some variables. FER variable has a significant relationship with more than one variable especially in the two regions: In TR31 region (İzmir), FER variable has a significant Granger causality with FUR, CDR, LNINC, AV and PR variables. In TRA2 region (Ağrı, Kars, Iğdır, Ardahan), FER variable has a significant Granger causality with CDR, LNINC, AV and AC variables. In both of these regions, all of the variables that FER affects are the same except one. On the other hand, PR, LNINC, AB, and AC variables are the Granger cause of FER variable in TR21 region (Tekirdağ, Edirne, Kırklareli). In TR52 region (Konya, Karaman), SR, AC, PR, FUR variables are the Granger cause of FER variable.

Table 5. Regional causality Estimation Results

Region	FER does not Granger Cause X	X does not Granger Cause FER	F-Statistics	P
TR10	-			
TR21	FER → FUR		14.9385	0.0276
	FER → UR		17.8491	0.0216
	FER → CDR		5.8547	0.0921
		PR → FER	21.2856	0.0169
		LNINC → FER	11.2319	0.0404
		AV → FER	10.0705	0.0467
		AC → FER	9.5842	0.0498
TR22	-	AC → FER	11.2217	0.0405
		PR → FER	8.6831	0.0565
TR31	FER → FUR		5.8213	0.0927
	FER → CDR		7.9537	0.0632
	FER → LNINC		11.5127	0.0391
	FER → AV		13.7146	0.0310
	FER → PR		12.8236	0.0339
TR32	-	UR → FER	6.5337	0.0807
		AV → FER	6.9753	0.0745

Region	FER does not Granger Cause X	X does not Granger Cause FER	F-Statistics	P
TR33	FER → UR		7.9713	0.0630
		CDR → FER	18.7965	0.0201
TR41	FER → AC		12.4156	0.0354
	FER → FUR		7.8885	0.0639
		CDR → FER	7.3317	0.0700
		AV → FER	8.0310	0.0624
TR42	FER → PR		6.5512	0.0804
	FER → SR		26.2073	0.0126
TR51	FER → UR		15.1517	0.0270
		CDR → FER	17.2901	0.0226
		PR → FER	16.0531	0.0250
TR52	FER → CFR		9.2430	0.0522
		SR → FER	46.4965	0.0055
		AC → FER	16.4808	0.0241
		PR → FER	40.7865	0.0067
		FUR → FER	5.6590	0.0959
TR61				
TR62	FER → LNINC		12.7912	0.0340
		UR → FER	40.0571	0.0069
TR63	FER → FUR		6.2117	0.0858
		CFR → FER	5.7903	0.0933
TR71	FER →CDR		8.0995	0.0618
		UR→ FER	6.1387	0.0870
TR72		UR → FER	22.751	0.0154
		CFR → FER	50.0358	0.0050
		AC → FER	8.5921	0.0573
TR81	FER →FUR		9.8903	0.0478
TR82				
TR83	WER → CFR		18.1414	0.0211
		UR → FER	6.3964	0.0828
TR90	FER → UR		15.7711	0.0256
TRA1	FER → UR		15.0611	0.0273
TRA2	FER → CDR		6.9235	0.0751
	FER → LNINC		17.7219	0.0218
	FER → AV		28.3376	0.0113
	FER → AC		8.7260	0.0562
		CFR → FER	17.5733	0.0221
TRB1	FER → UR		6.1994	0.0860
TRB2		AV → FER	7.7990	0.0648
		AC → FER	8.3423	0.0595
TRC1	FER → CFR		6.2421	0.0853
		AV → FER	7.7256	0.0656
TRC2	FER → CFR		28.8260	0.0110
		LNINC → FER	7.0541	0.0734
		AV → FER	9.5005	0.0504
TRC3		CFR → FER	17.7641	0.0217
All Regions	FER → UR		14.5162	1.E-06
	FER → FUR		2.5194	0.0830
		FUR → FER	2.7025	0.0695

Region	FER does not Granger Cause X	X does not Granger Cause FER	F-Statistics	P
		AV → FER	3.6573	0.0275
		CFR → FER	7.6772	0.0006
		LNINC → FER	6.7393	0.0015
		CDR → FER	3.5848	0.0295

TR2 (Tekirdağ, Edirne, Kırklareli) is the region where the most intense causal relationship is. While the causal effect of FER variable on FUR, UR, and CDR variables was found to be significant, there is a significant causal effect of PR, LNINC, AV, and AC variables on FER variable. Attention must be paid to that none of these relationships is bidirectional. The regions TR31 (İzmir), TR42 (Kocaeli, Sakarya, Düzce, Bolu, Yalova), TRB1 (Malatya, Elazığ, Bingöl, Tunceli) are the regions where women's labor force participation rate has unilateral causal relationships. On the other hand, the only variables affecting the participation of women in the labor force is unilaterally located in the regions TRC3 (Mardin, Batman, Şırnak, Siirt), TR72 (Kayseri, Sivas, Yozgat), TR22 (Balıkesir, Çanakkale), and TRB2 (Van, Muş, Bitlis, Hakkari).

FER has causality only with UR and FUR across the country when Granger causality is analyzed in Turkey-wide, which seems to be reasonable. Besides, FUR, AV, CFR , LNINC, and CDR variables are Granger cause of FER. The fact that FUR and UR The fact that five variables are the Granger cause of FER indicates that there is significant bidirectional causality between FUR and FER.

Discussion and Conclusion

Divorce and the reasons that may cause divorce in Turkey which is separated into 26 regions in NUTS Level 2 were investigated. This study which covered the term between 2004 and 2013, the period after the adoption of the new Civil Code which includes unilateral divorce law, examined the relationship between women's labor force participation and divorce from different perspectives. The crude divorce rate

in Turkey has increased from 0.52 to 1.32 per thousand in a year after the entry into force of the unilateral divorce law. That is, it is clear that some variables trigger divorce easily as a result of the ease of divorce. The rate of participation of women in the labor force (FER), the crude birth rate (CFR), Female unemployment rate (FUR), the total unemployment rate (UR), the logarithm of income per capita (lnınc), Gross Value Added per capita (AV), sectoral shares in Regional Gross Added Values are the independent variables in the model of the study. Agriculture sector is represented with (AC), the industrial sector with (PR), and services industry with (SR). It is found that both divorce rate and the rate of women's participation in the labor force are low in the Level 2 regions geographically located in the Eastern and the South Eastern Anatolia.

It is interesting that there is a 17-fold difference, a 22-fold difference between the minimum and maximum of the women's labor force participation rates and of the crude divorce rate respectively. The difference between the maximum and minimum of income per capita (log) is more than 9 fold. Similarly, the difference between the maximum and the minimum of women unemployment is 30 fold. The maximum value of the SR variable is 53-fold greater than it's minimum value, and the maximum value of the SR variable is 95-fold greater than its minimum value. That is, economic income disparity is far beyond the social one across Turkey. The rude divorce rate and the crude fertility rate are inversely proportional. While the crude divorce in TR31 Izmir Region has the highest rate, TRB2 Van region has the lowest divorce rate. TRB2 region which has the lowest divorce rate is one of the regions having the lowest added value to the economy, and it is located in the South Eastern Anatolia region where ethnically Kurdish people are dense. Istanbul has the highest added value among the regions in terms of economic indicators.

On a regional basis, the women's participation in the labor force is significantly positively correlated with the income per capita, the

crude divorce rate, and the added value. The increase in the female employment can be explained by that more women have been employed in the industrial agriculture production. The highest increase and decrease in women employment (dwer) took place in TRC1 region (Gaziantep, Adıyaman, Kilis), and in TR90 region (Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane) respectively. The biggest change in divorce in the decade took place in TRB2 region (Van, Muş, Bitlis, Hakkari) by 87.5 % percent, and the biggest decline was observed in TR10 (Istanbul) region with a rate of -27 %. Istanbul region has become more conservative about divorce.

When regional causality relationships are analyzed it becomes clear that a total of 60 variables have a significant Granger causality with one another. There is no causal relationship between the variables of TR10 (Istanbul) and TR61 (Antalya, Isparta, Burdur) regions. In TR31 region (İzmir), FER variable has a significant Granger causality with FUR, CDR, LNINC, AV and PR variables. FER has causality only with UR and FUR across the country when Granger causality is analyzed in Turkey-wide.

FER as the dependent variable in panel regression analysis, it was found that CDR and UR from the independent variables carry significant positive and negative values respectively. FER has positive and meaningful relationship with CDR and negative and meaningful relationship with UR as a result of panel regression estimation. These results coincide with the theoretical assumptions. On a regional basis across Turkey, the crude divorce rate and the rate of women's participation in the labor force are high in the coastal Western and the South Western Anatolia regions where economic added value is high, and service industry and bureaucracy are dense. However, both crude divorce rate and the rate of women's participation in the labor force are low in the Eastern and the South Eastern regions where economic added value is low, and where ethnically Kurdish people live.

Although TR10 Istanbul Region hosting almost one-fifth of Tur-

key's population has the highest economic added value, is not on the frontiers in terms of neither divorce nor fertility rate. The 27% decline of divorce rate in Istanbul within the last decade is also noteworthy. It attracts attention that although the added value and the women's participation in the labor force are high, the divorce rate is relatively low. On the other hand, the divorce rate has risen up to 90% in TRB2 region (Van, Muş, Bitlis, Hakkari) where the divorce rate is the lowest of all Turkey is a phenomenon that needs explanation. It can be said that the last two issues overlaps that Göksel (2013) and Carkoglu and Kalaycioglu (2009) claimed about women's participation in the labor force and women status.

Conflict of Interest: The authors declare that they have no conflict of interest.

Özet: Bu çalışmada Türkiye'de 2004-20013 yılları arasındaki bölgesel boşanma seyri ve kadınların işgücüne katılmaları arasındaki ilişki incelenmektedir. Kadınların işgücüne katılımında Trabzon en yüksek orana sahip bölgede yer almakta iken Mardin bu oranın en düşük olduğu bölgede yer bulunmaktadır. Kişi başına düşen gelir, kaba boşanma oranı ve katma değer ile kadınların işgücüne katılma oranları arasında anlamlı bir korelasyon ilişkisi tespit edilmiştir. Panel regresyon analizi sonuçlarına göre boşanma ile kadınların işgücüne katılması arasında anlamlı bir ilişki vardır. Diğer taraftan, boşanma ile kadınların işgücüne katılmaları arasında çift yönlü bir nedenselliğin varlığı da tespit edilmiştir.

Anahtar Kelimeler: Türkiye, Kadınların İşgücüne Katılımı, Boşanma, Panel Regresyon, Nedensellik.

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