

**ECONOMIC DEVELOPMENT AND  
FEMALE LABOR FORCE  
PARTICIPATION IN TURKEY:  
TIME-SERIES EVIDENCE AND  
CROSS-PROVINCE ESTIMATES**

Aysit Tansel

**Working Paper 0124**

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### **Abstract**

Recently, several researchers hypothesized that the female labor force participation rate exhibits a U-shape during the process of economic development. This paper provides time series evidence on female labor force participation rates in Turkey and considers its cross-provincial determinants. Time series evidence shows that after a period of sharp decline, female labor force participation rates have exhibited a slowdown in the rate of decline recently. An upturn in this rate may be expected during the coming decades. In the cross-provincial determinants of female labor force participation the measure of development used is per capita Gross Provincial Product. A quadratic term in per capita Gross Provincial Product and other determinants are included in the models estimated. The models are estimated using data for 67 provinces for three time points: 1980, 1985 and 1990. The results affirm the U-shaped impact of economic development. Further, unemployment had a considerable discouraging effect on female labor force participation while the impact of education was strongly positive. The hidden unemployment computations indicate that urban female unemployment rate is underestimated and the discouraged-worker effect for women is substantial.

## 1. Introduction

The economic analysis of female labor force participation attracted considerable attention since the pioneering works of Mincer (1962) and Cain (1966)<sup>1</sup>. Female labor force participation rates increased considerably in the developed countries in recent years. In contrast, in many developing countries as well as in Turkey, the female labor force participation rates show a declining trend. In Turkey, it declined from 72 percent in 1955 to about 26 percent in 2000. This rate is very low compared to the rates in OECD countries<sup>2</sup>. There are also large differences in female participation rates in rural and urban areas. Female labor force participation rate was about 17 percent in urban areas and 39 per cent in rural areas in 2000. The urban rate was very low by international comparisons. Further, there is significant variation in female participation rates in various regions of the country.

This paper provides time series evidence on various aspects of female labor force participation rates in Turkey. It also provides econometric estimates of the determinants of female labor force participation rates across the 67 provinces for the years 1980, 1985 and 1990. A hypothesis investigated is the relationship between female labor force participation and the level of economic development, specifically, the U-shaped hypothesis of female labor force participation. Cross-province estimates seem to validate the U-shaped hypothesis between female labor force participation and level of economic development.

Other important findings include the following. Rate of economic growth and level of female education were both found to have a strong positive effect on female labor force participation. The analysis found a negative impact of unemployment on female labor force participation. The hidden

unemployment computations indicated that urban female unemployment rate is underestimated and the discouraged-worker effect for women is substantial. The employment shares of agriculture and industry were found to have positive and negative impact respectively, on female participation rates. There were also significant regional differentials in female participation rates. The cross-province analysis was also carried out with female nonagricultural participation rates.

Women's full integration into the economy is a desirable goal for equity and efficiency considerations. The equity aspect implies that labor market participation of women will improve their relative economic position. It will also increase overall economic efficiency and improve development potentials of the country. However, the relatively low level of female labor force participation rates and the significant regional variation in these rates in Turkey are in conflict with the equity and efficiency goals. This issue requires the attention of policy makers. Labor market policies, programs and initiatives may be developed to ameliorate the situation and promote the labor market participation of women. Analysis in this paper may be useful in this respect.

This paper contains 7 sections. Section 2 highlights the time-series trends and various patterns in labor force participation rates in Turkey. Section 3 gives a brief account of the hypothesis of U-shaped impact of economic development on female labor force participation. The model, and empirical specification of the cross-provincial analysis of the female labor force participation are introduced in Section 4. Data and methodology are discussed in Section 5. Empirical results are provided in Section 6. A summary of the findings and their implications appear in the concluding Section 7.

## 2. Trends in Labor Force Participation Rates

Female labor force participation rate is defined as the ratio of the female labor force (employed and unemployed but seeking work) to the female population. This rate refers to the probability that a female works. The number of females employed includes those who are in paid employment and those who are unpaid family laborers. Women working on the family farm or business are considered economically active and thus counted in the labor force. Dixon (1982 and 1983) discusses variation in the international

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<sup>1</sup> Recent research on female labor force participation in Turkey include Kasnakoglu and Dayioglu (1996), Tunali (1997), Özar and Senesen (1998) and Dayioglu (2000).

<sup>2</sup> For instance, female labor force participation rates in 1998 were about 77 percent in Canada, 95 percent in France, 74 percent in Germany, 67 percent in Japan, 84 percent in Sweden and 77 percent in the United States (Ehrenberg and Smith, 2000: 181). Several researchers investigated the female labor force participation in developed countries: Ben-Porath and Gronau (1985) in Israel, Columbino (1985) in Italy, Franz (1985) in Germany, Iglesias and Riboud (1985) in Spain, Riboud (1985) in France and Shimada and Higuchi (1985) in Japan studied this issue.

statistics in this regard and measurement conventions. Beneria (1981) discusses the conceptual ambiguity in the measures of labor force activity of women, particularly those that occur within the family. In the Turkish statistics unpaid family workers are counted as employed.

The labor force participation rates have been declining over time in Turkey. As it is observed in Table 1 and Figure 1, men's labor force participation declined from about 95 percent in 1955 to about 73 percent in 2000. Similarly, female labor force participation also declined since the mid 1950s. It was 72 percent in 1955 and declined to about 26 percent in 2000. Female labor force participation is lower than that of males'. It is one of the lowest among the OECD countries. The decline since the mid 1950s has been faster in the case of women's participation rates than in the case of men's.

### ***1.1 Rural-Urban Differences***

Table 2 and Figure 2 give an idea about the differences in the rural and urban participation rates during 1988-2000. Rural participation rates are observed to be higher than the urban participation rates. Highest participation rates are for rural men and the lowest participation rates are for urban women. The participation rates for rural men, urban men and rural women declined by about ten percentage points during the past decade while for urban women they remained about the same. Urban women's participation rate at about 17 percent during the past decade is exceptionally low by international standards.

### ***1.2 Reasons for the Recent Declining Trends***

There are several reasons for the declining trends in the labor force participation rates in Turkey. First of all, recently, younger populations have been staying in school longer. Recent increases in enrollment rates at all levels of schooling (Tansel, 2002), as well as the 1997 law which extended the compulsory schooling from five to eight years have caused a delay in the entry into the labor market. This contributes to the declining trends in the participation rates of the young.

Second, the changing composition of the labor force away from agriculture towards nonagricultural activities is another reason for the declining participation rates. As discussed in Section 2.1, both female and male

participation rates are higher in rural than in urban areas. In rural areas, men are usually self-employed, small proprietors in agriculture while women are largely unpaid family workers. When women migrate into urban areas they drop out of the labor force and concern themselves with household work. This is due to cultural values working against their participation in market work, their lack of education and marketable skills as well as due to the unfavorable labor market conditions. They are often considered to represent hidden unemployment.

Third, the early retirement scheme introduced in the early 1980s is another factor that contributed to the declining participation rates. According to these institutional arrangements women after 20 years of service or at age 50 and men after 25 years of service or at age 55 were eligible for retirement<sup>3</sup>. This contributed to lower participation rates of the middle to older age groups.

### ***1.3 Differences by Educational Attainment***

Table 3 and Figure 3 give an idea about the labor force participation rates by educational attainment. For women participation rates increase sharply at the level of education above middle school and vocational middle school, and the highest rates are achieved at the university level. For men the highest participation rates are at the primary school level and the university level. The gender differences are smallest at the university level.

Table 4 and Figure 4 show the participation of men and women by educational attainment and urban-rural division in 2000. Participation rates of the urban men and women with the basic education level are low in particular, possibly because they continue for further education. The participation rates of urban women are very low, less than ten percent for the illiterates and the literates without a diploma in contrast to almost 40 percent participation rates of the rural women who are illiterate and literate without a diploma. Participation rates of urban women increase sharply with the vocational high school diploma and a tertiary level education. This indicates the importance of educational attainment in increasing the labor force participation, in particular of women. This is also demonstrated by

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<sup>3</sup> This has changed, and longer years of service and a higher age limit were introduced in 2001. This change is expected to increase participation around the 50 years age bracket.

individual level studies (Tansel, 1994 and 1996). In rural areas, education has little impact on labor force participation (except at the university level) since most women are unpaid family workers while in urban areas female participation is responsive to different levels of education. At the university level, participation rates do not differ much by gender where the rates are highest for both men and women.

#### ***1.4 Differences by Age***

Table 5 shows the labor force participation rates by age groups. Figures 4 and 5 show the participation rates for selected years for men and women respectively. For men, participation rates increase by age, reach a peak around the ages of 25-45 and decline thereafter. The pattern is somewhat different for women as observed in Figure 5. For women, labor force participation rates rise during the 15 to 25 age interval and decline afterwards due to family formation. After the age of 25, they remain either constant or show a mild increase during the ages 35-39 and decline after the ages 50-54. The Figures 4 and 5 show that for both men and women the age profiles have shifted downwards (a larger shift-down for women) over the past decade. However, the patterns changed very little over time. The shift-down is larger for the young and old age groups because of longer years of schooling and earlier retirement (Bulutay, 1995).

Figure 7 shows the labor force participation rates in 2000 by age, gender and rural-urban division. The highest participation rates are for urban men for the 25-44 age group. The highest rates are observed for the rural men at young and older ages. In particular, elderly rural men remain active in high proportions. For the urban men, more or less, an inverse-U shaped age profile is observed. For rural women there is a clear indication that participation rate has a mild M-shape age profile with participation rate remaining high until the age of 60. Lowest participation rates are observed for urban women. For urban women the age profile of participation shows a continuous decline after the 20-24 age group.

#### ***1.5 Differences by Marital Status***

Table 6 shows the female and male labor force participation rates by marital status. Highest participation rates are observed for married men and lowest participation rates are observed for widowed women. The participation

profiles by marital status have shifted downwards over the past decade for both men and women.

Figure 8 shows female and male participation rates by marital status in 2000. Rural and urban married men have the highest participation rates at about 80 percent. Urban married women have a very low participation rate, about 13 percent. In contrast, rural married women have a participation rate at about 41 percent. This shows the significant rural-urban differences in the participation rates of married women. The very low participation rate of urban married women is behind the low participation rates of urban women generally. An age profile for married women could not be made due to the non-availability of data. Although a high proportion of women 15 years and older are married, it would have shown a decrease in child-rearing periods.

The participation rates of widows are the lowest for both men and women, and both on the rural and urban levels. This may possibly be due to the fact that a high proportion of the widows are elderly persons, and thus have reduced participation rates. Divorced urban women show a relatively high participation rate possibly because this group may need to support family and children.

#### ***1.6 Employment by Sector of Economic Activity and Employment Status***

Table 7 gives the distribution of employment by sector of economic activity for men and women. Agricultural employment constituted about 71 percent of men's employment, and about 96 percent of women's employment in 1955. These percentages declined to about 26 and 59 respectively, in 2000. Thus, agriculture continues to dominate the employment scene until today especially for women, while its importance for men declined significantly during the past four decades. Although agriculture accounts for a large portion of employment, labor productivity in agriculture is very low, almost one-fifth of that in manufacturing.

Employment in industry constituted about 11 percent of men's employment and about two percent of women's employment in 1955. These percentages increased to about 28 percent for men and 14 percent for women in 2000. The import substitution policies followed before the 1980s contributed to the increase in employment in manufacturing. The export promotion strategy adopted after 1980 contributed to the increase in labor productivity in manufacturing, as well as to an increase in female employment in light

manufacturing. This was true also in those countries that have pursued export-led industrialization strategy (Standing, 1989 and 1999).

The employment in services constituted about 18 percent of men's employment and 1.54 percent of women's employment in 1955. In 2000, about 45 percent of men's employment and 27 percent of women's employment were in the service sector. Service sector employment grew rather rapidly over time and became the largest employing sector for men and the second largest employing sector for women after agriculture in 2000. We can conclude that the sectors women work at are different than those of men.

The employment status of men and women differ markedly also. The distribution by employment status is given in Table 8. Among the urban men and women the largest proportions of men and women are in regular and casual paid employment, about 70 and 80 percent respectively. In contrast, among rural men the largest proportion is self-employed, almost 50 percent. Among rural women, 77 percent are unpaid family workers. This high proportion of unpaid family workers among rural women, although declining over time, is especially striking.

## **2. The Hypothesis of a U-Shaped Impact of Economic Development on Female Labor Force Participation**

Several researchers have alluded to a U-shaped, long-term relationship between female labor force participation rate and economic development. Goldin (1995), Durand (1975), Psacharopoulos and Tzannatos (1989), Schultz (1990; 1991), Pampel and Tanaka (1986) and finally Kottis (1990) are among these.

The U-shape is hypothesized to occur as follows. At low levels of income when agriculture is the dominant form of economic activity, women participate in the labor force in large numbers often as unpaid family workers on the family farm or business. During the process of development, economic activity shifts from home-based production to market oriented activities. Family production for own use diminishes, and consumption goods are produced outside the family in specialized enterprises (Boserup, 1990). The expansion of markets or the introduction of new technology may contribute to a rise in incomes. As incomes rise, women's labor force participation rate falls. Increased mechanization in agriculture reduces

employment opportunities for both men and women, but more so for women. A reduction in the relative price of home produced goods, as well as a decline in the demand for women's labor in agriculture may also play a role. Social custom or employer preference may hinder women's employment in manufacturing. In the growing industrial and service sectors women may not be able to compete with men because of their lower educational attainment. They are also held back by tradition, culture and household responsibilities. There may be discouraged worker effect also. As women's education improve and as their wages relative to the price of goods rise, their labor force participation rises as in the rising portion of the U-shaped curve. Expansion of the tertiary sector increases the demand for women's labor.

Income and substitution effects are hypothesized to operate during this process. The income effect is the change in labor supply as a result of a change in household income. The own-substitution effect is the change in the labor supply of individuals with respect to a change in their wage, holding income constant. The declining portion of the U-shaped curve suggests that a strong income effect dominates a small own-substitution effect. In the rising portion of the U-shaped curve the substitution effect of higher wages (away from home to market activities), dominates the small income effect. Mincer (1962), Killingsworth and Heckman (1986) and Goldin (1995) provide a theoretical exposition of these stages.

Evidence for the U-shaped pattern of the female labor force participation rate is based on both the historical experience of developed countries and the studies on cross-country data. For instance, in the United States, female labor force participation fell during the initial stages of economic growth, and began to rise thereafter exhibiting a U-shaped pattern (Goldin, 1995). Similarly, cross-country data show that high-income and low-income countries have the highest female labor force participation rates while middle-income countries have the lowest female labor force participation rates (Pampel and Tanaka, 1986; Psacharopoulos and Tzannatos, 1989; Mincer, 1985) contends that the U-shaped trends in aggregate female labor force participation rates take a long time to materialize. Hill (1983) also analyzed such trends. For the countries on the left arm of the U-shape, a significant share of gross domestic product (GDP) is generated in the agricultural sector and a great share of the labor force is engaged in

agricultural activities. For the countries on the right arm of the U-shape, agriculture constitutes a low share of GDP, and the share of the labor force in agriculture is small, while the industrial activities are predominant. Boserup (1970) argued that industrialization marginalized women in the sense of hindering their participation in wage work. This is consistent with the U-shaped pattern of female labor force participation over the course of development.

Not all researchers agree on a U-shaped pattern for the female labor force participation during the course of economic development. Durand (1975) concludes that although initially female participation in agriculture diminishes with economic development, the hypothesis of U-shape is not a general pattern of female participation rates in developing countries. Standing (1978) argues that the determinants of female labor force participation are too complex to be suitably described by the U-shaped hypothesis. Steel (1981) finds that Ghana's experience in the 1960s as its economy modernized does not confirm the U-shaped model in the female labor force participation. Female labor force participation rose instead of falling with the rapid growth of manufacturing employment.

Schultz (1991) emphasized that employment should be separated into wage worker, unpaid family worker and self-employed categories, based on the cross-country data he was using. He found that the U-shaped relationship cannot then be observed for any one category. The participation rate as wage worker was more or less constant and rose eventually in the later stages of economic development. The participation rates as unpaid family worker and as self-employed showed decreasing trends with economic development, while the total participation of females suggested a U-shaped pattern. Schultz concluded that the changes in the sectoral composition of the labor force traces out the U-shaped relationship between female labor force participation rate and economic development.

### 3. The Model and the Empirical Specification

According to the theory of allocation of time exposed by Becker (1965, 1991), Gronau (1977), Heckman (1978) and Killingsworth (1983), the labor force participation decision of a woman is the result of a joint decision-making process of her household. The household maximizes a combined utility function subject to the constraints they face to determine the times

allocated to home work, market work and leisure for the individuals. Thus, the time allocated to market work will depend on a number of personal and household characteristics, as well as labor market characteristics. The labor market conditions determine the costs of a job search and the remunerations of the market work. Accordingly, the following model is posited:

$$\text{Female Participation Rate}_i = X_i \beta + Z_i \mu + U_i$$

Where  $X_i$  is a vector of variables representing personal and household characteristics. Personal characteristics include cultural determinants also such as religion and patriarchal ideology.  $Z_i$  is a vector of variables representing the labor market conditions.  $U_i$  is the zero mean and constant variance disturbance term.

The most important personal variable influencing the female labor force participation rate is the level of education of a women. At the provincial level used in this study education will be proxied by a provincial indicator of the educational level. Several alternative indicators are used such as the proportion of high school graduates in the female population; female high school enrollment rate; female mean years of schooling and female illiteracy rate.

Theoretically, the effect of education on female labor force participation is ambiguous. We can differentiate between the effect of education on the decision to participate in the labor market and on the decision of how much time to spend in the labor market. Education has a positive effect on the decision to participate in the labor market for two reasons. First, if education is considered as an investment in human capital then the recipient has to work in order to recover the cost of education. Second, if education is considered a consumption activity, the recipient will be induced to work because of higher earning potential since the opportunity cost of not working is higher.

The effect of education on women's duration of work depends on the relative strength of two forces: the substitution effect and the income effect. First, education increases potential earnings and therefore the cost of not working. This will increase the duration of work. Thus, it is a positive effect. Second, as a result of higher earnings, income target is achieved sooner. Part of the higher income then could be allocated to consume more



leisure and less work. The net effect of education depends on which force dominates.

Empirical studies at the individual level show that in a number of countries, the substitution effect is stronger than the income effect; as a result educated females have higher labor force participation. The cross-country study by Psacharopoulos and Tzannatos (1991) find that education has a positive effect on female labor force participation. Empirical evidence on the effect of education on female labor force participation in Turkey also shows a positive effect, which is larger at higher education levels. (Tansel, 1994; 1996). Some researchers suggested that the effect of education on female labor force participation depends on the stage of development of the country. Smith and Ward (1985) found that in the United States in 1900 the association between education and female participation was negative. Kottis (1990) found a similar result in Greece in 1971 and 1981.

The second important personal variable is female and male wages. Economic theory posits that the effect of female wages on female labor force participation depends on the relative strengths of substitution and income effects. The substitution effect will be positive since higher female wages will mean more female labor force participation. The income effect will be negative since as income rises workers desire more leisure and less work. Assuming that the income effect is small, the overall effect of female wages on female labor force participation will be positive. On the other hand male wages are expected to have a negative influence on female labor force participation since the higher the wages of the husbands, the less it is likely that the wives need to work. At the provincial level in Turkey female and male wages existed for 1990 but not for 1980 and 1985. Further, they were not reliable since they were averages for those workers who were covered by the Social Security Institution who represented a small portion of the population. For this reason real average female and male wages were not included in this study<sup>4</sup>.

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<sup>4</sup> An important personal-demographic determinant of female labor supply is fertility. Fertility is usually assumed exogenous in the labor supply equations (for example, Ward and Pampel, 1985). However, this is not a tenable assumption. Inclusion of the fertility rate among the determinants of the female labor force participation may give biased coefficient estimates (Rosenzweig and Wolpin, 1980). Here, I recognize the simultaneous nature of fertility and

One of the variables that were used to describe local labor market conditions was the provincial unemployment rate. The effect of the unemployment rate on female labor force participation is ambiguous depending on the relative strengths of “discouraged-worker effect” and the “added-worker effect”. The provincial unemployment affects the probability that women entering the labor market will find a job. The higher the provincial unemployment rate, the less likely will it be for a woman to find a job. Economic and psychological costs associated with job search will be higher when the local unemployment rate is high. For these reasons, women may be discouraged from looking for a job and drop out of the labor force. Therefore, the discouraged-worker hypothesis implies a negative effect of the local unemployment on female labor force participation.

According to the added-worker hypothesis when men lose their jobs with a rise in local unemployment rate, wives might enter the labor force in order to compensate for the loss in the family income. The added-worker hypothesis implies a positive effect of the local unemployment on the female labor force participation. However due to paucity of jobs for women, the added-worker effect is expected to be small. Therefore, the discouraged-worker effect is likely to dominate the added-worker effect producing a negative effect of local unemployment on female labor force participation. Two measures of local unemployment are used in this study. One is the provincial female unemployment rate and the other is the provincial male unemployment rate.

Another important factor describing local labor market conditions and employment opportunities is the local industrial composition. The importance of this factor is emphasized by King (1978). At the provincial level local industrial composition is approximated by the percentages of the provincial employment in agriculture, industry and the service sector. The service sector was the base sector. The effect of these sectors on female labor force participation will depend on their importance as employer of women. Agriculture has traditionally been the sector where women participate in high rates. Even today women’s employment is concentrated

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female labor supply and do not condition on fertility. Some researchers included a number of other factors as determinants of female labor supply such as an indicator of income distribution (Semyonow, 1980). This approach is not followed here.

in agriculture. Therefore, we expect a positive effect of the size of the agricultural sector on female labor force participation. The impact of the industrial sector on female labor force participation could be positive or negative.

The growth rate in the per capita Gross Provincial Product (GPP) is taken as an overall measure of the general economic conditions in a province. Faster economic growth means greater availability of jobs and thus higher female labor force participation. Conversely, contraction of the economy reduces the work opportunities and the female labor force participation (Standing, 1978). Therefore, we expect a positive impact of per capita GPP growth rate on female labor force participation.

The degree of urbanization of a province gives an idea about spatial accessibility of jobs. This is proxied by the urban share of the population of a province. In urban areas there may be more paid employment opportunities than in rural areas. Thus, the higher the proportion of the population living in urban areas, the higher the female labor force participation will be. However, in the case of Turkey, most women in rural areas participate in the labor force in large numbers in agriculture as unpaid family workers. Thus, if a province has a large rural population, the female labor force participation may be high. This implies a negative sign for the impact of urban share of a province on the female labor force participation. The net effect of urban share can be empirically determined.

#### **4. The Data and Estimation Methodology**

The data are panel data on the 67 provinces of Turkey, in 1980, 1985 and 1990. There were 67 provinces in 1980 and 1985 but the number of provinces had increased by 1990. The newly created provinces in 1990 are adjusted by adding the data for the new provinces back to their old provinces so that there are 67 provinces in 1990 also. The data are compiled from the 1980, 1985 and 1990 Population Census results. The most recent census after 1990 was conducted in 2000. However, the results of this census were not available for this study. Variable definitions and data sources are given in the Appendix A.

The models for the female labor force participation and female nonagricultural labor force participation are estimated by the method of Ordinary Least Squares (OLS). The data are pooled for the 67 provinces for

the three years. The models included dummy variables for the seven regions of the country in order to capture the cultural differences that might influence the female labor force participation. Marmara was the base region. The provinces which are included in each region are shown in Appendix B. The models also included dummy variables for the three years; 1980 was the base year. With the inclusion of the regional dummy and time dummy variables, the OLS estimation is a kind of fixed-effects estimation. Including region specific and time specific dummy variables controls for unmeasured variables that are constant overtime but vary across regions, or that are constant across regions but vary over time.

In testing the U-shaped hypothesis about the relationship between economic development and female labor force participation Pampel and Tanaka (1986) used per capita energy use as a measure of development. Psacharopoulos and Tzannatos (1989) and Goldin (1995) proxied economic development by per capita gross domestic product. In this study I used, per capita gross domestic product of a province as a measure of the level of development of that province. Gross domestic product of a province is referred to as gross provincial product (GPP). Following the previous studies I posited female labor force participation rate as a quadratic function of the logarithm of the per capita GPP. Thus, in the estimated equations both logarithm per capita GPP and its square appears. For a U-shape to hold between log per capita GPP and female labor force participation, we expect the coefficient of log per capita GPP to be negative and the coefficient of its square to be positive.

The means and standard deviations of the variables used in this study are presented in Table 9. These figures are computed for the 67 provinces in the years 1980, 1985 and 1990. A salient feature of the data is the large difference between the female labor force participation rate and the female nonagricultural labor force participation rate. The mean female nonagricultural labor force participation rate is only 4.40 percent. The mean female and male unemployment rates are low. The mean female unemployment rate is lower than the male rate. These figures are based on the Population Censuses and are much lower than the unemployment rate estimates based on the Household Labor Force Surveys. For instance, the latter estimates were 7.0 percent for females and 8.5 percent for males in 1991 (SIS, 2001: Table 2.1). There were large differences in the

unemployment rates by geographic location. Urban women face high rates of unemployment. Urban unemployment rates were 22.3 percent for females and 10.4 percent for males in 1991. Rural unemployment rates were much lower. They were 2.0 percent for females and 6.3 percent for males in 1991 (SIS, 2001: Table 2.1). Urbanization has been rather fast in Turkey. The urban population as a percentage of the total was 44 in 1980 and increased to 74 in 1999 (World Bank, 2000: 277).

## **5. Empirical Results**

### ***5.1. Results for Female Labor Force Participation***

Estimation results for female labor force participation are presented in Table 10. They are OLS estimates based on the pooled data of 67 provinces for 1980, 1985 and 1990. Poolability is tested using F statistics. The null hypothesis that the three years are from the same sample cannot be rejected. All models are overall statistically significant and have high R-squares. The results indicate that the coefficient estimate for log per capita GPP is negative and that of its square is positive in all models. The estimates are statistically significant at 1 and 5 percent levels. The results confirm a U-shaped relationship between female labor force participation and log per capita GPP which is an indicator of the level of economic development of the provinces.

The coefficient estimates for GPP growth rate are positive in all models and statistically significant at the 5 percent level in Models 1 and 4 and at the 1 percent level in Models 2 and 3. The positive coefficient indicates that the high rate of growth of output in a province increases the female labor force participation.

In order to measure the female level of education, four alternative variables are used: The percentage of females in a province who had completed high school (used in Models 1 and 2); the female high school enrollment ratio in a province (Model 3); female mean years of schooling in a province (not shown) and female illiteracy rate in a province (Model 4). The coefficient estimates on the percentage of female high school graduates are positive and statistically significant. The coefficient estimate on the female high school enrollment ratio is also positive and statistically significant. These results indicate that education increases female labor force participation. This is in accordance with the micro level evidence from Turkey (Tansel,

1994 and 1996), as well as evidence from other countries (see Psacharopoulos and Tzannatos, 1989 for a list) about the effect of education on female labor force participation. The coefficient estimate on the female mean years of schooling (not shown) was not statistically significant. In Model 4, the female illiteracy rate is used. The coefficient estimate is negative and statistically significant indicating that the higher the female illiteracy rate, the less the female labor force participation will be. In contrast, Kottis (1990) found a positive coefficient on the percentage of women who were uneducated using data on Greece in 1971 and 1981.

With regard to unemployment, two alternative measures were used: the female unemployment rate (Models 1, 3 and 4), and the male unemployment rate (Model 2). The coefficient estimates for both specifications were negative as expected and highly significant. The coefficient estimate on the female unemployment rate was larger than the coefficient estimate on the male unemployment rate indicating that the female labor force participation decision was more responsive to the female unemployment rate rather than to the male unemployment rate. However, the t-ratio of male unemployment was larger than that of the female unemployment indicating a higher level of significance. Kottis (1990) also found a negative impact of the unemployment rate on female labor force participation in Greece. The negative impact of unemployment on female labor force participation implies that the negative discouraged-worker effect dominates the positive added-worker effect. Mincer (1966) gives a summary of the studies that report a negative coefficient estimate of the unemployment rate on female labor force participation.

The coefficient estimate on urban share is negative and highly significant. An increase in the urban share of the population leads to a decrease in the female labor force participation. This implies that in provinces with a high rural population, female labor force participation may also be high because rural women participate in large numbers in agricultural activities as unpaid family workers.

In order to measure the impact of provincial industrial structure, two variables were included: one was the agricultural share which represented the percentage of provincial employment in agricultural activities and the other was the industrial share representing the percentage of provincial employment in industrial activities. The service sector was the base

category. The coefficient estimate on agricultural share is positive and highly significant in all models indicating that an increase in agricultural activities relative to the services will increase female labor force participation. The coefficient estimate on industrial share was negative and statistically significant indicating that an increase in industrial activities relative to the services decreases female labor force participation. Industrial and service sector activities are spatially concentrated in a few urban areas.

Regarding the region dummy variables, the regional differentials in female labor force participation are observed. Regional dummy variables control for broad differences in regional labor markets. Marmara was the base region. The coefficient estimates indicate that female labor force participation rates in Aegean are not statistically significantly different from those in Marmara. In the Black Sea, the female labor force participation was statistically significantly higher than in Marmara in Models 2, 3 and 4. In Mediterranean (in Models 1 and 4), in Central Anatolia, in Southeast Anatolia and in East Anatolia (except in Model 2) the female labor force participation rate was statistically significantly less than in Marmara.

Observing time dummy variables, the coefficient estimates for Dummy 1985 indicate that the female labor force participation rates in 1985 were not statistically significantly different than those for 1980. The coefficient estimates for Dummy 1990 indicate that female labor force participation rates in 1990 were statistically significantly higher than those in 1980 after controlling for all other factors.

### ***5.2. Results for Female Nonagricultural Labor Force Participation***

Table 11 presents the estimation results for female nonagricultural labor force participation rates. They are OLS estimates based on the pooled data of 67 provinces for 1980, 1985 and 1990. Poolability tests using F-statistic indicated that the null hypothesis that the three years are from the same sample cannot be rejected. All of the models are overall statistically significant, as indicated by the F-statistic, and have high R-squares.

The coefficient estimates on log per capita GPP and its square were statistically insignificant in all models. Thus, female nonagricultural labor force participation appears to be not related to the log per capita GPP in a quadratic fashion. The coefficient estimates on the GPP growth rate are all positive and statistically significant at the five percent level or better. These

indicate that an expansion of the economy during an upswing increases the female nonagricultural labor force participation. The coefficient estimates on the percent of high school graduates were positive and statistically highly significant. The alternate measure of education was the female high school enrollment ratio. Its coefficient estimate was also positive and statistically significant (Model 3). The female illiteracy rate was also used as an alternative. However, it was statistically insignificant. This result is not reported.

The coefficient estimates on female and male unemployment rates were both negative and statistically significant. The coefficient estimate on the female unemployment rate was larger than that on male unemployment rate indicating that female nonagricultural labor force participation was more responsive to the changes in female unemployment than to male unemployment. Although the coefficient estimate on male unemployment was smaller it had a higher level of significance. The coefficient estimate on urban share was not statistically significant. Therefore, it was dropped from the equation in Model 4. However, it was significantly positive when agricultural share was omitted from the equation. The high collinearity between urban share and agricultural share did not permit the examination of their separate effects.

The impact of the industrial structure of a province was examined with the employment share of the agricultural activities and the employment share of the industrial activities. The service sector was the base category. The impact of agricultural share was negative and statistically significant in all models indicating that an increase in the employment share of agricultural activities reduces the female nonagricultural labor force participation. The impact of the industrial share was positive and statistically significant only in Models 2 and 4.

The regional differentials in female nonagricultural labor force participation can be summarized as follows. The female nonagricultural labor force participation rate was higher in the Aegean (all models) and in the Mediterranean (Models 2, 3 and 4) than in Marmara. It was lower in Black Sea (Models 1 and 4), Central Anatolia (Models 1, 2 and 4), Southeast Anatolia (all models) and East Anatolia (all Models) as compared to Marmara. Time dummy variables indicated that the female nonagricultural labor force participation rates in 1985 and in 1990 did not statistically

significantly differ from those in 1980 (except for Dummy 1990 in Model 3) after controlling for the relevant factors.

### 5.3. Hidden Unemployment of Women

The regression results in Table 10 showed that the impact of female unemployment on female labor force participation was negative and highly significant. This result can be used to estimate the size of the hidden unemployment of women following Kottis (1990). It will indicate the number of women who are discouraged from participating in the labor force but would join the labor force if the labor market conditions were favorable. The following formula enables us to compute the number of additional women who would join the labor force if their unemployment decreased to the level of men's unemployment.

$$U_h = b ((U_f - U_m)/100) P_f$$

$U_h$  = Number of women hidden-unemployed.

$b$  = Regression coefficient of female unemployment rate from Table 10.

$U_f$  = Urban female unemployment rate in 1991 = 22.35.

$U_m$  = Urban male unemployment rate in 1991 = 10.45.

$P_f$  = Non institutional civilian female population of 15 years old and over in 1991 = 9 699 000.

Using the above formula, the number of hidden-unemployed females in 1991 is found to be 1 357 317 if the regression results of Model 1 is used and 865 636 if the regression results of Model 4 are used. The corresponding adjusted rates of unemployment are 59.11 percent and 50.63 percent respectively. These rates include both the reported and the hidden unemployment. If I repeat the same exercise for the year 2000, I find that the adjusted unemployment rates are 35.93 percent and 29.21 percent (for Models 1 and 4 respectively) while the reported female urban unemployment rate was 13.1 percent (State Institute of Statistics, 2001: Table 2.1). Based on these estimates we can conclude that the adjusted rate of female unemployment in urban areas was about two and a half times larger in 1991 and in 2000 than the reported rates in those years. This indicates that the female unemployment rate is underestimated, and that the discouraged-worker effect for women is substantial.

## 6. Conclusions

This paper is concerned with female labor force participation in Turkey. The paper investigates the long-term relationship between female labor force participation and the level of economic development, specifically the U-shaped hypothesis of female labor force participation. Two kinds of evidence are considered. First, the time-series evidence indicates that there has been a sharp decline in female labor force participation rates in Turkey recently. However, the data from Household Labor Force Surveys of the past decade shows that the rate of decline has slowed down. It is likely that there will be a secular upturn in female labor force participation rates during the coming decades.

The second approach to the test of the U-shaped hypothesis of female labor force participation is the estimation of a relationship between female labor force participation and a measure of the level of economic development and other determinants. This analysis was carried out pooling data for the 67 provinces of Turkey for the years 1980, 1985 and 1990. The measure of economic development used was the logarithm of the per capita Gross Provincial Product (GDP of the provinces). A linear and a quadratic term in log per capita GPP are included. The coefficients on these variables were negative and positive respectively, indicating a U-shaped relationship. Therefore, the cross-province estimates in Turkey vindicate the U-shaped hypothesis between female labor force participation and level of economic development.

Other important findings of this study relate to the determinants of female labor force participation in the cross-province analysis as follows. A high rate of economic growth was found to increase female labor force participation, possibly by increasing the work opportunities for women. Female education was found to have a strong positive effect on female labor force participation. This was in concordance with the micro-level evidence from Turkey and other countries.

Another important finding of the analysis was the negative impact of unemployment on female labor force participation. This implied a considerable discouraging effect of both female and male unemployment rates on female participation rates. The hidden unemployment computations indicated that the urban female unemployment rate is underestimated and

the discouraged-worker effect for women is substantial. The employment share of the agricultural sector was found to increase the female labor force participation as compared to the service sector, while the employment share of the industrial sector was found to decrease the female labor force participation as compared to the service sector. These imply that the agricultural sector encourages female labor force participation, since there is little contradiction between work and household responsibilities in this sector. However, in the industrial sector family responsibilities (may be) conflict(ing) with outside employment.

Significant regional differentials in female labor force participation were found. Mediterranean, Central Anatolia, Southeast Anatolia and East Anatolia had significantly lower female labor force participation rates than Marmara, while Black Sea had higher female participation rates, and the Aegean was not significantly different from Marmara.

The cross-province analysis was also carried out for female nonagricultural labor force participation rates. In this analysis it was not possible to observe the U-shaped relationship between female nonagricultural labor force participation and the level of economic development. The growth rate of output had a positive impact on female nonagricultural activities. In addition, female education influenced female nonagricultural participation positively. Unemployment had a negative impact on female nonagricultural participation. The employment share of the agricultural sector had a negative impact as compared to the service sector, while the employment share of the industrial sector was not significantly different from the service sector. As for the regional differentials, Black Sea, Central Anatolia, Southeast Anatolia and East Anatolia had significantly less female nonagricultural participation rates than Marmara. The Aegean and Mediterranean had significantly more female nonagricultural participation rates as compared to Marmara.

The policy implication of the strong link between education and female activity rates is that policy makers should concentrate on increasing female education levels. This will increase female labor force participation rates. Recently in Turkey female enrollment rates at all levels of schooling have been increasing. The recent increase in the compulsory level of schooling from five to eight years also contributed to an increase in enrollment rates.

These imply an increase in the role of women in the labor market in the coming decades.

Another policy implication is that an improvement in the unemployment rates in the labor markets will draw the discouraged workers into the labor force. Therefore, measures to decrease unemployment rates and improve labor market conditions will contribute to increasing female labor force participation.

Analysis of this paper may prove useful to the policy makers in designing labor market policies, initiatives and programs appropriate for promoting female market work.

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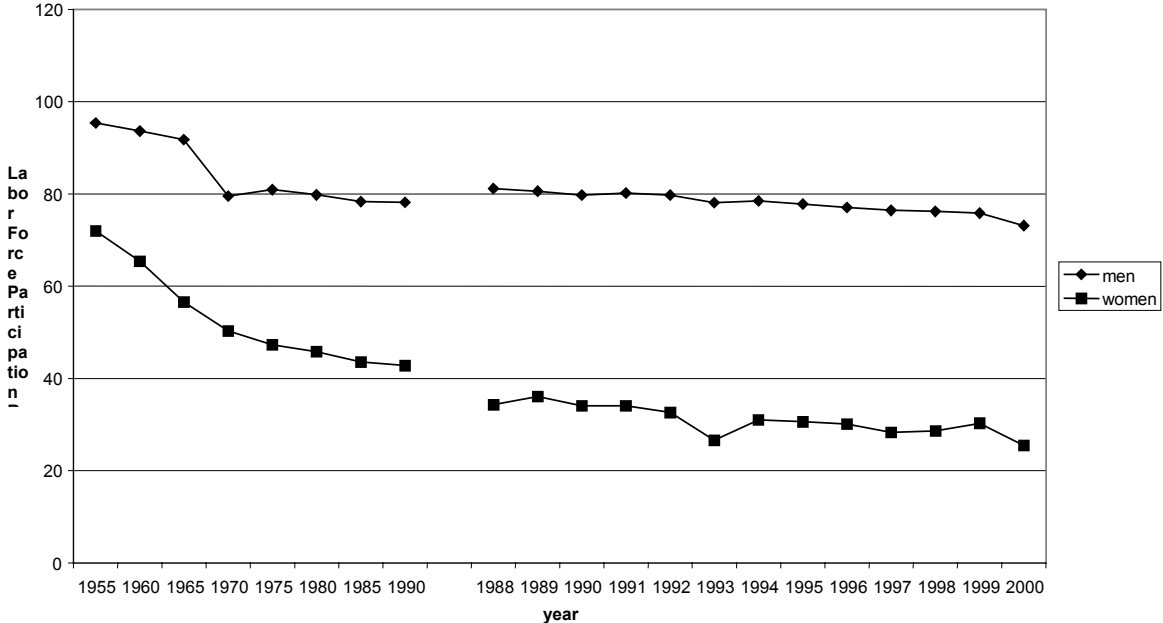
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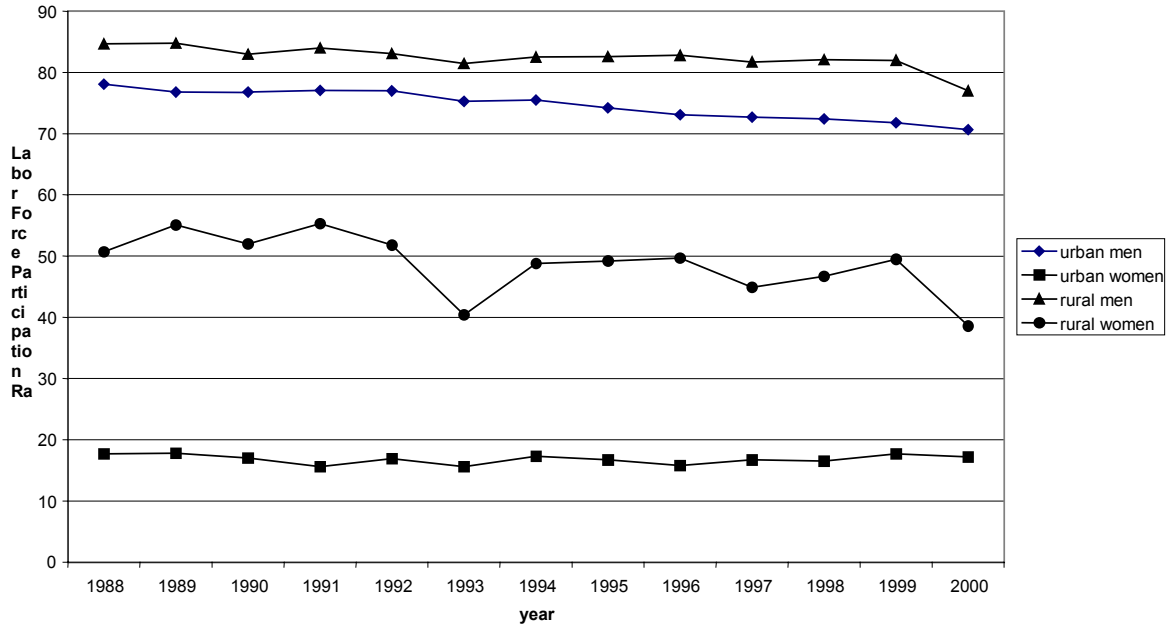


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**Figure 1: Labor Force Participation Rate By Gender**



**Figure 2: Labor Force Participation Rates by Geographic Location and Gender**



**Table 1: Labor Force Participation Rates by Gender, Turkey, 1955-2000 (%)**

Year	Men	Women
	Census of Population:	
1955	95.4	72.0
1960	93.6	65.4
1965	91.8	56.6
1970	79.5	50.3
1975	80.9	47.3
1980	79.8	45.8
1985	78.3	43.6
1990	78.2	42.8
Household Labor Force Surveys:		
1988	81.2	34.3
1989	80.6	36.1
1990	79.7	34.1
1991	80.2	34.1
1992	79.7	32.6
1993	78.1	26.6
1994	78.5	31.0
1995	77.8	30.6
1996	77.1	30.1
1997	76.4	28.3
1998	76.2	28.6
1999	75.8	30.3
2000	73.1	25.5

Notes: The Population Census figures for the years 1955-1965 include population 15 years of age and over while for 1970-1990 they include population 12 years of age and over. The Household Labor Force Survey results 1988-2000 include population 15 years of age and over. Source: 1955-1990: Census of Population, State Institute of Statistics. 1988-1990: State Institute of Statistics Website, Household Labor Force; Survey Results. 1991-2000: Household Labor Force Survey Results, 2000, Table 2.1, State Institute of Statistics.

**Table 2: Labor Force Participation Rates by Geographic Location and Gender, Turkey, 1988-2000, (%)**

Year	Urban		Rural	
	Men	Women	Men	Women
1988	78.1	17.7	84.7	50.7
1989	76.8	17.8	84.8	55.1
1990	76.8	17.0	83.0	52.0
1991	77.1	15.6	84.0	55.3
1992	77.0	16.9	83.1	51.8
1993	75.3	15.6	81.5	40.4
1994	75.5	17.3	82.5	48.8
1995	74.2	16.7	82.6	49.2
1996	73.1	15.8	82.8	49.7
1997	72.7	16.7	81.7	44.9
1998	72.4	16.5	82.1	46.7
1999	71.8	17.7	82.0	49.5
2000	70.7	17.2	77.0	38.6

Notes: The figures include population 15 years of age and over.

Source: 1988-1990 State Institute of Statistics Website. Household Labor Force Survey Results. 1991-2000 Household Labor Force Survey Results, 2000, Table 2.1, State Institute of Statistics.

**Table 3: Labor Force Participation Rates by Educational Attainment and Gender, Turkey 1988 and 2000 (%)**

Educational Attainment	1988		2000	
	Men	Women	Men	Women
Illiterate	70.5	32.3	55.6	23.2
Literate-No-Diploma	76.3	31.7	54.3	21.2
Primary School	88.9	34.3	80.7	23.6
Basic Education	-	-	13.7	7.5
Middle School	62.5	19.5	61.8	15.1
Voc-Middle School	50.5	19.6	50.2	12.2
High School	75.5	45.7	67.0	28.0
Voc-High School	82.8	52.5	78.7	42.2
University	89.5	82.5	82.9	69.6

Notes: The figures include population 15 years of age and over. The basic education category includes graduates of the eight-year basic education which is being implemented since 1997.

Source: 1988: State Institute of Statistics website. Household Labor Force Survey Results. 2000: Household Labor Force Survey Results, 2000, Table 3.2.

**Table 4: Labor Force Participation Rates by Educational Attainment, Geographic Location and Gender, Turkey, 2000 (%)**

Educational Attainment	Urban		Rural	
	Men	Women	Men	Women
Illiterate	43.5	5.3	61.1	36.1
Literate-No-Diploma	45.3	8.0	61.9	39.2
Primary School	78.4	10.9	83.5	40.1
Basic Education	7.1	2.9	34.3	29.2
Middle School	61.4	13.8	62.9	20.4
Voc-Middle School	52.6	11.0	43.1	18.3
High School	65.0	27.5	74.7	31.3
Voc-High School	77.2	40.1	84.4	54.9
University	81.9	69.2	89.8	75.0

Notes: See Table 3

Source: Household Labor Force Survey Results, 2000, Table 3.2.

**Table 5: Labor Force Participation Rates by Age Group and Gender, Turkey, 1988-2000 (%)**

Year	Age Group										
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
<b>Men</b>											
1988	64.2	87.5	97.9	98.5	98.5	95.8	89.0	82.4	71.0	58.1	33.3
1989	60.7	87.3	97.8	98.2	98.0	97.1	90.4	82.2	70.2	58.1	34.7
1990	61.8	88.0	96.8	97.9	98.2	95.9	90.4	78.7	66.8	54.8	30.8
1991	61.2	85.5	97.1	98.4	98.2	94.8	89.3	78.3	67.5	54.3	30.6
1992	56.3	86.5	97.1	98.6	97.6	95.2	88.8	78.4	67.5	56.4	31.0
1993	51.9	84.4	96.8	98.1	98.1	95.5	88.4	75.4	64.3	53.7	27.2
1994	53.9	84.9	96.7	98.0	97.8	94.8	87.7	75.4	66.2	50.8	29.8
1995	50.1	81.1	96.2	97.8	97.8	95.2	87.2	77.0	65.4	54.9	32.6
1996	49.6	80.9	96.6	97.9	97.8	95.8	84.0	73.2	62.3	52.2	33.0
1997	49.7	77.9	96.3	97.2	97.6	94.9	84.6	72.7	61.5	52.0	31.1
1998	47.6	76.4	96.0	97.7	97.7	94.5	86.0	71.8	61.7	53.9	33.3
1999	48.6	76.5	94.4	97.0	97.2	94.2	83.6	72.0	60.5	50.5	34.8
2000	45.3	72.0	90.9	94.4	95.3	93.1	82.7	68.8	57.8	47.4	32.0
<b>Women</b>											
1988	40.5	40.8	35.9	36.4	36.5	34.5	34.3	34.1	27.3	19.8	10.1
1989	41.3	41.8	37.2	39.3	39.8	38.6	36.1	34.2	31.3	25.0	10.9
1990	38.4	40.7	35.8	36.3	37.4	37.0	35.4	33.1	30.3	22.2	9.3
1991	40.0	40.9	34.4	35.8	35.7	36.1	36.0	35.4	34.3	20.7	8.5
1992	34.9	40.5	33.8	34.5	36.4	35.4	33.9	31.8	29.6	20.1	9.7
1993	28.9	33.5	29.6	28.6	30.0	28.8	27.3	24.3	20.7	15.9	6.5
1994	33.3	37.9	33.3	33.2	33.3	32.6	32.9	30.7	28.1	20.1	9.7
1995	31.9	35.9	33.8	32.8	33.4	34.4	30.6	29.6	27.4	21.4	10.8
1996	31.6	35.8	31.7	31.2	33.4	32.6	29.8	30.3	28.4	24.0	11.3
1997	27.9	35.8	30.8	29.6	30.4	30.2	29.3	26.9	27.3	21.6	10.8
1998	27.8	34.7	32.8	28.9	31.7	31.0	28.0	28.0	27.3	22.2	12.8
1999	28.5	37.8	32.3	33.0	33.8	32.7	27.1	26.9	27.3	27.6	16.6
2000	23.4	31.1	30.7	28.4	28.9	27.5	24.5	24.5	22.7	16.9	10.3

Notes: Figures include population 15 years old and over.

Source: 1988-1999: State Institute of Statistics, Website. Household Labor Force Survey Results. 2000: Household Labor Force Survey Results, 2000, Table, 3.1. State Institute of Statistics.

**Table 6: Labor Force Participation Rates by Marital Status and Gender, Turkey, 1988 - 2000 (%)**

Year	Men				Women			
	Single	Married	Divorced	Widowed	Single	Married	Divorced	Widowed
1988	91.8	86.4	81.1	30.1	47.8	32.0	41.5	16.0
1989	69.8	86.1	76.3	34.4	48.5	34.2	48.0	16.5
1990	70.7	84.5	77.1	31.3	46.6	32.5	41.7	14.4
1991	71.2	85.3	78.5	33.3	47.4	32.2	43.5	14.1
1992	69.1	85.4	70.2	32.2	44.4	30.8	45.5	14.0
1993	65.8	84.5	76.4	31.9	37.5	24.6	42.5	10.8
1994	66.7	84.5	71.8	28.0	42.2	29.1	39.4	14.0
1995	64.4	84.6	83.5	33.8	40.8	28.7	43.6	14.4
1996	63.5	83.9	77.1	30.4	40.4	28.3	40.2	13.8
1997	62.2	83.5	75.5	32.8	38.3	26.3	44.3	13.4
1998	61.2	83.9	78.3	31.6	38.7	26.6	42.9	14.0
1999	61.9	82.9	76.8	33.4	39.5	28.4	46.6	15.8
2000	58.5	80.6	71.9	28.4	33.7	24.2	40.2	10.8

Notes: The figures include population 15 years old and over

Source: 1988-1999: State Institute of Statistics website. Household Labor Force Survey Results. 2000: Household Labor Force Survey Results, 2000 Table, 3.2. State Institute of Statistics.

**Table 7: Distribution of Employment by Sector of Economic Activity and Gender, Turkey, 1955-1990 (%)**

Year	Men			Women		
	Agriculture	Industry	Service	Agriculture	Industry	Service
<b>Census of Population:</b>						
1955	70.68	10.95	18.37	96.14	2.32	1.54
1960	66.68	11.79	21.53	95.39	2.75	1.86
1965	64.29	13.02	22.69	95.83	1.56	2.60
1970	55.58	12.36	32.07	90.30	5.12	4.58
1975	56.40	12.06	31.54	89.31	4.25	6.44
1980	44.54	15.85	39.61	87.86	5.53	7.61
1985	43.44	15.5	41.06	86.70	4.48	8.82
1990	38.02	16.33	45.65	82.27	6.67	10.97
<b>Household Labor Force Survey:</b>						
1988	33.8	26.8	39.4	76.8	8.8	14.4
1989	34.2	26.1	39.7	76.6	9.0	14.4
1990	33.9	25.1	41.0	76.6	8.8	14.6
1991	35.0	25.3	39.7	77.4	8.3	14.4
1992	33.3	25.9	40.9	72.2	11.2	16.7
1993	33.1	26.5	40.6	68.9	11.6	19.6
1994	32.5	27.5	40.0	71.1	10.7	18.3
1995	32.3	27.1	40.5	71.2	9.9	19.0
1996	31.5	28.0	40.6	71.5	10.2	18.4
1997	31.1	28.7	40.3	67.1	12.0	21.1
1998	30.5	28.3	41.2	67.0	11.3	21.8
1999	30.9	27.6	41.6	67.6	10.9	21.6
2000	26.4	28.3	45.2	59.1	13.8	27.1

Notes: The Population Census figures for the years 1955-1965 include population 15 years of age and over, while for 1970-1990 they include population 12 years of age and over. The Household Labor Force Survey results 1988-2000 include population 15 years of age and over. Source: 1955-1990: Census of Population, State Institute of Statistics. 1988-1990: State Institute of Statistics website. Household Labor Force Survey Results. 1991-2000: Household Labor Force Survey Results, 2000, Table 2.2, State Institute of Statistics.

**Table 8: Distribution of Employment by Employment Status, Geographical Location and Gender, Turkey, 2000 (%)**

Employment Status	Urban		Rural	
	Men	Women	Men	Women
Regular Employee	57.7	72.0	18.3	6.8
Casual Employee	12.0	8.0	11.9	2.5
Employer	9.8	1.8	2.7	0.2
Self-Employed	17.3	8.7	47.4	13.5
Unpaid Family Worker	3.3	9.6	19.8	77.1

Notes: The figures include population 15 years old and over.

Source: Household Labor Force Survey Results, 2000, Table, 3.12. State Institute of Statistics.

**Table 9: Mean and Standard Deviation of the Variables, Turkey, 1980-1990**

Variable	Mean	Standard Deviation
Female Labor Force Participation Rate (%)	52.15	11.17
Female Nonagr. Labor Force Participation R.(%)	4.40	2.65
Logarithm of per capita Gross Provincial Product	13.53	0.58
Log per capita Gross Provincial Product Squared	183.53	15.80
GPP Growth Rate	0.023	0.022
Female High School Graduates (%)	4.70	2.95
Female High School Enrollment Ratio (%)	19.14	10.73
Female Illiteracy Rate (%)	39.82	16.87
Female Mean Years of Schooling	3.50	1.24
Female Unemployment Rate (%)	1.83	1.30
Male Unemployment Rate (%)	5.58	2.42
Urbanization Rate (%)	42.34	13.82
Agricultural Employment Share (%)	66.46	14.39
Industrial Employment Share (%)	12.13	7.23
Services Employment Share (%)	20.74	8.20
Number of Observations	201.00	201.00

Source: Author's computations using 1980, 1985 and 1990 Population Census data for the 67 provinces.

**Table 10: OLS Estimation Results with Provincial Female Labor Force Participation Rates, Turkey, 1980-1990**

Explanatory Variables	Model 1	Model 2	Model 3	Model 4
Log per capita GPP	-58.766 (4.31)	-58.867 (4.89)	-68.723 (5.00)	-78.05 (4.86)
Log per capita GPP Square	2.038 (4.02)	2.022 (4.51)	2.394 (4.70)	2.750 (4.68)
GPP Growth Rate	22.864 (1.91)	34.423 (3.22)	26.406 (2.15)	22.079 (1.77)
Female HS Graduates	0.720 (3.71)	0.360 (2.32)	-	-
Female HS Enrollment Rate	-	-	0.149 (3.28)	-
Female Illiteracy Rate	-	-	-	-0.063 (1.79)
Female Unemployment	-1.176 (3.92)	-	-1.058 (3.60)	-0.750 (2.68)
Male Unemployment	-	-0.925 (8.40)	-	-
Urban Share	-0.296 (8.16)	-0.255 (7.90)	-0.295 (8.06)	-0.277 (7.29)
Agricultural Share	0.301 (5.23)	0.358 (6.96)	0.251 (4.76)	0.214 (4.10)
Industrial Share	-0.338 (4.05)	-0.222 (2.94)	-0.390 (4.93)	-0.466 (6.17)
Region Dummy Variables:				
Aegean	0.009 (0.01)	0.119 (0.18)	0.636 (0.84)	0.731 (0.94)
Mediterranean	-1.947 (2.30)	-0.416 (0.53)	-1.224 (1.40)	-1.516 (1.71)
Black Sea	0.947 (1.14)	2.128 (2.84)	1.543 (1.83)	1.532 (1.75)
Central Anatolia	-2.990 (3.73)	-2.017 (2.81)	-2.359 (2.85)	-2.820 (3.41)
Southeast Anatolia	-6.621 (6.07)	-3.023 (2.78)	-6.139 (5.25)	-6.256 (4.53)
East Anatolia	-3.657 (3.69)	-1.447 (1.56)	-3.211 (3.12)	-3.338 (3.05)
Time Dummy Variables:				
Dummy 1985	-0.691 (1.40)	0.630 (1.37)	-0.393 (0.81)	-1.233 (1.75)
Dummy 1990	1.833 (2.63)	3.814 (6.07)	2.898 (4.87)	2.310 (2.88)
Constant	469.84 (5.13)	469.24 (5.80)	540.47 (5.88)	611.42 (5.58)
R-Squared	0.952	0.962	0.951	0.949
Adj. R- Squared	0.948	0.959	0.947	0.945
F-Statistic (K, N-K-1)	228.2	294.5	224.5	215.4
Number of Observations	201	201	201	201

Notes: Absolute values of the t-ratios are in parentheses. The one-tail critical value is 1.645 at 5 percent level of significance. K is the number of explanatory variables. N is the number of observations. In the provincial industrial structure, services is the omitted sector. In the region dummy variables, Marmara is the omitted region. In the time dummy variables, 1980 is the omitted time period. GPP stands for Gross Provincial Product. HS stands for high school.

Source: Author's computations using 1980, 1985 and 1990 Population Census data for the 67 provinces.

**Table 11: OLS Estimation Results with Provincial Female Nonagricultural Labor Force Participation Rates, Turkey, 1980-1990.**

Explanatory Variables	Model 1		Model 2		Model 3		Model 4	
Log per capita GPP	3.314	-0.56	3.348	-0.59	-3.949	-0.66	-0.71	3.978
Log per capita GPP Square	-0.155	-0.7	0.162	-0.76	0.103	-0.46	-0.186	-0.9
GPP Growth Rate	8.596	-1.64	11.75	-2.32	11.503	-2.14	11.801	-2.34
Female HS Graduates	0.509	-6.01	0.405	-5.5	-	-	0.413	-5.72
Female HS Enrollment Rate	-	-	-	-	0.112	-5.61	-	-
Female Unemployment	-0.343	-2.62	-	-	-0.275	-2.13	-	-
Male Unemployment	-	-	-0.253	-4.84	-	-	-0.244	-4.92
Urban Share	-0.002	-0.13	0.009	-0.55	-0.001	-0.08	-	-
Agricultural Share	-0.069	-2.73	-0.053	-2.18	-0.101	-4.36	-0.059	-2.74
Industrial Share	0.057	-1.55	0.087	-2.45	0.024	-0.69	0.086	-2.41
Region Dummy Variables:								
Aegean	0.857	-2.57	0.89	-2.77	1.306	-3.93	0.885	-2.77
Mediterranean	0.251	-0.68	0.654	-1.77	0.788	-2.06	0.665	-1.81
Black Sea	-0.857	-2.35	-0.552	-1.55	-0.42	-1.13	-0.594	-1.71
Central Anatolia	-0.97	-2.77	-0.719	-2.11	-0.498	-1.37	-0.705	-2.08
Southeast Anatolia	-1.902	-3.99	-0.936	-1.82	-1.488	-2.9	-0.878	-1.75
East Anatolia	-1.557	-3.59	-0.972	-2.21	-1.12	-2.67	-0.975	-2.22
Time Dummy Variables:								
Dummy 1985	-0.309	-1.43	0.054	-0.25	-0.1	-0.47	-0.07	-0.33
Dummy 1990	-0.215	-0.71	0.336	-1.13	0.522	-2	-0.359	-1.22
Constant	-9.133	-0.23	-9.649	-0.25	43.701	-1.08	-13.15	-0.35
R-Squared	0.85		0.85		0.833		0.85	
Adj. R-Squared	0.837		0.837		0.819		0.838	
F-Statistic (K, N-K-1)	65.14		65.14		57.51		69.72	
Number of observations	201		201		201		201	

Notes: See Table 10.

Source: See Table 10.

## Appendix A: Data Definitions and Sources

**Female Labor Force Participation Rate:** This rate is given for each province by the ratio of the number of female labor force participants, 12 years of age and over, to the total female population 12 years of age and over.

**Nonagricultural Female Labor Force Participation Rate:** This is the ratio of the number of females 12 years of age and over employed in the nonagricultural sector to the total female population 12 years of age and over.

**Per Capita Gross Provincial Product (per capita GPP):** In millions of Turkish Lira (TL) and in 1987 prices. Gross Provincial Product is the Gross Domestic Product (GDP) of the provinces. The Gross Provincial Product is divided by the provincial population of all age groups to obtain per capita Gross Provincial Product. The 1987 TL GPPs are obtained from the current TL GPPs by using the implicit national sectoral price deflators for each year. In 1987, the State Institute of Statistics began calculating a new GDP series for Turkey that include new sectors.

**Percent of Female High School Graduates:** This is the percentage of women who had completed high school. It is the number of female high school graduates divided by the female population 12 years of age and over.

**Female High School Enrollment Ratio:** This is the ratio of the number of female high school enrollments to the female population of the official age for attending high school, that is, 14-16 years of age.

**Female Illiteracy Rate:** This is the ratio of the number of illiterate females, six years of age and over, to the female population six years of age and over.

**Female Mean Years of Schooling:** This is the mean years of schooling for the female labor force, 12 years of age and over. This is a weighted average of the years of formal education completed by the labor force.



**Female Unemployment Rate:** This is the ratio of the number of unemployed females to the female labor force, 12 years of age and over.

**Male Unemployment Rate:** This is the ratio of the number of unemployed males to the male labor force, 12 years of age and over.

**Urbanization Rate:** This is the percent of the population which is urban. Urban means those who live in the province centers and the district centers, regardless of population size.

**Agricultural Employment Share:** This is the ratio of the number of people, 12 years of age and over, employed in agriculture to total employment.

**Industrial Employment Share:** This is the ratio of the number of people employed in industry, 12 years of age and over, to total employment.

**Services Employment Share:** This is the ratio of the number of people employed in the service sector, 12 years of age and over, to the total employment.

**Data Sources:** Gross Provincial Product figures are taken from Öztün (1980 and 1988) for the years 1980 and 1985 and from the State Institute of Statistics (1995) for the year 1990. Female high school enrollment ratios are taken from Güngör (1997). Female Mean Years of Schooling are taken from Tansel and Güngör (1997). All other data are from State Institute of Statistics (1990) for various census years and provincial census books.

#### **Appendix B: Regional Division of Turkey's 67 Provinces:**

**Marmara :** Balıkesir, Bilecik, Bursa, Çanakkale, Edirne, İstanbul, Kırklareli, Kocaeli, Sakarya, Tekirdağ.

**Aegean:** Afyon, Aydın, Denizli, İzmir, Kütahya, Manisa, Muğla, Uşak.

**Mediterranean:** Adana, Antalya, Burdur, Hatay, Isparta, İçel, Kahramanmaraş.

**Black Sea:** Amasya, Artvin, Bolu, Çorum, Giresun, Gümüşhane, Kastamonu, Ordu, Rize, Samsun, Sinop, Tokat, Trabzon, Zonguldak.

**Central Anatolia:** Ankara, Çankiri, Eskişehir, Kayseri, Kırşehir, Konya, Nevşehir, Niğde, Sivas, Yozgat.

**Southeast Anatolia:** Adıyaman, Diyarbakır, Gaziantep, Mardin, Siirt, Şanlı Urfa.

**East Anatolia:** Ağrı, Bingöl, Bitlis, Elazığ, Erzincan, Erzurum, Hakkari, Kars, Malatya, Muş, Tunceli, Van.