Time Series Analysis for Effect of the Minimum Wage on Female Employment in Turkey

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Abstract

The effect of the minimum wage on female employment in Turkey is analyzed for the period 1988–2009. The econometric framework utilizes Granger Causality Test, Kaitz Index, Impulse-Response Functions and VAR Analysis. The purpose of this paper is to determine the presence and direction of any relationshipbetween minimum wage and female employment in Turkey. The findings indicate no significant relationship between minimum wage and female employment in Turkey. These findings support those in the empirical literature, reporting non-significant connection between minimum wage and employment. In this sense, this paper emphasizes the position of the minimum wage level and minimum wage policies for female employment.

Jel Code:J3, J30, J31.

Keywords: Minimum Wage, Employment, Female Workforce, Turkey

Introduction

Wage is the most important and essential basic means of living for those who work in the labour market. In this regard, it is necessary to discuss wage as both an economic and social phenomenon. Wage is an economic phenomenon because it is the minimum source of income required for man to continue to exist and to maintain his life. In the economic life, the difficulty ofthe minimum wage level being set by employers regardless of social needs, and setting a common minimum wage level during the period when capitalist economic thought was dominant, thereby required the minimum wage level to be determined by the state. Hence, the minimum wage became a means of intervention for the state and the lowest wage level for labor (Gökdere, 1997: 1). Wage is also a social phenomenon. It should be sufficient to meet the social and cultural needs of both employees and their families, including the needs forfood and shelter. The implementation of minimum wage policies has an effect on all wages, general price levels, distribution of income, economic growth, balance of payments, employment and unemployment; and the directions of these effects vary according to the economic and social structures of countries. In this regard, the relationship between minimum wage and employment is a vast area of discussion in literature.

Employment is not only important for men but also for women, young people and minorities. Although women may be regarded as a form of secondary labour in the labour market, under current economic conditions, women can be an important or sole source of household income; however, they usually participate in the labour market in order to make a contribution tothe household economy. In this context, the present paper primarily discusses the importance of the minimum wage.We then discuss the link between minimum wage and employment—and female employment, on which the minimum wage has a considerable effect—is analyzedvia the theoretical and empirical literature. The finalpart of the paper presents an empirical analysis ofthe effect of the minimum wage on female employment in Turkey for the period 1988–2009, and discusses and whether the minimum wage is effective in female employment in Turkey.

Minimum Wage

It is not possible to define the concept of "minimum wage" in a single way. The differingeconomic, social and cultural factors of each country result in differing definitionsof the minimum wage. As such, it is observed that the minimum wage difference in the same country changes in time (Kutal, 1969: 3). The definitions of minimum wage within theliterature and legal regulations can be outlined as follows:

According to Talas (1979), minimum wage is accepted as*"….the wage that primarily meets the ordinary needs of amiddle-income employee living a civilized and modern life. In other words, minimum wage is that whichprovides an acceptable life for the employee in the society that he/she lives with his/her family"* (Talas, 1979: 48–49). Seeing the minimum wage as an instrument of social policy, Starr (1981) regardsminimum wage as *"a social policy measure that aims to increase the share of national income for the wage earners and let them have a level of income which is suitable for human dignity and meets the minimum standards of living"* (Starr, 1981: 547). Article 45 of the 1961 Turkish Constitution stated that: "State takes the necessary measures to provide employees a fair wage so that they could have a standard of living suitable for their jobs and human dignity". In the 1982 Constitution, this provision was amended and a new restriction was implemented on the determination of the minimum wage. In accordance with Article 55 of the 1982 Constitution, "The minimum wage is set based on the economic and social status of the country" (Gökdere, 1997: 5).In line with all these definitions within legal regulations and the literature, theminimum wage in the most general sense, is the level of income which enables an employee and his/her family to live humanly in the current economic and social conditions and which accords with the human dignity (Gerek, 1999: 8).

From past to present, minimum wage has been a matter of discussion betweenemployers and labor, due to the expectations of labour and employers from working life. Employers want to have the possible highest efficiency from employees in return forthe wage they pay, and the relationshipbetween the salary paid for the labour and the cost of production to be in favor of their enterprise. Therefore, employers aim to have the highest production with the least cost, which means the lowest possible wage. However, maintaining low wage levelswill not make a positive contribution to the employers,because labor will react by striking or decreasing theirproductivity. In contrast toemployers, laborconsiders wage in terms of meeting their needs irrespectiveof the link between production and cost, and wants wages to be increased in order to achieve higherstandards of living (Mutluer, 1969: 373). Governments have made legal regulations on the minimum wage in order to end wage discussions between employees and employers.

In this regard, the purposes of setting aminimum wage areto provide employees an appropriate standard of living in social terms; to equalizethe wages paid similar jobsand to facilitate higherwages in general; to prevent unfair competition; and to enable the working and living conditions of employees to be more fair and organized in the most general sense (Gerek, 1999: 9–11). The determination of the minimum wage has significant effects on current wage payments, economic growth, general price levels, balance of payments, distribution of income and employment. The present study focuses onthe effect of the minimum wage on employment,and it wouldthereforebe beneficial to briefly mention the economic effects of the minimum wage.

Determining or changing the minimum wage has an influence on the current wage level in all countries, regardless of their level of development. In developing countries, this has a greater effectbecause a higher proportion of the workforce is on minimum wage than those in developed countries; correspondingly, this effect is less in developed countries (Gerek, 1999: 4). Minimum wage also has an effect on the general price level. Increasingthe minimum wage considerably leads torapid increase in general price level and causes the economy to enter aprice–wage–price cycle. This leads to increase the costs in the economies of developing countries where unqualified labour is dominant, which is in higherprices. In this environment, a disruption in import–export balance arises (Gökdere, 1997: 31–34).The change in the minimum wage level affects growth both positively and negatively. The positive effects of the minimum wage on economic growthinclude:ensuring an increase in production,thereby increasing total demand;increasing employees' productivity, and ensuring an increase in labour supply to meet the total consumer demand. The negative effects include:increasing the costs of production, decreasing investment expenditures and exports;and encouraging unrecorded employment. An increase in productivity led by the increase in labor wage would also increase the income of the wage earners if the increased wage financed itself. However, if the wage did not finance itself, the increase in only one part of the society may occur with adecrease in the income of another part of the society.

Since anyincrease in wages that leads to income inequality also decreases employer profits, income inequality would start to arise between the employer and the employee (Gerek, 1999: 14–18).The effect of the minimum wage on employment is analyzed in the third part of the paper; in this section, it is sufficient to statethat the increase in wages sometimes affects employment positively and sometimes negatively, and there is no link between the minimum wage and employment.

Minimum Wage, Employment and Female Employment: Theory and Overview ofThe Literature

The overall effects of the minimum wage on the economy are multi-dimensional and vary according tothe level of development, economic and social structures of the countries. In this context, minimum wage has diverse effects on current wage payments, economic growth, general price level, balance of payments, and the distribution of income, employment and unemployment. However, the most controversial effects of the minimum wage are seen in the labour market. There are differing positive and negative opinions and discussions about the effects of the minimum wage on employment according tothe conditions of the labor market. Although minimum wage is a very important social policy instrument, opinions vary betweenthose for or againstthe conventional competitive Neo-classical theory; both groupsclaim differenteffects of the minimum wage on the labor market, especially employment (Neumark and Wascher, 2008: 37–38; Suryahadiet. al., 2003: 29; Biçerli, 2011: 398; Korkmaz and Çoban, 2006: 17; Güvenet. al., 2009: 7; Gökdere, 1997: 21–35). Moreover, there are different discussions and empirical investigations ofthe effects of the minimum wage on employment of young people, femalesand minorities (McConnell et al., 2003: 409).

Those who emphasize that the minimum wage negatively affects employment argue the conventional competitive Neo-classical theory (labour supply and demand model). Accordingly, when the minimum wage is set higher than anequilibrium wage in the market, it negatively affects employment. The resultingdecrease in employment leads those who would like to work on fewer wages to become unemployed (McConnell et al.,2003: 409; Biçerli, 2011: 398; Suryahadi et al., 2003: 29). Notable theoristswho adopted this opinion includeStigler (1946), Reynolds and Gregory, (1965), Brown et al. (1981), Brown, Gilroy and Kohen (1982), Wellington (1991), Neumark and Wascher (1992), Kim and Taylor (1995), Zavodny (2000), Couch and Wittenburg (2001), Suryahadiet al.(2003), Lemos (2004), Potter (2006), Montenegro and Pages (2003).Thereare many studies and empirical implementations in the literature (Kim and Taylor, 1995: 175; Neumark and Wascher, 2008: 42–49; Neumark and Wascher, 2007; Korkmaz and Çoban, 2006: 17; Güven et al., 2009: 7–11).

On the other hand, those who emphasize that the minimum wage positively affects employment argue contrary to the conventional competitive Neo-classical theory. According to this view, employment is not negatively affected when the minimum wage is equal or close to the equilibrium wage in the market. Contrary to a decrease in employment, employment may actually increase, depending on the structure of the labour market. In this context, a monopsonistic labor market model predicts that a minimum wage set above the monopsony wage level will increase employment. However, great care is required when determining the minimum wage level. If it far exceeds themonophony wage level, employment may decrease and unemployment may increase (Suryahadi et al.,2003: 29; McConnell et al., 2003: 412–414; Biçerli, 2011: 400–401; Neumark and Wascher, 2008:50–53). Notable supporters ofthis view in literature include:Kartz and Krueger (1992), Card (1992a,b) Card, Kartz and Krueger (1994), Card and Krueger (1994), Neumark, Cunnigham and Siga(2006).The literature also includes diverse studies and empirical implementations (Neumark and Wascher, 2007;Neumark and Wascher, 2008:40–49; Korkmazand Çoban, 2006: 17; Güven et al., 2009: 8–11).

In addition to the various discussions and studies on the effects of minimum wage on employment generally, the literature also focuses on the effects on female employment. The factorsinvolved in female employment and female participation in labour are multidimensional, and vary according to different economic and social structures. Economic, political, cultural and social powers are among the most important factors thatfacilitate female employment and female participation in labour. According to many studies on countries with different characteristics, the factors that hinder female employmentinclude: lowwages, less education, long working hours, high informality rates, economic crises, lack of childcare opportunities, housework, childcare and elderly care, urbanization and marital status (DünyaBankasıve DPT, 2009).

Table 1summarizesthe analyses and results of various studies on the relationship between: the minimum wage/employment; and minimum wage/female employment. According to the studies by Suryahadiet al.(2003), Montenegro and Pages (2003), Felliciano (1998), Neumarket al. (2006), Addison and Öztürk (2010), minimum wage implementation affects female employment, and this effect can be positive or negative depending on the characteristics of the country or the group. Suryahadiet al. (2003) analyzed the effect of minimum wage on urban employment in Indonesia, and found a negative effect, especiallyon female employment. Montenegro and Pages (2003) examined the effect of the increase in minimum wage in China, and found that it increased female employmentbut decreased employment among young and qualified employees (Montenegro and Pages, 2003: 77–110). Neumark et al. (2006)tried to put forward the effects of the minimum wage on distribution of household income in metropolitan cities in Brazil during 1996–2001, when a period of hyperinflation ended. The significant finding is that the increase in minimum wage negatively affects householder employment;whereas it positively affects employment among other household members (Neumark et al. 2006:157–158). Feliciano (1998), analyzed how the decrease in minimum wage affected employment according to age and gender groups in Mexico. Government policies on reducing the average price to minimum leveldidnot affect male employment but increased female employment. Astudy by Addison and Öztürk (2010) estimated the economic effects of the minimum wage regulation in 16 OECD countries during 1970–2008. Although the effects on unemployment were moderated to a great degree, minimum wage negatively affected the adult female employment (Addison and Öztürk, 2010:1–17).

Table 1: Minimum Wage, Employment and Female Employment:Overview of Literature

Authors	**Major Findings**		
	Subject	**Method**	**Result**
D. Card (1992a)	Examined the effect of the Federal minimum wage increase on employment in 1990 in the USA.	Panel Data Analysis	The minimum wage increase does not have any effects on youth employment.
D. Card (1992b)	Examined the effects of the minimum wage on the youth employment and employees working in the retail trade in California.	Time Series Analysis	There is a relative increase in retail employment, but this is very small and is not statistically significant.
D. Neumark - W. Washer (1992)	Examined the effects of minimum wage increases during 1973–1989 on the employment of 16–19 and 16–24 age groups atthe federal and state levelsin the USA.	Panel Data Analysis	The minimum wage increase decreases youth employment.
L. F. Katz - A. B. Krueger (1992)	Examined the effects of the minimum wage increases in 1991 on employment in the fast-food industry in Texas,USA.	Telephone calls and Time Series Analysis	The minimum wage increase has a significant and positive effect on employment.
D. Card- A. B. Krueger (1994)	Examined the effects of minimum wage increases in 1992 in New Jersey on employment in New Jersey and Pennsylvania.	:	The minimum wage increase in New Jersey did not decrease employment and there were positive findings between minimum wage and employment.
M. Zavodny (2000)	Examined the effect of minimum wage increase on average working hours on a state basis in the USA.	Panel Data Analysis	The minimum wage does not have a positive effect on working hours by itself; the increase in the minimum wage affects total employment negatively.
K. A. Cuch - D.C. Wittenburg (2001)	Examined the effect of minimum wage increase on average working hours on a state basis in the USA.	Panel Data Analysis	Minimum wage has a positive effect on the working hours per person.
S. Lemos (2004)	Examined the effect of the minimum wage on employment	Time Series Analysis	The effect on employment varies regionally and

	for Brazil.		according to different wage level.
D. Neumark - W. Cunnigham - L. Siga (2006)	Examined the effect of minimum wage increase on employment atthe household level for Brazil.	Time Series Analysis	The increase in minimum wage has significant negative effects on householder employment, but positively affects the employment of other household members.
C. E. Montenegro - C. Pages (2003)	Examined the effect of increase in minimum wage in China on unqualified,and youth and female labor forces.	Panel Data Analysis	The increase in the minimum wage reduces employment of young and qualified people, but **increases female employment**.
A. Suryahadi - W. Wildyanti - D. Permiro - S. Sumarto (2003)	Examined the effect of minimum wage on urban employment for Indonesia.	:	Minimum wage has a negative effect on the consolidated urban employment, male employment and **female employment**; and a significant positive effect on unqualified employees andpublic sector employment.
J. T. Addison - L. Blackburn - C.D. Cotti (2009)	Examined the effect of minimum wage on earnings and employment withincertain industries.	Panel Data Analysis	Minimum wage has a slight effect on redundancy and a positive effect in some industries.
R. Dickens - S. Machin - A. Manning (1994)	Examined the effect of change in minimum wage on employment change in Great Britain.	The analysis usedcross-sectional data.	The change in the minimum wage affects the distribution of payments to the labor force over theminimum levelin Great Britain.
J. Dolado - F. Kramarz - S. Machin - A. Manning - D. Margolis - C. Teulings - G. Saint Paul - M. Keen (1996)	Examined economic effects of the minimum wage in Europe.	:	There was no general evidence that the minimum wage decreased employment; it was also stated that the effect of the minimum wage on employment was exaggerated (good or bad).
Z. M. Feliciano (1998)	Analyzed how decrease in minimum wage affects employment according to age and gender groups in Mexico.	Panel Data Analysis for 1970, 1980 and 1990	Government policies on minimizing average price levels do not affect male employment **but increase female employment**. The reason is that men's income exceeds the minimum wage, Whereas women's income is at or very similar to the minimum wage.
J. Meer - J. West (2012)	Suggestedthat the effect of the minimum wage on employment dynamics was clearer than that on the level of employment.	Eachemployment dynamic was analyzedusing annual panel data.	While minimum wage decreases employment of new labor force, it does not have any effect on redundancy.
J. T. Addison - Ö. D. Öztürk (2010)	Estimated the economic effects of the minimum wage regulation in 16 OECD countries.	Panel Data Analysis	Although the effects of the minimum wage on unemployment were moderated to a great degree, **it negatively affected adult female**

			employment.
X. Del Carpio - H. Nguyen - L. C. Wang (2012)	Examined the effect of the minimum wage on manufacturing industry for Indonesia.	Time Series Analysis	The effect of the minimum wage on employment is positive when analyzed accordingto employment sector. It is negative when analyzed on a company basis. This shows that the effect of the minimum wage on employment depends on external variables. The effect on the small-scale companies and poorly-educated employees is more important than that on large-scale companies and highly-educated employees.
N. Potter (2006)	Examined the effect of minimum wage on employment in construction, retail and healthcare industries in the USA.	Panel Data Analysis	The minimum wage affects employment negatively in construction, retail and healthcare industries.
C. Brown - C. Gilroy - A. Kohen (1981)	Examined the effect of minimum wage on employment and youth employment.	Regression Analysis	Increased minimum wage affects the youth employment negatively.
V. Alatas - L. A. Cameron (2008)	Examined the effect of minimum wage on employment in low-income countries in the example of Indonesia.	:	The minimum wage affects employment negatively in small-scale enterprises in Indonesia.
P. Skedinger (2006)	Examined the effect of minimum wage on employment for all the employees working at hotels and restaurants in Sweden for the period of 1979–1999.	:	There is an inverse relationship between the minimum wage and employment.
A. Korkmaz - O. Çoban (2006)	The minimum wage during1969–2006 was analyzed for effectsbetween unemployment and inflation in Turkey.	Time Series Analysis	The minimum wage does not have any negative effects on unemployment for the period 1969–2006.
A. Güven - Ş. Mollavelioğlu - B. Ç. Dalgıç (2009)	Examined the relationshipbetween minimum wage and employment for the period 1969–2008 in Turkey.	Time Series Analysis	Changes in the minimum wage in Turkey 1969–2008 do not significantly affect employment.

Source:D. Neumarkand W.L. Wascher (2008), Minumum Wages, Massachusetts Institute of Technology, ISBN978-0-262-14102-4, http://www.google.com.tr/books, s. 40-49; NeumarkandWascher (2007), Minumum Wages and Employment, IZA Discussion Paper No. 2570, January; A. Korkmazve O. Çoban (2006), EmekPiyasasındaAsgariÜcret, İşsizlikveEnflasyonArasındakiİlişkilerinBirAnalizi: TürkiyeÖrneği (1969-2006), MaliyeDergisi, Sayı.151, TemmuzAralık, s.17; A. Güven - Ş. Mollavelioğluand B. Ç. Dalgıç (2009), AsgariÜcretİstihdamıArttırırmı? (1969-2008) TürkiyeÖrneği, Econ Anadolu 2009: AnadoluUluslararasıİktisatKongresi, 17-19 Haziran 2009,s. 7-11.

Empirical Analysis and Findings

Research Method and Data

This part of the study uses a time series approach to analyze causality between the minimum wage and female employment in Turkey for the period 1988–2009.First, the stationary of time series included in the study was analyzed using the ADF, PP and KPSS unit root tests. Then, the Johansen cointegration test was applied; the appropriate temporal offsetof the VAR model was determined, and the suitability of the model was tested using the autocorrelation LM test, White test and autoregressive unit root test. Finally, the dynamic interactions between the variables were examined via impulse–response analysis using the VAR model.

Data Set

The econometric modelused dataforthe period 1988–2009, giving a data set consisting of 21 observations. The year 2009 was taken as the last observation year because some variables are not available beyond 2009. The present study did not usethe official gross or net minimum wage values published six-monthly by the Minimum Wage Determination Commission; instead, a new wage variable was determined using the Kaitz Index. The method used the formula employed by Feliciano (1998) and Brown et al. (1982), which is widespread within the literature. According to the calculations, the average Kaitz index for Turkey for 1988–2009 is 0.37. During the study period, the Kaitz index was lowest level (0.25) in 1991, 1999 and 2000, and peaked (0.43) after 2003. The female employment variable used the ratio of female wage earners aged >15 to the total female population aged >15, rather than the number of female wage earners detected by TUIK. The average female employment variable for Turkey was therefore0.18. This was higher values during the1990s (average0.21)but decreased (average0.15) during the 2000s. In the analysis, lk is the logarithmic value of the wage variable, andlkemp is the logarithmic value of the female employment variable. The Eviews 7 package was used for the econometric analysis.

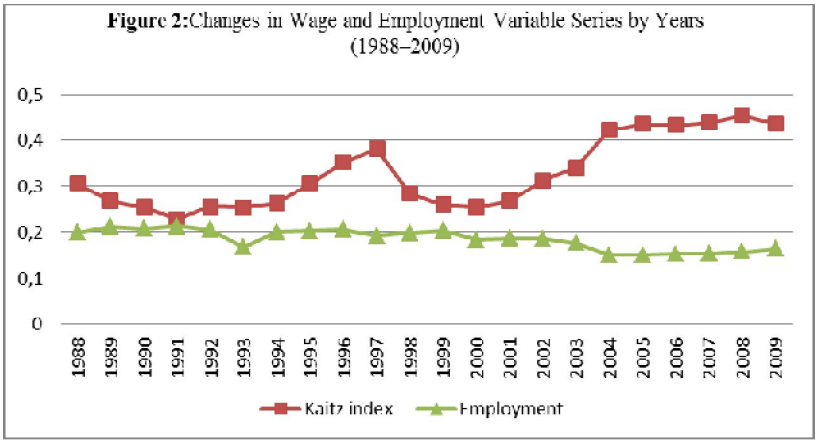

Figure 2: *Changes in Wage and Employment Variable Series by Years (1988–2009)*

Unit Root Test

"A type of stochastic process that has received a great deal of attention and scrutiny by time series analysts is the so-called stationary stochastic process. In generally, a stochastic process is stationary, if its mean and variance are constant over time and the value of the covariance between the two time periods only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed". (Gujarati, 2009: 740). The series fluctuates around a fixed long-term average in a stabile period of time, and the effect of any shock is not permanent. In addition, in case the series includes a unit root, it does not tend to change into the deterministic path in the long-term, and a shock series that would arise in the current period has permanent effects on the long-term values. This is important for the appropriate modeling of the time series (Özata and Esen, 2010: 60).In determining whether there is stationary or not in the time series, ADF, PP and KPSS tests are generally used. In the present study, in order to determine whether the time series have a unit root, the Augmented (Enhanced) Dickey–Fuller (ADF), Phillips–Perron Test (PP) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests were used.

Augmented (Enhanced) Dickey–Fuller (ADF) Test

In the present study, in order to determine whether the series have a unit root or not, the Augmented (Enhanced) Dickey–Fuller (ADF) test was used at first, as shown in the following equation:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{k} \alpha_i \Delta Y_{t-i} + \varepsilon_t$$

Here, ΔY_t is the first-order difference of the variable analyzed with stationary, t is the tendency variable, ΔY_{t-i} is the delayed difference and k is the delay length.

The test is used to determine whether the δ coefficient statistically equals to 0 or not, and compares ADF test statistics with the MacKinnon critical values. If the absolute ADF test statistics are larger than the MacKinnon critical value, the time series is stationary. Otherwise, the series is not stationary and the difference should be taken until stationary is reached. In the present study, the null hypothesisis represented as δ=0. In this case, there is a unit root and the time series is not stationary. The alternative hypothesis is δ<0. In this case, the time series is also stationary. The ADF Test results are given in Table 2.

Table 2: *ADF Test Results*

Variables		Test Statistics	Critical Value*	Possibility	Result
lk	Level	0.723895	3.012363	0.8196	-
	Second Difference	5.875536	1.960171	0.0000	I(2)
lkemp	Level	1.403957	3.012363	0.5608	-
	Second Difference	4.592939	1.962813	0.0001	I(2)

*The MacKinnon is the one-way critical value according to the 5% significance level.

As the test statistics value calculated for the wage and employment variable is greater than the MacKinnon critical value which has a5% significance level in its second difference, the null hypothesis—which states that the series has a unit root—was rejected, and it was decided that the series werestationary in their second differences. Accordingly, both time series are I(2).

Phillips–Perron Test

The second test that was used to test whether the series have a unit root or not is Phillips–Perron (PP) Test. The test also compares the PP test statistics with the MacKinnon critical value. If the absolute value of the PP test statistics is greater than the absolute value of the MacKinnon critical value, the series is concluded to be stationary. The PP unit root test results for the minimum wage and female employment series are shown in Table 3.

Table 3: *Phillips–PerronTest Results*

Variables		Test Statistics	Critical Value*	Possibility	Result
lk	Level	1.057204	3.012363	0.7124	—
	Second Difference	6.236239	1.960171	0.0000	I(2)
lkemp	Level	1.253666	3.012363	0.6307	—
	Second Difference	18.72363	1.960171	0.0001	I(2)

*The MacKinnon is the one-way critical value according to the 5% significance level.

The results of the PP unit root test show that both time series have a unit root on their level, and thatthey are not stationary on their level. Both time series including wage and employment variables become stationary only when their second differences are taken. According to the PP test results, the minimum wage and female employment variable series is I(2).

Kwiatkowski–Phillips–Schmidt–Shin (KPSS) Test

This test aims to purify the deterministic trend in the observed series and to make it stationary. The hypothesis phase is different. While the null hypothesis shows that the series is not stationary; the alternative hypothesis means that the series is not stationary. The length of delay is determined according to the "Newey–West". KPSS results are given in Table 4.

Table 4: *KPSS Test Results*

Variables		Test Statistics	Critical Value*	Result
lk	Level	0.475552 (3)	0.463000	—
	Second Difference	0.133255 (3)	0.463000	I(2)
lkemp	Level	0.532698 (3)	0.463000	—
	Second Difference	0.392140 (14)	0.463000	I(2)

*The values in parenthesesshow the band widths.
*Newey–West Criteria was used to determineband widths.

KPSS test results show that the wage and employment variable series became stationary in their second difference. According to the test results, both series are I(2).Generally, according to the ADF, PP and KPSS unit root test results, the nullhypothesis that the series include a unit root (δ=0) could not be rejected atthe 5% significance level. According to this result, the wage and employment variable series were not stationary on their level; however,they became stationary when their second difference was taken I(2).

Cointegration Analysis

In this method, the cointegration relationships between the Trace Test and Max Eigen value Test statistics and the series can be evaluated. The Trace Test studies the rank of the π matrix and compares r—which is the cointegration vector number—with the matrix number; and tests the null hypothesis, which represents that the matrix rank is equal to or smaller than r. Max Eigenvalue tests the alternative hypothesis, which shows the cointegration vector as r + 1 (Gül and Ekinci, 2006: p.96). The results of the cointegration analysis are shown in Table 5.

Table 5:*Johansen Cointegration Results*

H_0	γ_{trace}	%5	γ_{max}	%5	Eigenvalue
r=0	3.561949	12.32090	3.493563	11.22480	0.167957
r≤1	0.068387	4.129906	0.068387	4.129906	0,003593

* According to the Trace and Max. Eigenvalue tests, there is no cointegrated vector at the5% significance level.

According to the results of the Trace Test and Max. Eigen valueTest results, the r=0 hypothesis cannot be rejected at the 5% significance level. The Trace Testand Max. Eigenvalue are smaller than the critical value at the significance level of 5%. According to these results, there is no balanced relationship between minimum wage and female employment in the long-term for the period studies. Since there is no cointegration between the variables, the short-time causalrelationship will be analyzedviathe VAR model.

Granger Causality Analysis

In the economicsliterature, various causality tests are used to determine the direction of causality between two variables:Granger causality test, Sims test, Geweke–Meese–Dent test, Pierce–Haugh test and Geweke tests. Due to its simplicity and ease of application, the Granger causality test is preferred in many econometric studies. In this study, the dual Granger causality test was also used in order to show the causal relationshipbetween minimum wage and female employment.

$$lkemp = \sum_{i=1}^{k} \alpha_{1i}\, lkemp_{t-i} + \sum_{i=1}^{k} \beta_{1i}\, lk_{t-j} + e_{1t} \quad (1)$$

$$lk = \sum_{i=1}^{k} \alpha_{2i}\, lk_{t-i} + \sum_{i=1}^{k} \beta_{2i}\, lkemp_{t-j} + e_{2t} \quad (2)$$

In this study, Granger Causality Test was used in order to show the causal relationship between the minimum wage and female employment. The results are shown in Table 6.

Table 6: *Granger Causality Test Results*

Causality Direction	F-Statistics	Possibility
lk ⇨ lkemp	1.27935	0.3110
lkemp ⇨ lk	0.87808	0.4388

The Granger causality test showsthat there is no causal relationship between minimum wage and female employment; therefore, the minimum wage regulations are not the cause of the change in female employment. However, this test does not show the effect of the shock applied to one variable in VAR models on the other variables; this is examined via impulse–response analysis.

Impulse–Response Analysis

In this section, the series were listed from external to internal, and impulse–response analysis was performed based on the results of the Granger Causality test. The results are shown in Figure 2.

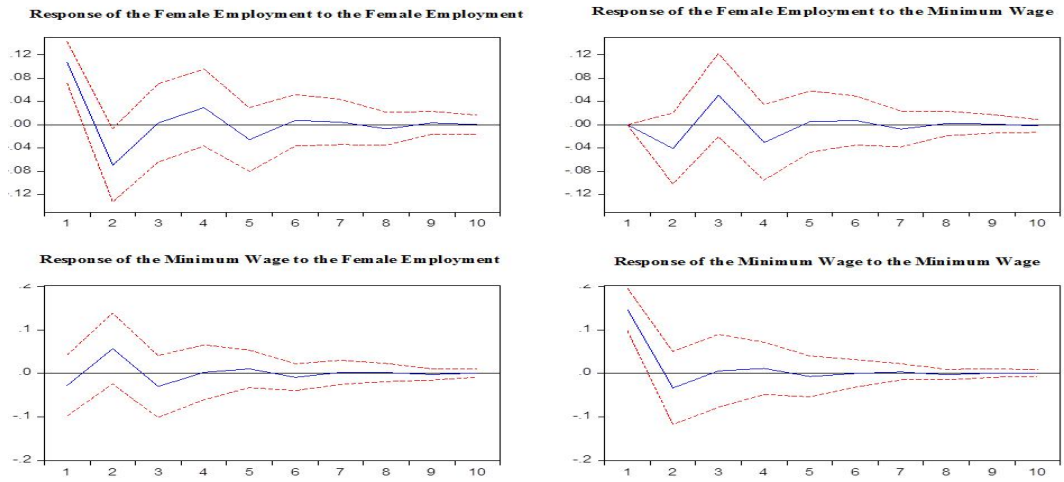

Figure 2: Impulse–Response Graphics

Figure 2 showsimpulse–response graphs forminimum wage and female employment. What should be examined due to the subject of the study is the graphic named "Response of the Minimum Wage to the Minimum Wage" in the figure 2. The level line in the graphshows how female employment level respondsto the shock associated with the introduction of the minimum wage. Accordingly, while the effect of the minimum wage on employment was negative in the first period, it became positive after the second period; it then cycled from negative to positive in the third and fourth periods, respectively, after which, the effect of the minimum wage on female employment decreased. The dashed lines in the graph represent the confidence intervals. In order to have a statistically significant relationship between these two series, both of the confidence intervals should be on the same side of the zero axis. However, as seen in the graph, the confidence intervals are either side ofthe zero axis. Accordingly, it is possible to say statistically insignificant for the response of female employment to the shocks in the minimum wage for all periods. Both the causality analysis and the impulse–response graphsshow that there is no statistically significant relationship between the minimum wage and female employment in Turkey. These findings supportthe results in the empirical literature

Result

The empirical findings of the present study on the effect of the minimum wage on female employment in Turkey during 1988–2009 are as follows: Both the Granger causality analysis and the impulse–response graphs show that there is no statistically significant relationship between the minimum wage and female employment in Turkey. These findings are consistent with the findings ofCard (1992a, b),Doladoet al.(1996),Korkmaz and Çoban (2006),Güven, Mollavelioğlu and Dalgıç (2009) in that the minimum wage does not produce any significant positive effects on employment.

In this context, the findings of the study confirmthat implementation of the minimum wage in Turkey do not have a significant positive effect on female employment, as proposed by the conventional competitive Neo-classical theory.

Based on the empirical findings of the study, it can be specifically stated that the minimum wage is not only factor to affect female employment in Turkey. This is because the factors that determine female employment are multi-dimensional, and it is not possible to expect that female employment is affected in the same way only by changing the minimum wage. As stated by the World Bank and the State Planning Organization (2009), various factors determine female employment, such as: low wages, low level of education, long working hours, a large informal economy, economic depression, lack of childcare opportunities, housework, childcare and elderly care, urbanization, and marital status—all ofwhich are based on different economic and social policies. In this context, attempts should be made to regulatethe different factors that hinder female employment in Turkey,especially various policies on ensuring gender equality in the workplace.

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