A Sectoral Analysis of Hysteresis in Unemployment: Evidence from Turkey

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Abstract

One of the most important issues that the Turkish economy must overcome is the problem of unemployment. Several theories have been proposed to explain the existence of high unemployment rates. Traditional theories, sometimes referred to as equilibrium unemployment rate theories, describe movements in the unemployment as fluctuations around the natural rate. However, these theories have been challenged by hysteresis theories, which have become the popular explanations for the increase in unemployment. This paper tests hysteresis effects in sectoral and general unemployment using data from Turkey for the period 1988–2008. The paper applies univariate time series unit root tests with and without structural break to test for unemployment hysteresis in Turkey versus the alternative of a natural rate. Similar to previous empirical research, the results point to the rejection of the hysteresis hypothesis and are compatible with the structuralist theories as described by Phelps (1994).

Keywords

Hysteresis, Monetary Policy, Unemployment, Unit Root Test, Structural Breaks. JEL Classification: E2, E24, E31

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1. Introduction

One of the most important issues that the Turkish economy must overcome is the problem of unemployment. The unemployment rate in Turkey has been persistently high and increasing, from 8 percent in the 1990s to over 10 percent in the 2000s. It was 8.4 percent in 1988, it decreased to 7.3 percent in 1999, and 6.5 percent in 2000. In the crisis year of 2001, it increased to 8.4 percent. Then, it stood over 10 percent in between 2002-2007. It increased to 11 percent in 2008 and even to 14 percent in 2009. "Between 2002 and 2009 during 27 quarters, Turkish economy achieved an average growth rate of 6.5 percent but could not decrease unemployment rate. Since 2001, despite high and permanent economic growth has been achieved, job creation has been relatively slow, this is called "jobless growth", that is growth does not generate sufficient employment to reduce unemployment rate" (Tunalı 2010: 21).

Other European economies have also experienced high and persistent levels of unemployment since the 1970s. There is a near consensus among economists that the cause of the high unemployment rate of the 1970s was supply shocks. Although these supply shocks were eliminated in the 1980s, the European unemployment rate increased to 10 percent in the same period.

The conventional natural rate of unemployment theory developed by Friedman (1968), and Phelps (1967, 1968), or the *non-accelerating inflation rate of unemployment* (NAIRU), argues that although output fluctuations generate cyclical movements in the unemployment rate, there will be a tendency to revert to an equilibrium rate in the long run (Layard et al. 1991). After the unprecedented behavior of the European unemployment rate, an alternative theory of unemployment developed that embodies the idea that the equilibrium unemployment rate depends on the history of actual unemployment rate (Blanchard et al. 1986: 1). Referred to as hysteresis theory, it emphasizes permanent effects of temporary shocks.

This paper examines the presence of hysteresis in the Turkish labor market. It tests hysteresis effects in unemployment using data from Turkey for the period 1988-2008. The remainder of the paper is organized as follows: Section II explains the NAIRU and hysteresis; Section III discusses the sources of hysteresis; Sections IV presents methodology; Sections V applies univariate time series unit root tests with and without a structural break to test for sectoral and general unemployment hysteresis in Turkey; and Section VI concludes the paper.

2. The Nairu and Hysteresis

The natural rate of unemployment describes fluctuations in unemployment as movements around a natural rate. This hypothesis characterizes unemployment dynamics as a mean reversion process. According to Friedman (1968: 8), "the natural rate of unemployment is the level which would be ground out by the Walrasian system of general equilibrium equations, provided that there is imbedded in them the actual structural characteristics of the labor and commodity markets, including market imperfections, stochastic variability in demands and supplies, the cost of gathering information about job vacancies and labor availabilities, the costs of mobility, and so on." NAIRU, which is an acronym for *non-accelerating inflation rate of unemployment*, is generally used as a synonym for the natural rate of unemployment. The NAIRU can be defined as the rate of unemployment at which inflation is stable in the long run. Gordon (1989: 220) argues that "Friedman's natural rate hypothesis became influential two decades ago with its accurate prediction that an attempt to maintain actual unemployment below the NAIRU would lead to accelerating inflation."

However, when the NAIRU shifted in Europe during the 1980s by exactly as much as the actual unemployment rate, hysteresis theory developed to explain this new phenomenon. Hysteresis theory suggests that the natural rate is affected by the actual history of unemployment (Phelps 1972, Ostrup 2003). According to León-Ledesma et al. (2004: 383), "If a country suffers a prolonged period of historically-high unemployment, then equilibrium unemployment will itself rise, being, thus, both path dependent and non-unique" (2004: 383).

If the actual unemployment rate does not fluctuate around some natural rate, it suggests that the nonstationarity, i.e., hysteresis, in the unemployment series is possible (Song et al. 1997: 235-236). The relationship between actual unemployment and the natural rate of unemployment can be illustrated with a simple model from Gordon (1989), Brunello (1990) and Dobbie (2004). Equation (1) defines the standard expectations-augmented Phillips curve that, for simplicity, assumes the coefficient on expected inflation (p_{t-1}) to be unity.

$$p_t = p_{t-1} + \beta(U_t - U_t^*) \tag{1}$$

p_t is the current inflation rate

p_{t-1} is the expected inflation rate

U_t is the current unemployment rate

U_t^* is the natural unemployment rate

β is the slope of the Phillips curve.

The possibility of hysteresis arises when the natural rate of unemployment (U_t^*) is a function of past unemployment rates in addition to its microeconomic determinants, represented by Z_t.

$$U_t^* = \alpha U_{t-1} + Z_t \qquad\qquad (2)$$

Substituting (2) into (1) results in

$$p_t = p_{t-1} + \beta(U_t - \alpha U_{t-1} - Z_t) \qquad\qquad (3)$$

If the parameter α in (3) is equal to one, it displays full hysteresis. This implies that there is no longer a unique U_t^*. This also shows that there exists a tradeoff between inflation and unemployment rate.

Although the terminology is not always used consistently, there is a crucial difference between hysteresis and persistence. The unit root case where α equals one is considered a full hysteresis. Hysteresis hypothesis argues that cyclical fluctuations have permanent effects on the natural rate of unemployment. Persistence, on the other hand, is defined as a slow speed of adjustment towards a long run equilibrium level. Persistence is a special case of the natural rate theory (Mitchell et al. 2008, Camarero et al. 2006). In the case of persistence where α is between zero and one, unemployment shows mean reversion (León-Ledesma 2002: 95). It can be characterized by a near unit root process. A number of authors have investigated empirically the existence of hysteresis in various countries and samples. Some of empirical literature can be shown in Appendix Table 1.

As discussed above, a largely common increase in the natural rate of unemployment across European countries during the 1980s and 1990s has led to the development of explanations based on hysteresis (Blanchard et al. 1997: 68).[1] There are a number of channels through which hysteresis may affect the economy. The next section will discuss these channels.

3. The Sources of Hysteresis

3.1. Insider-Outsider Theory

The insider-outsider theory of hysteresis advanced by Blanchard et al. (1986, 1987) is based on the role of insiders on the wage formation process. Their model explains hysteresis by referring to membership and duration theories: "First, membership theories are based on the distinction

between insiders and outsiders and explore the idea that wage setting is largely determined by firms' incumbent workers rather than by the unemployed. Second, duration theories are based on the distinction between short term and long term unemployed and explore the idea that the long term unemployed exert little pressure on wage setting" (Blanchard et al. 1986: 2). This explanation of hysteresis focuses on how and why insiders have power in the wage formation process. Because insiders have the power to bargain in the wage formation process, employment follows a random walk in these theories (Gustavsson et al. 2007: 161). The existence of random walk implies that the unemployment rate may not converge to a constant equilibrium level (Dreger et al. 2009).

Insider-outsider theory provides the microeconomic rationale for insider market power. Insiders are considered experienced incumbent workers whose positions are protected by labor turnover costs. Outsiders are defined as unemployed workers (Lindbeck 1993: 37).[2] Lindbeck et al. (1988, 2001) assume that there are several reasons behind the power of insiders to dominate the wage formation process. The first is labor turnover costs. It is costly for firms to replace their insiders with outsiders. Therefore, "insiders exploit and manipulate labor turnover costs in order to raise their wage rates. In other words, turnover costs provide insiders with the leverage necessary to extract a share of the product market rents earned by firms, so that higher product demand is converted into higher wages for insiders rather than into increased access to jobs for outsiders" (Springer 1989: 9). There are several sources of turnover costs. The most obvious type of turnover cost is the cost of hiring and firing labor. Hiring costs include the costs of searching, screening, negotiations, and training of newly hired workers. Firing costs include severance pay and costly firing procedures (Lindbeck 1993: 37-38).

Insiders use their power to pursue their interests in the wage bargaining process without taking into account the utility of outsiders. It is generally assumed that unions are more responsive to the interests of their incumbents than to those of the unemployed.[3] Unions are able to raise the wages of insiders in some respects, and may amplify the costs of hiring and firing. The existence of unions may help increase the effectiveness and types of cooperation and harassment activities. Insider bargaining power also increases. Moreover, unions may provide insiders with new rent-seeking tools (Lindbeck et al. 1988: 83). Additionally, due to high labor turnover costs, the market power of outsiders is less than insiders. In this theory, it is assumed that insiders set wages unilaterally. Firms usually select the

employment level from the labor demand curve (Dobbie 2004: 8). When insiders lose their jobs, they immediately become outsiders. Once they lose their jobs, they lose their power in the wage determination process. Finally, wage costs are positively related to the insider wage.

The degree of unionization is important in explaining insider-outsider theory. As the unionization in Turkish labor market is very weak, it may be argued that insider-outsider theory is not applicable for Turkey. "There were 2.95 million union members in Turkey, according to the July 2005 labor statistics of the Ministry of Labour and Social Security. However, it is acknowledged—including by the labor movement—that active (dues-paying) union membership is considerably lower. According to the 2002 Household Incomes and Expenditures Surveys (HIES), slightly less than 1.3 million workers reported being trade union members. This represents 12 percent of all wage and salaried employees and about 5 percent of the total employed labor force. Unionization is essentially a public sector phenomenon in Turkey. Only 4 percent of private sector wage employees are union members, compared to 28 percent in public enterprises and 51 percent in government (2002 HIES). Moreover, even among active trade union members, only about 700,000 are covered by a collective agreement." (World Bank 2006: 67).

3.2. The Capital Stock Theory

The capital stock is one of the major channels through which hysteresis may affect the economy. The essence of these explanations is that reductions in the capital stock may affect labor demand in the same way adverse supply shocks do (Franz 1990: 119). Burda (1988: 38) argues that "deviations of the capital stock from its trend path can also explain reduced demand for labor and higher rates of unemployment. … A reduction in the capital stock can induce classical unemployment by reducing the demand for labor at any given product of wage. It follows that adverse changes in the determinants of investment can exacerbate existing classical unemployment for any level of real wages."[4]

The reduction in capital stock leads to a subsequent decrease in demand for labor, which causes a persistent increase in unemployment. Røed (1997: 403) suggests that there are two mechanisms behind the relationship between the reduction in capital stock and the persistence of unemployment. Initially, capacity utilization decreases below its target level in a recession, stimulating capital scrapping. Then, this reduction leads to a higher equilibrium rate of unemployment, which persists even when the recessionary shocks are removed: "The second mechanism is related to the

strategic type of investment rather than to its level. During recessions, investments are typically aimed at costs reductions (often associated with less labor intensive technologies) rather than capacity augmentation. In booms on the other hand, capacity augmentation has the highest priority. Thus, business cycles contribute to long-lasting changes in the basic input structure in some industries" (Røed 1997: 403).

Blanchard combines the relationship between capital stock and the rate of unemployment with monetary policy. Blanchard (2003: 4-5) argues that there is a strong relationship between capital accumulation and monetary policy by way of real interest rates. If monetary policy affects real interest rates for a long period of time, it leads to a change in capital accumulation. He believes that this relationship has an important role in the history of unemployment in Europe over the past thirty years: "High real interest rates in the 1980s had the reverse effect of leading to a larger increase in the natural rate of unemployment during that period" (Blanchard 2003: 5).

The capital stock theory seems to be more applicable for Turkey. Capital stock theory argues that the reduction in capital stock may lead to a subsequent decrease in demand for labor, which causes a persistent increase in unemployment. Gross fixed capital formation as a share of GDP insistently decreased in 1990s and in the first decade of 2000. The decrease of gross fixed capital formation may be considered as the reason of "jobless growth" and persistency of unemployment. "Gross fixed capital formation (GFCF) as a share of GDP declined from an average of 24% and 22% during 1989-1994 and 1995-2001, respectively to 20% during 2002-2007 that are below the 25% minimum (GFCF in GDP) that has been identified as the required threshold to generate high and sustained growth in middle-income developing countries" (Demir and Erdem 2009: 31). There are some structural fault lines that explain low investment performance of Turkish economy. These are high real interest rates, capital market imperfections, lack of credit availability, high macro volatility, risk and uncertainty (Demir and Erdem 2009: 32).

3.3. Human Capital Theory

This type of explanation is usually referred to as duration theory (Mikhail et al. 2003: 6). The basic idea of this approach is that long-term unemployment causes a depreciation of the skills of unemployed workers. This depreciation negatively influences the labor market position of the workers. The early contributions to the hysteresis literature, such as Phelps (1972) and Heap (1980), emphasize a demoralizing effect of long-term unemployment on search behavior.

Logeay et al. (2006: 411) list explanations for why long-term unemployment leads to a hysteresis effect. Initially, there was a consensus in the literature that long-term unemployment causes deterioration in skills. The unemployed workers may lose their skills, and as a result they may be less attractive to firms and less employable to the employers (Blanchard et al. 1986: 14, Möller 1990: 200). When the loss of skill or the lack of work experience decreases the productivity of the long-term unemployed, productivity may fall below the reservation wage, resulting in the permanent unemployment of outsiders (Pissarides 1992).[5] Additionally, because screening potential employees is costly, employers use unemployment duration as a screening device (Lee 1989: 33). Blanchard et al. (1994: 417) argues that the frequency and duration of unemployment spells are used for "ranking" by employers. Ranking has some implications in the labor market: "[T]he exit rate from unemployment is a decreasing function of duration" and "the effect of duration is stronger the higher the rate of unemployment." Due to the loss of their jobs, unemployed workers also lose their social status; as a result, they may feel stigmatized. Long-term unemployment also leads to an increase in the reservation wage of unemployed workers by raising the social acceptance of unemployment (Lindbeck 1995). Finally, long-term unemployment may create a political response to unemployment. Blanchard et al. (1997: 69) argue that "Higher prolonged unemployment creates pressure for government policies to offer more generous programs aimed at helping the unemployed. These changes decrease the pain, but they are likely to increase the natural rate in the process".

Human capital theory emphasizes that long-term unemployment causes a depreciation of the skills of unemployed workers. The degree of depreciation of the skills is positively related with the degree of education level of workers. It is well known that education levels are comparatively low by OECD or EU standards in Turkish labor market (World Bank 2006: 11). Therefore it can be argued that human capital theory does not provide well established explanation about the persistency of unemployment in Turkey.

4. Methodology

If y_t indicates the unemployment rate, the ADF (p) regression (Dickey et al. 1979, 1981) can be defined with a frame of a pure time series as follows:

$$\Delta y_t = \mu + \beta t + \delta y_{t-1} + \sum_{j=1}^{p} \alpha_j \Delta y_{t-j} + \varepsilon_t \tag{4}$$

where ε_t is white noise and the process is performed with $iid(0,\sigma_\varepsilon^2)$. The value of p can be determined using different strategies, such as the Akaike info Criteria (AIC) and the Schwarz info Criteria (SIC) from general to specific or specific to general (Ng et al. 1995: 268-281). Consequently, if we make a false estimation of the number of lags, the estimated parameters will be biased.

The second motivation for an alternative unit root test is to allow for the disturbance process, ε_t, which is not $iid(0,\sigma_\varepsilon^2)$. Philips-Perron adapted and generalized the Dickey-Fuller tests to situations where, for example, the ε_t are serially correlated, other than by augmenting the initial regression with lagged dependent variables as in the ADF procedure (Phillips et al. 1988: 335-346). Their approach is nonparametric with respect to nuisance parameters and thereby allows the use of a very wide class of weakly dependent and possibly heterogeneously distributed data. The Philips-Perron versions of the Dickey-Fuller tests are flexible, in that the serial correlation between disturbances can be of an autoregressive or moving average form. However, where the autocorrelations of ε_t are predominantly negative, the Philips-Perron tests suffer severe size distortions with the actual size being much greater than the nominal size. When this distortion in size is corrected for, it appears that the Philips-Perron tests provide more explanatory power than the ADF tests (Schwert 1989: 147-160).

Ng et al. (2001) developed four statistical tests by utilizing GLS detrended data sets. These proposed tests based on previously developed unit root tests, in order to improve their performance in terms of size and power. The calculated values of these tests based on the forms of Philip et al. (1988) Z_α and Z_t statistics, Bhargava (1986) R_1 statistics, Elliot, Rotherberg et al. (1996) that created best optimal statistics. The terms are defined as following (see Ng et al., 2001, for further details):

$$MZ_\alpha = Z_\alpha + (T/2)(\hat{\phi}_1 - 1)^2 \qquad (5)$$

$$MZ_t = MSB * MZ_\alpha \qquad (6)$$

$$MSB = (T^{-2}\sum_{t=1}^{T} Y_{t-1}^2 / s^2)^{1/2} \qquad (7)$$

$$MPT = \left[\overline{c}T^{-2} \sum_{t=1}^{T} \widetilde{Y}_{t-1}^2 - \overline{c}T^{-1}\widetilde{Y}_T^2 \right] / s_{AR}^2 \tag{8}$$

A problem common with the conventional unit root tests, such as the ADF, PP, and Ng-Perron tests, is that they do not allow for the possibility of a structural break. Assuming the time of the break as an exogenous phenomenon, Perron (1989) showed that the power to reject a unit root decreases when the stationary alternative is true and a structural break is ignored.

Bai et al. (2003) procedure allows testing endogenously for the presence of multiple structural changes in an estimated relationship, and has a number of advantages over previous approaches. In particular, the underlying assumptions are less restrictive, confidence intervals for the break dates can be calculated, the data and errors are allowed to follow different distributions across segments, and the sequential method used in the application can allow for the presence of serial correlation in the errors and heterogeneous variances across segments. Bai et al. (2003), who suggest several statistics in order to identify the break points (see Bai et al. (2003), for further details):

- The $SupF_t$ (k) test, i.e., a sup F-type test of the null hypothesis of no structural break versus the alternative of a fixed (arbitrary) number of breaks k.

- Two maximum tests of the null hypothesis of no structural break versus the alternative of an unknown number of breaks given some upper bound, i.e., UDmax test, an equal weighted version, and WDmax test, with weights that depend on the number of regressors and the significance level of the test.

- The $SupF_t$ (ι+1|ι) test, i.e., a sequential test of the null hypothesis of ι breaks versus the alternative of ι+1 breaks.

5. Data and Empirical Results

We use a time series analysis approach to test hysteresis effects on unemployment in Turkey. Our data consist of log of the general and log of sectoral data (e.g., agriculture, industry, services rate) on the unemployment rate in Turkey. Data are taken from the Turkish Statistical Institute website and cover the 1988-2008 yearly periods. Therefore, the first sectoral data (agriculture, industry, and services rate) available are from 1988.

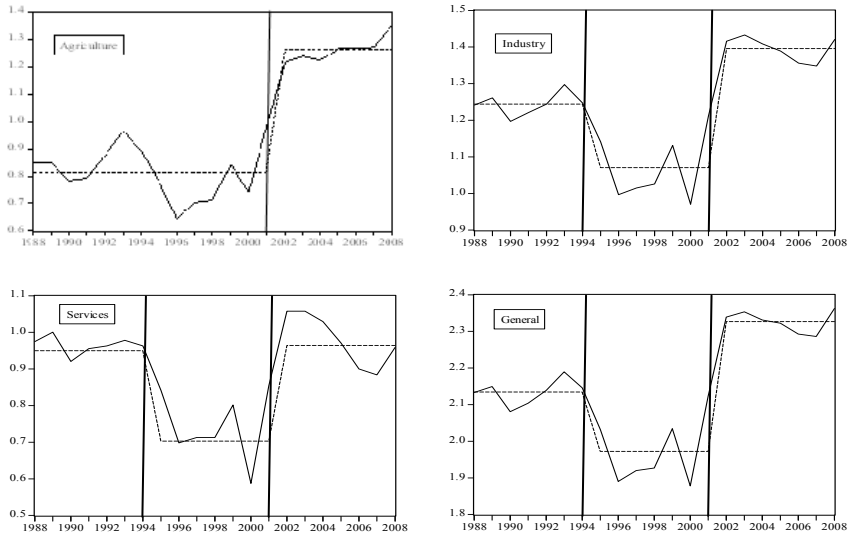**Figure 1.** *Turkey's sectoral and general unemployment rate 1988-2008*

Figure 1 presents a graph of log of sectoral and general unemployment series. Except for the agriculture sector, all unemployment series have two break points that gives Turkey's two major economic crises in 1994 and 2001. The details of the determinations of these crises are explained by Feridun (2008), Demir and Erdem (2009), Yeldan (2006).

Table 1 shows the Augmented Dickey-Fuller (ADF) test result. The numbers of lags are determined by Akaike info criteria (AIC), Schwarz info criteria (SIC), and Lagrange multiplier (LM) tests. ADF test results indicate that all unemployment series are non-stationary and first differences of series are stationary. Therefore, for all unemployment series, the hysteresis hypothesis is valid.

The truncation lag parameter for Phillips-Perron unit root test is taken to be $\lambda = \alpha(T^{1/3}) \cong 2$. Results of the Phillips-Perron test show that all of unemployment series include unit roots. If we take first differences of the series, we find that the series are now stationary. Lastly, Ng-Perron unit root tests gives that the unemployment rates appear to be non-stationary I(1) (at least a 5% significance level).

In the results of the three unit root tests we applied, it is seen that all of the unemployment rate series include the unit root and are not stationary. If we take first differences of the series, we can show that the series become

stationary. That is, the all of unemployment series can be said to integrate of order 1, I(1).

Table 1. *Time Series Unit Root Tests Results*

Variables	ADF[1] Delta	PP[2] Delta	Ng-Perron[3]			
			MZ_a	MZ_t	MSB	MPT
Series Levels						
Agriculture	-0.2483	0.4133	-0.602	-0.286	0.474***	15.876***
Industry	-1.2240	-1.3816	-3.519	-1.210	0.344***	6.913***
Services	-1.9602	-2.0445	-5.490	-1.649*	0.300***	4.484***
General	-1.0569	-1.2081	-3.023	-1.078	0.357***	7.772***
First Differences						
Agriculture	-3.4491**	-3.4262**	-9.198**	-2.126**	0.231*	2.731*
Industry	-3.8146**	-3.8047**	-9.448**	-2.154**	0.228*	2.664*
Services	-4.1492*	-4.1421*	-9.488**	-2.157**	0.227*	2.660*
General	-3.7774**	-3.7640**	-9.439**	-2.152**	0.228*	2.670*

Notes:

[1] The ADF test for all unemployment series, models includes a constant term.

[2] The PP test for all unemployment series, models includes a constant term.

[3] While in the MSB and MPT tests null hypothesis are stationarity, in the MZa and MZt tests are non-stationarity.

* Significant at 1%, ** significant at 5%, *** significant at 10%.

In Table 1, ADF, PP, and Ng-Perron unit root tests do not consider structural break. But in relevant period, there are two important crises at 1994 and 2001 in Turkey. Because of economic crisis, the series may be non-stationary. In order to take into account the possibility of structural changes in the DGP, we used to Bai et al. (2003) test.

Figure 1. shows in sectoral and general unemployment series is the presence of abrupt structural changes in the mean of the series. To that effect we apply Bai et al. (2003) procedure with only a constant as regressor (i.e. zt = {1}) and account for potential serial correlation via non-parametric adjustments.

The Bai et al. (2003) considered theoretical issues related to the limiting distribution of estimators and test statistics in the linear model with multiple structural changes. The Bai et al. (2003) test results gives in Table 2.

Table 2. *Bai-Perron (2003) Multiple Structural Breaks Tests Results for Unemployment Rate.*[6]

	Agriculture	Industry	Services	General
Tests [1]				
$\mathrm{SupF_T}(1)$	49.7715[*]	16.4128[*]	1.8121	25.9538[*]
$\mathrm{SupF_T}(2)$	29.8730[*]	69.0601[*]	65.7496[*]	101.6997[*]
$\mathrm{UD_{max}}$	49.7715[*]	69.0601[*]	65.7496[*]	101.6997[*]
$\mathrm{WD_{max}}$	49.7715[*]	90.6783[*]	86.3314[*]	133.5352[*]
$\mathrm{SupF_T}(2|1)$	1.4026	52.9638[*]	163.2861[*]	32.0482[*]
Number of breaks selected [2]				
Sequential	2	2	0	2
BIC	1	2	2	2
LWZ	1	2	2	2
Estimates with two breaks [3]				
$\hat{\delta}_1$	0.8142[*] (0.0420)	1.2441[*] (0.0140)	0.9496[*] (0.0148)	2.1345[*] (0.0182)
$\hat{\delta}_2$	1.2628[*] (0.0436)	1.0705[*] (0.0171)	0.7028[*] (0.0144)	1.9722[*] (0.0193)
$\hat{\delta}_3$		1.3958[*] (0.0194)	0.9642[*] (0.0436)	2.3268[*] (0.0136)
$\hat{T}_1$	2001 (2000-2003)	1994 (1993-1995)	1994 (1994-1996)	1994 (1992-1995)
$\hat{T}_2$		2001 (2000-2002)	2001 (1997-2001)	2001 (2000-2002)

Notes:

[1] The $\mathrm{SupF_t}$ (k) tests and the reported standard errors and confidence intervals allow for the possibility of serial correlation in the disturbances. The heteroscedasticity and autocorrelation consistent covariance matrix is constructed following Andrews (1991) and Andrews and Monahan (1992) using a quadratic kernel with automatic bandwidth selection based on an AR(1) approximation. The residuals are pre-whitened using a VAR(1).

[2] We use a 5% size for the sequential test $\mathrm{SupF_t}$ (ι +1| ι).

[3] In parentheses are the standard errors (robust to serial correlation) for $\hat{\delta}_i$ (i =1, 2).

[*] Significance at the 1% level.

In Table 2, the first issue to be considered is the determination of the number of breaks. Here the SupF_t (k) tests are all significant for k between 1 and 2. Therefore at least one break is present. The SupF_t (2|1) test takes the value 32.0482 and is therefore highly significant. The sequential procedure (using a 1% significance level), BIC and LWZ are select two breaks. Of direct interest are the estimates obtained under global minimization. The break dates are estimated at 1994 and 2001. The first date has a rather large confidence interval (between 1992 and 1995 at the 95% significance level). The other break dates are, however, precisely estimated since the 95% confidence intervals cover only one year before and after. The differences in the estimated means over each segment are significant. Applying Bai et al. (2003) tests give similar results for sectoral unemployment series. Differently, we reached that only one structural break is appropriate for agriculture sector.

In Table 2, we showed that unemployment series (agriculture, industry, services, and general) experience structural breaks. Structural breaks may cause the spurious use of the unit root. For this reason, we used as Choi et al. (2007) approach in which the error term $\hat{\varepsilon}_t = y_t - \hat{\delta}_j$ to purify the structural break effect, where $\hat{\delta}_j$ is the break regime.

Using Choi et al. (2007) approach, in which we use the results of Bai et al. (2003) test for each regime mean, we derived unemployment series by their regime mean. Therefore, we deflated structural break from the unemployment series. Figure 2 shows demeaned sectoral and general unemployment series.

Figure 2. *Turkey's demeaned sectoral and general unemployment rate 1988-2008*
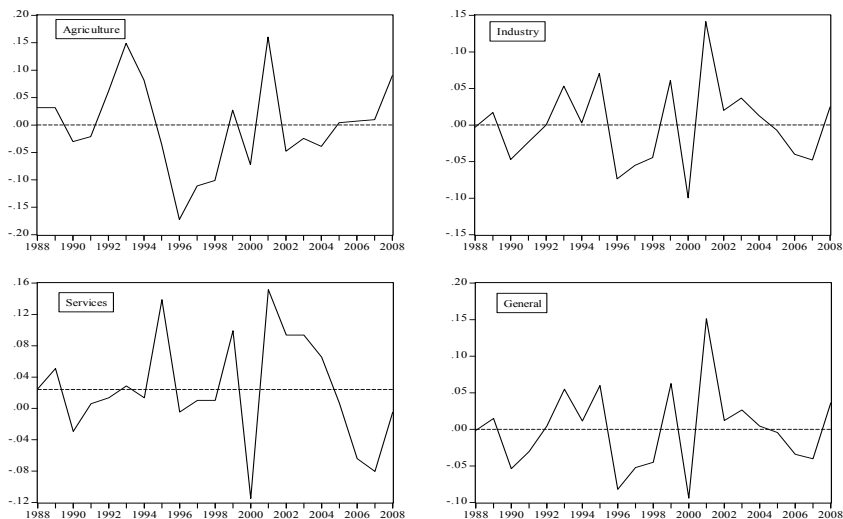

Figure 2 gives line graph of after adjustment for the estimated structural breaks. If Figure 2 examined, it can be seen all of unemployment series may be stationary. Anymore, we cannot find the effects of 1994 and 2001 crises in data. Table 3 reports ADF and PP unit root tests of demeaned data.

Table 3. *Time Series Unit Root Tests Results: Demeaned Data*

	Agriculture	Industry	Services	General
ADF[1]	-3.3686*	-3.9139*	-4.0242*	-3.8331*
PP[1]	-3.2228*	-5.6479*	-4.0560*	-5.6621*

Notes:

[1] The ADF and PP tests for all unemployment series, models do not includes deterministic terms.

* Significance at the 1% level.

The results point to the fact that the all of unemployment series represented by stationary I(0) processes around a breaking drift.

In all, the results point to the rejection of the hysteresis hypothesis and are compatible with the structuralist theories as described by Phelps (1994). Structuralist theories imply that the majority of shocks to unemployment are temporary but, occasionally, and mainly associated with recessions, can provoke a change in the level of the natural rate of unemployment

(Camarero et al. 2006: 180). The structuralist theories argue that the natural rate of unemployment is endogenously affected by market forces. It means that the natural rate of unemployment depends on the whole structure of economy and its institutional framework.[7] Some of the determinants of structural unemployment are real interest rates, productivity growth rates, oil prices, stock prices, government regulations, labor market dynamics (Werding 2006: 3, Gordon 1989, Lee and Chang 2008).[8]

The results in the literature and support the structuralist view of unemployment implying that shocks have highly persistent but not permanent effects on unemployment. Structural factors can affect the natural unemployment rate, which could be characterized as a stationarity in variance process subject to structural changes. Therefore econometric methods that are used in this study are in line with structuralist theories. Turkey has experienced two major economic crises in 1994 and 2001 respectively. Unemployment series have two break points that gives Turkey's two economic crises that can be observed in Figure 1. Moreover, the results show that the structure of the agricultural sector and the intensity of breaking are different from other sectors. In other words, the agricultural sector is least affected sector by economic crises. This result demonstrates that in the face of economic developments and economic shocks, the internal dynamics of the agricultural sector is different from the other sectors. This observation also supports the structuralist view of unemployment.

6. Conclusion and Policy Implications

This paper has outlined the concept of hysteresis and its utility in explaining persistent unemployment. The persistence of high unemployment rates in European countries has led to the development of alternative unemployment theories that emphasize the permanent effects of transitory shocks. There are many possible sources of such hysteresis. Three of these sources are named in this paper. First, the insider-outsider model focuses on the microeconomic rationale for insider market power and emphasizes wage setting in labor markets. Second, a reduction of physical capital may be a source of hysteresis. Shocks affect capital formation, which can then cause an increase in the unemployment rate. Third, a depreciation of human capital may affect the unemployment rate. Turkish economy experienced a low investment performance in 1990s and 2000s. So the second source, the capital stock theory, seems to be more applicable for Turkey.

This paper analyzes the empirical validity of the hysteresis hypothesis for unemployment rates in Turkey for the 1988-2008 yearly periods. Similar to previous empirical research, the results point to the rejection of the

hysteresis hypothesis and are compatible with the structuralist theories as described by Phelps (1994).

When the structural characteristics and transformation of Turkish labor market that are mentioned above are taken into consideration, some macroeconomic policy actions may be suggested for the solution of persistent unemployment in Turkey. First, productivity of agricultural employment should be increased. Second, by applying regulations, the degree of informalization of Turkish labor market should be declined. Third, by increasing capital stock formation, the link between economic growth and employment should be strenghtened.

Notes

[1] By examining the recessions of the early 1980s and 1990s and the recovery of the mid-1980s, Ball et al. discusses the role of monetary policy and labor market policies on the level of unemployment (Stockhammer et al. 2008: 7). According to Ball (2009: 5), "demand influences actual unemployment, U, which in turn influences the natural rate through hysteresis channels." He shows empirically that hysteresis exists, and that it depends on monetary policy (Stockhammer 2004: 72). Ball et al. (1999: 190) believes that there are two specific aspects of hysteresis. The first concerns the role of monetary policy. He argues that the reactions of policy makers can be used to explain the differences between unemployment rates of different countries in the 1980s. In countries where monetary policy is tight, the unemployment rate is permanently high. On the other hand, in countries where expansionary monetary policy is applied, the unemployment rate is low. The second aspect is concerned with how hysteresis works in reverse. He argues that demand expansion can produce permanent decreases in unemployment.

[2] "In contrast to the descriptive statistical terms 'employed' and 'unemployed,' the terms 'insiders' and 'outsiders' provide an analytical distinction that highlights the asymmetric position of incumbent workers and unemployed workers in terms of market power, due to the market power of the former" (Lindbeck 1993: 37).

[3] The degree of unionization is important in explaining the difference between the unemployment experiences of Europe and U.S. "While the concept of 'membership' has several interpretations, the role of trade unions themselves in such an account must play a central role in distinguishing U.S. and European labor markets. Whereas unions are involved in the determination of wages for less than 20% of employment in the U.S., the percentage of employees whose wages are directly or indirectly determined in collective bargaining exceeds 75% in most major European economies" (Burda 1990: 144).

[4] Although the literature on the relationship between capital stock and unemployment usually focuses on the long-run impact of capital accumulation on the rate of unemployment, Palacio-Vera et al (2006) postulate a different framework in which capital stock affects unemployment through its effects on the marginal product of labor.

5   "If the unemployment rate has been high in the recent past, a higher proportion of the unemployed may have suffered skill erosion and so will be less employable, raising the NAIRU" (Roberts et al. 1999: 1).

6   We use the Quandt-Andrews unknown breakpoint test for unemployment series. The results gives that the unemployment series have one structural break in 2001.

7   "The Turkish labor market experienced a significant structural transformation since early 1980s including: declining share of agricultural employment, falling participation rates (especially for women), increasing informalization, decreasing labor's bargaining power, falling real wages and increasing unemployment, increasing labor market flexibility, and the weakening of the link between economic growth and employment" (Demir and Erdem 2009: 20).

8   "Yet this is not nearly all one can say about why the notion of structural unemployment is so useful. The many implications of the term ''structural'' make it a powerful heuristic device. In applied work, and even in theory-building, researchers can make use of the relevant subissues, in attending to the questions that lead to at least preliminarily valid answers. Whether the conclusions hold more generally for earlier periods of time and for other places is then a matter that can be clarified in separate steps" (Werding 2006: 3).

References

Andrews, Donald W. K. (1991). "Heteroscedasticity and Autocorrelation Consistent Covariance Matrix Estimation". *Econometrica* 59/3: 817-858.

Andrews Donald W. K. and J. Christopher Monahan (1992). "An Improved Heteroscedasticity and Autocorrelation Consistent Covariance Matrix Estimator". *Econometrica* 60/4: 953-966.

_____, (2000). "OECD Unemployment: Structural Breaks and Stationarity". *Applied Economics* 32/4: 399-403.

Bai, Jushan and Perron Pierre (2003). "Computation and Analysis of Multiple Structural Change Models". *Journal of Applied Econometrics* 18/1: 1–22.

Ball, Laurence M, N. Gregory Mankiw and William D. Nordhaus (1999). "Aggregate Demand and Long-Run Unemployment". *Brookings Papers on Economic Activity* 2: 189-251.

Ball, Laurence M. (2009). "Hysteresis in Unemployment: Old and New Evidence". *NBER Working Paper Series* 14818: 1-37.

Bhargava, Alok (1986). "On the Theory of Testing for Unit Roots in Observed Time Series". *Review of Economic Studies* 53/3: 369-384.

Blanchard, Olivier Jean (2003). "Monetary Policy and Unemployment". *Remarks at the Conference Monetary Policy and the Labor Market. A Conference in Honor of James Tobin.* 1-10.

Blanchard, Olivier Jean and Lawrence H. Summers (1986). "Hysteresis and The European Unemployment Problem". *NBER Working Paper Series Working Paper* 1950: 1-100.

_____, (1987). "Hysteresis in Unemployment". *European Economic Review* 31/1-2: 288-95.

Blanchard, Olivier Jean and Peter Diamond (1994). "Ranking, Unemployment Duration, and Wages". *Review of Economic Studies* 61/3: 417-434.

Blanchard, Olivier Jean and Lawrence F. Katz (1997). "What We Know and What We Do Not Know About the Natural Rate of Unemployment". *Journal of Economic Perspectives* 11/1: 51–72.

Brunello, Giorgio (1990). "Hysteresis and the Japanese Unemployment Problem: A Preliminary Investigation". *Oxford Economic Papers* 42/3: 483-500.

Burda, Michael Christopher (1988). "Is There a Capital Shortage in Europe?" *Review of World Economics* 124/1: 38-57.

_____, (1990). "Some Evidence on the Membership Hysteresis Hypothesis in Europe". *Empirical Economics* 15/2: 143-161.

Camarero, Mariam, Josep Lluis Carrion-i-Silvester and Cecilio Tamarit (2006). "Testing for Hysteresis in Unemployment in OECD Countries: New Evidence Using Stationarity Panel Tests with Breaks". *Oxford Bulletin of Economics and Statistics* 68(2): 167-182.

Choi, Kyongwook and Eric Zivot (2007). "Long Memory and Structural Changes in the Forward Discount: An Empirical Investigation". *Journal of International Money and Finance* 26(3): 342-363.

Demir, Fırat and Nilgün Erdem (2009). "Labor Market Performance After Structural Adjustment in Developing Countries: The Interesting But not so Unique Case of Turkey". *Employment and Labor Issues: Unemployment.* Eds. Lance K. Valencia et al. New York: Nova Science Publishers.

Dickey, David A. and Wayne A. Fuller (1979). "Distribution of the Estimator for Autoregressive Time Series with a Unit Root". *Journal of the American Statistical Association* 74/376: 427-431.

_____, (1981). "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root". *Econometrica* 49/4: 1057-1072.

Dobbie, Michael John (2004). "Hysteresis and Insider-Outsider Theory: A Literature Review". *Macquaire University Faculty of Business and Economics Research Papers* 04/08: 1-30.

Dreger, Christian and Hans-Eggert Reimers (2009). "Hysteresis in the Development of Unemployment: the EU and US Experience". *Spanish Economic Review* 11/4: 267-276.

Franz, Wolfgang (1990) "Hysteresis in Economic Relationships: An Overview". *Empirical Economics* 15/2: 105-125.

Friedman, Milton (1968). "The Role of Monetary Policy". *The American Economic Review* 58/1: 1-17.

Feridun, Mete (2008). "Currency Crises in Emerging Markets: The Case of Post-Liberalization Turkey". *The Developing Economies* 46/4: 386-427.

Gordon, Robert J. (1989). "Hysteresis in History: Was There Ever a Phillips Curve?" *The American Economic Review* 79/2: 220-225.

Gustavsson, Magnus and Pär Österholm (2007). "Does Unemployment Hysteresis Equal Employment Hysteresis?" *The Economic Record* 83/261: 159–173.

Heap, H. S. P. (1980). "Choosing the Wrong "Natural" Rate: Accelerating Inflation or Decelerating Employment and Growth?" *Economic Journal* 90/359: 611–20.

Layard, Richard, Stephen Nickell and Ricard Jackman (1991). *Unemployment Macroeconomic Performans and the Labour Market.* Oxford: Oxford University Press.

Lee, Chien-Chiang and Chun-Ping Chang (2008). "Unemployment Hysteresis in OECD Countries: Centurial Time Series Evidence with Structural Breaks". *Economic Modelling* 25: 312-325.

Lee, George (1989). "Hysteresis and The Natural Rate of Unemployment in Ireland". *Journal of the Statistical and Social Inquiry Society of Ireland* 26/2: 31-68.

León-Ledesma, Miguel A. (2002). "Unemployment Hysteresis in the US States and the EU: A Panel Approach." *Bulletin of Economic Researc* 54/2: 95-103.

León-Ledesma, Miguel A. and Peter McAdam (2004). "Unemployment, Hysteresis and Transition". *Scottish Journal of Political Economy* 51/4: 377-401.

Logeay, Camille and Silke Tober (2006). "Hysteresis and the NAIRU in the Euro Area". *Scottish Journal of Political Economy* 53/4: 409-429.

Lindbeck, Assar (1993). *Unemployment and Macroeconomics.* Cambridge: The MIT Press.

_____, (1995). "Welfare State Disincentives with Endofenous Habits and Norms". *Scandinavian Journal of Economics* 97/4: 477–94.

Lindbeck, Assar and Dennis J. Snower (1988). *The Insider-Outsider Theory of Employment and Unemployment.* Cambridge: The MIT Press.

_____, (2001). "Insiders versus Outsiders". *Journal of Economic Perspectives* 15/1: 165–188.

Mikhail, Ossama, Curtis J. Eberwein and Jahdish Handa (2003). "The Measurement of Persistence and Hysteresis in Aggregate Unemployment". *Faculty Working Papers University of Central Florida* 03-36: 1-18.

Mitchell, William (1993). "Testing for Unit Roots and Persistence in OECD Unemployment Rates". *Applied Economics* 25/12: 1489–1501.

Mitchell, William and Joan Muysken (2008). *Full Employment Abandone.* Cheltenham: Edward Elgar.

Möller, Joachim (1990). "Unemployment and Deterioration of Human Capital." *Empirical Economics* 15(2): 199-215.

Ng, Serena and Pierre Perron (1995). "Unit Root Tests in ARMA Models with Data-Dependent Methods for the Selection of the Truncation Lag." *Journal of the American Statistical Association* 90/429: 268-281.

_____, (2001). "Lag Length Selection and the Construction of Unit Root Tests with Good Size and Power". *Econometrica* 69/6: 1519-1554.

Ostrup, Finn (2003). *Money and the Natural Rate of Unemployment.* Cambridge: Cambridge University Press.

Palacio-Vera, Alfonso, Ana Rosa Martínez-Cañete, Elena Márquez de la Cruz and Inés Pérez-Soba Aguilar (2006). "Capital Stock and Unemployment:Searching for the Missing Link". *The Levy Economics Institute Working Paper* 475: 1-33.

Perron, Pierre (1989). "The Great Crash, the Oil Price Shock and the Unit Root Hypothesis". *Econometrica* 57/6: 1361–1401.

Phelps, Edmund S. (1967). "Phillips Curves, Expectations of Inflation and Optimal Unemployment Over Time". *Economica* 34/135: 254-281.

_____, (1968). "Money-Wage Dynamics and Labor-Market Equilibrium". *Journal of Political Economy* 76/4: 678-711.

_____, (1972). *Inflation Policy and Unemployment Theory.* London: Macmillan.

_____, (1994). *Structural Slumps: the Modern Equilibrium Theory of Unemployment, Interest, and Assets*. Cambridge, MA: Harvard University Press.

Phillips, Peter C. B. and Pierre Perron (1988). "Testing for Unit Roots in Time Series Regression". *Biometrika* 75/2: 335-346.

Pissarides, Christopher A. (1992). "Loss of Skill During Unemployment and the Persistence of Employment Shocks". *The Quaterly Journal of Economics* 170/4: 1371–91.

Roberts, John. M. and Norman J. Morin (1999). "Is Hysteresis Important for U.S. Unemployment?" *Board of Governors of the Federal Reserve System Finance and Economics Discussion Series* 56:1-44.

Røed, Knut (1997). "Hysteresis in Unemployment". *Journal of Economic Surveys* 11/4: 389-418.

Schwert, G. William (1989). "Tests for Unit Roots: A Monte Carlo Investigation". *Journal of Business and Economic Statistics* 7/2: 147-160.

Song, Frank M. and Yangru Wu (1997). "Hysteresis in Unemployment: Evidence from 48 States". *Economic Inquiry* 35/2: 235–244.

Springer, K. A. (1989). "Wage Rigidity and the Persistence of Unemployment". *Serie Research Memoranda from VU University Amsterdam, Faculty of Economics, Business Administration and Econometrics* 41: 1-42.

Stockhammer, Engelbert (2004). "Explaining European Unemployment: Testing The NAIRU Hypothesis and A Keynesian Approach". *International Review of Applied Economics* 18/1: 3-24.

Stockhammer, Engelbert and Simon Sturn (2008). "The Impact of Monetary Policy on Unemployment Hysteresis". *IMK Macroeconomic Policy Institute Working Paper* 15/08: 1-28.

Tunalı, Halil (2010). "The Analysis of Unemployment in Turkey: Some Empirical Evidence Using Co-integration Test". *European Journal of Social Sciences* 18/1: 18-38.

Werding, Martin (2006). "Introduction: Still More Questions Than Answers". *Structural Unemployment in Western Europe Reasons and Remedies*. Cambridge: MIT Press.

World Bank (2006). *Turkey: Labor Market Study.* Report No. 33254-TR, April 14.

Yeldan, Erinç (2006). "Neoliberal Global Remedies: from Speculative-Led Growth to IMF-Led Crisis in Turkey". *Review of Radical Political Economics* 38/2: 193-213.

İşsizlik Histerisinin Sektörel Bir Analizi: Türkiye Örneği

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Öz

Türkiye ekonomisinin üstesinden gelmek zorunda olduğu en önemli sorunlardan birisi işsizliktir. Literatürde yüksek işsizlik oranlarını açıklayan çok sayıda teori vardır. Denge işsizlik oranı teorileri olarak da adlandırılan geleneksel teoriler, işsizliği, doğal işsizlik oranı etrafında dalgalanmalar olarak tasvir ederler. Fakat bu geleneksel teorilere, son yıllarda popüler hale gelen histeri hipotezi perspektifinden itirazlar yükselmiştir. Bu makale, Türkiye için 1988-2008 verilerini kullanarak sektörel ve genel işsizlikteki histeri etkisini test etmektedir. Çalışmada doğal oran alternatif hipotezine karşılık histeri etkisini test etmek için yapısal kırılmasız ve yapısal kırılmalı tek değişenli zaman serisi birim kök testleri uygulanmıştır. Bulunan sonuçlar önceki ampirik çalışmalara benzer olarak, histeri hipotezinin reddedilmesi üzerinde yoğunlaşmakta ve Phelps (1994) tarafından geliştirilen yapısalcı teori ile uyumludur.

Anahtar Kelimeler

Histeri, Para Politikası, İşsizlik, Birim Kök Testi, Yapısal Kırılma. JEL Sınıflandırması: E2, E24, E31

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Отраслевой анализ гистерезиса безработицы: на примере Турции

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Аннотация

Одной из наиболее важных и требующих решения проблем экономики Турции является безработица. В литературе существует множество теорий, объясняющих высокий уровень безработицы. Традиционные теории, известные также как теории равновесного состояния безработицы, изображают безработицу как колебания вокруг естественного уровня безработицы. Однако в последние время возросли возражения ставших популярными гистерезисных гипотез этим традиционным теориям. Данная статья анализирует влияние гистерезиса в отраслевой и общей безработице на основе данных Турции за 1988-2008 годы. В работе для тестирования влияния гистерезиса согласно гипотезе альтернативного естественного уровня применяются тесты единчиго корня для одномерных временных рядов со структурным сдвигом и без него. Полученные результаты, также как и предыдущие эмпирические исследования, сосредотачиваются на отрицании гипотезы гистерезиса и соответствуют структурной теории, разработанной Фелпсом (1994).

Ключевые слова

гистерезис, денежная политика, безработица, тест на единичный корень, структурный сдвиг. Классификация JEL: E2, E24 E31

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