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Unemployment Hysteresis in Turkey: Does Education Matter?

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ABSTRACT: This paper re-examines the empirical validity of the hysteresis hypothesis in unemployment rates in terms of education level in Turkey with minimum Lagrange Multiplier (LM) unit root methodology. Our empirical findings indicate that the time series properties of high and vocational high school educated unemployment rates are different than the overall unemployment rate and other educational unemployment rates.

Keywords: unemployment; business cycles; hysteresis, Turkey
JEL Classifications: J21; J64

1. Introduction

There has been an intense and lively academic and political debate on the unemployment in world economies during the last 25 years, notably for European economies. It can be distinguished two major hypotheses on the time series properties of unemployment: the natural rate hypothesis (NRH) and the hysteresis hypothesis (HH). NRH characterizes unemployment dynamics as a mean reverting process, which means that the unemployment rate tends to revert to its equilibrium in the long run. On the other hand, HH states that cyclical fluctuations have permanent effects on the level of unemployment therefore; the level of unemployment can be characterized as a non-stationary process.

Despite a blooming literature on testing HH and NRH (e.g., Blanchard and Summers, 1986; Mitchell, 1993; Song and Wu, 1998; Leon-Ledesma, 2002; Chang et al., 2005) by the time series and panel data unit root methodology, there are still some methodological debates associated with empirical literature.

First of all, the dynamics of the aggregate unemployment rate need not reflect that of joblessness is neglected in many studies (Gustavsson and Osterholm, 2006). The labor market is heterogeneous, a country's unemployment rate structure can be better understood if it is analyzed at a disaggregate level. For instance, one would expect that the reasons behind unemployment persistence differ greatly by educational level. Labor force skill level and expansion of the educational system may affect employability of workers and then cyclicality of both employment and unemployment rates (Murphy and Topel, 1997; Keane and Prasad, 1993; Hoynes, 1999; Gustavsson and Osterholm, 2007; Camarero et al., 2008).

One other issue that has been addressed in time series analyses of HH is whether there has been a structural break in the unemployment series. Unionization, discouraged worker effects, opportunity costs of unemployment, and the ability to adjust to structural changes in labor demand all would reflect different unemployment dynamics. The several studies illustrate that structural breaks could provide an explanation for hysteresis or persistence in the equilibrium rate of unemployment (e.g., Papell et al. 2000; Summers, 2003).

In this paper, we re-examine the informational value of unemployment rates in studies of hysteresis from disaggregated perspectives. In particular, it is applied Lagrange Multiplier (LM) unit root methodology to investigate the differences between on unemployment among workers

categorized by their level of educational attainment for Turkey. This approach allows us to abstract away from changes in the composition of the unemployed labor force by focusing on particular educational groups and accounting at the same time for the presence of structural break.

The paper is organized as follows: In Section II presents the data used. The econometric techniques and the empirical results are discussed in Section III and IV, respectively. The final section concludes the paper.

2. Data

For empirical studies, half-yearly data for the period 1989:1 2008:2 was used. Data for unemployment rates were collected from Turkish Statistical Institute (TUIK) online database. The major unemployment classifications used in the databases are "illiterate" (hereafter U1), "less than high school" (hereafter U2), "high and vocational high school" (hereafter U3), "higher education" (hereafter U4). We also consider total unemployment rate (hereafter U5).

During the period of 1989-2008, five major shocks effects on the Turkish economy. These are 1991 First Gulf War, 1994 crisis, 1998 Russian crisis and 1999 earthquakes which struck the eastern Marmara region, 2000-2001 financial crises and 2008 global crisis. In order to visualize the evolution of the unemployment and the effects of shocks we plot the unemployment rates by educational level over the 1989-2008 periods in Figure 1.

In general, the effects of shocks can be observed on all unemployment rates in Figure 1. But the widespread effect of 2000-2001 financial crises is shown clearly as compared to the previous ones. Another observation is that the U3 and U4 series are more cyclical than the unemployment rate of the other education levels.

Figure 1. Unemployment Rate by Educational Level

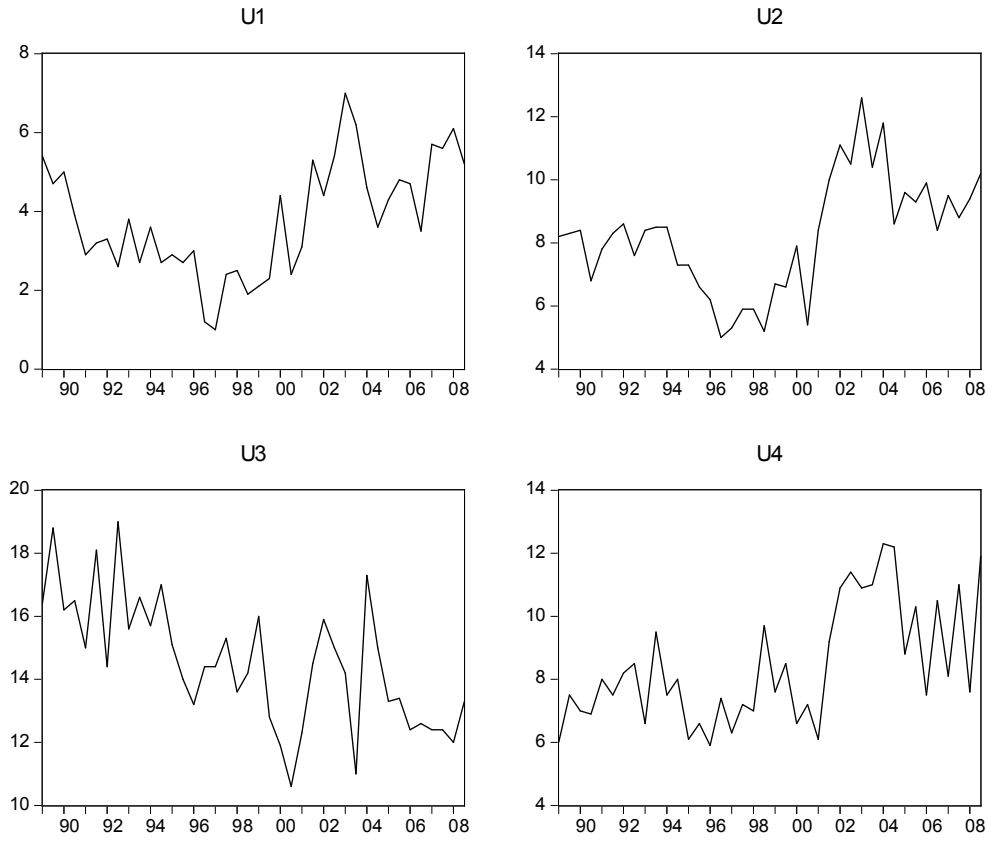

Figure 1 also indicates that for the period between 1989 and 1997 unemployment rates shows a decrease in all education levels. But U1, U2 and U4 series follow same increasing trend for the 1989-2008 period. There is some increase in the U3 in 1993, but the general decreasing trend is evident for the over period.

3. Methodological Framework

A traditional testing procedure in which to empirically examine HH is to apply unit root tests on the unemployment rate. Because hysteresis is consistent with non-stationary unemployment rates, unit root tests provide a convenient methodological framework.

Since incorporating non-stationary or unit root variables in estimating the regression equations using OLS method give deceptive conclusions, the Augmented Dickey-Fuller test was widely used to test for stationarity.

On the other hand, ADF type models are that they do not allow researchers to analyze the impact of structural changes in the economy. These structural changes, which could be by reason of shocks, have influence on macroeconomic variables. Perron (1989) also illustrated that failure to allow for an existing break leads to a bias that reduces the ability to reject a false unit root null hypothesis. To cope with this problem, Perron (1989) proposed allowing for one known, or 'exogenous,' structural break in the augmented Dickey–Fuller (ADF, hereafter) unit root test. Perron (1989) identified three trend break models. However, in these models, the break date was identified ex ante by economic information. It means that the Perron's method of assuming the break date as exogenously determined.

Following Perron (1989), in the unit root literature, many authors including, Zivot and Andrews (1992) (hereafter ZA) and Perron (1997) suggested determining the break point 'endogenously' from the data. Lumsdaine and Papel (1997) modified the ZA model to accommodate two structural breaks.

Nevertheless, all these endogenous tests were criticized for their treatment of breaks under the null hypothesis. Given the breaks were absent under the null hypothesis of unit root there may be tendency for these tests to suggest evidence of stationarity with breaks. Lee and Strazicich (2003) recommend a two break minimum LM unit root test in which the alternative hypothesis unambiguously implies the series is trend stationary. To avoid problems of bias and spurious rejections, the endogenous break LM unit root test derived in Lee and Strazicich (2003) is employed in PPP testing. In contrast to the ADF-type tests, size properties of the break LM test are unaffected by breaks under the null.

The break minimum LM unit root can be described as follows;

According to the LM principle, a unit root test statistic can be obtained from the following regression:

$$\Delta u_{it}=\delta'\Delta Z_t+\phi\overline{S}_{t-1}+\mu_t \qquad (1)$$

Here, Δ is the first difference operator; $\overline{S}_t = u_t - \hat{\Psi}_x - Z_t\hat{\delta}_t$ t= 2,…..T; $\hat{\delta}$ are coefficients in the regression of Δu_t on ΔZ_t; $\hat{\Psi}_x$ is given by $u_t - Z_t\delta$. If unemployment rate has a unit root then ϕt = 0, which is the null hypothesis tested using the *t*-test against the alternative hypothesis that $\phi t < 0$.

4. Empirical Results

We begin our empirical analysis by examining the LM test without breaks. These results are reported second column in Table 1. We are able to reject the null hypothesis of a unit root at the 10% significance level or better in only U3. This preliminary evidence favors the HH in U1, U2; U4 and U5 series versus the NRH.

Since it is well known that nonstationarity may conceal the existence of stationarity with breaks. Table 1 also shows the results of two break test. But the null hypothesis of a unit root cannot be rejected for the U1, U2; U4 and U5 series with two breaks specifications while we are able to reject the null hypothesis of a unit root in for U3 series again.

Overall, our LM test results are consistent with the HH for U1, U2, U4 and U5 series. However, the empirical evidence not to favor the HH for U3 series. These results indicate that shocks have permanent effects on the U1, U2, U4 and U5 series while the U3 tends to revert to its equilibrium in the long run after a shock. It means that unemployment is highly persistent in Turkey as a whole. The hysteresis phenomenon occurs in all unemployment rates of educational level, except in high and vocational high school graduates.

Table 1. LM unit root test results

Series	LM (No Break)	LM (Two Break)	Break Date (1)	Break Date (2)
U1	-2.288$^{(0)}$	-3.693 $^{(0)}$	1999:02	2002:02
U2	-2.342 $^{(4)}$	-4.361 $^{(8)}$	2000:02	2002:02
U3	-5.591 $^{(0)}$	-6.645 $^{(0)}$	2000:01	2001:01
U4	-2.695 $^{(2)}$	-3.376 $^{(6)}$	2001:02	2007:01
U5	-1.535 $^{(1)}$	-4.214 $^{(8)}$	2000:02	2003:02

Notes: The 1, 5 and 10% critical values for the LM test without a break are −3.63, −3.06, −2.77, respectively The 1, 5 and 10% critical values for the minimum LM test with two breaks are -5.823, -5.286 and -4.989, respectively. Lag lengths are in the parenthesis.

5. Conclusion

We have applied LM unit root tests to the unemployment rates by educational attainment in Turkey during the period 1989–2008. After controlling for educational attainment we find differences between unemployment rates in terms of educational level. More specifically we can conclude that the evidence is favorable to the nonstationary of the overall unemployment rate and unemployment rates by illiterate, less than high school, higher education level and therefore the existence of hysteresis, in these parts of unemployed labor force. But we also find that, there is no evidence of hysteresis for unemployment rate of high and vocational high school graduates. These results show that the aggregate unemployment rate may be superior to tests for hysteresis. The results also point to the importance of considering some degree of heterogeneity with educational differences in labor markets.

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