An Investigation on the Relationship between Government Size and Unemployment Rate: Evidence from OECD Countries

Ahmet AYSU
ahmet.aysu@deu.edu.tr

Gökhan DÖKMEN
gokhan.dokmen@karaelmas.edu.tr

Kamu Hacmi ve İşsizlik Arasındaki İlişki Üzerine Bir İnceleme: OECD Ülkeleri Örneği

Abstract

It is widely accepted that size of government is an important determinant of labor market performance. Therefore, understanding the effects of government size on employment is both empirically and theoretically critical. Recent empirical studies indicate that the size of government is inversely related to labor market performance. This study examines the relationship between government size and unemployment rate for 17 OECD countries over the period of 1990-2007 using panel cointegration analysis. The empirical findings indicate a statistically significant relationship between size of government and unemployment rates.

Keywords   :   Government Size, Unemployment Rate, Panel Cointegration.

JEL Classification Codes   :   E24, H11, H30.

Özet

Devletin büyüklüğünün işgücü piyasasının performansını etkileyen önemli bir unsur olduğu genel kabul görmektedir. Bu nedenle kamunun hacminin istihdam üzerindeki etkisi, hem teorik hem de deneysel olarak oldukça dikkat çekicidir. Son dönemdeki çalışmalarda göstermiştir ki devletin büyüklüğü, işgücü piyasasının performansını olumsuz yönde etkilemektedir. Bu çalışmada devletin büyüklüğü ile işsizlik oranları arasındaki ilişki, 1990-2007 yılları arasında 17 OECD üyesi ülke açısından panel koentegrasyon analizi ile test edilmiştir. Test sonuçlarına göre kamunun hacmi ile işsizlik arasında istatistiksel açıdan bir ilişki bulunmaktadır.

Anahtar Sözcükler   :   Kamu Hacmi, İşsizlik Oranı, Panel Koentegrasyon.

1. Introduction

The issue of unemployment is clearly one of the most pressing problems in OECD countries. The labor market performance of OECD economies has been damaged in recent years. **Over the past** two or **three decades** unemployment has increased dramatically within OECD countries. It started at less than %2 of the workforce before the first oil price shock, peaked at %6.1 in 1990 and is now around %6.9 (OECD, 2010). Similarly, other industrialized countries have also seen increases in unemployment rates over time. Consequently, u**nemployment phenomenon** is a worldwide problem attracting significant political attention.

In principle, increase in unemployment causes increase in the size of the government sector. For example, higher unemployment may lead to an increase in transfers and subsidies, as government outlays for unemployment benefits rise. A high unemployment rate might generate political pressure to increase budgetary items such as unemployment insurance and other transfer programs. However, it is argued by many that increasing government size has also deleterious effect on employment rate (Abrams, 1999; Christopoulos and Tsionas, 2002; Christopoulos et al., 2005; Feldmann, 2006). The size of government is expected to affect the unemployment rate of a country through the impacts of taxation, expenditure and the budget balance on several economic issues such as the employment costs, the efficient allocation of production factors, profitability of private investment and work-leisure decisions.

There is a variety of explanations for negative relationship between government size and labor market performance. First, a large government sector tends to crowd out private sector, particularly a private investments (Abrams, 1999: 395). While the neoclassical school advocates crowding-out, increased government involvement in the economy might distort the economic and political environment of business and discourage or crowd out private sector investments. **Crowding out effect tend to** increase unemployment. Second, a high level of government size requires taxes, which distorts economic incentives as well as the efficient allocation of production factors and ultimately undermines employment. The negative effects of taxation on employment operate through higher real wages (Doménech and Garcia, 2008). Moreover, high taxes presumably affect work leisure decisions and lengthen search time between bouts of unemployment. High taxes may discourage participation in the labor market, thus reducing the supply of labor. Third, high government size may have intensive regulations which may impede labor market functioning (Abrams, 1999: 396). The expansion of government may be accompanied by intensive regulations which reduce the informational content of price signals in the labor market, decreasing the ability of labor market to operate in an efficient way. Regulations are regarded as barriers to employment creation because they impede the flexible employment adjustment of firms in response to changes in demand. Further,

more government is also likely to produce additional regulation activities in the labor market as utility–maximizing political agents seek to balance the costs of achieving government objectives on the margin (Christopoulos et al, 2005: 1193-1194).

One of the recent empirical studies identifies a **positive** and statistically significant relationship between government size and unemployment rate. The seminal study is Abrams' (1999) cross-sectional study. He found out a **linear and positive relationship between size of government and unemployment. Other scholars have attempted to replicate this result using different samples.** Accordingly, this study empirically analyzes how the size of government affects unemployment in OECD countries. However it differs from previous papers in several respects. Firstly, while almost all previous papers are subject to Dynamic Panel Data, Ordinary Least Squares, Causality Analysis, we conduct Pedroni Panel Cointegration and estimate the coefficients with Fully Modified OLS and Dynamic OLS. Similar method is used in Christopoulos et al. (2005)'s study, but in this study coefficients are estimated only by Fully Modified OLS. Secondly, our sample is different from the previous papers.

2. Literature Review

Recent empirical studies mostly indicate a positive and statistically significant relationship between government size and unemployment rate. Abrams (1999) has reviewed the evidence using data for 20 OECD countries over the period of 1984-1993 and his result gave support to the existence of a positive association between the government size (total government outlays as a percent of GDP) and unemployment rate. Using OLS to estimate the relationship, an important implication of this analysis is that causality runs from government size to unemployment rate. Christopoulos and Tsionas (2002) examined the relationship between size of government measured as the ratio of total government expenditures over GDP and the unemployment rate for 10 European countries over the period between 1961 to 1999. The results were based on causality analysis made robust to non-stationarity and cointegration in the data. This study founded that there is unidirectional causality from government size to unemployment rate. Christopoulos et al. (2005) have obtained similar results for ten European countries over the period of 1961–1999 and concluded that there is a positive long-run relationship between government size and the unemployment rate and that causality runs one-way from government size to the unemployment rate. Karras (1993) also remarked permanent changes in government consumption have a greater impact on employment than temporary changes and this implies negative employment effects of government spending.

Feldmann (2010) analyzed the relationship between government size measured as the ratio of the Economic Freedom of the World index and the unemployment rate using data from 52 developing countries. Using a random effects model, Feldmann (2010)

indicated that a larger government sector is correlated with higher unemployment rates among the total labor force as well as among women and youths. Additionally, a larger government sector is correlated with a larger share of long-term unemployed in the total number of unemployed. Wang and Abrams (2007) came up with the same result for the twenty OECD countries from 1970 to 1999. Using an error-correction model, they find that government size, measured as total government outlays as a percentage of GDP, plays a significant role in affecting the steady-state unemployment rate.

In addition to the suppressing effect of government size on employment, a large number of studies on the labor market performance of taxes were executed recently covering OECD countries. These studies differ in their specifications and in the scope of their empirical analyses. However, almost all of them concluded that increases in tax rate (especially labor tax) correlated with reductions in employment. For example, Nickell and Layard (1999) have examined the impact of the tax rate on unemployment in OECD economies during the period between 1983 and 1994. Blanchard and Wolfers (2000) have also explored the employment effect of higher taxes, relying, however, on a different model specification that uses an average tax rate and interacts this measure with time-specific dummies. In a recent study, Daveri and Tabellini (2000) concluded that a 10 percentage increase in the total employment tax rate leading to around a 1 percentage increase in unemployment rate in the long run. Nickell et al. (2005) have obtained similar results for 14 industrial countries over the period of 1965 to 1995. According to their estimates, the observed rise of 14 percentages in labor tax rates in the EU could account for a increase in EU unemployment of roughly 4 percentage a year.

Moreover, in the literature, the effects of government spending on total hours worked have been analyzed in Yuan and Li (2000). Using the Generalized Methods of Moments (GMM) estimation technique, Yuan and Li (2000) demonstrated that a temporary innovation in government spending raises both hours worked per worker and output, but lowers the employment level.

3. Data and Methodology

The data used in this study are relationship unemployment rate, general government total expenditure as a percentage of GDP, total population, consumer price indices and GDP per capita for 17 OECD countries for the period 1990 to 2007 due to availability of data. All data is annually and expressed in natural logarithms. The data is gathered from the OECD data base.

Both theoretical studies and the literature on labor market performance lead to the hypothesis that the unemployment rate in the economy is determined by the following independent variables.

-   *General government total expenditure as a percentage of GDP*: The relationship between unemployment and government size is not clearly precise, because empirical studies especially in related to government size and growth are give different results depends on the used variables (Agell et.al., 1997). But depending on the recent studies, we expect that the government size effects unemployment rate positively.

-   *GDP per capita*: All else being equal, a higher income per capita level is likely to lead to lower unemployment rate.

-   *Total population*: A large population may lead to higher unemployment rate especially if the economic growth rate is less then population growth rate in the long run. We expect a positive relationship between unemployment and population.

-   *Consumer price indices*: Although there is against opinion such as monetarist approach, the negative relationship between inflation and unemployment is account for Phillips Curve. In this study, we anticipate negative relationship between consumer price indices and unemployment.

These factors lead to the formulation of the following panel regression:

$$\ln UEMP_{it} = \alpha_{i0} + \alpha_i \ln EXP_{it} + \alpha_{i2} \ln POP_{it} + \alpha_{i3} \ln CPI_{it} + \alpha_{i4} \ln Y_{it} + \varepsilon_{it} \quad (1)$$

The subscript t and i denotes time and each of the 17 OECD countries, respectively. In the regression, Y is GDP per capita, and UEMP is unemployment rate which is defined as the number of unemployed persons as a percentage of the labour force. EXP is a proxy for the government size of the economy to the rest of the world, CPI is the consumer price indices, and POP stands for total population for each country. The error term ε_{it} is assumed to be identically and independently distributed over countries and years.

We use a panel cointegration test to investigate the long-run relationship among our variables. Pedroni (1999, 2004) proposed a heterogeneous panel cointegration test using the following regression:

$$y_{it} = \alpha_i + \delta_i t + \beta_i X_{it} + e_{it} \quad (2)$$

Where y_{it} and X_{it} are observable variables for members i=1,2,…,n over time periods t=1,2,…t. The variables y_{it} and X_{it} are assumed to be integrated of order one,

denoted I(1). The parameters α_i and δ_i allow for the possibility of individual effects and individual linear trends, respectively. The slope coefficients β_i are also permitted to vary by individuals, in other words cointegrating vectors may be heterogeneous across members of the panel.

Pedroni (1999, 2004) develops seven residual-based test statistics to test the null hypothesis of no cointegration. These tests are classified into two categories. The first four statistics are based on the within dimension approach and named as panel cointegration statistics. They are panel v-statistic, panel ρ-statistic, panel PP-statistic (nonparametric) and panel ADF statistic (parametric). These statistics mainly pool the autoregressive coefficients across different members for the unit root tests on the estimated residuals. The second type is based on the between-dimension approach and named as group mean cointegration statistics which includes three statistics: group ρ-statistic, group PP-statistic (nonparametric) and group ADF-statistic (parametric). These statistics are based on averages of the individual autoregressive coefficients related to the unit root tests of the residuals for each member in the panel. All statistics can be standardized and asymptotically normally distributed.

To estimate the cointegrating vector coefficients, the FMOLS (Fully Modified Ordinary Least Squares) proposed by Pedroni (2000) and DOLS (Dynamic Ordinary Least Squares) proposed by Kao and Chiang (2000) estimation methods are employed. Estimation the long-run (cointegrating) relationship between variables with OLS is biased due to serial correlation and endogeneity. FMOLS corrects the serial correlation and endogeneity to the OLS estimator nonparametrically while the DOLS uses the future and past values of the differenced explanatory variables as additional regresssors.

4. Results

Before proceeding to the identification of a possible long run relationship we need to verify that all variables are integrated of order one in levels. Therefore, we test our series for the existence of unit roots. We performed the panel unit root tests developed by Levin, Lin and Chu (2002) (hereafter LLC); Im, Pesaran and Shin (2003) (hereafter IPS); Maddala and Wu (1999) (hereafter Fisher-ADF) and Choi (2001) (hereafter Fisher PP). The results of panel unit root tests are reported in Table: 1.

Table: 1
Results of Panel Unit Root Tests

Variables	LLC	IPS	Fisher-ADF	Fisher-PP
UEMP	-0.298 (0.38)	0.276 (0.60)	33.140 (0.50)	32.842 (0.52)
EXP	-0.293 (0.38)	0.462 (0.67)	32.541 (0.53)	42.419 (0.15)
POP	4.769 (1.00)	9.089 (1.00)	18.858 (0.98)	98.637 (0.00)*
CPI	-1.203 (0.11)	2.988 (0.99)	35.267 (0.40)	107.801 (0.00)*
Y	3.002 (0.99)	8.743 (1.00)	2.212 (1.00)	2.455 (1.00)
ΔUEMP	-5.554 (0.00)*	-4.731 (0.00)*	82.654 (0.00)*	181.606 (0.00)*
ΔEXP	-8.582 (0.00)*	-7.363 (0.00)*	118.659 (0.00)*	150.199 (0.00)*
ΔPOP	-2.141 (0.016)**	-1.651 (0.049)**	53.720 (0.017)**	57.154 (0.00)*
ΔCPI	-8.723 (0.00)*	-6.278 (0.00)*	102.772 (0.00)*	161.497 (0.00)*
ΔY	-5.901 (0.00)*	-6.300 (0.00)*	108.472 (0.00)*	183.700 (0.00)*

*Individual intercept in test regressions. Automatic lag length selection (Schwarz Information Criteria) used. P values shown below test statistics. Δ denotes first differences.The null hypothesis for the first test is a unit root (assumes common unit root process). For the other three tests, the null hypothesis is a unit root (assumes individual unit root process). *, ** and *** indicate the 1%, 5%and 10%significant levels, respectively.*

As shown in Table: 1, the null of the unit roots for the variables cannot be rejected by the LLC, IPS and Fisher-ADF tests. In Fisher-PP test the null hypothesis of a unit root cannot be rejected for UEMP, EXP and Y variables but rejected the null hypothesis for the POP and CPI variables. To verify these variables whether integrated of order 1, I(1), the null of a unit root is tested for the first difference variables. All results reject the null hypothesis of a unit root, indicating that all variables are integrated of order one.

Since all the variables are I(1), Pedroni's cointegration tests are employed to examine the null hypothesis of a no cointegrating relationship against the alternative hypothesis of the existence of cointegrating relationships. The results of panel cointegration test over the period 1990-2007 are reported in Table: 2.

The results from performing panel cointegration tests are mixed. Two of the within dimension statistics (panel v and panel rho) cannot reject the null hypothesis while the two statistics (panel-pp and panel adf) rejected the null hypothesis. Two of the between dimension statistics (group pp and group adf) indicate evidence of cointegration at the 1%level but the group rho statistic is not able to reject the null of no cointegration.

Table: 2
Panel Cointegration Test Results

Alternative hypothesis: common AR coefs. (within-dimension)		
	Statistic	**Prob.**
Panel v-statistics	-0.584	0.720
Panel rho-statistic	1.853	0.968
Panel PP-statistic	-2.810	0.002*
Panel ADF-statistic	-4.759	0.000*
Alternative hypothesis: individual AR coefs. (between-dimension)		
Group rho-statistic	3.721	0.99
Group PP-statistic	-3.348	0.004*
Group ADF-statistic	-4.389	0.000*
Numbers of observations: 306, Number of cross-sections: 17		

*This table reports Pedroni (2004) residual cointegration tests. The null hypothesis is
no cointegration. The tests assume individual intercepts but no deterministic trend.
Automatic lag length selection (Schwarz Information Criteria) used. *, indicates
1%significant level.*

Pedroni investigates the small sample properties of between group statistics and
within group statistics using Monte Carlo simulation method. Accordingly, if time series of
panel is short (i.e. t < 20), the group ADF and panel ADF statistics give better results
(Pedroni, 1997). Because of our time period is 18 (t=18), we can decide depend on these
statistics whether there is a cointegration relationship among our variables or not.
Therefore we conclude that from these test statistics there is a cointegration among our
variables.

Table: 3
Panel Cointegration Estimation

Variables	FMOLS	DOLS	
Dependent variable: UEMP			
EXP	0,8790 (3,32)*	0.7437 (2.3183)**	
POP	0,0821 (0,0827)	0.0853 (0.0707)	
CPI	-0,8229 (-3,72)*	-0.9835 (-3.6622)*	
Y	1.2060 (4.689)*	0.9748 (3.1213)*	

*Note: t statistics are in brackets. * and ** denote statistical significance at the
%1 and %5 levels, respectively.*

Finally we estimate the cointegrating vector using FMOLS and DOLS methods.
Table: 3 presents the estimates of the long run coefficient for the variables. According to
FMOLS results the coefficients of EXP and Y are positive and statistically significant at

the 1%level. An increase of 1%percentage in government total spending as a percentage of GDP raises the unemployment rate by 0.879%. The DOLS estimation results are the same as FMOLS but the coefficients are relatively small for EXP and Y variables. The POP has a positive effect on unemployment but the coefficients not significant at conventional levels in FMOLS and DOLS. The CPI has negative effect on unemployment rate and statistically significant at the 1%level.

We conclude that more government expenditure cannot stimulate the employment opportunities in selected OECD countries. The various reasons may be as following. Firstly, this situation may arise from the crowding-out effect, an increase in government spending reduce private investments, so the unemployment rate rises. Secondly, a higher government size requires higher tax rates. Tax rates affect the decisions about investments, consumption and work-leisure choice of economic individuals. In some countries, high tax rates on entrepreneurship and employment may lead to an increase in unemployment. The other reason is related with new incentives and problems such as environmental protection and population aging. These factors may increase government expenditures, but cannot directly contribute to the employment.

5. Conclusion

Evidence is presented linking the size of government to reported unemployment rates for the industrialized countries during recent years. This finding helps to explain the empirical link between government size and labor market performance. The size of government may have negative effects on employment by inducing lower market efforts and savings because of the substitution effects of high tax rates and crowding out private sector investment and production. This paper examines the relationship between government size and unemployment rates for 17 OECD countries over the period of 1990-2007. According to our regression results, a large government sector is likely to increase the unemployment rate in OECD countries. The empirical findings presented for OECD countries show strong evidence for a positive connection between the size of government and the unemployment rate. The policy implication is that the reduction of government sector can be considered as an additional channel through which employment growth could grow faster. Therefore, OECD countries with both high unemployment and big government sector should consider a reduction of the size of the government sector as a means of fighting unemployment.

References

Abrams, B.A. (1999), "The Effect of Government Size on the Unemployment Rate", *Public Choice*, 99(3–4), 395–401.

Blanchard, O. and J. Wolfers (2000), "The Role of Shocks and Institutions in the Rise of European Unemployment: The Aggregate Evidence", *The Economic Journal*, 110 (March): C1–C33.

Choi, I. (2001), "Unit Root Test for Panel Data", *Journal of International Money and Finance*, 20(2), 249-272.

Christopoulos, D.K., E.G. Tsionas (2002), "Unemployment and Government Gize: Is there any Credible Causality?", *Applied Economics Letters, 9*(12), 797–800.

Christopoulos, D.K., J. Loizides, E.G. Tsionas (2005), "The Abrams Curve of Government Size and Unemployment: Evidence from Panel Data", *Applied Economics*, 37, 1193–99.

Daveri, F., G. Tabellini (2000), "Unemployment, Growth and Taxation in Industrial Countries", *Economic Policy, (30*), 47–104.

Doménech, R. & JR. Garcia (2008), "**Unemployment, Taxation and Public Expenditure in OECD Economies**", *European Journal of Political Economy*, 24, 202–217.

Feldmann, H. (2006), "Government Size and Unemployment: Evidence from Industrial Countries", *Public Choice*, 127, 451–67.

Feldmann, H. (2010), "Government Size and Unemployment in Developing Countries", *Applied Economics Letters,* 17, 289–292.

Im, K.S., M.H. Pesaran, Y. Shin (2003), "Testing for Unit Roots in Heterogeneous Panels", *Journal of Econometrics*, 115, 53-63.

Kao, C. and M.H. Chiang (2000), "On The Estimation and Inference of a Cointegrated Regression in Panel Data", *Advances in Econometrics*, 15, 179–222.

Karras, G. (1993), "Employment and Output Effects of Government Spending: Is Government Size Important?", *Economic Inquiry, 31*(3), 354–369.

Levin, A., Chien-Fu Lin and J. Chia-Shang Chu (2002), "Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties", *Journal of Econometrics*, 108, 1-24.

Maddala, G.S. and S. Wu (1999), "A Comparative Study of Unit Root Tests With Panel Data and A New Simple Test", *Oxford Bulletin of Economics and Statistics*, Special Issue, 61, 631-652.

Nickell, S. and R. Layard (1999), "Labour Market Institutions and Economic Performance." In *Handbook of labour economics*, vol. 3, ed. O. Ashenfelter and D. Card. Amsterdam: North Holland.

Nickell, S., L. Nunziata, W. Ochel (2005), "Unemployment in The OECD Since the 1960s. What do We Know?", *The Economic Journal*, 115, 1–27.

OECD (2010), *OECD Factbook 2009: Economic, Environmental and Social Statistics*, 10 Eylül 2010, <http://www.sourceoecd.org>, 25.03.2011.

Pedroni, P. (1997), "Panel Cointegration; Asymptotic and Finite Sample Properties of Pooled Time Series Tests, with an Application To The PPP Hypothesis: New Results", *Indiana University Working Papers In* Economics, April.

Pedroni, P. (1999), "Critical Values for Cointegration Test in Heterogeneous Panels with Multiple Regressors", *Oxford Bulletin of Economics and Statistics*, Special Issue, 653- 670.

Pedroni, P. (2000), "Fully-Modified OLS for Heterogeneous Cointegrated Panels", ***Advances in Econometrics***, 15, 93-130.

Pedroni, P. (2004), "Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Test With an Application to the PPP Hypothesis", *Econometric Theory*, 20, 597-625.

Siyan Wang and Burton A. A. (2007), "**The Effect of Government Size on The Steady-State** Unemployment Rate: A Structural Error Correction Model", *University Of Delaware Working Paper Series,* Working Paper No. 2007-14.

Valentine, T. (2004), "Real Wages and Unemployment: State of the Debate", *Agenda*, 11(4), 307-320.