An Empirical Analysis on the Long-term Relation Between Unemployment and Higher Education in Turkey

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AN EMPRICAL ANALYSIS ON THE LONG-TERM RELATION BETWEEN UNEMPLOYMENT AND HIGHER EDUCATION IN TURKEY

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Abstract

In this empirical paper, a long-run co-integration between higher education and unemployment in Turkey has been investigated. ARDL bounds model which is a long-run co-integration method has been used based on the number of unemployed and higher education graduates time series in Turkey in 1961-2012 period. The results of bounds test conclude that there is no long-run co-integration and evidence between higher education and unemployment in the reference period in Turkey. As a result, this study supports to some extent the current debate on the availability of "non-qualified" higher education which does not generate adequate link between higher education and labor market to employ particularly for higher education graduates in Turkey.

Keyword: Unemployment, higher education, co-integration, bounds test, Turkey

JEL Classification: I25; J60

I. Introduction

In economics, the long-run relationship between education and unemployment are examined within the context of neo-classical economic growth theory (Solow, 1956; Swan, 1956). Since the late 1970s, economists have started to give special attention to education through the accumulation of human capital investments in long-run economic growth (Ashenfelter & Ham, 1979; Mincer, 1991; Barro, 2001; Mankiw *et al.*, 1992; Jorgenson & Fraumeni, 1992; Hanushek & Kimko, 2000). Unlike neo-classical growth models, recently,

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along with the emergence of endogenous growth model that accepts as an inherent factor of human capital formation and accumulation in economic growth, the relationship between education and economic growth began to discuss again in economic growth theory and literature (Romer, 1986; Lucas, 1988; Aghion & Howitt, 1992).

Dissemination of high education by rising skill level employed of increasing graduates may lead to higher growth and lower unemployment. Higher education institutions requires human capital which will produce higher education programs. The increase in the number of programs can lead to a permanent change in the human capital stock. Supply side of labor market and differences in human capital demand are important in the determination of regional human capital stock. Higher education institutions by giving local graduates and managing research activities help to raise the level of a region's human capital (Hunter, 2013). Basic training of primary level for the production of goods and services may be sufficient, while secondary-level education in the workplace employees enables you use your technology. Higher education requires a level that will lead to new technology and inventions (Keller, 2006). College graduates generate spillover effects that facilitates the flow of knowledge from universities to company's right and contains the accumulation of human capital formation and accumulation. One of the important mechanisms that facilitate the spread of knowledge is the mobility of human capital which leads to university graduates transition from universities to companies (Audretsch *et al.*, 2005).

Research-oriented higher education institutions facilities the spread of knowledge in the local economy. At the same time, research-intensive fields tend to have wider human capital inventory. The spreading effects of academic research and development studies to the benefits of local business depends on the economic environment and infrastructure support of a region. Increasing demand for skillful workforce by the effect of academic research and development efforts, rather than the expansion in the supply of local graduates, has a large scale of causal effect over the local human capital levels. Higher education institutions are vital functions to local economic development. The development and enrichment of local higher education institutions can trigger the spillover effect in local economies (Abel & Deitz, 2011). Thus, through accumulation and formation of human capital, long term sustainable growth with low unemployment can be accomplished together.

In literature, emprical studies are much more concentrated on the long-run relationship between levels of education and unemployment. In these studies, it has been determined that there is an inverse relationsihp between levels of education and unemployment. In the other words, while levels of education rises, unemployment decreases in the long-run (Mincer, 1991; Wolbers, 2000; Garrouste *et al.*, 2010). Researchs over the expansion of higher education policy which are assessing the effects of the policy of enlargement of higher education among higher education graduates in the European labor markets in the 1990s are examined increasing unemployment among higher education graduates, and particularly further growth of the problem of unemployment among youth universitiy graduates (Schomburg, 2000; Mora *et al.*, 2000; Woodley & Brennan, 2000). Plümper and Schneider (2007), founded that the rise in the unemployment rate leads to an increase in college enrollment, at the same time, however, fell significantly in expenditures per student in Germany. Nunez and Livanos (2010), in theirs paper on the impact of unemployment on higher education at the national level, concluded that the effects of higher education between the EU 15 countries exhibit different behaviors. Accordingly, the countries which have powerful influence of higher education on employment are Finland, Belgium and UK. On the other hand, South European countries higher education graduates Italy, Greece and Portugal as well as, are faced with the problems of unemployment because of insufficient employment creation in the labor markets. More importantly, similar negative results in the labour market are valid for France, Luxemburg, Germany and Sweden which have accepted quality and reputation in higher education in the international arena. Erdem and Tuğcu (2012), investigated co-integration and causality relationship between higher education and unemployment in Turkey, and they found a statistically significant relationship between these two variables. According to the results obtained, higher education graduates are one of the the factors affecting the increase in unemployment in the long-run in Turkey. Unlike, Dongshu *et al.* (2016), investigated the effects of higher education expansion policy on unemployment, and concluded that higher education expansion policy reduced unemployment among college graduates in China.

The purpose of this article is to contribute to insufficient number of empirical studies that have been done so far over the subject of long-run relationship between higher education and unemployment in Turkey. The rest of the article composed of a brief look at the labor market and higher education in Turkey,

specification of the data, building of empirical method and methodology, empirical analysis, and conclusion after evaluation of the test results.

2. Turkish Labor Market and Higher Education: An Overview

Turkey's economy, in the period of 1962 and 1977, under the leadership of economy policies based on planning, realized a stable and high growth process. With the support of the period of high growth in the world economy, it has been provided annual growth rates up to 10% in the manufacturing industry, and 6% for all of the economy in the 1960s. Until domestic market-oriented through import substitution industrialization process collapsed, between the years 1962 and 1977, there was no contradiction in the economy. It had been the fastest increase of the period of employment in manufacturing. But, this growth period which was based on new investments and an increase in the total factors rather than production and productivity increases using available facilities and factories, had been ended with great depression in the economy reflected higher price increases, bottle necks in manufactory production and difficulties in foreign payments in 1977 the first signs began to emerge. This economic depression period by gaining political and social character over time has led to a drastic change of the model in Turkish economy and industrialization process after 1980. The main feature of the new period starting with the 1980s, through domestic market-oriented import substitution industrialization strategy completely abandoned, export-driven economic growth model has been introduced (Turan, 2015).

Following 1980, the biggest impact of these economic transformation, industrialization and growth model executed with outward-oriented neo-liberal economic policies has been on the labor markets. The economic and financial crisis in this process are deeply influenced the labour markets and thus the mass public. The failure in the implementation of national economic policies coupled with global economic volatility and instability, Turkey has survived the most severe sucessive economic crisis in its economic history in the period of 1994 and 2001. Although Turkey's economy recovering entered into a new wave of growth since 2002, rises in employment has been limited by incresas in productivitiy in industry. For this reason, while production increases, employment levels remained low in the manufacturing industry, and the vast majority of the employment growth has been performed in the services sector. Erratic growth rates did not prevent higher non-farm unemployment which it has already high (Turan, 2015; İsmihan & Kıvılcım, 2009).

In the 1990s, although a marked decrease observed in the population growth rate which was a thousand of 19.9, due to the fact that young population structure, working age population has continuously increased. Especially in the period covering the years 2002-2007, relatively high growth has been reached, but job creation capacity of Turkey's economy has remained at limited level, and the employment rate has not exceed low level of 46 percent so far. Thus, unemployment rate has continiued its high level which has over the level of 10 percent following 2002 period to the present. Non-agricultural unemployment rate is over 14 percent. Becase of difficulties of job finding in the labor market by the effects of discourage of job finding expectations and extension of job search duration, the number of people out of the labor market has constant increased in the mass of over 3 million registered unemployed as of January 2015 (Turkstat, 2016). Therefore, in fact, the number of unemployed has reached larger dimensions. This number is over 6 million when combined with the the number of registered unemployed. Therefore, prolonged unemployment and being discouraged worker has also led to a deepening and mass poverty in Turkey (Turan, 2015).

If we look at the developments in higher education brief, prior to the last university reform in 1981 while there are a limited number of universities and graduates, the numbers and graduates have increased in the new era under Turkish Higher Education Council. A remarkable point in the restructuring of Turkish higher education system after 1981, private universities has began to be established also. Since the 1990s, it has been observed dramatic increases in tne number of universities and graduates by the impact of new universities which were spreading to the whole country with the addition of a large number of private universities. While the total number of faculties and colleges were 55 and the number of graduates were 6,025 in the education year of 1960/1961, total number of them respectively were 1914 and 573,434 in 2011/2012 education year (Turkstat, 2015). Although saving important quantitave develoyments, the content, structure and quality of Turkish higher education system has been contionusly the subject of debate, and universities have exhibited ups and downs in higher education (Turan, 2016; Şen, 2012; Balaban, 2012; Sargın, 2007).

3. Emprical Model and Methodology

In this study, the long-run relationship between higher education and unemployment has been tested by using a log-linear fonction which is formulated as follows:

$$\ln U_t = \alpha + \beta \ln HE_t + \epsilon_t \quad (1)$$

Here, HE_t represents the number of graduates in higher education, α fixed term, U_t the number of unemployed, and $\in$ error term.

To determine the long-run relationship between the higher education and unemployment it has been employed the long-term co-integration bound test which is known as Autoregressive Distributed Lag (ARDL). The bounds test which was developed by Pesaran *et al.* (2001) has more advantageous according to the tranditional Engle and Granger (1987), and Johansen and Juselius (1990) co-integration tests. In traditional co-integration tests assumed that all variables are integrated at I(1) level. Whereas ARDL bounds test can be employable irrespective of whether the variables are integrated at I(0), I(1) or mutually co-integrated.

The following estimation of regression equation is done in bound test:

$$\Delta \ln U_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta \ln U_{t-1} + \sum_{i=0}^{p} \alpha_{2i} \Delta \ln HE_{t-1} + \theta_1 \ln U_{t-1} + \theta_2 \ln HE_{t-1} + u_t \quad (2)$$

Where; Δ is the difference operator, p is the lag lenght, and u is the serially uncorrelated error term. The ARDL test is performed in two stages: In the first, the null hypothesis of no-cointegration long-term relationship between the varibles described as $H_0: \theta_1 = \theta_2 = 0$ is tested against $H_1: \theta_1 \neq 0, \theta_2 \neq 0$. F-statistic is used to test the relationship of long-term co-integration. Since the asymptotic distribution of this F-statistic is non-standard irrespective of whether the variables are I (0) or I (1), two tables of critical values are developed by Pesaran *et al.* (2001). One assumes that all variables are I (0) and the other that all variables are I (1). In this case, it contains a bound covering all possible classification of the variables. If the calculated F-statistic lies above the upper level of the bound, the H_0 is rejected supporting the existence of co-integration relationship in the long-run. If the calculated F-statistic lies below the lower level of the bounds, the H_0 cannot be rejected, and does not support the relationship of co-integration. If the calculated F-statistic falls between the bounds, then the result is inadequate and in this case, the error correction term which is known Error Correction Model (ECM) is used to

determine the existence of co-integration. If obtained ECM is negative and significant, the variables are accepted to be co-integrated in the long-run.

After the determination of a long-run relationship, the next phase of the ARDL test which is ECM is formulated as follows:

$$\Delta \ln U_t = \alpha + \sum_{i=1}^{p} \omega_k \Delta \ln U_{t-1} + \sum_{i=0}^{p} \lambda_k \Delta \ln HE_{t-1} + \omega EC_{t-1} + u_t \qquad (3)$$

Where; ω is the error correction parameter, and EC gives the residual.

Since long-run co-integration relationship between variables breaks the stability of the parameters, whether testing variables should be stable over time. Tests for parameter stability which are developed by Brown *et al.* (1975) are cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests which are widely used in ARDL modelling framework. These are based on the recursive regression residuals, and they have been updated against structural breaks in the model. The existence of a co-integration relationship between variables supports at least the existence of a one-way causality relationship. As a result of ARDL test supporting the existence of co-integration relationship, the causality relationship should be tested between variables. To do this, modified Wald (MWALD) test which is developed by Donaldo and Lütkepohl (1996) is recommended in the literature.

4. Empirical Analysis and Findings

The first step of the ARDL procedure is to test whether all variables are stationary or not. In other words, to test irrespective of whether the variables are integrated at I (0), I (1) or mutually co-integrated. For this application, the ADF and PP unit root tests are recommended in the literature. The results of the unit root tests are given in Table 1 below. Applying the unit root tests to the first-differences of each series leads to a very clear rejection of the hypothesis that the data are I (2), which is important for the legitimate application of the bounds test below.

Table 1
Results for unit root tests

Level	Variables	Test	Type
		ADF	PP
Constant	lnHE	-0.8014	-0.8029
	lnU	-1.1720	-1.1724
Constant+Trend	lnHE	-4.1803*	-3.0512
	lnU	-1.2679	-1.4207
First Difference			
Constant	lnHE	-4.5806	-7.6235
	lnU	-5.8010	-5.7831
Constant +Trend	lnHE	-4.5504	-7.5855
	lnU	-5.7762	-5.7533

*stationary at level.

The next step in the bounds testing approach to co-integration is perform the F-test on selected ARDL model including appropriate lag lengths. The optimal lag length is imposed as 5 using Vector Auto Regressive (VAR). Applying committed regression model considering the number of lag length, F-statistic value is 3.7059. This result is compared to the bounds test critical values table lower and upper bounds values which are developed by Pesaran *et al.* (2001), and founded that the calculated F-statistic lies below the lower level of the bound, the H_0 cannot be rejected, and does not support the long-run relationship of co-integration at 1%, 5% and 10% levels as reported in Panel A at Table II. As a result, there is no long-run co-integration relationship between higher education and unemployment in Turkey. On the other hand, hence the bounds test results do not support the long-run relationship between higher education and unemployment it is not possible to make a statistical inference and analysis over the short-run dynamics of the model. At the same time, because of no long-run evidence between higher education and unemployment, it is impeded the direction or directions of the relationship of causality.

Table 2
Results for co-integration analysis

Panel A: Co-integration tests	Dependent variable:lnU
F-statistic	3.7059
Error-correction parameter	-0.8729 [0.0569]
Panel B: Long-run parameters	
Constant	-0.3070 [0.4983]
lnHE	0.0552 [0.9051]
Panel C: Diagnostic checking	
Adjusted-R^2	-0.2242
Serial correlation:Breusch-Godfrey LM test statistic	0.9880 [0.4409]
Heteroscedasticity:White test statistic	0.5299 [0.8233]
Functional form: Ramsey's Reset test statistic for regression specification error	0.9921 [0.3260]
Panel D: Stability tests	
CUSUM	stable
CUSUMQ	stable

Note that F istatistic critical values are generated from Pesaran *et al.* (2001), p.300, Table CI (iii), Case III at level 10% (4.04-4.78), at 5% level (4.95-5.73), and at 1% level (6.84-7.84).
Numbers in brackets are p-values.

As reported in Panel A at Table 2, both the result of F-statistic and error-correction parameter do not support the long-run co-integration between higher education and unemployment in Turkey. According to the Panel B which gives long-run parameters, the independent variable lnHE is not statistically significant. Since the ARDL method uses the Ordinary Least Squires (OLS) to estimate the co-integration vector, it should be checked that the assumptions of the OLS estimator are not violated. To do this, the diagnostic checking must be done. The Panel C gives the diagnostic checking tests results. These results

illustrated that the estimated ARDL model ensures the assumptions of no-serial correlation, homoscedasticity, and no-functional misspecification. Panel D gives the results of stability tests. The stability of long-run coefficients was tested by applying CUSUM and CUSUMSQ tests. Both the results of stability tests illustrated that the estimated ARDL model provides stable parameters in the long-run.

5. Conclusion

In this empirical paper, the long-run con-integration between higher education and unemployment in Turkey has been investigated. ARDL bound test which is a long-run co-integration test has been used based on the number of higher education graduates and unemployed time series in Turkey in 1961-2012 period. The results of bounds test conclude that there is no evidence of a long-run relationship between higher education and unemployment in the reference period in Turkey. In other words, higher education and unemployment are not moving together both directly and inversely in the long-run in Turkey. The results of this study supports to some extent the current debate on the availability of "non-qualified" higher education which does not generate enough link between higher education and labor market to employ particularly for higher education graduates in Turkey. On the other hand, hence the bounds test results do not support the long-run relationship between higher education and unemployment, it is not possible to make a statistical inference and analysis over the short-run dynamics of the model. At the same time, because of no long-run evidence between higher education and unemployment, it is impeded the direction or directions of the relationship of causality. Because of no long-run co-integration, and both inverse and statistically significant evidence between higher education and unemployment in Turkey, it can be said that higher education does not effective to combat with unemployment problem, and it does not give enough and sustainable support to decrease unemployment in the long-run in Turkey. It can be observed that unemployment depends on labor and total factor productivitiy levels which are led by changings in working hours and capacitiy utiliy rates particularly in manufacturing industry in the short-run. Hence, the long-run unemployment maintains at its high levels in Turkey. From here, it can be determined that the contirbution of higher educated human capital to the long-run economic growth is inaduquate and limited compared to physical capital and primary and secondary educated human capital in Turkey.

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