Vol.:4 Issue:2 Year: 2021 Gönderim Tarihi (Recieved): 20.07.2021 KabulTarihi (Acceptance): 26.09.2021

IMPACT OF TAX WEDGE AND SOCIAL SECURITY CONTRIBUTIONS ON UNEMPLOYMENT: EVIDENCE FROM SELECTED EU TRANSITION ECONOMIES

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ABSTRACT

The unemployment is one of the main economic problems for all the counties with different dimensions. Therefore, extensive studies have been conducted on the determinants of unemployment. This research explored the role of tax wedge and social security contributions on unemployment in selected EU transition economies over the 2000-2019 period through causality and cointegration tests. The causality analysis revealed a bilateral causality between tax wedge and unemployment and a unilateral causality from social security contributions to the unemployment. Furthermore, the cointegration analysis revealed that social security contributions positively affected the unemployment in the long run for the whole panel, but tax wedge did not have a significant impact on the unemployment. In addition to this, the country level cointegration coefficients revealed that tax wedge raised the unemployment in Lithuania, Poland, Slovak Republic, and Slovenia, and the social security contributions had a positive impact on the unemployment in Estonia, Hungary, Latvia, and Lithuania.

Keywords: TAX WEDGE, SOCIAL SECURITY CONTRIBUTIONS, UNEMPLOYMENT, PANEL COINTEGRATION ANALYSIS, PANEL CAUSALITY ANALYSIS

Jel Codes: B23, E24.

VERGİ TAKOZU VE SOSYAL GÜVENLİK KATKI PAYLARININ İŞSİZLİK ÜZERİNDEKİ ETKİSİ: SEÇİLMİŞ AB GEÇİŞ EKONOMİLERİ ÖRNEĞİ

ÖZET

İşsizlik bütün ülkeler için farklı boyutlarda temel ekonomik sorunlardan birisini oluşturmaktadır. Bu nedenle işsizliğin belirleyicileri üzerine çok sayıda çalışma yapılmıştır. Bu çalışma nedensellik ve eşbütünleşme analizlerini kullanarak 2000-2019 döneminde seçilmiş AB geçiş ekonomilerinde vergi takozu ile sosyal güvenlik katkı paylarının işsizlik üzerindeki etkisini araştırmaktadır. Nedensellik analizi vergi takozu ile işsizlik arasında iki yönlü bir nedensellik, sosyal güvenlik katkı paylarından işsizliğe doğru ise tek yönlü bir nedensellik olduğunu belirlemiştir. Ayrıca eşbüyünleşme analizi panel düzeyinde sosyal güvenlik katkı paylarının uzun dönemde işsizliği pozitif etkilediği, ancak vergi takozunun işsizlik üzerinde anlamlı bir etkiye sahip olmadığını göstermektedir. Buna ilave olarak, ülkelerin eşbütünleşme katsayıları ise vergi takozunun Litvanya, Polonya, Slovak Cumhuriyeti ve Slovenya'da işssizliği artırdığı, sosyal güvenlik katkı paylarının ise Estonya, Macaristan, Letonya ve Litvanya'da işsizlik üzerinde pozitif etkiye sahip olduğunu göstermektedir.

Anahtar Kelimeler: VERGİ TAKOZU, SOSYAL GÜVENLİK KATKI PAYLARI, İŞSİZLİK, PANEL EŞBÜTÜNLEŞME ANALİZİ, PANEL NEDENSELLİK ANALİZİ

Jel Kodları: B23, E24.

1. INTRODUCTION

The unemployment is one of the common problems which all the countries face to with different dimensions. Also, the unemployment is one of the main macroeconomic indicators which reflect the health of the economy and economic performance. Furthermore, the unemployment leads economic, social, and psychological costs such as decreases in production, tax revenues and life satisfaction, increases in crime, violence, alcoholism, drug abuse, and divorce for the societies (e.g. see Ochsen and Welsch, 2011). Therefore, one of the main targets of the governments is to decrease the unemployment given the costs for individuals and societies. In this context, specification of the causes underlying the unemployment exhibits importance for policy makers. The main determinants of the unemployment have been documented as the economic growth, labor productivity, labor taxes, unemployment insurance, population growth, inflation, external debt, foreign direct investment and institutional quality in the related literature (e.g. see Baccaro and Rei, 2007; Maqbool et al., 2013; Folawewo and Adeboje, 2017; Pană and Fanea-Ivanovici, 2019).

In this context, tax wedge reflects the additional burden for employers. Therefore, an increase in tax wedge causes the labor demand curve to the downward, but the size of the effect of tax wedge increases on the unemployment or employment depends on the elasticities of both labor demand and supply curve. The negative unemployment effect of tax wedge increases as the elasticities of labor demand and supply curves raise (Gora et al., 2006). The related empirical literature has generally reached the findings in compatible with the theoretical suggestions (e.g. see Festa (2015). The social security contributions also exhibit the same impact on the unemployment.

We analyzed the impact of tax wedge and social security contributions on unemployment in sample of selected EU transition countries except Bulgaria, Croatia, and Romania due to data absence. The EU transition economies implemented a

transition from centrally planned economy to liberal market economy and communed with EU (European Union) as of fall of the Communism and in turn made institutional and economic reforms during the transition process. The countries experienced significant decreases in unemployment as seen in Table 1. Furthermore, the countries except Czech Republic and Slovak Republic experienced the decreases in tax wedge, but social security contributions remained at nearly same levels during 2000-2019 period.

Table 1: Unemployment, tax wedge, and social security contributions in selected EU transition economies

Country	Year	Unemployment (% of total labor force)	Tax Wedge (% of labor cost)	Social Security Contributions (% of GDP)
Czech Republic	2000	8.76	42.586	14.313
Czech Republic	2019	2.01	43.941	15.469
Estonia	2000	13.36	41.309	10.899
Estonia	2019	4.45	37.245	11.584
Hungary	2000	6.56	54.676	11.309
Hungary	2019	3.42	44.583	11.631
Latvia	2000	14.21	43.212	9.772
Latvia	2019	6.31	42.552	9.553
Lithuania	2000	15.93	45.697	9.901
Lithuania	2019	6.26	37.232	9.713
Poland	2000	16.31	38.167	12.902
Poland	2019	3.28	35.59	13.294
Slovak Republic	2000	19.06	41.861	13.926
Slovak Republic	2019	5.75	41.883	14.981
Slovenia	2000	6.92	46.252	14.98
Slovenia	2019	4.45	43.593	15.803

Source: World Bank, 2021 & OECD, 2021a & 2021b

The institutional and economic determinants of unemployment have been extensively explored in the relevant literature. In this context, the impact of labor taxation on employment or unemployment has been investigated especially in sample OECD and EU members through cluster and regression analyses. This article targets

to make a contribution to the related literature by analyzing the impact of social security contributions and tax wedge on unemployment for a panel of selected EU transition countries in the long run through second generation cointegration test taking notice of cross-section dependence and heterogeneity unlike the relevant empirical literature. In this context, the forthcoming part summarized the literature about the impact of tax wedge and social security contributions on the unemployment and then data and method were described. The empirical analysis was conducted in Section 4 and the research was concluded with Section 5.

2. LITERATURE REVIEW

In the relevant literature, the scholars have generally explored the impact of tax wedge on employment and unemployment in OECD and EU member countries through regression and cluster analyses and reached that a negative unemployment effect of tax wedge and discovered the cluster consisting of higher tax wedge-higher unemployment and lower tax wedge-lower unemployment (e.g. see Thomas, 1998; Daveri et al., 2000; Vork et al., 2007; Šeparović, 2009; Dolenc and Laporšek, 2010; Trpeski and Tashevska, 2012; Catalano and Pezzolla, 2015; Turgut, 2015; Deskar-Škrbić et al., 2018; Yilanci et al., 2019; Galuščák and Kátay, 2019; Akalin, 2021).

In one of the first studies, Thomas (1998) analyzed the interaction between labor taxation and unemployment in Sweden and discovered that labor taxation raised the unemployment. On the other side, Vork et al. (2007) analyzed the effect of tax wedge on the labor market in Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia over the 1996-2004 period through regression analysis and discovered that tax wedge negatively affected employment and labor force participation. Šeparović (2009) explored the impact of tax wedge on the unemployment in Croatia and OECD countries through correlation analysis and hierarchical cluster analysis and reached that higher tax wedge led relatively higher unemployment. On the other side, Dolenc and Laporšek (2010) explored the impact of

tax wedge on employment in EU member states over the 1999-2008 period through regression analysis and reached that tax wedge negatively affected the employment and 1% increase in tax wedge caused about a 0.04% decrease in employment.

Dolenc et al. (2011) explored the impacted of labor taxation on unemployment in Croatia, OECD economies and EU members through hierarchical cluster and regression analyses over the 2000-2008 duration and reached that Croatia was in the group with higher tax wedge-higher unemployment and tax wedge raised the unemployment. On the other side, Tvrdon (2011) explored the effect of labor taxation on unemployment in EU member states over the 2000-2009 period through regression analysis and revealed that taxation decreased the employment in the sample. On the other side, Trpeski and Tashevska (2012) explored the impact of tax wedge on employment and unemployment in 43 countries through hierarchical cluster analysis and revealed two groups including countries with high tax wedge-high unemployment-low employment rate, and countries with low tax wedge-low unemployment-high employment.

Lehmann et al. (2014) analyzed the impact of progressive tax on employment in sample of 21 OECD countries over the 1998-2008 period and discovered a raising impact of progressive tax on employment. Catalano and Pezzolla (2015) explored the determinants of employment and economic growth through general equilibrium model and revealed that decreases in tax wedge significantly raised the employment and economic growth. On the other side, Radu et al. (2018) explored the interaction among tax wedge, employment, and unemployment rate in 41 countries through hierarchical cluster analysis and discovered that the countries with larger tax wedge had a higher unemployment. Deskar-Škrbić et al. (2018) also analyzed the effect of labor taxation on employment in Croatia through VAR approach and reached a negative impact of labor taxation on employment. Đurović-Todorović et al. (2018) examined the effect of tax wedge on unemployment in 36 OECD member and Serbia

through cluster analysis and discovered that the countries with higher tax wedge had higher unemployment.

Yilanci et al. (2019) analyzed the causality between tax wedge and unemployment in OECD members over the 2000-2017 duratiın through causality test and discovered a unilateral causality from tax wedge to unemployment in Hungary, Mexico and Poland. Galuščák and Kátay (2019) analyzed the role of tax-benefit system on employment in Czech Republic and Hungary and discovered the tax-benefit system as a significant determinant of employment. Lastly, Akalin (2021) examined the impact of tax wedge on unemployment in 36 OECD member over the 2000-2019 period through dynamic regression analysis and revealed that tax wedge raised the unemployment.

Furthermore, social security contribution has been revealed a significant determinant of unemployment by a relatively few scholars (Steiner, 1996; Giray and Çınar, 2017). In this context, Giray and Çınar (2017) analyzed the impact of social security contributions on unemployment in Turkey over the 1965-2015 period through ARDL approach and discovered a significant influence of social security contribution on unemployment in the long run. Steiner (1996) also reached positive employment effect of decreases in social security contributions for Germany. Van Rijckeghem (1997) explored the effect f social security taxes on employment for France through general equilibrium model and revealed a large positive effect of decreases in social security taxes on unemployment.

3. DATA AND METHOD

In the research, the infleunce of tax wedge and social security contributions on unemployment was explored in selected EU transition countries by methods of panel data analysis. In the empirical analysis, unemployment was proxied by share of unemployed in total labor force, tax wedge was represented by tax wedge as a percent of GDP, and social security contributions were proxied social security contributions as

a percent of GDP. Tax wedge data was provided from OECD (2021a) and described as the rate of taxes paid by an average single worker to the corresponding total labor cost for the employer and indicated how extent the tax on labor income discourages employment. The data of social security contributions was obtained from OECD (2021b) and included accident, injury and sickness benefits, reimbursements for medical and hospital expenses or provision of hospital or medical services, old-age, disability and survivors' pensions, family allowances, and unemployment insurance benefits and supplements.

Table 2: Dataset description

Variable	Variable definition	Data source
UNEMP	Unemployment, total (% of total labor force) (modeled ILO estimate)	World Bank (2021)
TAXWEDGE	Tax wedge (% of labor cost)	OECD (2021a)
SSC	Social security contributions (% of GDP)	OECD (2021b)

The data of 8 EU transition economies (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, and Slovenia) was employed in the empirical analysis, because the taxwedge data was absent for Bulgaria, Croatia, and Romania and the data existed for the period of 2000-2019. The software packages of Stata 14.0, Gauss 10.0 and Eviews 10.0 were used in the econometric analyses. The mean of unemployment (UNEMP), tax wedge (TAXWEDGE), and social secxurity contributions (SSC) were respectively 9.44%, 42.38%, and 12.21% as seen in Table 3, but the aforementioned series showed significant variations from country to country. Furthermore, tax wedge level of the sample was found to be higher than that of OECD.

Table 3: Summary statistics of the dataset

Characteristic	UNEMP	TAXWEDGE	SSC
Mean	9.44925	42.38707	12.2194

Characteristic	UNEMP	TAXWEDGE	SSC
Maximum	19.9	55.803	15.864
Minimum	2.01	34.124	7.852
Std. Dev.	4.285288	4.192147	2.197699

The main focus of the research is to research the effect of tax wedge together with ocial security contributions on unemployment. In the econometric model, unemployment (UNEMP) was represented by total unemployed persons as a percent of total labor force. On the other side, tax wedge (TAXWEDGE) was proxied by tax wedge as a percent of labor cost and social security contributions (SSC) were proxied by social security contributions as a percent of GDP.

$$UNEMP_{it} = \alpha_0 + \beta_1 TAXWEDGE_{it} + \beta_2 SSC_{it} + u_{it} \quad (1)$$

In the econometric part of the research, the pre-tests of cross-sectional dependency and homogeneity were firstly conducted. Then, Pesaran (2007) CIPS unit root test, Westerlund and Edgerton (2007) LM bootstrap panel cointegration test and Dumitrescu and Hurlin (2012) causality test were conducted given the consequence of the aforementioned pre-tests.

Westerlund and Edgerton (2007) LM bootstrap cointegration test takes cognizance of cross-sectional dependence and in turn produces relatively more robust consequences for small sample size, also permits autocorrelation and heteroscedasticity in cointegrating equation and hinged upon on LM (Lagrange multiplier) test by McCoskey and Kao (1998). The cointegration test was derived the following equation:

$$y_{it} = \alpha_i + x'_{it}\beta_{it} + z_{it} \quad (2)$$

In the above equation, t=1...., T and i=1...., N and z_{it} is error term.

$$z_{it} = \mu_{it} + v_{it} = \sum_{j=1} \eta_{ij} \quad (3)$$

In the above equation, η_{ij} is the error term with zero average and σ_i^2. The LM test statistic is calculated as following:

$$LM_N^+ = \frac{1}{NT_2}\sum_{i=1}^{N}\sum_{t=1}^{T} W_i^{-2} S_{i,t}^2 \qquad (4)$$

On the other side, Dumitrescu and Hurlin (2012) Granger causality test is the modified version of Granger causality test for heterogeneous panels and also produces robust consequences in the existence of cross-sectional dependence (Dumitrescu and Hurlin, 2012).

4. EMPIRICAL ANALYSIS

In the applied part of the research, cross-sectional dependence among the series was questioned by tests of Pesaran et al. (2008) $LM_{adj.}$, Pesaran (2004) LM CD, and Breusch and Pagan (1980) LM and the consequences were shown in Table 4. The null hypothesis in terms of cross-sectional independence was rejected at 1% significance level and therefore cross-sectional dependence among the cross-sections was disclosed.

Table 4: Cross-sectional dependency tests' results

Test	Test statistic	P value
$LM_{adj.}^{*}$	22.66	0.000
LM CD *	8.857	0.000
LM	102.6	0.005

*two-sided test

The homogeneity of cointegration coefficients was questioned by adjusted delta tilde test of Pesaran and Yamagata (2008) and the consequences were displayed in Table 5. The null hypothesis of homogeneity was declined at 1% significance level and therefore cointegration coefficients were found to be heterogeneous.

Table 5: Homogeneity tests' results

Test	Test statistic	P value
Delta tilde	6.727	0.000
Adjusted delta tilde	7.521	0.000

The unit root existence at the series were analyzed by Pesaran (2007) CIPS unit root test and the consequence were shown in Table 6 and all three series included an unit root at level, but were stationary with first differenced values.

Table 6: Pesaran (2007) CIPS unit root test

Variables	Constant	Constant + Trend
UNEMP	-2.027	-2.058
d(UNEMP)	-2.920***	-3.050***
TAXWEDGE	-1.816	-2.133
d(TAXWEDGE)	-2.865***	-3.607***
SSC	-2.169	-2.455
d(SSC)	-2.986***	-3.458***

*** indicated that it was significant at 1% significance level

The cointegrating relationship among unemployment, tax wedge, and social security contributions was explored by Westerlund and Edgerton (2007) LM bootstrap cointegration test and the consequences were shown in Table 7. The bootstrap probability values were regarded due to the existence of cross-sectional existence and the null hypothesis in terms of significant cointegration relationship among unemployment, tax wedge, and social security contributions were accepted, because the bootstrap probability value was discovered to be higher than 10%.

Table 7: Westerlund and Edgerton (2007) LM bootstrap cointegration test results

	Constant			Constant and Trend		
LM_N^+	**Test statistic**	**Asymptotic P value**	**Bootstrap P value**	**Test statistic**	**Asymptotic P value**	**Bootstrap P value**
	2.213	0.013	0.900	2.717	0.003	0.850

Note: Critical values of the test were obtained through 10.000 simulations and asymptotic probability values were provided from normal distribution.

The cointegrating coefficients were forecasted through AMG (Augmented Mean Group Estimator) estimator of Eberhardt and Bond (2009) and the consequences were rshown in Table 8. The panel cointegration coefficients indicated that social

security contributions had a positive influence on the unemployment in the long run, but tax wedge did not have a significant impact on the unemployment. However, the cross-sectional cointegration coefficients disclosed that taw wedge positively influenced the unemployment in Lithuania, Poland, Slovak Republic, and Slovenia in the long run. On the other side, social security contributions positively influenced the unemployment in Estonia, Hungary, Latvia, and Lithuania.

Table 8: Cointegration coefficients

Countries	**TAXWEDGE**	**SSC**
Czech Republic	0.2832503	-0.3141181
Estonia	0.0272599	2.151835***
Hungary	-0.2056115	2.236761***
Latvia	0.2050354	1.96308**
Lithuania	0.4229517*	0.8143224**
Poland	1.880682***	0.364909
Slovak Republic	0.8922458**	-0.6438395
Slovenia	0.5391547**	0.721155
Panel	0.2650945	0.9117631**

***, **, * respectively indicates that it is significant at 1%, 5%, and 10% levels.

The long run analysis among unemployment, social security contributions, and tax wedge indicated that both social security contributions and tax wedge are significant determinants of unemployment in compatible with theoretical expectations and empirical findings by Vork et al. (2007), Šeparović (2009), Dolenc and Laporšek (2010) , Dolenc et al. (2011), Tvrdon (2011), and Galuščák and Kátay (2019). Consequently, both tax wedge and social security contributions can be employed as the tools to combat with unemployment.

The causality interaction among unemployment, tax wedge, and social security contributions was checked through the causality test of Dumitrescu and Hurlin (2012), and the findings were displayed in Table 9. The causality analysis disclosed a bilateral causality between tax wedge and unemployment, and a unilateral causality from social security contributions to the unemployment. In other words, both tax wedge

and social security contributions were found to be significant causes of unemployment.

Table 9: Results of causality test

Null Hypothesis	W-Stat.	Zbar-Stat.	Prob.
DTAXWEDGE ↛DUNEMP	4.61193	5.31312	1.E-07
DUNEMP ↛ DTAXWEDGE	6.28391	7.88201	3.E-15
DSSC ↛DUNEMP	5.33673	6.42674	1.E-10
DUNEMP ↛ DSSC	1.33466	0.27781	0.7812

***, **, * respectively indicates that it is significant at 1%, 5%, and 10% levels.

5. CONCLUSION

All the countries have faced with the unemployment problem with different dimensions and unemployment together with inflation are the main economic goals of all the governments given its social and economic costs. Furthermore, the causes underlying the unemployment can be differ among the countries. In this context, specification of factors underlying the unemployment matters for right policy-making.

In the article, the impact of tax wedge and social security contributions on unemployment were analyzed throug causality and cointegration analyses. The causality analysis disclosed that tax wedge and social security contributions were significant causes of unemployment. On the other side, the cointegration analysis disclosed that social security contributions had a positive impact on unemployment at the panel in the long run, but tax wedge did not have a significant impact on the unemployment at panel level. Furthermore, the country specific cointegration coefficients disclosed that taw wedge raised the unemployment in Lithuania, Poland, Slovak Republic, and Slovenia in the long run and social security contributions raised the unemployment in Estonia, Hungary, Latvia, and Lithuania.

The theoretical considerations suggest that additional costs in terms of tax wedge and social security contributions on labor may decrease labor demand and in turn employment and the theoretical considerations have been verified by empirical

studies to a great extent. Therefore, tax wedge and social security contributions were significant factors for unemployment in the light of empirical findings and can be employed to fight with unemployment.

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