Dimensions of tax burden: a review on OECD countries

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Abstract

Purpose – The tax burden, defined as the ratio of the collected taxes in a particular period against the total product, is commonly used to determine the effect of fiscal and tax policies on the socioeconomic structure. The purpose of this study is to examine how the changes in some macroeconomic indicators affect the tax burden.

Design/methodology/approach – System generalized method of moments approach is used for 34 Organisation for Economic Co-operation and Development (OECD) members in the period of 1993-2016.

Findings – Based on the research findings, variables such as income per capita, foreign trading volume, the capacity of employment, unemployment and economic share of industry sector effect tax burden in a statistically significant and positive direction. The reason that lies behind the positive effect of unemployment on tax burden is the fact that the sense of social state is not abandoned. Thus, it is predicted that the state will increase public transfer expenditures in the short term due to unemployment, this increase will impose a financial burden on the public sector both in the medium and long term and finally, there will be an increase in the tax burden.

Originality/value – Results in the literature suggest that there are many reasons for increasing tax burden such as socio-economic development, financial and organizational structure and the globalization process. However, according to this study, it seems that gross domestic product per capita, the size of the industry sector, openness, employment capacity and unemployment rate also have a positive and significant effect on tax burden in the long run. Ultimately, these results demonstrate that tax burden, one of the most important indicators of the public sector size in the sample of the states and period in hand, is influenced positively by all independent variables and increases slightly but surely. These results suggest that the tax state is still a determinative factor in the socioeconomic field within its taxation tools.

Keywords Public economics, Taxation, Tax burden,
System generalized method of moments approach, OECD countries

Paper type Research paper

1. Introduction

In today's globalized world, taxes, the main source of revenue for the state, affect several socioeconomic components. Calculations of the tax burden are primary the means used in the literature to determine the effects originating from taxes with both national and international approaches. In general, the tax burden can be defined as the ratio of the collected taxes in a particular period against the total product. Theoretically, the tax burden can surge when the increase in tax revenue is greater than the increase in income. Indeed,

according to Smith (1776), an undeterred rising in the tax burden will create corrosive effects on economic activities, especially taxable resources. Although Ricardo (1871) also argues that high tax rates can lead to the displacement of capital, Keynes (1936) thinks that the tax burden can affect investment and savings.

However, according to Moşteanu (2005), the tax burden, giving the relationship between the collected tax and the gross domestic product (GDP), can be affected by many economic components. As a matter of fact, a fiscal requirement of the state is one of the most important reasons for the increase in the tax burden. The question raised is: what is the reason the variety of services offered by the state is constantly and regularly increasing.

This phenomenon has been discussed in various ways in the literature. First of all, Wagner (1890) explains the increase of state intervention with new social requirements. Musgrave (1959) considers that the state can produce new goods and services apart from its traditional duties, especially due to the lack or failure of the market mechanism. Also, Rostow (1960) considers the services provided by the state as an attractive power of economic development. According to Peacock and Wiseman (1961), while asymmetric incidents are likely to put pressure on public spending in the medium and long term, Downs (1957) and Buchanan and Tullock (1962, 1977) suggest that public spending and the financial sector can expand with "the populist approach" in the political process. Niskanen (1979) claims that it is the behavior of the bureaucrats who expand public spending. These views, which explain the increase of public expenditures in the field of public finance in general, also can be related to the expansion of the public sector and, consequently, the increase in the need for financing. In the medium and long term, the increase in public expenditures and the increase in the tax burden can occur together. This view also supports the political financing approach of Buchanan and Wagner (1977).

The aim of the paper is to determine the effects of macroeconomic indicators such as GDP per capita, foreign trade transactions, the employment capacity, the unemployment rate and the size of the industry sector on the tax burden. In this context, the dynamic panel data estimators are used to investigate the effects of the dependent variables on the tax burden. Therefore, the system generalized method of the moments (GMM) approach is used, taking the datum of 34 Organisation for Economic Co-operation and Development (OECD) members between 1993 and 2016 as a basis. In both the theoretical and empirical literature, it is obvious that the effects of public spending or revenues on various macroeconomic indicators are generally focused upon. In addition, the effects of various macroeconomic components on the public sector and in particular on public expenditures are also examined especially in terms of the fiscal theory. It can be said that the optimal tax rate is defined as a tax burden level, which will not negatively affect the producers or consumers. We aim that the paper will contribute to the literature by addressing the relationship between tax burden and economic growth, globalization, employment, unemployment and the industrial production level. The fact that only 34 OECD member countries are involved in the analysis process and the analysis period began in the post-Cold War is the most important constraint in the research. The main problem addressed by the research under that is "Does the dominant role of the tax state continue in the years of intensive implementation of neoliberal policies or after the global financial crisis?" In particular, in the post-Cold War period, increasing welfare or income is expected to adversely affect the tax burden due to neoliberal policies. In addition, the increase in the level of openness as an indicator of integration into the global system might reduce the tax burden. However, the questioning of neoliberal policies in the aftermath of the global crisis may have prevented this interaction. In this context, the relationship between these variables is evaluated in the study as a whole. The paper is organized as follows: Section 2 discusses the tax burden and its determinants in the

context of the theoretical and empirical literature. Section 3 explores the methodological framework of the research and provides a theoretical background for the analysis. Section 4 presents the results obtained from the simulation models. Section 5 discusses the findings of the analysis and Section 6 describes analysis results. The conclusions are provided in Section 7.

2. Literature review

Nowadays, the most important financial resource of the modern state is taxes. The state has consistently maintained its effectiveness over the socioeconomic structure through its financial instruments such as taxes, spending or regulation. The effectiveness of fiscal governance has an increasing trend, although it resembles a cyclical fluctuation. One of the most important reasons for this result is that the state has been taking on new functions continuously, as its existence. As a matter of fact, the services that individuals expect from the state have increased in almost all countries (Wagner, 1890) or the market's failure to offer some goods and services made public intervention necessary (Musgrave, 1959). Also, factors such as different social needs, the maximization of social welfare and autonomous returns of the political process have led to the expansion of the modern state, increasing in public spending and diversification of taxes. Therefore, the increase in the tax burden is not a cause but as a result. In the 1980s, the accelerated globalization process and the neoliberal policies pursued led to discussions on the minimization of the state. In this period, it is seen that intensive efforts were made toward reducing the tax burden to build a minimal state. However, increased welfare, regional or international crises affecting many countries, employment problems in which countries involved left the state intervention mandatory.

Every day calculating the tax burden becomes more important for the comparison of tax systems and to determine whether sources of taxation are used optimally. Accordingly, several studies, regarding to what extent and to which direction different socioeconomic indicators affect the tax burden, have been conducted (Friedman, 1978; Rosen, 1978; Atkinson, 1980; Beal-Hodges *et al.*, 2016; Browning and Johnson, 1979; Colm and Wald, 1952; Cural and Cevik, 2015; Dennis *et al.*, 2007; Devarajan *et al.*, 1980; Engen and Skinner, 1992; Kong and Hoek, 2008; Liu and Altshuler, 2013; Nikola, 2015). While certain studies have discussed the factors that affect the tax burden, others have examined the tax burden's effect on macroeconomic indicators or have tested the causality relationship between the indicators in question and tax the burden.

The different development levels of the states could differentiate the productivity of tax systems' potential tax burdens. The increase in the income per capita based on economic development, in particular, provides individuals with a stronger ability to pay their taxes and participate actively in the taxation process. Moreover, economic variables such as the intensity of a state's foreign trade transactions can affect the actual tax burden (Adam and Kammas, 2007; Adam *et al.*, 2015; Tanzi and Zee, 2000). Thus, Lotz and Morss (1967) stated that the gross national product per capita and level of openness affect the tax burden positively in their study, where they compiled the data for 72 states. Shin (1969) and Bahl (1971) revealed that indicators such as the import and export capacity and income per capita affect the tax burden, albeit weak.

Taxes are among the most important components of fiscal policy. Measures such as raising the tax rate or imposing new taxes, especially to remove the inflationist pressure, can cause an increase in the tax burden (Brasoveanu *et al.*, 2008; Feldstein, 1980a; Feldstein, 1980b; Lucinda and Arvate, 2007; Purohit, 2006). Within this context, Stotsky and Asegedech (1997) examined 43 African countries and determined that there was a serious relationship between the strict financial policy followed to remove the budget imbalances

and tax the burden in their study, where they examined the key elements of the taxation ability. Also, they revealed that variables such as the size of the export and income per capita affect the tax burden positively, while the size of the agriculture and mining sectors affect the tax burden adversely. Furthermore, Eltony (2002) concluded that the GDP per capita and the size of the agriculture and mining sectors affect the tax burden directly in his panel data analysis conducted with a sample of 16 African countries. Purohit (2006) created a taxation capacity index in his study using the total tax revenue, GDP, population and trade balance data of 34 developing countries. According to this index, the tax burden is growing in countries where the GDP per capita is high and the foreign trade balance is strong. Similarly, Kong and Hoek (2008) identified the GDP growth as the most important reason for the current tax revenue and the increase in the tax burden in their studies specific to China from 1984 to 2004. However, changes in external factors, especially such as the economic structure, taxation policies and efficiency of the financial management can result in a state where the growth in the tax burden is greater than the growth in the GDP.

Globalization policies are the other factors, which affect the tax burden and which cause it to differ between countries (Adam and Kammas, 2007; Avi-Yonah, 2000; Bretschger and Hettich, 2002; Rodrik, 1998; Roosma et al., 2015). Gelleny and Mccoy (2001) investigated this issue in the context of the OECD members and concluded that the globalization process increases the tax competition between the states and decreases the corporate tax rates and the direct tax burden in particular.

Whether the tax revenue from different economic sources is used in productive fields by the public sector rendered taxes is an element affecting the economic growth and socio-economic development process. In this context, there are studies in the literature that have examined the effects of the tax burden on different macroeconomic variables (Agell et al., 2006; Arnold, 2008; Easterly and Rebelo, 1993; Gemmell et al., 2015; Gemmell et al., 2006; Koester and Kormendi, 1989). For example, Barro (1989, 1991), Engen and Skinner (1992), Levine and Renelt (1992), Leibfritz et al. (1997), Folster and Henrekson (2001) suggested that an increase in the tax burden will affect economic growth adversely and have a negative impact on the GDP. Also, Arnold (2008) carried out a study with a sample of 21 OECD members and concluded that the tax structures and economic growth have an adverse correlation. However, a one-unit increase in the tax rates can affect economic development positively if the tax sources are used in productive fields such as increasing human and real capital stocks. Also, the increase in the GDP allows for greater tax revenue. In this context, Vasiliauskaite and Stankevicius (2009) found that there is a strong and positive interaction between these two variables in the study they conducted with tax systems and economic growth data. Karagianni et al. (2012) found that there is a causality between the tax burden and economic growth in a study conducted with 1964-2007 data for the USA. Besides, Tiwari and Mutascu (2013) determined a unilateral causality relationship from indirect and direct taxes to the GDP as a result of the Granger analysis conducted with the 1947-2009 USA tax burden and GDP data. Cural and Cevik (2015) analyzed datum regarding Turkey's development indicators and tax structure of the 1924-2013 period and stated that the development process has a statistically significant and positive effect on taxes levied on income, on goods and services and foreign trade transactions.

Based on the literature review, it is possible to indicate several factors that determine the tax burden and are influenced by the tax burden in different economic systems. Here, factors such as the GDP per capita, economic, financial and corporate structures and openness of the economy are prominent. The main problem discussed in the present research is how and to what extent macroeconomic variables such as the OECD members' level of income, foreign trade, employment and sectoral growth affect the tax burden. In the following

sections, a methodological background of the empirical method used in the solution to this problem and findings are obtained as a result of the analysis are discussed.

3. Methodology
The dynamic panel data estimators were used to investigate the effects of independent variables on the tax burden in 34 OECD member countries. To this end, first, we tested the stability of variables with Levin, Lin and Chu (LLC) panel unit root test. In addition, then the system GMM approach was used to address endogeneity issues. The autoregressive panel data model that includes lagged explanatory variable values on the dependent variable can be formulated as follows:

$$Y_{it} = \propto Y_{i,t-k} + X'_{it}\beta + \mu_i + v_{it} \tag{1}$$

$i = 1,\ldots\ldots\ldots,N; t = 1,\ldots\ldots\ldots\ldots, T; k$ = number of the previous period.

Here, especially if there is a correlation between $Y_{i,t\text{-}k}$ and the error terms ($u_{it} = \mu_i + v_{it}$), it is impossible to make consistent predictions with the classical model. Besides, random effects methods will be inefficient and inconsistent if lagged values of the dependent variable correlate with μ_i, which reflected the fixed unit effects. Generally, the system GMM estimator, developed by Arellano and Bover (1995) and Blundell and Bond (1998), can analyze linear correlations between variables when n is large and T is small. The system GMM, which models the lagged values of a dependent variable in explanatory variables and allows to work with only one autoregressive variable, provides consistent estimates and also prevents endogeneity bias, inverse causality and omitted variables problems.

Consistency of the estimates in system GMM depends on the autocorrelation problem. Essentially, one of the key assumptions of the GMM estimator is that there is not a second-order autocorrelation in the error terms. Therefore, the following equation can be formulated:

$$E\big(\Delta u_{it}\Delta u_{i,t-2}\big) = 0 \tag{2}$$

If there is a second-order autocorrelation in the predicted model, equation (2) will be different than zero. The effectiveness of estimates in the GMM is analyzed with the Arellano and Bond (1991) test. The null hypothesis of the Arellano and Bond (1991) test is "there is no autocorrelation in the model." According to this test, it is assumed that the first difference is:

$$E\big(\Delta u_{it}\Delta u_{i,t-1}\big) \neq 0 \tag{3}$$

However, the second difference is:

$$E\big(\Delta u_{it}\Delta u_{i,t-2}\big) = 0 \tag{4}$$

Under these assumptions Arellano-Bond test's statistics for second-order autocorrelation is as follows:

$$AB_2 = \Delta\hat{u}_{-2}\,\Delta\hat{u}/\sqrt{\Delta\hat{\hat{u}}} \tag{5}$$

The statistics of this test are independent and identically distributed with zero mean and a variance equal to one. Here, the test statistic of AB_2 shows whether there are second-order autocorrelation problems (Hong, 2016; Baltagi, 2008; Baum, 2003).

In system GMM, instrumental variables are used to prevent endogeneity bias. Therefore, it is assumed that these instrumental variables are exogenous in the model for consistent and efficient results. In Sargan and Hansen's tests, the null hypotheses, "instrumental variables are external/over-identifying restrictions are valid," are used to analyze the validity of the instruments. Sargan test's statistic is calculated as follows:

$$m = \Delta \hat{u} W \left(\sum_{i=1}^{N} W_i^{'}(\Delta \hat{u}_i)(\Delta \hat{u}_i)^{'} W_i \right)^{-1} W'(\Delta \hat{u}) \tag{6}$$

As a result of this test, if the null hypothesis is rejected, it is understood that the instruments are not exogenous variables (Arellano, 2003; Boumahdi and Thomas, 2008; Bun and Windmeijer, 2010; Hayakawa, 2007; Alvarez and Arellano, 2003; Kruiniger, 2009). In this case, a robust standard error estimator can be used. According to this methodological background, and also based on the purpose of the study, equation (1) can be written as follows:

$$lntb_{it} =$$
$$\propto lntb_{i,t-1} + \beta_1 lngdp_{it}^{pc}$$
$$+ \beta_2 lnexim_{it} + \beta_3 lnlaborforce_{it} + \beta_4 lnunemp_{it} + \beta_5 lnfactory_{it} + \mu_i + v_{it} \tag{7}$$

i = 1,. . . . .,34; t = 1993,. . . . ., 2016.

4. Data and findings

In the analysis, we used panel data for 34 OECD member countries[1] for the 1993-2016 period that included tax revenue, GDP, GDP per capita (constant prices), import and export expenses, labor force, unemployment rate and industrial sector size. The data were annual and came from the statistical tables of the World Bank, OECD, IMF and EUROSTAT. Table I demonstrates a summary description of all variables. In addition, Table II includes a descriptive statistic.

TB is the dependent variable in all models, which is measured by the central government's total tax revenue as a share of GDP (in percent). The independent variables include GDP per capita (GDP$^{pc}_{it}$), openness (EXIM$_{it}$), the labor force (laborforce$_{it}$), unemployment rate (unemp$_{it}$) and factory share (factory$_{it}$).

In the analysis process, initially, we tested the stationarity of all variables using the LLC panel unit root test. As seen in Table III, all variables included in the model were stationary at that level.

The Arellano and Bond (1991) system GMM approach was used to investigate the effects of independent variables on the tax burden in the sample of 34 OECD members. The most important advantage of this method is to keep control of the short-term dynamics, unit and time effects in detecting the impact of the independent variables of the tax burden. Then also, it prevents endogeneity bias, inverse causality and omitted variables problems. So, we believe that this approach provides more effective and consistent estimates of the effects of

Variable name	Definition
TB	Tax burden rate = total tax revenue/GDP (all countries ($) for 1993-2016)
GDPpc	Gross domestic product per capita (all countries for 1993-2016)
EXIM	Openness = (export spending + import spending)/GDP (all countries for 1993-2016)
laborforce	Annual statistics of the labor force (all countries for 1993-2016)
unemp	Annual statistics of the unemployment rate (all countries for 1993-2016)
factory	Factory share = the share of industrial sector on GDP (all countries for 1993-2016)
lnTB	Logarithm of tax burden rate
lnGDPpc	Logarithm of gross domestic product per capita
lnEXIM	Logarithm of openness
lnlaborforce	Logarithm of the labor force
lnunemp	Logarithm of the unemployment rate
lnfactory	Logarithm of factory share

Source: Author's estimation

Table I.
Summary description
of variables

explanatory variables on the tax burden in our sample. Thus, the results of the estimates for all models are given in Table IV.

According to the results of the autocorrelation test on columns number (1), (2) and (3), an adverse autocorrelation was present on the first level (AR-1) in every three models while an autocorrelation was not present on the second level (AR-2). The results of the Sargan test demonstrated that the *H0* hypothesis, "over-identifying restrictions is valid" was rejected. (Sargan test-0). Also, the null hypothesis suggesting that "the tools used are exogenous" in GMM (Sargan variation-1) equation was rejected for all models. Based on these results, it was understood that the system GMM approach and the analysis findings were not consistent. To reach consistent results, system GMM estimation was conducted with robust standard errors for each of the three models. The results of the estimation are presented in columns number (4), (5) and (6). Results of the Hansen tests, which were more robust than both the Arellano and Bond test and Sargan test, showed that each of the three models was convenient for consistent estimations.

5. Analysis results
The column number (4) includes the results of the model in which variables of the lagged value of tax burden, GDP per capita, foreign trade volume, labor force and the unemployment rate were reproduced as independent variables. The lagged tax burden variable had a positive coefficient and it was statistically significant at a level of 1 per cent. Then also, GDP, trade openness, the labor force (1 per cent) and unemployment (5 per cent) variables had a positive coefficient and were statistically significant, respectively.

The column number (5) includes the results of the model, in which variables of the lagged value of tax burden, GDP per capita, foreign trade volume, labor force and the size of the industry sector in GDP were the independent variables. In this model, the lagged value of the tax burden was also statistically significant and positive. Besides GDP, trade openness, labor force and factory share had a positive coefficient and were statistically significant.

Table II.
Summary statistics

Variable name		Mean	SD	Min.	Max.		Obs.
TB	Overall	33.72434	7.364314	14.84	50.882	N	816
	Between		0.9236649	31.8975	35.02827	n	34
	Within		7.3078	13.86266	49.70761	T	24
GDPpc	Overall	32,255.39	13,275.38	9,733.9	89,973.2	N	816
	Between		12,733.97	13,904.3	75,747.06	n	34
	Within		4,317.431	14,659.73	46,481.54	T	24
EXIM	Overall	85.24639	50.9104	16	374.2	N	816
	Between		48.47742	25.12727	278.1773	n	34
	Within		17.54635	−15.93088	181.2691	T	24
laborforce	Overall	16,700,000	27,700,000	148,642	161,000,000	N	816
	Between		28,000,000	172,076.7	150,000,000	n	34
	Within		2,040,402	−599,969.1	28,200,000	T	24
Unemp	Overall	7.642246	3.976016	1.8	27.2	N	816
	Between		3.226763	3.596591	17.26705	n	34
	Within		2.385249	−1.2248	22.42747	T	24
Factory	Overall	22.51591	5.397716	6.072197	39.51464	N	816
	Between		5.128816	10.77797	33.58403	n	34
	Within		1.889464	16.09669	31.89652	T	24
lnTB	Overall	3.491369	0.2405032	2.697326	3.929509	N	816
	Between		0.0287639	3.436256	3.534805	n	34
	Within		0.2388257	2.675851	3.927577	T	24
lnGDPpc	Overall	10.29589	0.4252669	9.18337	11.40727	N	816
	Between		0.4020203	9.524984	11.22559	n	34
	Within		0.1541919	9.730194	10.6866	T	24
lnEXIM	Overall	4.304538	0.5234377	2.772589	5.92479	N	816
	Between		0.5027978	3.187127	5.602451	n	34
	Within		0.1681917	3.492548	4.770663	T	24
lnlaborforce	Overall	15.66105	1.506624	11.9093	18.89722	N	816
	Between		1.525819	12.05201	18.8233	n	34
	Within		0.0850968	15.34166	15.99	T	24
lnunemp	Overall	1.914229	0.4884466	0.5877866	3.303217	N	816
	Between		0.4127792	1.237706	2.777856	n	34

Variable name		Mean	SD	Min.	Max.	Obs.	
Infactory	Within		0.2701545	1.159895	2.775266	T	24
	Overall	3.082924	0.2593538	1.80372	3.676671	N	816
	Between		0.2448993	2.340373	3.508644	n	34
	Within		0.0947354	2.546271	3.406349	T	24

Source: Author's estimation

Table II.

The column number (6) includes the estimation results obtained by considering all variables used in models number (4) and (5) besides the deferred value of the tax incident as an independent variable. In this model, it is observed that the lagged value of the tax burden had a positive coefficient as it had in other models but it was not statistically significant. Furthermore, the variables of GDP, openness, labor force and share of the industry sector in GDP had positive coefficients and all of them were statistically significant.

When the estimators obtained in columns number (4) and (6) are considered as a whole, it was observed that a 1 per cent rise in GDP would cause a 0.1756 per cent rise according to model 1, a 0.1678 per cent rise according to model 2, a 0.1831 per cent rise according to model 3 in tax burden. This demonstrated that the increase in GDP would be partly absorbed by the tax system. Besides that, a 1 per cent rise in the level of openness would cause 0.1121 per cent, 0.0849 per cent and 0.0591 per cent rise in the tax burden, respectively. Also, a 1 per cent rise in the share of the labor force within-population would increase the tax burden 0.0535 per cent according to model 1; 0.0422 per cent according to model 2 and 0.0319 per cent according to model 3. A 1 per cent rise in the unemployment rate, another indicator of the labor market, would increase the tax burden by approximately 0.066 per cent. The most important reason for this was the fact that besides unemployment, insurance taxes were called upon to finance social transfers for the unemployed, especially in the case of growth in unemployment.

In total, in the context of the OECD sample, the share of the industry sector in GDP was the most effective variable for tax burden, except for the GDP per capita. Thus, 15 increases observed in the share of the industry sector in GDP, increased the tax burden approximately 0.17 per cent in model 2, where unemployment was disregarded and approximately 0.18 per cent in model 3, where all variables were analyzed. This reveals the importance of the industry sector in terms of the tax burden, especially in the OECD sample that includes predominantly.

6. Conclusion

The state, which emerged during the process of social needs recovery, has the potential to continuously affect socioeconomic activities. Although the intensity of these effects has changed from the past to present, social needs have been evolving dynamically in the process. These public requirements have been putting pressure on both public expenditures and taxes from the past until today. In this context, various financial instruments such as expenditures and taxes, on the one hand, create reflections in socioeconomic situations; on the other hand, they are affected by macroeconomic developments.

	LLC statistics	
Variable	Unadjusted t	Adjusted t
lnTB	−22.0222	−10.3759[a]
lnGDPpc	−11.0332	−8.1025[a]
lnEXIM	−9.2206	−5.1717[a]
lnlaborforce	−10.6388	−1.9030[b]
lnunemp	−12.7547	−5.2514[a]
lnfactory	−13.3444	−2.5094[a]

Notes: [a]and [b]indicate levels of significance at "1" and "5"%, respectively
Source: Author's estimation

Table III.
Results of the panel
unit root tests

	(1)	SGMM (2)	(3)	(4)	SGMM (robust) (5)	(6)
$lntb_{t-1}$	0.0677564[c]	0.0600655	0.046564	0.0677564[a]	0.0600655[b]	0.046564
	[0.0401638]	[0.0401858]	[0.0401523]	[0.0254134]	[0.0289028]	[0.0282735]
	(1.69)	(1.49)	(1.16)	(2.67)	(2.08)	(1.65)
$lngdp^{pc}$	0.1756691[a]	0.1678074[a]	0.1831446[a]	0.1756691[a]	0.1678074[a]	0.1831446[a]
	[0.0179083]	[0.017394]	[0.0178517]	[0.0322552]	[0.026117]	[0.0284713]
	(9.81)	(9.65)	(10.26)	(5.45)	(6.43)	(6.43)
lnexim	0.1121485[a]	0.084906[a]	0.0591265[b]	0.1121485[a]	0.084906[b]	0.0591265[c]
	[0.0226224]	[0.023603]	[0.0245105]	[0.0360262]	[0.0328898]	[0.0331957]
	(4.96)	(3.60)	(2.41)	(3.11)	(2.58)	(1.78)
lnlaborforce	0.0535159[a]	0.0422367[a]	0.0319038[a]	0.0535159[a]	0.0422367[a]	0.0319038[b]
	[0.0072782]	[0.0077558]	[0.0082238]	[0.0130279]	[0.012812]	[0.0133228]
	(7.35)	(5.45)	(3.88)	(4.11)	(3.30)	(2.39)
lnunemp	0.063468[a]	–	0.0706937[a]	0.063468[b]	–	0.0706937[a]
	[0.020518]	–	[0.0203928]	[0.0253795]	–	[0.0243028]
	(3.09)		(3.47)	(2.50)		(2.91)
lnfactory	–	0.1699757[a]	0.1789296[a]	–	0.1699757[a]	0.1789296[a]
	–	[0.0350508]	[0.0348975]	–	[0.0478293]	[0.0422752]
		(4.85)	(5.13)		(3.55)	(4.23)
Wald test	141,099.79	141,587.42	143,728.32	56,575.11	72,390.54	83,017.54
Prob > χ^2	0.000	0.000	0.000	0.000	0.000	0.000
AR(1) [z]	−3.00	−3.07	−3.05	−5.29	−5.25	−5.28
	{0.003}	{0.002}	{0.002}	{0.000}	{0.000}	{0.000}
AR(2) [z]	−0.43	−0.48	−0.52	−1.14	−1.22	−1.36
	{0.664}	{0.633}	{0.604}	{0.252}	{0.222}	{0.174}
Sargan test-0	333.03 {0.000}	288.54 {0.000}	289.16 {0.000}	–	–	–
Sargan difference−1	38.55 {0.008}	39.30 {0.006}	35.34 {0.018}	–	–	–
Sargan difference −2	6.27 {0.180}	5.67 {0.225}	8.88 {0.114}	–	–	–
Hansen J test−0	–	–	–	33.17 {1.000}	33.81 {1.000}	33.77 {1.000}

(*continued*)

Table IV.
Estimation results

		SGMM			SGMM (robust)	
	(1)	(2)	(3)	(4)	(5)	(6)
Hansen difference −1	–	–	–	−0.00	−0.00	33.78
				{1.000}	{1.000}	{1.000}
Hansen difference −2	–	–	–	33.32	0.55	33.76
				{1.000}	{0.968}	{1.000}
Number of instruments	234	234	235	234	234	235

Notes: Notes: [a],[b] and [c] indicate levels of significance at "1", "5" and "10"%, respectively. The standard errors of the coefficient estimates are shown in [], z values in () and p values in {}
Source: Author's estimation

Table IV.

This paper aimed to determine the relationship between the predetermined main macroeconomic variables and the tax burden. In this context, the dynamic panel data analysis method, based on 34 OECD member states' GDP per capita, foreign trade volume, the level of employment, unemployment rate and the size of industry sector variables for 1993-2016 were used. In the research, first, the stability of the data sets was tested, then, an analysis was conducted with a system GMM estimator, which provides consistent estimations in the presence of endogeneity, heteroscedasticity and autocorrelation problems. Based on the analysis' findings, variables such as income per capita, foreign trading volume, the capacity of employment, unemployment and share of the industry sector effect tax burden in a statistically significant and positive direction. It has been remarkable that the effects of the variables, especially that of the income per capita and the share of the industry sector on tax burden, are greater in all the models. The effect of other variables on the tax burden has been relatively weak.

The results of this research demonstrate that states have not lost their importance in terms of taxation in the neoliberal process; on the contrary, they are becoming tax states by keeping their positions[2]. As a matter of fact, the average tax burden of OECD countries, which was approximately 33 per cent at the beginning of the 1990s, rose to around 34.5 per cent in 2014. The reason that lies behind the positive effect of unemployment on the tax burden is the fact that the sense of social state has not been abandoned. Thus, it is predicted that the state will increase public transfer expenditures in the short term due to unemployment and this increase will impose a financial burden on the public sector both in the medium and long term and finally, will mean an increase in the tax burden[3].

As seen in many studies in the literature, the increase in the GDP per capita affects the tax burden positively. This result supports the findings of Adam and Kammas (2007), Adam et al. (2015), Tanzi and Zee (2000), Lotz and Morss (1967), Shin (1969) and Bahl (1971). Also, (Brasoveanu et al., 2008; Feldstein, 1980a; Feldstein, 1980b; Lucinda and Arvate, 2007; Purohit, 2006) argue that taxes can be used as a fiscal instrument and can be particularly effective in reducing inflationary pressure. In this respect, the findings of the study reveal that employment can affect the tax burden. The increase in employment may lead to an expansion of the tax potential in general. It is a more interesting finding that the increase in unemployment affects the tax burden. In particular, the concentration of active and passive employment policies in the sample is clearly a weight on public finances. This weight brings about an increase in the tax burden.

In the literature, the expectation that the globalization process will lead to tax competition and reduce the tax burden is a common finding (Adam and Kammas, 2007; Avi-Yonah, 2000; Bretschger and Hettich, 2002; Rodrik, 1998; Roosma et al., 2015). However, the common denominator of the studies is that the increased tax competition will reduce the taxes on capital in general. The findings of the analysis show that the openness indicator, which is an indicator of the inter-country commercial activities, has positive effects on the tax burden. Therefore, as the external trade transactions increase, the tax burden also increases.

The studies in the literature generally focus on the effects of the fiscal instruments on various macroeconomic indicators. Many studies also discuss the expansionary impact of various macroeconomic components on public expenditures and the public financial sector. However, this paper aims to contribute to the literature by showing the effects of per capita income, employment conditions, trade relations and the production system on the tax burden. The most important constraint of the study is that the 34 OECD member countries were based on the data of the cold war. Surely, the most important part of the research is the fact that this conclusion could be assessed using the sample of 34 states in question. In

future studies, this finding can be discussed from the perspective of the global economic system including underdeveloped and developing countries. It is considered that the findings that are acquired as a result of an analysis process on such a broad sample would reveal the effects of the neoliberalism and global economic integration process on the tax burden and public finance more clearly.

Notes

1. Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea Rep., Luxembourg, Mexico, The Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, UK, US except Latvia, which has become member of the Organization since July/2016.

2. Even though the global market mechanism has grown rapidly in the 1990s and 2000s, not all the countries have adopted the neoliberal policies at the same level. Indeed, in the period covered, the tax burden is between 40 per cent and 45 per cent in the countries with relatively large and dense public scale such as Denmark, Sweden, Belgium and Finland. On the other hand, it fluctuates between 20 per cent and 30 per cent in the countries where the market mechanism has relatively more developed such as Ireland, Australia, the USA and Chile.

3. Although the average tax burden has been fluctuating by years, it is interesting to see a continuous upward trend, especially after the 2008 global crisis. The most important reason for this trend is, the public authorities' preferring "new fiscal interventionism" in the process of overcoming the financial instability.

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