THE EFFECT OF ECONOMIC GROWTH AND DIRECT TAXES ON TAX BURDEN IN OECD COUNTRIES

Gülçin Tapşın[1]

ABSTRACT

The objective of this study is to analyze the effects of economic growth and direct taxes on tax burden in OECD countries from 2008 to 2014. Among the variables used in this study, economic growth is associated with the annual growth rate of GDP. A direct tax is paid directly by an individual or organization to an imposing entity for different purposes, including real property tax, personal property tax, income tax or taxes on assets. Tax burden is defined as the ratio of tax revenue to GDP and refers to compulsory transfers to the central government. GDP increasing rates, direct taxes and tax burden variables are obtained from the database of World Development Indicators. The panel regression method was used to analyze the relationships among variables. The research findings suggest that direct taxes and economic growth have positive effects on tax burden.

Keywords: Direct taxes, tax burden, economic growth.

INTRODUCTION

Direct taxes are transferred to the central government from household income, profit and the capital gains of companies. They are a significant revenue item for the financing of public expenditures. Differences among tax revenues obtained through different taxation systems for different countries have increased interest in this area. Prior to the 1980s, most economists in the USA assumed that if governments raised tax rates, they would collect more total revenue from taxpayers. However, Reagan's tax revolution changed this perspective on taxation. Today, it is known that an increase in tax rates can also lead to smaller total tax collections (Scully, 1991: 1).

Piana (2003) states that tax revenue is the result of the application of a tax rate to a tax base. The width of the tax base is as deterministic as the tax rate on the revenue of central government. If an increase in tax rate is followed with a decrease in tax base, then there may be a decline in government revenues. GDP is the most significant determinant of tax revenue in the literature. Collecting sufficient tax revenue directly depends on the amount of GDP.

The Laffer curve is a theory developed by Arthur B. Laffer (1974) to show the relationship between tax rates and the amount of tax revenue. The Laffer curve states that there is a parabolic relationship between tax rates and tax revenue. According to the theory, tax revenue can increase by increasing tax rates, up to a certain point, the "revenue maximizing" point, beyond which increasing tax rates causes tax revenue to go down (Laffer, 1986: 1-35). Canto et al. (1981) provide a theoretical model of a Laffer curve to prove that there is a tax rate that maximizes government revenue. They call the range normal if an increase in either tax rate leads to an increase in total revenue collected. If an increase in either tax rate leads to a reduction in total revenue collected, they call it a prohibitive range. The upward-sloping portion of the Laffer curve is called the normal range and the downward-sloping segment is

[1] Istanbul Ticaret Üniversitesi, İşletme Fakültesi, İktisat Bölümü, Doç.Dr.

the prohibitive range. The prohibitive range is said to exist because high tax rates stifle economic activity, force agents to barter and encourage leisure pursuits (Ballard et al, 1985: 188).

It is not feasible for central governments to increase tax rates up to a point with a decrease in tax revenues. Therefore, an analysis to see the effect of tax rates on tax revenues is necessary to develop accurate policies. This study analyzes the effects of direct taxes and GDP on tax burden for OECD countries from 2008 to 2014 using the panel regression method. The dependent variable is tax burden, the tax revenue-to-GDP ratio, and the independent variables are direct taxes and GDP growth rate. According to World Development Indicators, tax revenue is defined as a share of GDP and refers to compulsory transfers to the central government. This data excludes fines, penalties, and compulsory social security contributions. A direct tax is paid directly by an individual or organization to an imposing entity such as the government for different purposes, including real property tax, personal property tax, income tax or taxes on assets. This study consists of five sections. The first section is the introduction. Tax revenue-to-GDP and history of direct taxes in OECD are analyzed in the second section. The third section includes a literature review, and the model and data are presented in the fourth section. The research findings are presented in the fifth section.

DIRECT TAXES AND TAX BURDEN IN OECD COUNTRIES

Gross domestic product (GDP) is one of the significant indicators in tax burden analysis. In a conjuncture associated with economic recession, a contraction in GDP leads to a decrease in tax burden. After the 2008 global financial crisis, serious decline in GDP growth rate in OECD countries causes an erosion in their tax bases and a decline in tax obligation (İnaltong, 2012: 27). The overall average economic growth rate significantly fell by -3.54% in 2009. Tax revenues fell in cash terms during 2009 in most OECD countries, driven downward by declining economic activity and tax cuts aimed at cushioning the effects of the recession that followed the financial crisis. Tax revenues as a share of GDP trended downward across OECD countries to the lowest level since the early 1990s (OECD). Tax revenues-to-GDP ratio fell in cash terms in 2009 in 24 OECD countries and increased in 4 OECD countries: Turkey, Germany, Hungary and Italy. The average tax revenues-to-GDP ratio in OECD countries was 14.97% in 2008, and it decreased to 13.60% in 2009. Economic growth was in an increasing trend in 2010 in OECD countries, and the economy grew by 2.89% in the same year. However, this increasing trend ended by 2011, and the 2010 rate of economic growth was not observed again until the end of 2015.

Since the global economic crisis, tax revenues-to-GDP ratios increased across OECD countries until the end of 2015. In 2014, tax revenue-to-GDP ratios were the highest in New Zealand, Austria, Sweden and Belgium at 26.65%, 26.63%, 26.27% and 26.09%, respectively. This ratio was the lowest in the following countries: Switzerland, United States, Germany, Canada, Spain and Czech Republic at 9.49%, 11.02%, 11.50%, 11.86%, 12.21% and 13.50, respectively. As Table 1 shows, the average tax revenue-to-GDP ratio in OECD countries was 15.53% in 2014, and it increased to 16.30% in 2015.

Table 1: Tax revenue, taxes on income, profits, capital gains and GDP growth 2008-2015

OECD	2008	2009	2010	2011	2012	2013	2014	2015
Tax revenue (% of GDP)	14.97	13.60	14.05	14.52	14.75	15.23	15.53	16.30
Taxes on income, profits and capital gains (% of revenue)	27.34	25.98	26.14	25.80	24.97	25.62	25.41	25.79
GDP growth (annual %)	0.18	-3.54	2.89	1.75	1.19	1.32	1.88	2.20

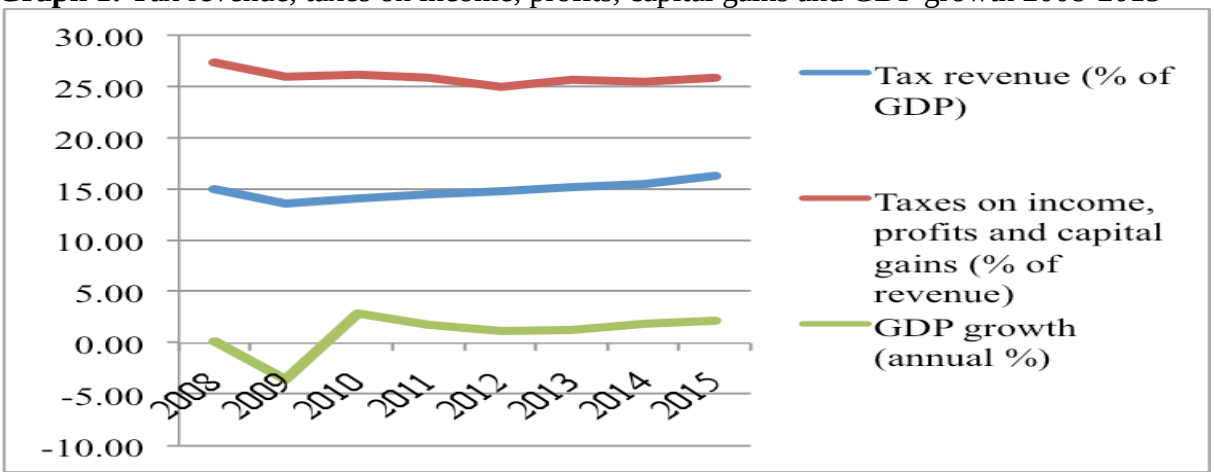
Source: World Development Indicators
Excludes fines, penalties, and compulsory social security contributions.

Direct taxes have become an important income source of developed countries. However, as a result of globalization, capital moves from countries with tough investment environments to countries with positive tax advantages. This move is a significant determinant of the tax policies of various countries, which causes a decline in the share of direct taxes in total tax revenue every year (Cural and Çevik, 2015: 131). The overall average direct tax ratio was 27.34% in 2008 in OECD countries, and then dropped to 25.98% in 2009. This ratio declined in all OECD countries in 2009 except Greece and Netherlands. Direct taxes fell for two consecutive years in 2011 and 2012. Then they increased slightly and remained flat until the end of 2015.

Transformations in the tax structure of a country is significantly related with its development level. The share of direct taxes in total tax revenues is higher in the beginning of the process of development, it decreases in the transitional stage and re-increases in developed economies (Cural and Çevik, 2015: 132). Therefore, there are differences in the structure of taxation between a developed, a less-developed and a developing country. In developed countries, the share of income tax, corporate tax and property tax in total tax revenues is higher than the share of indirect consumption taxes. In other words, in developed countries, direct taxes account for a major part of the aggregate tax revenue (Ay and Talaşlı, 2008: 152). World Development Indicators indicates that Australia with a 63.60% direct tax ratio, Canada with 53.52% and the United States with 53.15%, had the highest direct tax ratios of the OECD countries in 2014.

On the other hand, industrialization is the primary goal for less developed and developing countries. In less developed countries with insufficient capital accumulation, public investment is financed through taxes or borrowing. In such cases, government prefers to easily collect consumption tax instead of causing dissatisfaction in producers by collecting income tax, corporate tax and property tax (Ay and Talaşlı, 2008: 152). According to the World Bank Database, Latvia with a 9.30% direct tax ratio, Sweden with 14.27%, the Czech Republic with 14.31%, Finland with 14.82 and Hungary with 14.98%, have the lowest direct tax ratios amongst OECD countries over the period of 2008-2015. The overall average direct tax ratio was 25.88% in OECD countries between 2008 and 2015.

Graph 1: Tax revenue, taxes on income, profits, capital gains and GDP growth 2008-2015



LITERATURE REVIEW

Karran (1985) defined a macroeconomic model and claimed that changes in tax revenues are related to economic growth and inflation. According to this model, economic growth increases the real value of the taxable base and leads an increase in overall tax revenue.

Based on an econometric analysis, Scully (1991) examined tax revenues and tax rates for 103 countries between 1960 and 1980. On average, governments collect the highest possible revenue when they take about 43.2 percent of GDP in taxes. If governments try to take a larger share of private sector income, the tax base will shrink so much that total tax collections will actually go down. Stotsky and WoldeMariam (1997) found that GDP per capita has a positive effect on tax revenues in Saharan African countries.

According to Heinemann (2001), tax revenue may be linked to changes in national income through fiscal drag. Fiscal drag describes the phenomenon whereby inflation and economic growth push more tax payers into higher tax brackets. This has the effect of raising tax revenue without explicitly raising tax rates or changing tax bases. Temiz (2008) conducted an analysis to find relationship between public tax revenues and economic growth for 1960-2006 years. Temiz used the Johansen co-integration test to determine long-term relations and the vector error correction model (VECM) to determine short-term relations. The findings show that there are two-way causal relationships between total tax revenue and economic growth in the long run. There is also a one-way relation from direct tax revenue to economic growth in the short term.

Using China's annual data for 1984 to 2004, Kong and Hoek (2008) found that the high growth of Chinese tax revenues was relative to the increase in GDP. Vasiliauskaite and Stankevicius (2009) determined a positive and strong correlation between tax revenues and economic growth from 1995 to 2007 in EU countries. Using the panel co-integration analysis, Gül and Kenar (2009) found a long-term relationship between tax revenues and economic growth with a sample consisting of 27 EU countries and Turkey from 1980 to 2008.

Kazman (2014) used tax return data from 1948 to 2009 for a regression analysis to estimate the effects of changes in tax rates on government income. He found that tax rate increases are positively related to increases in tax revenue. An increase in the top marginal income tax rate of 1% causes income tax revenue to increase 1%.

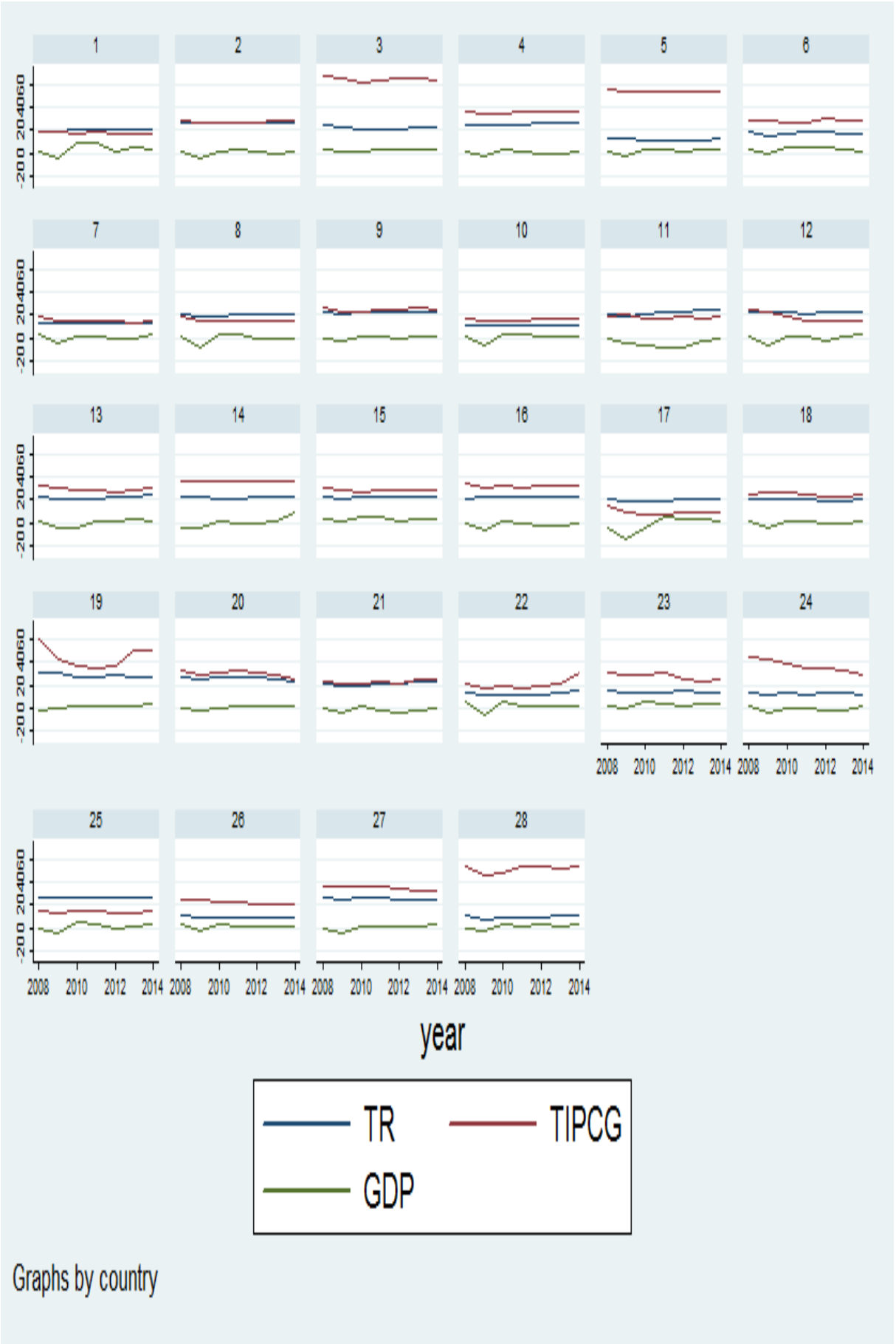
Velaj and Prendi (2014) provide evidence about factors that determine taxes in Albania from 1993 to 2013. Their findings show that an increase in GDP has a positive effect on tax revenue. Using static and dynamic panel data techniques, Castro and Ramirez (2014) examined the factors that affected tax revenue in 34 OECD countries from 2001 to 2011. Their results show that GDP per capita, the industrial sector and civil liberties have a positive effect on tax revenues.

Çelikay (2017) analyzed the relationship between GDP per capita and tax burden using data from 1924 to 2014 with the ARDL bounds testing approach. The research findings suggest that a 1% increase in GDP per capita will bring about a 0.07% increase in tax burden in the long run. In the short term, there is a negative relationship between these variables, but it is not statistically significant.

THE MODEL AND DATA

This study analyzes the effects of an increase in the share of direct taxes revenue in total tax revenue and an increase in GDP on tax burden in 28 OECD countries from 2008 to 2014. The research sample includes these OECD countries: Turkey, Austria, Australia, Belgium, Canada, Chile, the Czech Republic, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, the Netherlands, New Zealand, Norway, Portugal, the Slovak Republic, South Korea, Spain, Sweden, Switzerland, the United Kingdom and the United States.

This study conducts a panel data analysis to determine the effect of the independent variables of direct taxes and GDP growth rate on the dependent variable, tax burden. Economic growth is indicated by the annual growth rate of GDP. Direct taxes are defined as the percentage of tax revenue from household income, company profits and capital gains. Tax burden is defined as tax revenues to GDP ratio and consists of all compulsory payments to the central government. All variables were obtained from the World Development Indicators database.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
-20 0 20 40 60
2008 2010 2012 2014
year
TR
TIPCG
GDP
Graphs by country

EMPIRICAL FINDINGS

The analysis results are shown in Table 1.

Table 1: F, LM, LR and score test results

F test	LM test	LR test	Score test
F(24, 166) = 227,49* Prob = 0,0000	Chi^2 (1) = 539,96* Prob = 0,0000	$Chibar^2$(01)= 528,30* Prob = 0,0000	Chi^2 (1) = 8,6e+05* Prob = 0,0000

* Denotes that the statistic is significant at 5% significance level.

As this table shows, this is not a classical model, and there is a unit effect. Therefore, this cannot be solved using the pooled ordinary least squares method. The Hausman test was run to choose between fixed and random effects, and the estimates and variances were analyzed.

Table 2: Hausman, Levene, Brown and Forsythe test, DW-LBI and the Friedman test

Hausman test	Levene, Brown and Forsythe test	DW – LBI test	Friedman test
Chi^2 (2) = 3,47** Prob = 0,17	W_0 = 3,44** (0,00) W_{50}= 2,43** (0,00) W_{10}= 3,44** (0,00)	DW: 0,9554** BW – LBI: 1,34** Prob = 0,0000	F: 33,689* Prob = 0,17

* Denotes that the statistics are significant at 5% significance level.
** Denotes that the statistics are not significant at 5% significance level.

When using the Hausman test, the random-effects model is reasonable. The Levene, Brown and Forsythe's test was used to determine if there was heteroscedasticity in the model. The test statistics of Levene, Brown and Forsythe (W_0, W_{50}, W_{10}), were compared with the (27, 168) degrees of freedom Snedecor F table, and the hypothesis H_0, variations of the units are equal, was rejected. Therefore, there is heteroscedasticity in the model. The Friedman test is a non-parametric statistical correlation test, and it is not considered in the model. Franzini and Narendranathan suggest the DW test and, Baltagi-Wu suggests the LBI test. These are both autocorrelation tests, and if their output values are less than 2, they indicate autocorrelation in the model. In this case, there was no correlation among the units obtained in the model; however, heteroscedasticity and autocorrelation were found. Therefore, this requires obtaining robust estimators.

Huber (1967), Eicker (1967) and White (1980) produced the first studies on robust standard errors. In other words, this estimator was proposed to estimate variances in heteroscedasticity situations. However, since the analysis conducted in "stata" and robust estimators requires

selecting the robust option from the program with heteroscedasticity, robust standard errors are obtained in cases of heteroscedasticity and autocorrelation. When the robust option is selected from the stata panel regression command, clustered standard errors are automatically calculated.

Table 3: Huber (1967), Eicker (1967) and White (1980) robust variance estimator results

TR	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
TIPCG	.1297104	.0369708	3.51	0.000	.0572489	.2021718
GDP	.0676121	.0253851	2.66	0.008	.0178582	.1173661
_cons	15.97279	1.487741	10.74	0.000	13.05687	18.88871
sigma_u	5.6983323					
sigma_e	.97664637					
rho	.97146319	(fraction of variance due to u_i)				

Huber (1967), Eicker (1967) and White (1980) robust estimators were used to overcome the autocorrelation and heteroscedasticity problems. This gave positive results, and variations were removed. The R^2 value is 17%, the model is significant, and the F test is significant.

As Table 3 shows, the t-tests of TIPCG (taxes on income, profits and capital gains) and GDP variables were statistically significant, and individual coefficients have positive signs. According to these results, a 1% increase in TIPCG increases TR (tax revenue/GDP) by around 0.13%. A 1% increase in GDP increases TR (tax revenue/GDP) by 0.07%.

CONCLUSION

Countries implement tax policies by increasing tax-to-GDP ratio by a certain amount to reduce fiscal deficits and try to predict the future success of their tax policies. This study analyzes the effect of economic growth and direct taxes on tax burden in OECD countries from 2008 to 2014, and its findings suggest that a 1% increase in GDP increases tax burden by 0.07%. Economic growth is a determinant factor on tax burden; however, tax revenue has low sensitivity. A 1% increase in direct taxes increases tax burden by 0.13%. This result is consistent with the theory that tax revenues do not keep rising with increasing tax rates, and that an increase in tax rates on income, profit and capital will increase tax revenues at a decreasing rate. In less developed and developing countries, higher direct tax rates stifle economic activity, force agents to barter and encourage leisure pursuits, reducing tax bases in the end. Income tax is not sufficient to compensate for the deficit, particularly in less developed OECD countries where GDP per capita is too low. As a result, the share of direct taxes is decreasing, while the share of indirect consumption taxes is increasing in the tax structures of OECD countries.

REFERENCES

Ay M. Hakkı, Talaşlı Esra (2008), Ülkelerin Ekonomik Gelişmişlik Seviyeleri ve Vergi Yapıları Arasındaki İlişki, Maliye Dergisi, Sayı 154.

Ballard Charles L., Fullerton Don, Shoven John B., Whalley John (1985), A General Equilibrium Model for Tax Policy Evaluation, University of Chicago Press, Chapter 10, pp. 188-202. http://www.nber.org/chapters/c11222.

Canto Victor A., Jojnes Douglas H., Laffer Arthur B. (1981), Tax Rates, Factor Employment, and Market Production, The Supply-side Effects of Economic-policy, Vol. 1., Springer, 1980, pp. 3-32.

Castro Gerardo Ángeles, Camarillo Diana Berenice Ramírez (2014), Determinants of tax revenue in OECD countries over the period 2001-2011, Contaduría y Administración 59 (3), julio-septiembre 2014: 35-59.

Cural Mehmet, Çevik Kırcı Nüket (2015), Ekonomik Kalkınmanın Vergi Yapısı Üzerindeki Etkisi: 1924-2013 Dönemi Türkiye Örneği, Amme İdaresi Dergisi, Cilt 48, Sayı 3, s.127-158.

Engen, E.M., Skinner, J.(1996), Taxation and economic growth, National Tax Journal 49, pp. 617-642.

Ferda Yerdelen Tatoğlu, Panel Veri Ekonometrisi Stata Uygulamalı, Beta yayınları, 1.baskı, İstanbul, 2012, s.245.

Gül, E., B. Kenar (2009), AB Ülkeleri ve Türkiye'de Vergi Gelirleri ile Ekonomik Büyüme İlişkisi: 1980- 2008, Uluslararası Davraz Kongresi 2009 Bildiri Kitabı, s. 16-26.

Heinemann, F. (2001), After the Death of Inflation: Will Fiscal Drag Survive?.Fiscal Studies, 22, pp. 527–46.

İnaltong Ceyhan (2012), Vergi Yükü: Türkiye ve OECD Ülkeleri Karşılaştırması, Vergi Dünyası, Sayı 369, pp. 16- 30.

Karran,T.(1985), The Determinants of Taxation in Britain: An Empirical Test. Journal of Public Policy, 5(3), pp. 365-386.

Kazman Samuel B. (2014), Exploring the Laffer Curve: Behavioral Responses to Taxation, University of Vermont, ScholarWorks@UVM, UVM Honors College Senior Theses.

Kong, S., M.P. Hoek (2008), Is the Growth of Chinese Annual Tax Revenues Unnatural?, Journal of Public Budgetting, Accounting & Financial Management, 20 (4), pp. 554-570.

Laffer, A.B., 1986, "The Ellipse: an explanation of the Laffer curve in a two-factor model", In Canton, V.A., Kadlec, C.W., Laffer, A.B. (Eds.), The Financial Analyst's Guide to Fiscal Policy, Greenwood Press, New York, pp. 1–35.

OECD, http://www.oecd.org/general/taxrevenuesfallinoecdcountries.htm

Piana Valentino (2003), Tax Revenue, Economics Web Institute, http://www.economicswebinstitute.org/glossary/taxrev.htm#determinants

Scully Gerald W. (1991), Tax Rates, Tax Revenues and Economic Growth, NCPA Policy Report, No:159.

Stotsky, Janet G., Asegedech Wolde Mariam (1997), Tax Effort in Sub Saharan Africa, IMF Working Paper 97/107.

Temiz Dilek (2008), Türkiye'de Vergi Gelirleri ve Ekonomik Büyüme İlişkisi: 1960-2006 Dönemi, 2. Ulusal İktisat Kongresi, DEÜ İİBF İktisat Bölümü, İzmir.

Vasiliauskaite, A., E. Stankevicius (2009), Tax Burden Management and GDP Growth: Case of EU Countries, Economics & Management, 2009(14), s. 202-211.

Velaj Entela, Prendi Llambi (2014), Tax Revenue-The Determinant Factors- The Case of Albania, European Scientific Journal, September 2014, Special Edition, Vol. 1, pp.526-531.