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Tax Revenues and Economic Growth: Evidence from Panel Quantile Regression Analysis

İlyas Kays İMAMOĞLU[1]

Abstract: Changes in a country's fiscal policy can affect many macroeconomic factors such as production, investment, employment, income distribution, and economic growth. Governments often resort to fiscal policy instruments to manege the economy. One of these fiscal policy instruments is taxes. However, there is no consensus on how tax changes affect economic growth. Therefore, this study analyses the relationship between tax revenues and economic growth using a quantile regression analysis with annual data for 37 OECD countries from 1995-2020. The results of the quantile regression analysis show that taxes have a negative and statistically significant effect on economic growth in countries with low economic growth and also on the panel average. Furthermore, tax revenues are found to have a positive effect on economic growth in countries with high economic growth and a negative but statistically insignificant effect in other quantiles. Based on these results, it can be said that tax increases in OECD countries with low economic growth will reduce economic growth. Therefore, it is essential for these countries that want to grow economically to restructure their fiscal policies taking this into account.

Key Words: Fiscal Policy, Tax Revenues, Economic Growth, Panel Quantile Regression Analysis

Introduction

Sustainable economic growth is one of the main objectives of economic policy. In addition to this main objective, policy makers intervene directly or indirectly in the economy to develop procedures to solve economic instabilities. To intervene in or guide the economy, policy makers use two main instruments. These policy instruments are monetary and fiscal policy. Fiscal policy is the first safe haven to which governments turn to solve economic problems. Governments often resort to fiscal policy instruments to finance their spending, close budget deficits, find answers to fundamental economic issues such as unemployment, inflation and income inequality, and manage economic growth and development.

[1] *Assist Prof Dr, Department of Management and Organization, Vocational School of Social Sciences, Bayburt University, imamoglu@bayburt.edu.tr, ORCID:0000-0002-7732-4148*

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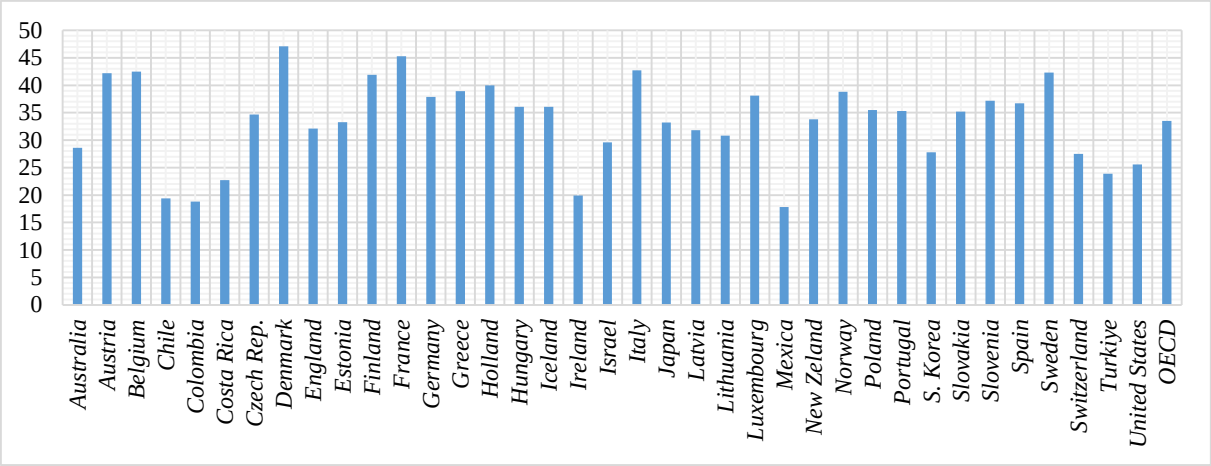
The revenue and expenditure policies that governments set and implement to ensure economic stability and sustainability are referred to as fiscal policy (Arslan and Karabulut, 2023, p.1389). Fiscal policy is a set of measures, including tax and expenditure components, that can be used to overcome economic problems in the short and long term and to achieve economic growth and development (Gunasinghe et al., 2021, p.1843). One of the fiscal policy tools that governments use to achieve economic growth objectives is tax revenue (Korkmaz et al., 2022, p.599). Due to rapid population growth in recent years, the public sector is making the necessary investments to increase social welfare in developed and developing countries (Başar et al., 2016, p.191). These public investments are financed by public revenues from taxes, fees, charges, goodwill, fines and tax penalties. Tax revenues account for the largest share of public expenditure financing (Aksu et al., 2017, p. 312). Changes in tax revenues can affect economic growth directly or indirectly through various channels (Korkmaz et al., 2022, p.599). Economic growth can be influenced by fiscal policy through microeconomic and macroeconomic channels. From a macroeconomic perspective, fiscal sustainability is a sine qua non for economic growth and crucial for macroeconomic stability. Suppose the government spends more than it takes in. In this case, it has to increase tax and non-tax revenues to finance its spending. This creates uncertainty for businesses and has a negative impact on private investment. From a microeconomic perspective, business behaviour can be influenced by changing taxes and spending, which can stimulate economic growth (Kim et al., 2021, p.256). Furthermore, taxes can influence the behaviour of entrepreneurs, which drive new ideas and technological changes, and thus economic growth. This is because taxes can determine the risk appetite of entrepreneurs (Dackehag and Hansson, 2012, p.4). Like business decisions, consumer decisions can also change in response to an increase or decrease in tax rates. This is because it is well known that indirect taxes account for a larger share of public tax revenues than direct taxes. From this perspective, it can be said that tax policy in a country has a significant impact on the economy at both the macro and micro levels.

Economic, political, social and other factors shape tax policy around the world. The tax system evolves as each country formulates its tax and economic policies (Wang, 2007, p.278). In addition to financing public expenditure, taxes in developed and developing countries also serve economic and social purposes such as preventing income inequality, efficient use of resources, economic stability, economic growth and development (Sağdıç and Aydın, 2021, p. 22). Based on the view that one of these objectives, economic growth, can be influenced by taxes, Engen and Skinner (1999) have suggested five possible mechanisms. The first is that some corporate

taxes have a negative impact on investment. The second is that taxes can slow labour supply growth by shifting the preference between work and leisure towards leisure. Third, tax incentives for R&D spending can affect productivity growth. Fourth, taxes can lead to a shift of resources to lower-taxed and less productive sectors. Fifth and finally, higher taxes can distort the efficient use of human capital. However, Engen and Skinner (1999), like most economists, agree that high taxes are bad for economic growth, but argue that this is not an absolute conclusion (Tosun and Abizadeh, 2005, p.2255). This conclusion is the main objective of this study. To this end, this study analyses the interaction between tax revenues and economic growth using non-linear panel quantile regression analysis instead of linear econometric methods with data for 37 OECD countries and the period 1995-2020. The second section presents the changes in tax revenues in OECD countries between 1995 and 2020. The fourth section presents the data set, the model and the econometric methodology. The fifth section presents the research results; the last section contains conclusions, discussion and recommendations.

Taxes in OECD Countries

Taxes are the most important source of income in OECD countries. In addition to taxes, social contributions and fees from public services are other sources of revenue (OECD, 2023, p.146). Recently, the increase in public debt in relation to gross domestic product (GDP) has become a significant problem for industrialised countries. This is due to the increase in public spending to solve economic problems and the inability to cover the spending with tax revenues (Hassan et al., 2021, p.73). In 2019, taxes accounted for 59.5% of revenues in OECD countries, net social contributions for 25.2%, sales for 8.5% and grants and other revenues for 6.8%. In OECD countries that are members of the EU, tax revenues fell by 0.7% on average in 2019 and 2020. This decline is due to the slowdown in economic activity due to the pandemic COVID -19 and its impact on tax collection. In addition, general public expenditure in OECD countries has increased in 2020. The main reason for this increase in public spending is the increase in health spending due to COVID -19 (OECD, 2021, p.83). Therefore, OECD countries are pursuing fiscal policies to increase tax revenues in order to close budget deficits. Figure 1 shows the ratio of tax revenues to GDP in OECD countries in 2020.



Source: Created by the author from OECD data.

Figure 1. The ratio of Tax Revenues to GDP in OECD Countries in 2020

According to Figure 1, Mexico, Colombia, Chile and Ireland are the countries with the lowest ratio of tax revenues to GDP in 2020. Countries with a high ratio of tax revenues to GDP are Denmark, France, Belgium and Italy. In addition, most of the countries with a higher tax revenue to GDP ratio are developed countries and members of the European Union. The countries with a lower tax revenue to GDP ratio are mainly developing countries.

Theoretical Framework and Literature Review

Economic growth models differ according to the factors that influence economic growth. Economic growth models are divided into exogenous and endogenous (Aliyev and Künü, 2023, p.253). The neoclassical growth model assumes that changes in public policy have no permanent impact on the steady-state growth rate of the economy. In contrast to the neoclassical model, the endogenous growth model argues that changes in these variables permanently alter the growth rate of per capita output (Wang, 2007, p.279). Moreover, there is no consensus on the impact of changes in tax revenues on economic growth in neoclassical and endogenous growth models. In the neoclassical growth model, Solow (1956) argues that taxes have no long-run impact on economic growth. In contrast to this view of Solow (1956), endogenous growth models claim that taxes affect economic growth (Kirbitçioğlu, 1999, p.14; Guelcemal, 2022, p.349; Karaş, 2022, p.96). Studies by Romer (1986), Barro (1990), King and Rebelo (1990), Jones and Manuelli (1990), Rebelo (1991), Jones et al. (1993), Stokey and Rebelo (1995) and Mendoza et al. (1997) consider that fiscal policy and taxation affect economic growth in the long run (Guelcemal, 2022, p.349; Karaş, 2022, p.96).

However, economists debate how taxes can promote economic growth. For example, Barro (1990) argues that tax revenues will have a positive impact on economic growth, while King and Rebelo (1990) argue that increases in tax rates will have a negative impact on economic growth. From another perspective, Mendoza et al. (1997) say that tax policy has an inefficient effect on economic growth. These three different results show the importance of studying this issue. Given this importance, Table 1 presents the studies that examine this interaction in OECD countries using different time periods/econometric methods and their results.

Table 1. Literature Review on the Relationship between Taxes and Economic Growth in OECD Countries

Author/Year	Period		Method	Result
Widmalm (2001)	1965-1990	23 OECD countries	Panel OLS	An increase in income tax affects economic growth (-).
Tosun and Abizadeh (2005)	1980-1999	24 OECD countries	Panel OLS	Personal and real estate taxes affect economic growth (+). Payroll, goods, and services taxes affect (-).
Furceri and Karras (2007)	1965-2007	26 OECD countries	Panel GMM	An increase in income tax affects economic growth (-).
Arnold (2008)	1971-2004	21 OECD countries	Panel ARDL	Income, consumption, and wealth taxes affect economic growth (-).
Dackehag and Hansson (2012)	1975-2010	25 OECD countries	Panel OLS	Taxes affect economic growth (-).
Macek (2014)	2000-2011	34 OECD countries	Panel OLS	Taxes affect economic growth (-).
Demir and Sever (2016)	1980-2014	11 OECD countries	Panel ARDL	In the long run, there is a (-) relationship between direct tax revenues and economic growth, while in the short run, there is a (-) relationship between total taxes, direct taxes, indirect taxes, and economic growth.
Zimcik and Reichel (2016)	1995-2014	32 OECD countries	Panel OLS	Social security contributions affect economic growth (-), while property taxes affect it (+).
Milenković and Kalaš (2017)	2012-2016	35 OECD countries	Panel OLS	Total tax revenues, personal income tax, and taxes on goods and services affect economic growth (-), while corporate income tax, social security contributions, and property tax affect economic growth (+).
Topal (2017)	1971-2014	22 OECD countries	Dumitrescu-Hurlin Causality and Panel ARDL	There is differential causality, and in the long run, indirect taxes affect economic growth in a (+) way, while direct taxes affect economic growth in a (-) way.

Sandalcı and Sandalcı (2017)	1990-2014	32 OECD countries	Dumitrescu-Hurlin Causality and Panel OLS	There is differential causality, and in the long run, indirect taxes affect economic growth in a (+) way, while total taxes and direct taxes affect economic growth in a (-) way.
Altuntaş et al. (2021)	1980-2018	24 OECD countries	Panel OLS	Taxes affect economic growth (-).
Kutbay (2021)	2000-2017	30 OECD countries	Panel OLS	Direct tax revenues have a (+) effect on economic growth. However, indirect tax revenues have no impact on economic growth.
Korkmaz et al. (2022)	2010-2019	9 OECD countries	Granger Causality	There is unidirectional causality from tax revenues to economic growth.
Karagöz (2023)	2008-2017	35 OECD countries	Panel OLS	The share of goods and services taxes in total tax revenues affects economic growth (-).

When analysing Table 1, it becomes clear that the studies generally use linear econometric methods and obtain different results. These studies that use linear econometric methods generally conclude that taxes reduce economic growth. For this reason, it is assumed that a re-examination of the topic with the research method used in the study will contribute to the literature.

Data, Model and Method

Data and Model

The interaction between tax revenues and economic growth is examined for 37 OECD countries with annual data from 1995-2020. Canada was not included in the analysis as its GDP data were not available in the selected period. Table 2 explains the variables used with reference to Macek (2014).

Table 2. Variable Explanations

Variable	Definition	Variable Description	Source
Economic Growth	Y	Gross Domestic Product (2015 constant $)	World Bank
Tax Revenues	TV	Total tax revenues as a percentage of GDP	OECD
Capital	K	Share of fixed capital investments in GDP	World Bank
Labor	L	Employed persons (thousand)	The Conference Board
Human Capital	H	Human Development Index	UNDP
Public Expenditures	G	Share of public expenditures in GDP	World Bank

Trade Openness	TR	Total of exports and imports share in GDP	World Bank

Equation 1 represents the full logarithmic research model constructed using their natural logarithms.

$$LNY_{it} = \beta_{0it} + \beta_1 LNTV_{it} + \beta_2 LNK_{it} + \beta_3 LNL_{it} + \beta_4 LNH_{it} + \beta_5 LNG_{it} + \beta_6 TR + \mu_{it} \quad \textbf{(1)}$$

The dependent variable in equation 1, *LNY*, is constant price gross domestic product (2015$), which is used to represent economic growth. The explanatory variable *LNTV* is tax revenue. LNK, LNL, LNH, LNG, and $LNTR$, added to the model as control variables, are capital, labour, human capital, public expenditure and external openness, respectively. In addition, β_0 is the constant term and μ is the error term.

Methodology

When analysing panel data, the preferred estimation method is decided based on the results of some preliminary tests, such as horizontal cross-sectional dependence, homogeneity and unit root tests. Therefore, the descriptive statistics were obtained first. Second, the problem of multicollinearity among variables is examined with the VIF test; cross-sectional dependence among units is tested with the CD test of Pesaran (2004); whether the units are homogeneous or heterogeneous is examined with the test of Pesaran and Yamagata (2008); and whether the series contain unit roots is examined with the CIPS unit root test, one of the second generation unit root tests of Pesaran (2007). After these preliminary tests, for comparison, the linear relationship between the variables was tested using Ordinary Least Squares (OLS) and the non-linear relationship was tested using the panel quantile regression analysis methods developed by Koenker and Bassett Jr. (1978).

Since the OLS estimation method considers the averages, it leads to biassed results when the skewness and kurtosis are high. To eliminate biassed results and obtain more robust results, panel quantile regression analysis is used. This is because quantile regression analysis is more resistant to skewness and kurtosis. Quantile regression analysis is expressed by the equation given in Equation 2 (Koenker, 2004; Lin and Xu, 2018; Salman et al., 2019; Eren, 2022);

$$Q_{y_{it}}(\tau|x_{it}) = x_{it}^{\tau}\beta_{\tau} \quad \textbf{(2)}$$

$Q_{y_{it}}(\tau|x_{it})$ denotes the τ th quantile of the dependent variable, β_τ denotes the slope parameters of my explanatory variables for τ quantiles (Koenker, 2004; Allard et al., 2018; Eren, 2022). In the panel quantile regression analysis, the quantile regression model constructed to examine the relationship between taxes and economic growth according to the selected quantile levels is presented in Equation 3;

$$Q_\tau(LNY_{it}) = \alpha_\tau + \beta_{1\tau}LNTV_{it} + \beta_{2\tau}LNK_{it} + \beta_{3\tau}LNL_{it} + \beta_{4\tau}LNH_{it} + \beta_{5\tau}LNG_{it} + \beta_{6\tau}LNTR_{it} + \mu_{it} \quad \textbf{(3)}$$

In Equation 3, Q_τ is the dependent variable, and $\beta_{1,2,3\ldots\tau}$ are the independent variables.

Findings

In this phase of the study, some results of the pretest and quantile regression analysis are presented. The descriptive statistics are presented in Table 3.

Table 3. Descriptive Statistics

Variable	Y	TV	K	L	H	G	TR
Obs	962	962	962	962	962	962	962
Mean	1.09e+12	32.6050	23.5933	15079.11	0.8565	18.7893	89.7152
Std. dev.	2.67e+12	8.0228	4.4576	25997.73	0.0672	3.9273	52.6037
Minimum	9.14e+09	9.912	11.8923	142.356	0.611	8.1197	16.3901
Maximum	1.99e+13	50.286	54.9548	160245.5	0.962	27.935	377.843
Variance	7.11e+24	64.3654	19.8703	6.76e+08	0.0045	15.4237	2767.148
Skewness	4.9944	-0.3224	0.9496	3.5412	-0.9903	-0.2682	2.0231
Kurtosis	29.6171	2.6996	6.6060	17.1732	3.5911	2.6222	9.0913
Jarque–Bera	3.2e+04 (0.000)	20.28 (0.000)	665.8 (0.000)	1.0e+04 (0.000)	171.2 (0.000)	17.26 (0.000)	2143 (0.000)

Note: The values in ( ) indicate Jarque-Bera probability values.

According to Table 3, the variables are not normally distributed. In this case, consistent results cannot be obtained with the OLS estimator. For this reason, quantile regression analysis will give more accurate results in determining the relationship between the variables. Before

performing the quantile regression analysis, you should perform some preliminary tests. First, use the VIF (Variance Inflation Factor) test to see if there is a multicollinearity problem between the variables. The test results are shown in Table 4.

Table 4. VIF Test Results

	VIF	**1/VIF**
LNTV	3.65	0.2737
LNG	2.99	0.3347
LNTR	2.02	0.4945
LNL	1.99	0.5026
LNH	1.55	0.6467
LNL	1.05	0.9519
Mean VIF	2.21	

Analysing the results in Table 4, it is clear that the VIF values of all variables are below 10, and in this case it is decided that there is no multicollinearity problem. Following the VIF test, the CD test developed by Pesaran (2004) was conducted to determine whether there is cross-sectional dependence between the units and the test results are shown in Table 5.

Table 5. Cross-Section Dependence Test Results

	Variables						
	LNY	LNTV	LNK	LNL	LNH	LNG	LNTR
Test Statistic	118.63	11.39	25.12	79.17	127.60	29.43	69.36
P- value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

When analysing Table 5, it is clear that there is a horizontal cross-sectional dependence between the units. Another robustness test that is as important as the horizontal cross-sectional dependence is the homogeneity test. To determine this, the delta test developed by Pesaran and Yamagata (2008) was performed and the test results are shown in Table 6.

Table 6. Homogeneity Test Results

Test	**Statistic Value**	**P-value**
Delta	29.298	0.000
Delta adj	31.606	0.000

According to the results of the homogeneity test in Table 6, the units of the panel data are heterogeneously distributed. Finally, the CIPS unit root test was performed to determine whether the variables are stationary and the results are shown in Table 7.

Table 7. Unit Root Test Results

Variables	**Constant**		**Constant and Trend**	
	CIPS Statistic	*Critical Values*	*CIPS Statistic*	*Critical Values*
At Level I(0)				
LNY	-1.750		-2.088	
LNTV	-2.019		-2.415	
LNK	-1.951		-2.413	
LNL	-2.009	%1 - 2.23	-1.931	%1: -2.73
LNH	-1.894	%5 -2.11	-2.576	%5: -2.61
LNG	-1.377		-1.540	
LNTR	-1.957	%10 -2.04	-2.268	%10:-2.54
First Difference I(I)				
LNY	-3.196		-3.270	
LNTV	-4.679		-4.874	
LNK	-4.506		-4.709	
LNL	-2.641		-2.826	
LNH	-4.458		-4.435	
LNG	-3.705		-3.993	
LNTR	-3.846		-3.963	

In Table 7, the absolute values of the CIPS statistics at the levels of the variables are smaller than the critical CIPS values, which means that the variables at the levels are non-stationary, i.e. they contain unit roots. However, for the differences of the first variables, the absolute values of the CIPS statistics are larger than the critical CIPS values. In this case, it is decided that the variables do not contain unit roots when their first differences are taken.

Based on these robustness checks, it was decided to conduct OLS and quantile regression analyses to investigate the impact of taxes on economic growth and to compare OLS and

quantile regression analyses. In the quantile regression analysis, nine different quantile levels (10th, 20th, 30th, 40th, 50th, 60th, 70th, 80th and 90th) were selected to determine the impact of taxes and other independent variables on economic growth. Figure 2 shows the graphical representation of the dependent and independent variables at the different quantile levels, and Table 8 presents the results of the OLS quantile regression.

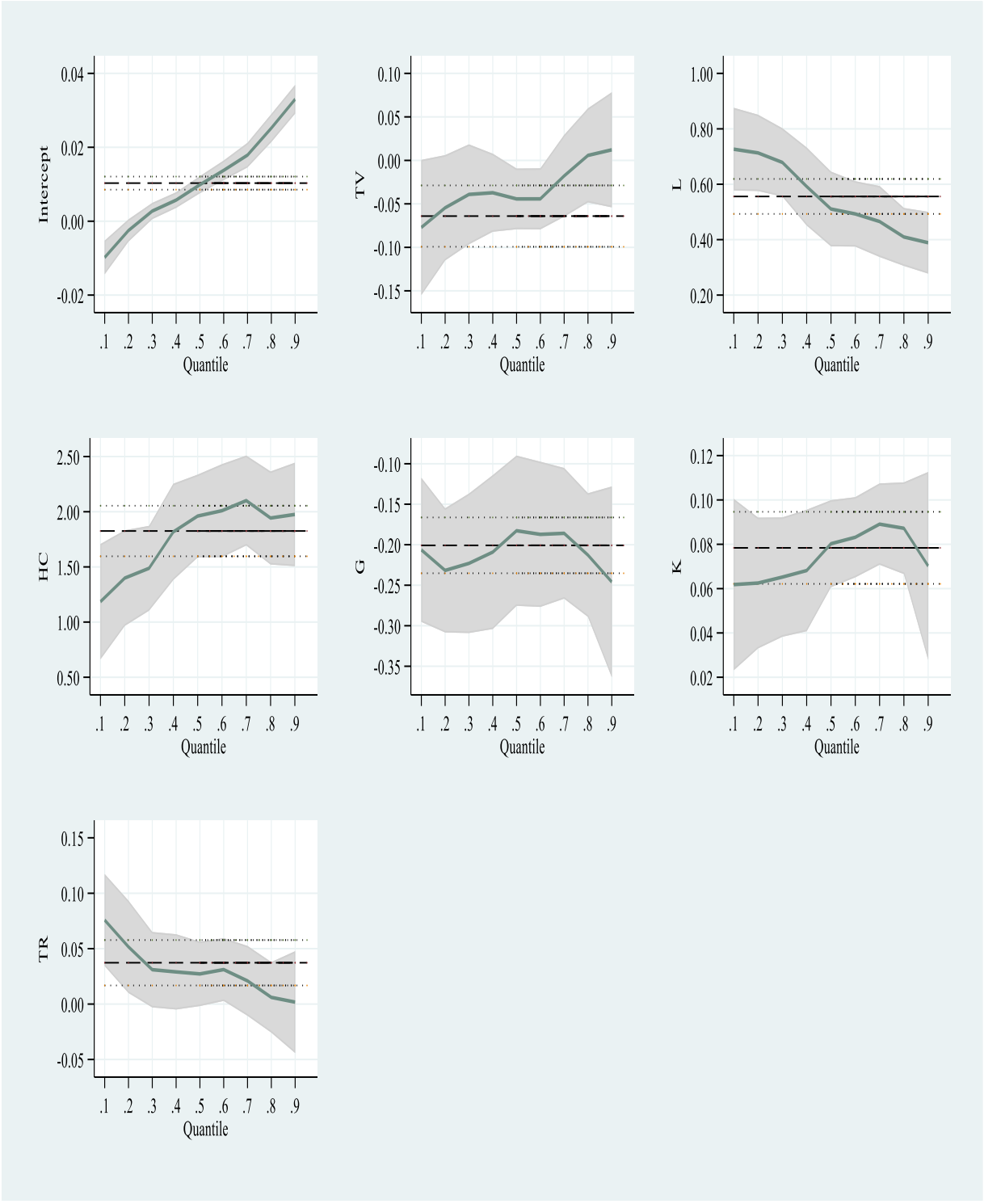


Figure 2. Quantile Distribution of Different Independent Variables on Economic Growth

The green lines in Figure 2 are quantile regressions and the dashed lines are OLS estimates. Furthermore, the grey area is a quantile and the dashed lines are OLS confidence intervals. Accordingly, it can be observed that the coefficients of variables that do not change in OLS differ significantly in the quantile regression method. It can thus be assumed that the effects of tax revenues and other independent variables on economic growth may differ in different quantiles.

Tablo 8. Quantile Regression and OLS Test Results

Variables	TV	K	L	H	G	TR	Intercept
OLS	-0.6787***	0.0790***	0.5553***	1.8377***	-0.2009***	0.0362***	0.0103***
	(0.0182)	(0.0084)	(0.0327)	(0.1183)	(0.0178)	(0.0106)	(0.0001)
q10	-0.0770**	0.0615***	0.7298***	1.1689***	-0.2063***	0.0760***	-0.0099***
	(0.0384)	(0.0178)	(0.0690)	(0.2436)	(0.0450)	(0.0203)	(0.0020)
q20	-0.0551*	0.0626***	0.7125***	1.4226***	-0.2321***	0.0515**	-0.0027
	(0.0301)	(0.0147)	(0.0637)	(0.2183)	(0.0380)	(0.0261)	(0.0017)
q30	-0.0396	0.0656***	0.6772***	1.5397***	-0.0221***	0.0298*	0.0025**
	(0.0278)	(0.0127)	(0.0566)	(0.2136)	(0.0364)	(0.0175)	(0.0012)
q40	-0.0385	0.0699***	0.5803***	1.8456***	-.02147***	0.0245	0.0058***
	(0.0241)	(0.0141)	(0.0634)	(0.2274)	(0.0373)	(0.0165)	(0.0014)
q50	-0.0504**	0.0840***	0.5013***	1.9833***	-0.1817***	0.0261**	0.0101***
	(0.0232)	(0.0129)	(0.0583)	(0.1978)	(0.0389)	(0.0131)	(0.0015)
q60	-0.0348	0.0900***	0.4796***	2.0231***	-0.1704***	0.0253**	0.0142***
	(0.0240)	(0.0118)	(0.0560)	(0.1916)	(0.0118)	(0.0113)	(0.0015)
q70	-0.0191	0.0921***	0.4570***	2.0678***	-0.1781***	0.0661	0.0184***
	(0.0257)	(0.0117)	(0.0561)	(0.2033)	(0.0309)	(0.0131)	(0.0017)
q80	0.0060	0.0884***	0.4051***	1.9410***	-0.2104***	0.0057	0.0254***
	(0.0257)	(0.0126)	(0.0531)	(0.2290)	(0.0281)	(0.0132)	(0.0018)
q90	0.0138	0.0672***	0.3942***	1.9915***	-0.2447***	-0.0026	0.0333***
	(0.0416)	(0.0214)	(0.0543)	(0.2767)	(0.0472)	(0.0223)	(0.0018)

Notes: ***, **, and * denote 1%, 5%, and 10% significance levels, respectively, and values in ( ) represent standard errors.

According to the results of the quantile regression and OLS analysis in Table 8, the signs of the coefficients of the capital, labour, human capital and public expenditure variables are consistent with the OLS results. However, it can be seen that the coefficients differ by cantilever level. It goes without saying that the signs of the variables for total taxes and external openness differ

significantly in the quantile regression and the OLS method. The results of the quantile regression show that taxes have a negative and statistically significant effect on economic growth in countries with low economic growth (10th and 20th quantiles) and the countries with the panel average (50th quantile). In the countries with the lowest tax revenues (10th quantile), a 1% increase in the share of tax revenues in GDP leads to a decrease in economic growth of about 0.08%. Furthermore, in countries with high economic growth (80th and 90th quantiles), tax revenues have a positive but statistically insignificant effect on economic growth. In the other quantiles (30th, 40th, 60th and 70th), tax revenues have a negative but statistically non-significant effect on economic growth. Based on these results, it can be said that there is a need to redesign tax policy in OECD countries with low economic growth. It is suggested that increases in direct taxes should finance public spending in these countries. Openness, included as a control variable in the study, is found to have no statistically significant effect on economic growth in the countries in the 40th, 70th, 80th and 90th quantiles. In the countries in the other quantiles, openness to foreign trade has a positive effect on economic growth. However, this positive and significant effect varies in the coefficients between the quantiles. This effect is smaller in countries with high economic growth than in countries with low economic growth. Capital, labour and human capital are also found to have a positive effect on economic growth in all quantiles. In contrast, public expenditure has a negative and statistically significant effect, but there are significant differences in terms of coefficients.

Conclusion and Discussion

Governments resort to fiscal policy instruments when necessary to overcome economic problems and ensure economic growth and development. Taxes are one of the most commonly used fiscal policy instruments to manage the economy. Although the impact of changes in tax policy on economic growth is frequently discussed in the literature, there is no consensus on how a tax increase will guide economic growth. For this reason, this study analyses the relationship between tax revenues and economic growth for 37 OECD countries with annual data for the period 1995-2020 using quantile regression analysis, which is one of the non-linear econometric methods. The quantile regression analysis shows that taxes have a negative and statistically significant effect on economic growth in countries with low economic growth (10th and 20th quantiles) and in panel average countries (50th quantile). In contrast, tax revenues have a positive but statistically insignificant effect on economic growth in countries with high economic growth (80th and 90th quantiles). In addition, tax revenues have a negative but statistically non-significant effect on economic growth in the 30th, 40th, 60th and 70th

quantiles. These results suggest that tax revenues do not have a negative effect on economic growth in all OECD countries, but only in countries where economic growth is lower and economic growth is in line with the OECD average. Based on these results, it is clear that the relationship between tax revenues and economic growth in OECD countries has a statistically significant effect only in countries with low economic growth, and this effect is negative. Although these results partially support the findings of Widmalm, 2001; Arnold, 2008; Macek, 2014; Dackehag and Hansson, 2012; Demir and Sever, 2016, they contradict the results of Altuntaş et al. 2021 and Kutbay, 2021. According to these results, it should be taken into account that the conclusions regarding the relationship between taxes and growth cannot be generalised to all OECD countries and that there may be different relationships depending on the economic growth level of countries.

Suggestions

In OECD countries where economic growth is low, it can be said that it is essential for countries seeking sustainable economic growth to reconsider their tax policies, as raising taxes will have a negative impact on economic growth. It is considered that it is essential for these countries to avoid distortionary taxation and to encourage entrepreneurs who produce new ideas with a selective taxation approach instead of penalising them with high taxes in order to ensure the continuity of entrepreneurial activities. Based on the conclusion that tax reduction has a positive impact on economic growth in OECD countries with low economic growth, reducing taxes on productive activities could be an essential policy component. Moreover, since tax increases or decreases can have asymmetric effects on economic growth, it is believed that studying the issue from this perspective can help policymakers design tax policy. Finally, the findings of the study relate to OECD countries. It is assumed that it is essential to study the topic in the future, taking into account tax subtypes for different countries and groups of countries.

Referencing

Aksu, H., Künü, S., & Bozma, G. (2017), Mali senkronizasyon hipotezi Türkiye için geçerli mi? *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi, 31*(2), 311-314.

Aliyev, P., & Künü, S. (2023). Eğitim, bilim, sosyal güvenlik ve sağlık harcamalarının ekonomik büyümeye etkisi: Azerbaycan örneği. *KAÜİİBFD, 14*(27), 249-275.

Allard, A., Takman, J., Uddin, G.S., & Ahmed, A. (2018) The N-shaped environmental Kuznets curve: an empirical evaluation using a panel quantile regression approach. *Environ Sci Pollut Res, 25*, 5848-5861. https://doi.org/10.1007/s11356-017-0907-0

Altuntaş, M., Kılıç, E., Mercan, N., & Yavuz, E. (2021). Vergi gelirleri ve ekonomik büyüme ilişkisinin panel veri yöntemiyle analizi: OECD ülkelerinden kanıtlar. *Trakya Üniversitesi Sosyal Bilimler Dergisi, 23,* 53-72. https://dergipark.org.tr/en/pub/trakyasobed/article/866853

Arnold, J. (2008). Do tax structures affect aggregate economic growth? Empirical evidence from a panel of OECD countries. *Economics Department Working Papers, 643,* OECD. https://doi.org/10.1787/18151973

Arslan, K. E., & Karabulut, K. (2023). Makroekonomik göstergeler çerçevesinde vergilerin ülke performanslarına etkisi: OECD ülkeleri üzerine VZA uygulaması. *İşletme Araştırmaları Dergisi, 15*(2), 1388–1410. https://doi.org/10.20491/isarder.2023.1656

Barro, R. (1990). Governmentspending in a simple model of endogenous growth. *Journal of Political Economy, 98*(1), 103-117.

Başar, S., Künü, S., & Bozma, G. (2016). Eğitim ve sağlık harcamalarının ekonomik büyüme üzerine etkisi: Türkiye üzerine bir uygulama. *Iğdır Üniversitesi Sosyal Bilimler Dergisi, 10,* 189-204. https://dergipark.org.tr/tr/download/article-file/2154191

Dackehag, M., & Hansson, Å. (2012). Taxation of income and economic growth: An empirical analysis of 25 rich OECD countries *(No. 2012: 6). Working paper.* https://www.econstor.eu/handle/10419/260033

Demir, M. & Sever, E. (2017). Vergi gelirleri ekonomik büyüme ilişkisi: OECD ülkelerine ilişkin panel veri analizi. *Aksaray Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 9*(2), 51-66. http://aksarayiibd.aksaray.edu.tr/en/pub/issue/34900/387088

Eren, M. (2022). Different impacts of democracy and income on carbon dioxide emissions: evidence from a panel quantile regression approach. *Environ Sci Pollut Res, 29,* 71439-71459 https://doi.org/10.1007/s11356-022-20805-x

Furceri, D., & Karras, G. (2007). Tax changes and economic growth: Empirical evidence for a panel of OECD countries. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.360.2497&rep=rep1&type=pdf

Gunasinghe, C., Selvanathan, E. A., Naranpanawa, A., & Forster, J. (2021). Rising income inequality in OECD countries: does fiscal policy sacrifice economic growth in

achieving equity?. *The European Journal of Development Research, 33,* 1840-1876. https://doi.org/10.1057/s41287-020-00322-8

Gülcemal, T. (2022). Türkiye'de dolaylı vergi ve ekonomik büyüme ilişkisi: ARDL sınır testi yaklaşımı. *EKEV Akademi Dergisi, 89,* 345-359. https://dergipark.org.tr/en/pub/sosekev/issue/71371/1147615

Hassan, M., Oueslati, W., & Rousselière, D. (2022). Energy taxes and economic growth in OECD countries: a simultaneous equations approach. *Journal of Environmental Economics and Policy, 11*(2), 172-195. https://doi.org/10.1080/21606544.2021.1937326.

Jones, L. & Manuelli, R. (1990). A convex model equilibrium growth: theory and policy implications. *Journal of Political Economy, 98*(5), 1008–1038.

Jones, L., Manuelli, R. & Rossi, P. (1993). Optimal taxation in models of endogenous growth. *Journal of Political Economy, 101,* 485–517.

Karagöz, H. (2023). Vergi gelirleri ve vergi yapısının ekonomik büyümenin sürdürülebilirliğine etkisi: Refah, verimlilik ve rekabet gücü perspektifinde bir inceleme. *İstanbul Ticaret Üniversitesi Sosyal Bilimler Dergisi, 22*(46), 438-457. https://dergipark.org.tr/en/download/article-file/3194415

Karaş, G. (2022). Vergi yapısı ve ekonomik büyüme: G7 ülkeleri örneği. *Gazi İktisat ve İşletme Dergisi, 8*(1), 94-114. https://dergipark.org.tr/en/download/article-file/1862174

Kim, J., Wang, M., Park, D., & Petalcorin, C. C. (2021). Fiscal policy and economic growth: some evidence from China. *Review of World Economics, 157*(3), 555-582. https://doi.org/10.1007/s10290-021-00414-5

King R.G., & Rebelo S. (1990). Pulic Policy and Economic Growth: Devoloping Neoclassical Implications. *Journal of Political Economy, 98*(5),126- 150.

Kirbitçioğlu, A. (1998). İktisadi büyümenin belirleyicileri ve yeni büyüme modellerinde beşeri sermayenin yeri. *AÜ SBF Dergisi, 53*(1-4), 207-230.

Koenker, R. (2004). Quantile regression for longitudinal data. *Journal of Multivariate Analysis, 91*(1),74-89. https://doi.org/10.1016/j.jmva.2004.05.006

Koenker, R., & Bassett Jr, G. (1978). Regression quantiles. *Econometrica, 46*(1):33-50. https://doi.org/10.2307/1913643

Korkmaz, S., Bayır, M., & Güvenoğlu, H. (2022). The causal relationship between tax revenues and economic growth in OECD countries. *Gaziantep University Journal of Social Sciences, 21*(2), 599-610. https://dergipark.org.tr/en/download/article-file/1924444

Kutbay, H. (2021). Vergi yükünün ve yapısının ekonomik büyüme üzerindeki etkileri: OECD ülkeleri için panel veri analizi. *Mali Çözüm Dergisi, 31*(164), 13-35. https://hdl.handle.net/11492/6022

Lin. B., & Xu, B. (2018). Factors affecting CO2 emissions in China's agriculture sector: A quantile regression. *Renewable and Sustainable Energy Reviews, 94*,15-27. https://doi.org/10.1016/j.rser.2018.05.065

Macek, R. (2014). The impact of taxation on economic growth: Case study of OECD countries. *Review of Economic Perspectives, 14*(4), 309-328. https://sciendo.com/it/article/10.1515/revecp-2015-0002

Mendoza, E. G., Milesi-Ferretti, G. M., & Asea, P. (1997). On the ineffectiveness of tax policy in altering long-run growth: Harberger's superneutrality conjecture. *Journal of public Economics, 66*(1), 99-126.

Milenković, I., & Kalaš, B. (2017). The ımpact of taxes on economic growth in OECD countries. In 5th RSEP Social Sciences Conference (pp. 7-10). https://rsepconferences.com/my_documents/my_files/26_IVAN_MILENKOVIC.pdf

OECD (2021). Government at a glance 2021. Paris: OECD Publishing. https://doi.org/10.1787/1c258f55-en

OECD (2022). OECD. Stat. https://stats.oecd.org/

OECD(2023). Government at a Glance 2023. Paris: OECD Publishing. https://doi.org/10.1787/22214399

Pesaran, M.H. (2004). General diagnostic tests for cross section dependence in panels. *CESifo, Working Paper Series No. 1229, IZA Discussion Paper No. 1240*. http://dx.doi.org/10.2139/ssrn.572504

Pesaran, M.H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics, 22*(2),265-312. https://doi.org/10.1002/jae.951

Pesaran, M.H., & Yamagata, T. (2008). Testing slope homogeneity in large panels. *Journal of Econometrics, 142*(1), 50-93. https://doi.org/10.1016/j.jeconom.2007.05.010

Rebelo, S. (1991). Long-run policy analysis and long-run growth. *Journal of Political Economy, 99*(3), 500-521.

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy, 94*(5), 1002-1037. https://doi.org/10.1086/261420

Sağdıç, E. N., & Aydın, D. (2021). Dolaylı ve dolaysız vergiler ile ekonomik büyüme arasındaki nedensellik ilişkisi: Türkiye örneği (2006-2018). *International Journal of Public Finance, 6*(1), 21-46.

Salman, M., Long, X., Dauda, L., Mensah, C.N., & Muhammad, S. (2019). Different impacts of export and import on carbon emissions across 7 ASEAN countries: A panel quantile regression approach. *Science of the Total Environment, 686,* 1019-1029. https://doi.org/10.1016/j.scitotenv.2019.06.019

Sandalcı, U., & Sandalcı, İ. (2017). OECD ülkelerinde ekonomik büyüme ve vergi gelirleri arasındaki ilişkinin ampirik analizi: 1990-2014. *Aksaray Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 9* (1), 51-62. http://aksarayiibd.aksaray.edu.tr/tr/pub/issue/34899/387008

Stokey, N. L., & Rebelo, S. (1995). Growth effects of flat-rate taxes. *Journal of Political Economy, 103*(3), 519-550.

The Conference Board (2023). Total economy database. https://www.conference-board.org/data/economydatabase/total-economy-database-productivity

Topal, M. H. (2017). Vergi yapısının ekonomik büyüme üzerindeki etkisi: OECD ülkelerinden ampirik bir kanıt. *Siyaset, Ekonomi ve Yönetim Araştırmaları Dergisi, 5*(3), 183-206. https://dergipark.org.tr/en/download/article-file/1023128

Tosun, M. S., & Abizadeh, S. (2005). Economic growth and tax components: an analysis of tax changes in OECD. *Applied Economics, 37*(19), 2251-2263. https://doi.org/10.1080/00036840500293813

UNDP (2023), İnsani gelişme endeksi. https://hdr.undp.org/data-center/human-development-index#/indicies/HDI

Wang, D. H. M. (2007). Convergence tests on tax burden and economic growth among China, Taiwan and the OECD countries. *Physica A: Statistical Mechanics and its Applications, 380,* 278-286. https://doi.org/10.1016/j.physa.2007.02.046

Widmalm, F. (2001). Tax structure and growth: are some taxes better than others*?*. *Public Choice, 107*(3/4), 199-219. https://link.springer.com/content/pdf/10.1023/a:1010340017288.pdf?pdf=button

World Bank, (2022). World Development Indicators. https://databank.worldbank.org/source/world-development-indicators Accessed 18 March 2023

Zimcik, P., & Reichel, V. (2016). Tax collectıon and economıc growth: OECD panel study. In 3rd International multidisciplinary scientific conference on social sciences and arts SGEM 2016 (pp. 685-692). https://www.elibrary.ru/item.asp?id=429846