Research Article / *Araştırma Makalesi*

A PATH TOWARDS SUSTAINABLE DEVELOPMENT FROM FISCAL INSTRUMENTS IN TÜRKİYE: THE ROLE OF TAX REVENUES AND PUBLIC EXPENDITURES

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ABSTRACT

Tax and expenditure policies have a range of economic, social, and environmental objectives. Although these policies are multidimensional, the relevant literature focuses on a single dimension. The long-run aim of public policies, including tax and expenditure policies, is to ensure sustainable development that includes all these dimensions. The sustainable development index is a broad indicator that combines economic, social, and environmental factors, including human development and ecological quality. This study aims to examine the effect of tax revenues and public expenditures on the sustainable development index in Türkiye for the period 1990-2019. According to the study results, while tax revenues affect sustainable development positively, public expenditures affect it negatively. The results of the study support that Türkiye implements its tax policy in a balanced manner towards sustainable development goals and emphasizes that it should review its expenditure policy. This study underscores the importance of aligning both tax and expenditure policies to effectively pursue sustainable development objectives in Türkiye.

Keywords: *Tax Revenues, Public Expenditures, Sustainable Development Index*

JEL Classification: *H21, H53, Q01*

TÜRKİYE'DE MALİ ARAÇLARDAN SÜRDÜRÜLEBİLİR KALKINMAYA BİR YOL: VERGİ GELİRLERİ VE KAMU HARCAMALARININ ROLÜ

ÖZET

Vergi ve harcama politikalarının bir dizi ekonomik, sosyal ve çevresel hedefi vardır. Bu politikalar çok boyutlu olmalarına rağmen ilgili literatür tek bir boyuta odaklanmaktadır. Vergi ve harcama politikaları da dahil olmak üzere kamu politikalarının uzun vadeli amacı, tüm bu boyutları içerecek şekilde sürdürülebilir kalkınmanın sağlanmasıdır. Sürdürülebilir kalkınma endeksi, insani gelişme ve ekolojik kalite de dahil olmak üzere ekonomik, sosyal ve çevresel faktörleri birleştiren geniş bir göstergedir. Bu çalışma, 1990-2019 dönemi için Türkiye'de vergi gelirleri ve kamu harcamalarının sürdürülebilir kalkınma endeksine etkilerini incelemeyi amaçlamaktadır. Araştırma sonuçlarına göre vergi gelirleri sürdürülebilir kalkınmayı pozitif, kamu harcamaları ise negatif yönde etkilemektedir. Çalışmanın sonuçları, Türkiye'nin vergi politikasını sürdürülebilir kalkınma hedefleri doğrultusunda dengeli bir şekilde uyguladığını ortaya koymakta ve harcama politikasını gözden geçirmesi gerektiğini vurgulamaktadır. Bu çalışma, Türkiye'de sürdürülebilir kalkınma hedeflerine etkili bir şekilde ulaşmak için hem vergi hem de harcama politikalarını uyumlu hale getirmenin önemini vurgulamaktadır.

Anahtar Kelimeler: *Vergi Gelirleri, Kamu Harcamaları, Sürdürülebilir Kalkınma Indeksi*

JEL Sınıflandırması: *H21, H53, Q01*

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1. Introduction

The relationship between economic growth (EG) and sustainable development (SD) is becoming increasingly important. While EG represents an increase in a country's production of goods and services, sustainable development aims to balance the environmental, social, and economic impacts of this growth. The differences between these two concepts are not limited to only a quantitative growth target but also include a strategic approach to the efficient and fair use of resources. Today, challenges such as global environmental problems, social inequalities, and economic fluctuations increase the importance of sustainable development (Hess, 2016: 431). In this context, it is emphasized that economic growth should not only improve the welfare of a country but also meet the needs of future generations by sustainably using natural resources.

In recent years, it has been observed that public policy tools have been tightly designed to achieve sustainability goals. Although this may seem ordinary today, the use of public instruments for this purpose actually became widespread in the mid-1900s (Damon & Sterner, 2012: 144). Classical economists argued for the superiority of the free market. For this reason, they opposed state intervention in the economy. According to classical economists, there is an invisible hand that maintains order in the economic life. This invisible hand is the price mechanism. According to the classics, instabilities in the economy are temporary, and these instabilities are resolved automatically by the price mechanism. In this context, the classicists argue that the state should not use public expenditures and taxes to intervene in the economy. They only advocate that the state should undertake essential public services such as justice, diplomacy, and security. Taxes should be collected only to finance these essential public services. In summary, the classics advocate minimum public spending and minimum taxes. With the great depression of 1929, the interventionist state approach replaced the neutral state approach. According to Keynes, the state should actively use public expenditures and taxes to eliminate economic instabilities and achieve its macroeconomic goals (Degirmenci & Aydin, 2023: 2232). However, Keynes's views are not sufficient to ensure SD. In order to achieve SD rather than only economic growth, it is a development model that aims at a balanced development in environmental, social, and economic areas by meeting the needs of the current generation without endangering the needs of future generations. This approach aims to use natural resources effectively, ensure social justice, and sustain economic growth within environmental limits (Hunjra et al., 2022: 2). Therefore, today, the role of environmental taxes and expenditures that affect income distribution, first put forward by Pigou, has increased. As the functions of taxes and expenditures increase worldwide, there is a serious effort to design them to ensure sustainable development. SD is a concept that includes EG as well as social justice and environmental protection goals. In this context, state fiscal policies play a critical role in ensuring SD. Fiscal tools such as tax revenues and public expenditures can be used effectively to direct economic activities, increase social welfare, and ensure ecological sustainability. Tax revenues enable the state to finance economic policies and are used to finance public services such as infrastructure investments, education, and health services. At the same time, tax policies are a strategic tool to balance income distribution and reduce economic inequalities. Environmental taxes, on the other hand, can encourage the choice of more sustainable alternatives by increasing the cost of activities that harm the environment (Bozatli & Akca, 2024: 3). Therefore, tax policies can

be designed taking into account the economic, social, and environmental dimensions of sustainable development, and in this way, sustainable development can be achieved. On the other hand, public expenditures can be directed to strategic areas to support EG (Kutasi & Marton, 2020: 404). Spending in areas such as infrastructure investments, R&D expenditures, and education increases economic growth and competitiveness in the long term. Additionally, public expenditures can be directed to environmental protection and sustainability projects. For Türkiye, providing tax revenues from direct taxes instead of indirect taxes can reduce injustice in income distribution and support social sustainability. Increasing infrastructure investments and R&D expenditures is essential for EG. Environmental sustainability should be supported by renewable energy investments and environmental protection projects. Thus, it will be possible for Türkiye to achieve sustainable development goals through fiscal policies.

Previous researches have focused on the effects of fiscal instruments on EG (Ojong et al., 2016; Egbunike et al., 2018; Nyasha & Odhiambo, 2019; Değirmenci & Yavuz, 2021; Mulugeta, 2023). The use of economic growth as a gauge of a nation's prosperity is subject to harsh criticism. Despite the GDP indicator's historical use in gauging a nation's economic performance, social and environmental concerns that might contradict financial gains are not taken into consideration. Furthermore, the GDP metric does not account for environmental damage and the depletion of natural resources. Based on this background, this study examines the impact of tax revenues and public expenditures on SD in Türkiye for the 1990-2019 period. The study uses the sustainable development index to represent sustainable development. This index is a new indicator that offers a much broader perspective by focusing on ecological efficiency as well as the basic components of the human development index. This is the first study to examine the role of fiscal instruments in achieving sustainable development. This aspect of the study aims to create a new area of discussion in the literature. The selection of Türkiye in the study is based on a number of important factors. Türkiye, as a developing country in the process of achieving SD goals, constitutes an important example to examine the impact of fiscal policies on these goals. Türkiye's dynamic economic structure, expanding population, and geographical location present unique opportunities and challenges for SD. The composition of tax revenues generally shows a structure based on indirect taxes, which may create injustice in income distribution. Therefore, evaluating the effects of the tax system in Türkiye on SD makes it possible to make inferences for other developing countries. In addition, Türkiye's rapid urbanization process is also of critical importance in terms of environmental sustainability. In addition, Türkiye's social structure is directly related to SD goals. A young and growing population requires increased social expenditures such as education and health. Social sustainability is the basis of social peace and economic stability. As a result, examining Türkiye's policies towards SD goals covering economic, environmental, and social dimensions can provide clues on how SD strategies can be effectively implemented in the context of Türkiye's unique conditions.

Following the introduction, the following section includes studies examining the relationship between fiscal instruments and SD. Then, the relevant literature was evaluated. The third section presents the analysis and findings. Finally, empirical results regarding the relationship between fiscal instruments and SD are evaluated in the fourth section, and policy recommendations are included.

2. Literature Review

Public instruments are crucial in promoting sustainable development. Social, economic, and environmental conditions can be improved through taxes and expenditures. For example, environmental taxes are a deterrent measures for companies and society to reduce or eliminate environmental degradation. Through environmental protection expenditures, environmental infrastructures are improved, environmental wastes are recycled, and clean energy can be obtained. Similarly, clean technologies that emit positive externalities are subsidized by the state. On the other hand, fair income distribution is regulated by providing social aid to low-income people and families. These public expenditures are supported by progressive income tax, which is in line with the concept of "taxing more on those who earn more and less on those who earn less." Finally, taxes and expenditures can be used to get a share of foreign capital and encourage economic growth. A summary of studies examining the relationship of public expenditures with Sustainable Development indicators is presented in Table 1.

Table 1: Literature on Public Expenditures and Sustainable Development

Author	Countries	Period	Methods	Findings
Adewuyi (2016)	Global	1990-2015	Panel d. a.	Public expenditures → environmental sustainability (✓)
Apergis et al. (2023)	USA	1980-2015	Panel d. a.	Public energy expenditures → environmental sustainability (x)
Ahuja & Pandit (2020)	59 nations	1990-2019	Panel d. a.	Public expenditures → economic growth (✓)
Aydin et al. (2023)	G7 nations	1990-2018	P. d.a.	Public R&D expenditures → environmental sustainability (+)
Alper &Demiral (2016)	18 OECD	2002-2013	FGLS	Public social expenditures → economic growth (+)
Montenegro & Shenai (2019)	Brazil	1994-2017	OLS	Public expenditures → economic growth, economic development (mixed results)
Onifade et al. (2020)	Nigeria	1981-2017	ARDL	Public expenditures → economic growth (✓)
Osuji & Nwani (2020)	Nigeria	2000-2018	VAR	Public expenditures → SDGs (mixed results)
Ozyilmaz et al. (2023)	G7 countries	1997-2020	GMM	Public health expenditures → environmental sustainability (-)
Saad & Kalakech (2009)	Lebanon	1967-2007	MCA	Public expenditures → Economic growth (mixed results)
Uzuner et al. (2017)	Türkiye	1975-2014	Johansen co-integration,	Public expenditures → economic growth (+)

Note: ✓: relationship, x: no relationship, -: negative effect, +:positive effect

No study has examined the impact of public expenditures on the sustainable development index. Various studies discuss the effects of public expenditures on EG, ecological quality, and human development index, which are indicators of SD. However, considering the

findings of the studies, it is seen that the effects of public expenditures vary. A summary of studies examining the relationship between tax revenues and Sustainable Development indicators is presented in Table 2.

Table 2: Literature on Tax Revenues and Sustainable Development

Author	Countries	Period	Methods	Findings
Abdulwahab & David (2023)	Nigeria	1998-2021	OLS	Tax revenue → economic growth (mixed results)
Bekmez & Nakıpoğlu (2012)	Türkiye	1994-2009	VAR	Environmental tax → economic growth (✓)
Dam & Ertekin (2018)	Türkiye	2005-2016	ARDL	Tax revenue → economic growth (+)
Demir & Sever (2017)	11 OECD	1980-2014	Panel d. a.	Tax revenue → economic growth (-)
Eren et al. (2018)	Türkiye	1975-2013	Causality	Tax revenue → economic development (✓)
Ho et al. (2023)	29 developing countries	2000-2020	FEM	Tax revenue → economic growth (+)
Li et al. (2023)	BRICS	1990-2019	CCEMG	Tax revenue → environmental sustainability (✓)
Mucuk & Alptekin (2008)	Türkiye	1975-2006	VAR	Tax revenue → economic growth (✓)
Okafor (2012)	Nigeria	1981-2007	OLS	Tax revenue → economic growth (+)
Şaşmaz & Yayla (2018)	11 countries	2004-2015	Panel causality	Tax revenue → human development (✓)
Sumandeep et al. (2023)	India	1990-2017	VAR	Tax revenue → economic growth (+)
Tanchev & Mose (2023)	28 European naions	1995-2020	POLS	Tax revenue → economic growth (+)
Wolde-Rufael & Mulat-Weldemeskel (2023)	20 European naions	1995-2012	Panel d. a.	Environmental tax → environmental sustainability (+)

Note: ✓: relationship, -: negative effect, +:positive effect

No study has been found investigating the relationship between tax revenues and the sustainable development index. There are various studies examining the relationship between tax revenues and variables such as EG, human development, and environmental sustainability, which are indicators of sustainable development. The findings of these studies show that tax revenues have mixed effects.

When studies in this field are evaluated, it is seen that a broad indicator to represent sustainable development is not used. There are many types of tax revenue or public expenditures. With these aspects, fiscal instruments have the potential to affect social, economic, and

environmental factors on the one hand. Because sustainable development is a complex term that incorporates economic and environmental indicators, there is a substantial research gap because the impact of these factors on the sustainable development index has not yet been fully explored.

3. Data, Methodology, and Findings

In this study, data for the period 1990-2019 were used for Türkiye. There are two important reasons why the study covers this period. Although the data period for other variables is long, the data for the SDI variable is until 2019. Secondly, these four years were not included in the model because of the fiscal deterioration caused by the COVID-19 pandemic seen since 2019, and the tax and expenditure measures taken in this context would make the results of the model unrealistic. Table 3 indicates the data description and sources.

Table 3: Data Description

Variables	Description	Source
Sustainable Development (SDI)	Index	Sustainable Development Index
Tax Revenues (TAX)	% of GDP	OECD
Public Expenditures (PEX)	%of GDP	IMF

All data used were considered logarithmic. In the study, public expenditures and tax revenues were determined as the determinants of sustainable development.

$$\ln SDI_t = \phi_0 + \phi_1 \ln PEX_t + \phi_2 \ln TAX_t + u_t \qquad (1)$$

where u_t represents the error term. ϕ_i, $i = 1,2,3$ show the slope coefficients of the relevant variables. Three different methods were adopted for the econometric methodology of the study. The first of these was to determine the stationarity of the variables, and the second was to determine the long-term relationship by cointegration test. Finally, long-run coefficients were tested using the appropriate estimator. In the study, Enders & Lee (2012) unit root test and the classical ADF test, which also takes into account soft structural breaks with the help of Fourier terms, were used.

Table 4: Unit Root Test Results

	Fourier-ADF					ADF			
Variables	I(0)	F-Stat.	p/k	I(1)	p/k	I(0)	p	I(1)	p
lnSDI	-3.034715	0.712	1/1	-3.695601	3/2	-0.964519	0	-5.013785*	0
lnPEX	-2.909657	6.191	1/3	-1.391216	3/3	-1.681891	3	-4.763996*	0
lnTAX	-2.652528	3.643	½	-3.352769	1/2	-2.795***	0	---	---

Notes: * p<0.01 and *** p<0.10. The critical values of F statistics are 10.35 (1%), 7.58 (5%), and 6.35 (10%).

Table 4 shows the unit root test results. When the results were examined, it was determined that the Fourier terms for all variables were meaningless, so the results of the ADF test should be trusted instead of the Fourier ADF test. According to the ADF test results, it was determined that all variables except lnTAX are stationary at the first level, while the lnTAX variable is not stationary at the first level. Accordingly, while lnSDI and lnPEX are I(1), lnTAX are I(0).

Table 5: Fourier-based A-ARDL Cointegration Test and Long-run Estimations Results

		Diagnostic Tests	
Statistics	**Statistics**	**Tests**	**Values**
ARDL(3, 3, 3)		Serial correlation	1.077 (0.376)
F-stat.	19.739*	Heteroscedasticity	0.793 (0.658)
t-dep.	-6.949*	Normality	0.674 (0.713)
F-indep.	21.386*		
Long-run and ECM Coefficients	*Values*	*Prob.*	
lnTAX	0.554***	0.074	
lnPEX	-1.366*	0.000	
ECM(-1)	-1.4910*	0.000	

Note: * p<0.01 and ** p<0.05

The A-ARDL bounds test approach is used to examine the long-term relationship between variables. Sam, McNown & Goh (2019) extended Pesaran (2001)'s classical ARDL bounds test approach with the new test statistics. These statistics are *(F-stat.)*, t-test *(t-dep.)*, and *(F-indep.)*. The hypotheses used for these tests are as follows:

$$F-stat. \,|\, H_0 : \beta_1 = \beta_2 = \beta_3 = 0, \; t-dep. \,|\, H_0 : \beta_1 = 0, \text{ and}$$
$$F-indep. \,|\, H_0 : \beta_2 = \beta_3 = 0 \cdot \tag{2}$$

Syed, Apergis & Goh (2023) organized this method to include smooth structural breaks with the help of Fourier terms. Accordingly, the Fourier A-ARDL model, which takes into account smooth structural breaks, is as follows.

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{p-1} \alpha_i \Delta y_{t-i} + \sum_{i=1}^{p-1} \gamma_i \Delta x_{t-i} + \sum_{i=1}^{p-1} \delta_i \Delta z_{t-i} +$$
$$\beta_1 y_{t-1} + \beta_2 x_{t-1} + \beta_3 z_{t-1} + \beta_4 \sin\left(\frac{2\pi kt}{T}\right) + \beta_5 \cos\left(\frac{2\pi kt}{T}\right) + e_t \tag{3}$$

Finding significant results for all test statistics indicates the existence of a cointegration relationship. According to the results reported in Table 5, lnTAX affects lnSDI positively, while lnPEX affects it negatively. Moreover, the error correction model was estimated, and the ECM(-1) coefficient was negative and significant. Accordingly, the model is expected to correct errors in the long term.

Lastly, we used Toda and Yamamoto's (1995) causality method to investigate the causal relations between variables. Toda and Yamamoto (1995) used the VAR model calculated with the lag length (p + dmax). Accordingly, we used the variables in a mixed order of integrations. Nazlioglu et al. (2016) used the following deterministic term to take into account smooth structural breaks:

$$\alpha(t)=\alpha_0+\gamma_1\sin\left(\frac{2\pi kt}{T}\right)+\gamma_2\cos\left(\frac{2\pi kt}{T}\right) \tag{4}$$

The deterministic term has k frequencies and is a function of time. Fourier Toda and Yamamoto (FTY) methodology has the following model:

$$y_t=\alpha_0+\gamma_1\sin\left(\frac{2\pi kt}{T}\right)+\gamma_2\cos\left(\frac{2\pi kt}{T}\right)+\beta_1 y_{t-1}+\ldots+\beta_{p+dmax}\,y_{t-(p+dmax)}+\varepsilon_t \tag{5}$$

The null and alternative hypotheses are no causal relationship between the variables and causality between variables, respectively. Table 6 shows the FTY results and the results show that there is a unidirectional causality from lnSDI to lnTAX. On the other hand, there is no causal relationship between all other variables.

Table 6: Fourier Toda-Yamamoto Causality Test Results

Causality	Values	Prob.	k	p
lnTAX ⇸ lnSDI	0.817	0.845	1	3
lnSDI ⇸ lnTAX	33.832*	0.000	1	3
lnPEX ⇸ lnSDI	0.386	0.546	1	1
lnSDI ⇸ lnPEX	2.690	0.114	1	1

Note: * p<0.01.

4. Conclusion and Policy Recommendations

Sustainable development is a model that includes economic, social, and environmental dimensions through the balanced use of natural resources to meet the needs of current and future generations. This approach aims to protect the rights of future generations and improve the quality of life while combating problems such as environmental degradation, social inequalities, and economic instability. Today, sustainable development become essential for various reasons. First, increasing population and economic growth have led to the depletion of natural resources and increased environmental problems. Global threats such as climate change have further emphasized the necessity of sustainable development. In addition, reducing social inequalities and increasing social welfare has increased the importance of SD. SD includes ecological, economic, and social factors. Ecological factors cover issues such as the protection of natural resources, reduction of ecological pollution, and climate change. Economic factors in-

clude balancing economic growth with the efficient use of resources, reducing income inequalities, and promoting sustainable production and consumption. Social factors include issues such as health, education, gender equality, job security, and aim to increase social welfare. In this context, the UN has determined 17 sustainable development goals, 5 of which are environmental, 5 economic and 7 social. Addressing these factors in a balanced manner plays a vital role in achieving SD.

This study aims to examine the effect of tax revenues and public expenditures on Türkiye's sustainable development index for the period 1990-2019. According to the study results, while tax revenues affect sustainable development positively, public expenditures affect it negatively.

Tax revenues can enable public sector to make more investments. With increased tax revenues, more investments can be made in areas important for development, such as public infrastructure, education and health. In this way, economic growth can be significantly accelerated. But tax revenues not only have positive effects, they can also have negative effects. For example; if the taxes collected on expenditures are excessive, justice in income distribution will be impaired, which may undermine SDG1 (No Poverty) and SDG2 (Zero Hunger) while supporting SDG8 (Decent Work and Economic Growth) of the sustainable development goals. On the contrary, if taxes on income have a large share in the tax revenues, although justice in income distribution can be ameliorated, the SDG8 target, which includes economic growth targets, may be moved away. Because the progressive structure of taxes on income causes a high tax burden on investors. Increasing these taxes may slow down economic growth by reducing investments. The results of the study support that Türkiye implements its tax policy balancedly towards sustainable development goals.

Public expenditure can also significantly support sustainable development. The benefits of infrastructure expenditure are ongoing and can promote EG and SD. On the other hand, increasing access to these services through investments in education and health services can contribute to sustainable development goals by increasing human capital and quality of life. In addition, increasing ecological quality, which is one of the essential components in achieving sustainable development, can be achieved through environmental protection expenditures. However, public expenditures may not always serve sustainable development goals. Failure to use public expenditures efficiently or directing them to the wrong priorities may cause adverse effects. For example, a large portion of public expenditures may be directed to defense expenditures. In such a case, resource transfer to other areas, such as education, health, and infrastructure services, decreases. This situation negatively affects long-term growth and SD. The results of the study emphasize that Türkiye should review its public expenditure policy.

Finally, this study has some limitations. Since sustainable development is a broad concept, general indicators such as public expenditures and tax revenues are used in this study. However, just as there are many types of taxes and expenditures, and these different types of expenditures and taxes can have different effects on sustainable development. Türkiye is a developing country, and expenditures and taxes are of great importance. Future studies can reach more specific findings by examining the effects of particular types of taxes and expenditures on the sustainable development index.

Contribution Statement of Researchers

The contribution to the study belongs to the author only.

Conflict of Interest

The author declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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