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Tax Buoyancy Effect of Direct Taxes in Turkey*

Abstract

Taxes are the state's most important source of income to finance public expenditures and fulfill its economic and social duties. In addition, governments can also make changes in their tax policies to increase tax revenue and achieve non-fiscal purposes. In measuring the impact of these changes, the concept of tax buoyancy emerges. The tax buoyancy effect is obtained by adding the automatic changes in tax revenues to the changes in tax revenues resulting from voluntary regulations taken by the government. The study aims to examine the buoyancy effect of direct taxes in Turkey. While analyzing the buoyancy effect of direct taxes, personal income tax and corporate tax, including direct tax revenues, are considered. In the study, which aims to measure the effect of discretionary regulations made in terms of both tax types on tax revenue, six incentive zones created by the Decision on State Aids in Investments No. 2012/3305 were taken into account the provinces in Turkey are divided into six regions according to the socio-economic development index, taking into account their development levels. The study aimed to calculate the tax buoyancy effect in the mentioned regions so that the reaction of the regions to the discretionary regulations related to the tax can be predicted. In the study, the AMG (The Augmented Mean Group estimator) method was preferred between 2004 and 2019. According to the study results, the buoyancy effect of direct taxes was relatively weak, with a coefficient of 0.30.

Keywords: Direct Taxes, Personal Income Tax, Corporate Tax, Tax Buoyancy Effect, Incentive Zone.

JEL Codes: H00, H20, H21, H24.

Türkiye'de Dolaysız Vergilerin Kaldıraç Etkisi*

Özet

Vergiler devletin hem kamu harcamalarını finanse etmek hem de ekonomik ve sosyal alandaki görevlerini yerine getirmek için yararlandığı en önemli gelir kaynağıdır. Devletler vergi hasılatında artış sağlamanın yanı sıra fiskal olmayan amaçları da gerçekleştirmek için vergi politikalarında değişiklik yapabilmektedir. Söz konusu değişikliklerin etkisini ölçmede vergi kaldıraç kavramı karşımıza çıkmaktadır. Vergi kaldıraç etkisi, vergi gelirlerindeki otomatik değişimlere devlet tarafından alınan iradi önlemler sonucunda meydana gelen vergi gelirlerindeki değişimlerin de eklenmesi sonucu elde edilmektedir. Çalışma, Türkiye'de dolaysız vergilerin kaldıraç etkisini incelemeyi amaçlamaktadır. Dolaysız vergilerin kaldıraç etkisi analiz edilirken, doğrudan vergi gelirlerini de içeren kişisel gelir vergisi ve kurumlar vergisi dikkate alınmaktadır. Her iki vergi türü açısından yapılan ihtiyari düzenlemelerin vergi gelirlerine etkisini ölçmeyi amaçlayan çalışmada, Türkiye'deki 2012/3305 Sayılı Yatırımlarda Devlet Yardımları Hakkında Karar ile illerin sosyo-ekonomik gelişmişlik düzeyleri dikkate alınarak oluşturulan altı teşvik bölgesi kapsamındaki iller dikkate alınarak yapılmıştır. Çalışma, bölgelerin vergi ile ilgili ihtiyari düzenlemelere tepkisinin tahmin edilebilmesi için söz konusu bölgelerde vergi kaldıraç etkisini hesaplamayı amaçlamaktadır. Çalışmada 2004-2019 yılları arasında AMG (The Augmented Mean Group estimator) yöntemi tercih edilmiştir. Çalışma sonuçlarına göre, dolaysız vergilerin kaldırma etkisi 0.30 katsayısı ile görece zayıf çıkmıştır.

Anahtar Kelimeler: Dolaysız Vergiler, Kişisel Gelir Vergisi, Kurumlar Vergisi, Vergi Kaldıraç Etkisi, Teşvik Bölgesi.

JEL Sınıflama Kodları: H00, H20, H21, H24.

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Introduction

It is possible to define tax, in its simplest form, as the economic values received from natural and legal personalities for financing public expenditures. Although taxes are subject to various classifications, direct taxes are on income and wealth that take into account the ability to pay and the personal and family situation of the taxpayer. The oldest and most common indirect-direct tax distinction in the Turkish tax system are taxes that comply with the principle of justice in taxation. Personal income tax, corporate tax, inheritance and gift tax, property tax, etc. taxes are examples. On the other hand, indirect taxes are primarily taxes on consumption and expenditures. For example, value-added tax, excise tax, stamp duty, etc., taxes are an example.

As in many areas legal regulations are frequently applied in taxation in our country. These regulations may occur in the tax system for specific economic and social objectives. The total effect created by the change brought about by the discretionary regulations and the automatic change is expressed with the tax buoyancy effect. This effect is one of the two criteria taken into account to increase efficiency in the tax system, and the other criterion is tax elasticity. The main difference between tax elasticity and tax buoyancy effect is the response of tax revenues to changes in GDP. While tax elasticity is the automatic reaction of tax revenues to the changes in GDP, the tax buoyancy effect also covers the change that occurs due to the discretionary regulations made with the automatic response.

The tax buoyancy effect is significant to see the effect of all the changes made in the tax system. The size of the tax buoyancy effect becomes even more critical, especially for developing countries with budgetary constraints. When the tax leverage coefficient is evaluated in terms of the values it receives, it takes three different values, similar to the tax flexibility. If the coefficient is less than 1, the increase in tax revenues is less than the growth in GDP, and discretionary changes are ineffective. If the coefficient is 1, the increase in tax revenues and the increase in GDP are equal to each other; if it is greater than 1, the increase in tax revenues is higher. If the coefficient is greater than 1, it is interpreted that the tax system responds to the measures taken by the administration. Estimates of the tax buoyancy coefficient are significant and widely used in the context of monitoring the applied tax policies.

The study will focus on personal income tax and corporate tax, whose weights are higher than the other taxes in direct taxes. In this study, the buoyancy effect of direct taxes will be estimated based on incentive regions[1], panel data analysis will be carried out considering the years 2004-2019. After examining the variables' cross-sectional dependencies, homogeneity, and stationarity levels, long-term cointegration between the variables will be investigated with the Westerlund (2007) Cointegration Test. Finally, the long-term cointegration coefficient estimation will be determined by AMG (The Augmented Mean Group estimator).

1. Overview of Direct Taxes in Turkey

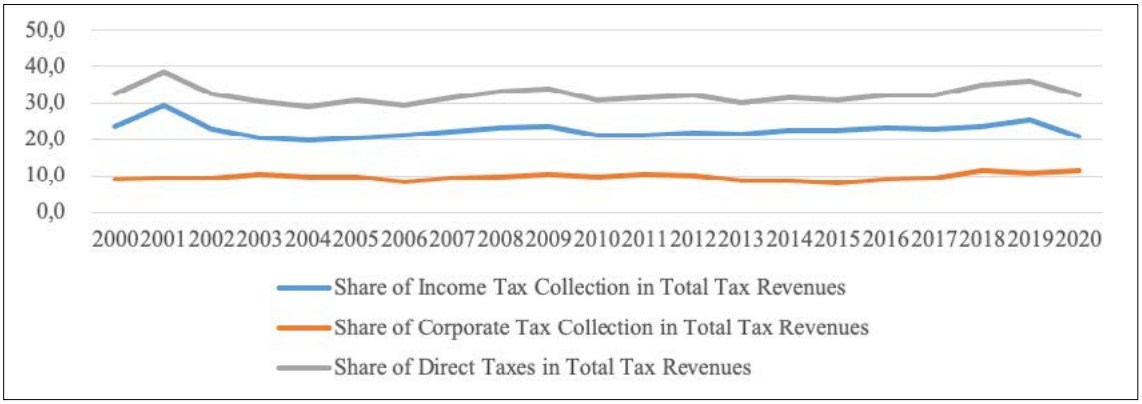
Taxes are the economic values in cash and the state or other public institutions that have been given the authority to tax receive from natural and legal persons, even from some institutions and organizations without legal personality, based on their sovereign power, to realize their financial and non-financial purposes (Şen and Sağbaş, 2016: 1). Classification of taxes according to specific criteria is an essential issue for the science of finance. The reason for this is that the classification made by taking into account the different characteristics and effects of taxes allows more effective tools to be used to realize the envisaged economic and social policies (Muter, Çelebi and Sakınç, 2008:

[1] 6 incentive zones covering 81 provinces were created with the Decision on State Aids in Investments numbered 2012/3305.

225). The most widely used and essential of these classifications is the indirect-direct tax distinction. In general, taxes on income and wealth are classified as direct taxes, while taxes on expenditures are indirect.

Considering the share of collection amounts in total tax revenues, the most important direct taxes are personal income tax and corporate tax. Personal income tax is levied on a natural person's income is applied by taking into account the Income Tax Law No. 193, which entered into force in 1961 (Öner, 2019: 35). Corporate tax is collected over the net income of the income elements within the scope of income tax if they are obtained by the institutions specified in the relevant law and due to the separate legal personality of these institutions. (Akdoğan, 2017: 269). Corporate tax is also levied on income, similar to personal income tax. The subject of this tax is corporate income, and corporate tax is collected at the rate of 20% over the determining corporate income. The share of the taxes mentioned above in the total tax revenues, both separately and as a whole, is given in chart1.

Chart 1. The Share Of Direct Taxes in Total Tax Revenues (2000-2020)



Source: https://gib.gov.tr/yardim-ve-kaynaklar/istatistikler, 19.01.2022.

When graph 1 is analyzed, it is seen that the course of taxes (income tax, corporate tax, and direct taxes) has fluctuated as of the relevant period. In particular, when the share of corporate tax in total tax revenues is taken into account, it is between 8% and 11.5%. This rate was highest in 2020 with 11.5%, and the lowest in 2015 with 8%. For 2020, this rate is 11.5%. The share of income tax varies between 19% and 29%, with the lowest rate being 19.5% in 2004 and the highest rate being 29.1% in 2001. For 2020, this rate is 20.7%. Finally, it is between 29% and 38% when direct taxes are examined. While this rate was highest in 2001 with 38%, the lowest rate was realized in 2006 with 29%. For 2020, this rate is 32.2%. Personal income tax collection and changes in corporate tax follow a parallel course. When the graph is analyzed, the decreases in 2002 and 2009 draw attention. These declines are the economic crises experienced in 2001 and 2008. Mainly due to the Mortgage crisis experienced in 2008 and affecting the whole world, the shrinkage experienced in Turkey also made itself felt in the amount of income and corporate tax collections.

2. International Comparison of Basıc Indicators on Direct Tax Revenues

The share of personal income and corporate taxes, which have an important place in the total collection of direct taxes, differs between countries within the scope of OECD countries. This difference is more evident, especially between developed and developing countries. In this part of the study, the share of income and corporate tax in OECD countries will be examined separately for the 2000-2020 period.

Table 1. The Share of Personal Income Tax in Total Tax Revenues in OECD Countries (%)

COUNTRY	2000	2003	2006	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Australia	37.7	39.8	37.4	37.6	38.7	39.5	39.4	39.4	41.5	41.6	41.0	40.4	41.2	42.0	NA
Austria	22.0	22.7	22.2	22.2	22.4	22.4	22.8	22.8	23.5	24.1	21.6	21.7	22.2	22.6	22.0
Belgium	31.4	31.5	28.0	28.4	28.2	28.2	27.8	28.5	28.8	28.2	27.6	27.2	26.9	26.5	27.7
Canada	36.8	34.3	35.5	36.2	35,0	36,1	36,4	36,1	36,3	36,8	35,8	35,6	35,7	36,0	36,3
Chile	7.6	6.5	4.3	7.5	6,8	6,6	6,8	7,2	7,3	9,8	8,8	9,7	6,7	7,2	10,3
Colombia	4.9	5.5	5.6	5.5	5,3	5,5	5,2	5,4	5,6	5,8	6,0	5,9	6,4	6,8	6,9
Costa Rica	0.0	0.4	2.7	4.0	4.6	4,8	5,7	5,4	5,5	5,6	5,5	5,7	5,8	6,1	6,8
Czech Republic	12.9	13.0	11.7	10.7	10.2	10,6	10,6	10,7	10,8	10,7	11,2	11,5	12,2	12,7	13,5
Denmark	52.6	54.0	51.4	56.0	52.0	51,8	51,2	54,4	54,0	54,8	53,1	53,1	54,5	52,1	54,2
Estonia	22.0	20.9	18.1	16.0	15.9	16,1	16,4	17,2	17,6	17,2	17,3	17,3	16,5	16,5	17,8
Finland	30.6	31.0	30.3	31.1	29.5	29,2	29,3	29,3	30,6	30,2	29,6	29,2	28,9	29,0	30,0
France	17.9	17.4	17.4	17.2	17.0	17,1	18,1	18,6	18,7	18,8	18,8	18,6	20,5	20,7	21,0
Germany	25.3	23.9	23.8	25.0	24,1	24,5	25,6	26,0	26,2	26,5	26,6	27,2	27,2	27,4	27,0
Greece	13.0	13.0	14.0	14.5	12,4	14,2	19,4	16,7	16,5	15,7	15,3	16,1	16,1	15,2	NA
Hungary	18.6	18.9	18.2	18.8	17,4	13,6	14,1	13,8	13,6	13,5	13,2	14,1	14,7	14,2	14,8
Iceland	34.8	37.8	33.7	37.9	36,5	37,6	37,4	38,3	34,9	36,7	26,7	38,2	39,8	41,0	42,3
Ireland	31.9	30.0	30.8	32.0	31,6	32,9	34,2	33,1	32,8	32,4	32,3	31,9	31,4	31,7	32,7
Israel	29.1	25.1	22.0	19.6	18,0	17,9	17,9	17,6	18,4	19,5	19,8	20,7	20,6	20,9	22,1
Italy	24.8	25.2	25.3	26.5	26,9	26,3	26,5	26,3	25,8	26,0	25,7	25,8	25,7	25,8	26,9
Japan	21.1	17.5	18.4	20.0	18,6	18,4	18,6	19,2	18,9	18,9	18,6	18,8	19,1	18,8	NA
Korea	14.6	12.6	15.2	14.2	14,2	14,7	15,0	15,3	16,3	17,2	17,6	17,9	18,4	17,5	18,8
Lithuania	18.8	20.2	19.5	18.9	21,6	19,7	19,7	19,7	19,9	19,7	20,3	21,1	19,2	20,8	19,1
Latvia	24.8	22.6	22.5	13.5	12,7	12,8	12,9	13,4	13,2	13,4	13,4	13,6	14,1	23,9	23,0
Luxembourg	18.5	17.2	21.1	20.6	20,9	22,2	21,8	22,9	23,2	25,0	25,0	23,8	23,6	23,9	25,5
Mexican	NA	19.1	17.8	18.5	18,3	18,8	19,9	19,7	21,5	20,6	20,4	21,4	21,2	20,8	21,0
Holland	15.1	17.5	17.8	22.1	21,5	20,8	19,4	18,8	18,7	20,5	18,5	21,6	20,5	21,6	22,8
New Zealand	43.1	41.9	40.7	41.1	37,7	36,1	36,9	36,8	37,5	37,2	36,8	37,8	37,5	39,5	NA
Norway	24.2	24.9	20.7	24.2	23,7	23,2	23,5	24,9	25,4	28,0	27,6	26,5	25,4	26,0	29,2
Poland	13.2	12.8	13.7	14.4	13,9	13,6	13,9	14,1	14,3	14,4	14,5	14,6	15,1	15,1	14,4
Portugal	17.0	16.5	16.3	18.5	17,7	18,5	18,4	22,7	22,5	21,3	19,9	18,9	18,7	18,4	19,9
Slovak Republic	9.9	9.7	9.8	9.7	9,3	9,6	10,0	9,4	9,4	9,5	10,0	9,9	10,5	10,9	10,9
Slovenia	14.6	14.6	14.7	15.3	14,7	14,8	15,0	13,6	13,6	13,6	14,0	13,7	14,4	14,2	14,7
Spain	19.3	18.9	19.4	22.3	22,1	23,0	23,1	22,9	22,7	21,6	21,5	21,8	22,1	22,7	23,8
Sweden	35.4	32.4	321	29.0	28,1	27,8	28,3	28,7	28,9	29,4	30,1	30,2	29,5	28,7	29,1
Switzerland	29.4	32.6	31.4	31,9	31,8	31,1	31,4	31,0	30,9	31,0	31,0	30,2	30,7	30,6	30,7
Turkey	22.2	15.7	15.6	16,4	14,0	13,5	14,4	13,9	14,7	14,6	14,6	14,5	15,4	16,3	13,2
United Kingdom	29.0	28.5	28.9	30,3	28,6	28,0	27,4	27,5	27,1	27,6	27,3	27,3	27,4	27,6	28,9
USA	42.2	35.3	36.3	34,3	34,8	38,8	38,5	38,8	39,0	40,4	40,3	39,0	40,6	41,1	41,1
OECD Average	23.42	22.67	22.22	22.68	22.02	22.12	22.45	22.63	22.79	23.11	22.56	22.95	23.06	23.49	NA

Source: https://data.oecd.org/tax/tax-revenue.htm, 18.02.2022.

Note: NA indicates no data in the relevant year.

When Table 1 is examined, the share of income tax in total tax revenues in OECD countries in the period covering the years 2000-2020 is approximately 23%. This rate remained in the single digits in Chile, Colombia, and Costa Rica. When the share of taxes collected from natural persons in Turkey is analyzed for the same period, it is noteworthy that although the said share follows a fluctuating course for the examined period, it is below the OECD average. In addition, it decreased from 22.2% to 13.2% in the related period.

Table 2. Share of Corporate Tax in Total Tax Revenues in OECD Countries (%)

COUNTRY	2000	2003	2006	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Australia	20,2	16,6	21,4	18,0	17,9	19,4	18,5	17,6	16,3	15,1	16,3	18,3	18,9	17,1	NA
Austria	4,6	4,9	5,2	4,0	4,6	4,8	4,8	5,0	4,9	5,2	5,6	5,9	6,4	6,4	4,9
Belgium	7,2	6,5	8,1	5,5	5,9	6,5	6,8	6,9	7,0	7,4	7,9	9,3	9,8	8,7	7,7
Canada	12,2	9,7	11,5	10,4	10,5	10,3	10,2	10,5	10,7	10,4	11,3	11,8	12,2	12,3	12,3
Chile	11,2	12,6	28,6	24,5	20,4	23,4	27,3	22,1	21,3	21,0	20,9	21,1	22,1	23,4	24,3
Colombia	16,7	18,9	21,9	23,3	20,7	22,3	27,1	27,1	27,1	25,9	25,7	25,7	25,6	24,0	24,5
Costa Rica	0,0	6,6	11,0	11,4	10,3	9,9	8,6	9,3	9,1	9,5	9,9	10,7	11,0	11,9	8,4
Czech Republic	9,9	12,4	12,9	10,5	10,0	9,7	9,9	10,1	10,6	10,8	11,0	10,7	10,4	10,1	8,4
Denmark	6,8	6,2	8,0	4,2	5,1	4,9	5,7	6,1	5,9	6,2	6,3	7,2	6,2	6,7	5,6
Estonia	2,8	5,1	4,8	5,2	4,0	3,8	4,4	5,5	5,4	6,2	5,1	4,7	6,1	5,5	4,9
Finland	12,5	7,7	7,7	4,7	6,0	6,2	4,9	5,4	4,4	4,9	5,0	6,3	6,0	6,0	5,0
France	6,9	5,7	6,7	3,4	5,5	6,1	5,8	5,8	5,1	4,6	4,5	5,0	4,6	4,9	5,1
Germany	4,8	3,5	6,2	3,6	4,2	4,7	4,7	4,8	4,7	4,6	5,2	5,4	5,6	5,2	4,3
Greece	11,9	8,7	8,2	8,2	7,9	6,1	3,1	3,2	5,2	5,9	6,5	5,0	5,6	5,6	NA
Hungary	5,7	5,8	6,3	5,6	3,3	3,3	3,3	3,5	4,2	4,4	5,8	5,2	3,6	3,5	2,8
Iceland	3,3	3,4	5,8	5,2	2,7	5,0	5,4	6,0	8,6	6,5	4,9	8,2	6,5	5,9	6,0
Ireland	11,7	12,4	11,5	8,2	8,5	7,9	8,0	8,3	8,2	11,3	11,6	12,2	14,3	14,0	15,9
Israel	9,6	7,6	12,7	8,5	8,6	9,6	9,1	11,3	10,2	9,5	9,9	10,1	10,4	10,1	9,3
Italy	6,9	6,6	6,8	5,7	5,5	5,2	5,5	5,8	5,0	4,7	5,1	5,0	4,4	4,6	4,9
Japan	13,7	13,0	17,0	9,6	11,6	11,8	12,5	13,2	12,9	12,3	12,0	11,8	12,9	12,0	NA
Korea	14,1	15,3	14,3	14,4	13,8	15,4	14,9	14,0	12,8	13,1	13,6	14,2	15,7	15,7	12,1
Lithuania	5,3	5,3	7,4	5,5	3,4	4,9	5,5	5,5	5,2	5,3	5,4	5,1	3,4	0,5	2,3
Latvia	2,2	4,8	9,1	6,0	3,5	3,0	4,8	5,1	5,0	5,4	5,4	5,0	5,0	5,1	5,1
Luxembourg	18,0	19,3	13,9	14,6	15,3	13,4	13,3	12,5	11,5	12,2	12,3	13,6	16,0	15,2	12,0
Mexican	NA	12,3	13,9	12,6	14,4	16,2	14,4	18,1	18,4	20,1	21,0	21,8	21,3	20,1	20,1
Holland	10,9	8,1	9,5	6,1	6,4	6,1	5,9	6,0	6,9	7,2	8,7	8,5	9,0	9,4	7,8
New Zealand	12,4	13,6	15,8	11,0	12,2	13,1	14,3	14,3	13,4	14,0	15,5	14,7	15,6	12,4	NA
Norway	21,0	19,0	29,5	21,8	23,6	25,7	25,0	20,8	17,1	11,7	10,4	12,6	16,4	14,7	6,2
Poland	7,3	5,4	7,1	7,1	6,2	6,4	6,5	5,6	5,5	5,7	5,5	5,7	5,9	6,3	6,3
Portugal	11,9	8,2	9,1	9,3	9,1	9,7	8,7	9,6	8,3	9,1	8,9	9,4	9,6	9,0	7,9
Slovak Republic	7,6	8,3	9,7	8,5	8,7	8,2	8,1	9,2	10,3	11,2	10,5	10,2	9,6	8,8	7,2
Slovenia	3,0	4,4	7,6	4,8	4,9	4,4	3,3	3,2	3,8	3,9	4,3	4,8	5,2	5,3	3,6
Spain	8,8	9,0	11,2	7,5	5,9	5,7	6,6	6,0	5,9	6,5	6,6	6,6	7,1	6,0	5,4
Sweden	7,3	4,9	7,5	6,4	7,6	7,2	6,0	6,2	6,3	6,8	6,2	6,3	6,5	7,0	6,6
Switzerland	8,8	8,3	10,3	10,4	10,1	10,4	10,3	10,3	10,3	10,7	11,3	10,8	11,4	11,4	11,1
Turkey	7,3	8,0	6,0	7,7	7,3	7,5	7,4	6,3	6,4	5,7	6,5	6,8	8,7	7,9	8,7
United Kingdom	10,6	8,0	10,4	8,1	8,9	8,3	7,9	7,6	7,6	7,2	8,0	8,0	7,8	7,0	7,1
USA	7,9	7,5	11,5	6,0	7,5	7,3	8,4	8,2	8,7	8,1	7,6	5,7	5,3	5,4	5,1
OECD Average	3.06	2.79	3.53	2.68	2.68	2.79	2.83	2.82	2.78	2.79	2.89	2.99	3.12	2.98	NA

Source: https://data.oecd.org/tax/tax-revenue.htm, 18.02.2022.Note: NA indicates no data in the relevant year.

When table 2 is examined, the share of corporate tax is about 3% in the OECD average for the 2000-2020 period. The countries with the highest rate are Australia, Chile, Colombia, and Mexico. Although the share of corporate tax in total tax revenues in Turkey is around 7% for the relevant period, it is seen that it is closer to the OECD average compared to income tax.

3. Tax Buoyancy Effect of Direct Taxes

Taxes are one of the most effective fiscal policy tools, and the sensitivity of tax revenues to the conjuncture provides economic administrations with a wide range of actions. The fact that tax revenues are a tool of economic stability is an expected and desirable situation in an economy (Erdoğdu, Demir and Önder, 2021: 6483). In this context, the concepts of tax elasticity and tax buoyancy effect are the issues in the fiscal literature that policymakers emphasize in their policy implementations.

Tax elasticity expresses the change in tax revenues to the change in GDP. In other words, it is the calculation made when the tax structure does not change. On the other hand, the tax buoyancy effect is a more comprehensive concept than tax elasticity, and it is the measurement of the change in tax income by including the optional changes in the tax rate and tax base. Consequently, if there is no discretionary change, the tax buoyancy effect and tax elasticity will be the same (Nalraj, 2015: 523).

The concept of the tax buoyancy effect, which is a more comprehensive concept, includes automatic changes as well as changes in tax revenues caused by discretionary regulations. What is meant by volitional change is changing the tax legislation. This regulations may be changes in the tax rate, tax base, or tax reform measures taken to abolish some taxes in the legislation, introduce new taxes, or increase the efficiency of the tax administration. Knowing the tax buoyancy value for the entire tax system or separately by tax types is very important when deciding which tax to take and in what direction (Topal and Şentürk, 2019: 201).

Estimating the tax buoyancy coefficient is a fundamental issue in the literature. Because the coefficient is an indicator of whether the expected success from government practices has been realized or not. The coefficient showing the success or failure of the implemented policies takes three values: less than one, greater than one, and one, similar to tax elasticity. A coefficient more significant than one indicates that the discretionary measure is effective. In contrast, a coefficient lower than one means that tax revenues cannot respond to national income changes. In this case, the decisions made should be improved.

As mentioned before, the tax buoyancy value can be calculated separately for tax types or within the entire tax system. In the study, the buoyancy effect of direct taxes will be calculated. While making this calculation, personal income tax and corporate tax that are direct taxes will be considered. Among the discretionary arrangements made regarding these taxes, the discretionary regulations in 2006, which is the common year among the two tax types and is thought to have a more significant potential to affect tax collection amounts, will be considered. The regulation made within the scope of income tax was realized with Law No. 5479. As of 01.01.2006, the new income tax tariff has been applied within the scope of this law. With the new tariff, the number of slices has been reduced from five to four. In addition, the five-point lower rate applied to wage incomes was terminated; thus, the separation theory was ended.

The discretionary regulation in terms of corporate tax entered into force on 13.06.2006. With the Corporate Tax Law No. 5520, which entered

into force, a broad-based, low-rate corporate tax approach that supports growth, pays more attention to the voluntary compliance of taxpayers, strengthens tax security has been adopted. In addition, bringing together the provisions regarding the subject of limited liability with this law, the fight against controlled foreign companies and tax havens, and the tax deductions implemented within the Income Tax Law, although it concerns corporate tax, were included in the Corporate Tax Law (Saracoglu, 2018: 215-216). Another change made within the scope of the law was about the rate. In order to attract foreign capital to the country, the corporate tax rate was reduced from 30% to 20%. Another regulation in 2006 was realized with the law numbered 5479 published in the Official Gazette dated 08.04.2006 and numbered 24133. The said law abolished the investment incentive exemption, effective as of 01.01.2006.

Direct taxes are taxes on earnings, income, or wealth. The share of personal income tax and corporate tax in total direct taxes is approximately 91%[2] for 2021. Therefore, only income and corporate taxes are included in the scope of the study. Tax buoyancy is the financial criterion used to evaluate the tax system's efficiency. In this context, tax buoyancy has been estimated to evaluate the efficiency of the Turkish tax system. The success or failure of discretionary arrangements made within the scope of personal income tax and corporate tax has been evaluated, based on the effect of discretionary arrangements made within the scope of direct taxes on tax buoyancy.

4. Empirical Literature

When the international literature is examined, although there are many studies covering different methods and countries for measuring the tax buoyancy effect, the national literature is quite limited. In this context, the literature on the tax buoyancy effect is given in Table 3.

Table 3. Empirical Studies on the Effect of Tax Buoyancy

Author/ Year of Study	Country	Period	Econometric Method	Results
Pascale, Fiore & Conto (2021)	28 European countries	2000-2018	Error correction model – DCCE estimator	The study aims to examine the tax buoyancy effect of both short-term and long-term environmental taxes for 28 EU countries. According to the results of the analysis, the tax buoyancy coefficient for total environmental taxes was found to be 1.19 in the short term, 2.26 in the long term, and 2.11 for transportation taxes. This means that in 28 EU countries, these taxes work as a good stabilizer for the economies
Khataybeh, Omet & Haddad (2021)	Jordan	1992-2019	Vector error correction model	The article aims to estimate the tax buoyancy effect in Jordan. According to the analysis results, the tax buoyancy coefficient in Jordan is less than 1. This suggests that once the Jordanian economy returns to its pre-COVID-19 growth rates, the increase in total tax revenues will not respond to increases in GDP.

[2] We calculated it based on the data obtained from the General Directorate of Accounting.

Table 3. (Continue) Empirical Studies on the Effect of Tax Buoyancy

Author/ Year of Study	Country	Period	Econometric Method	Results
Ibrahim, Adeniyi & Babatunde (2021)	Nigeria	1981-2019	Vector error correction model	The aim of the study is to examine the buoyancy effect in the Nigerian tax system for the period 1091-2019. As a result of the study, the buoyancy effect of the Nigerian tax system is weak both in the short term and in the long term for the period examined. In addition, the VAT buoyancy coefficient is -0.02; the customs tax buoyancy coefficient is 0.09; the personal income tax buoyancy coefficient is 0.39; oil tax is -0.04, corporate tax buoyancy coefficient is 0.11, for total tax revenues it is 0.002. As a result of the study, the buoyancy effect is weak since the buoyancy coefficient for different tax types is less than one for the period examined.
Gupta, Jalles & Liu (2021)	44 Sub-Saharan African countries (SSA)	1980-2017	Time series regression and panel regression	In the study, using time series and panel techniques, the short- and long-term tax buoyancy effect was estimated for 44 Sub-Saharan African (SSA) countries between 1980 and 2017. The short and long-term buoyancy effect is estimated by using the time series. The long-term average buoyancy coefficient of 44 countries is 1.088, and the short-term average buoyancy coefficient is 1.004.
Filipova & Tanchev (2021)	Bulgaria	March 2008-March 2020 (3 months)	VAR model	The study examined the effect of economic growth on the collectability of proportional income tax revenues in Bulgaria. Using VAR models, the tax buoyancy effect of proportional tax and the relationships between tax elasticity and GDP are modeled from March 2008 to March 2020. As a result the buoyancy coefficient is very close to zero.
Audi, Ali & Roussel (2021)	South Asian Association for Regional Cooperation (SAARC) countries	1990-2019	Regression analysis	The study analyzed the tax buoyancy effect of selected SAARC countries (Bangladesh, India, Pakistan and Sri Lanka) from 1990 to 2019. Pooled regression was applied to measure tax buoyancy coefficients. According to the findings, the buoyancy coefficients of sales tax, income tax, and total tax income are 1.30, 1.12 and 1.01, respectively. SCT and customs duty are 0.81 and 0.62, respectively, which is relatively small.
Lagranivese, et. al. (2020).	35 OECD countries	1995-2016	Regression analysis	Short and long term tax buoyancy coefficients are calculated for total tax revenues, personal income tax, corporate tax and goods and services taxes. In contrast to total tax revenues (0.76), the leverage coefficients of personal income tax (1.16) and corporate tax (2.16) are high in the short run. The leverage effect of goods and services taxes is quite low (0.56). In the long run, the tax leverage coefficient for total tax revenues is 0.91. Other taxes, on the other hand, are less than 1, unlike the short term. It has been concluded that this situation cannot guarantee long-term financial sustainability, especially for personal income tax and corporate tax. In addition, the leverage coefficient of total revenues in the short run is statistically significant in 23 of 35 countries, but exceeds 1 in only 9 countries (Chile, Czech Republic, Iceland, Japan, Latvia, Poland, Portugal, Spain, United States).

Table 3. (Continue) Empirical Studies on the Effect of Tax Buoyancy

Author/ Year of Study	Country	Period	Econometric Method	Results
Khadan (2020)	12 Caribbean countries	1991-2017	Regression analysis	The aim of the study is to estimate the short- and long-term tax buoyancy effect for 12 Caribbean countries. According to the analysis results, tax leverage coefficients differ according to tax categories. The tax with the highest tax leverage effect in the short run is corporate tax (2.57). The long-term tax leverage coefficient for corporate tax is estimated to be 1.55.
Gürler Hazman & Kaya (2020)	Turkey	2004-2017	Regression analysis	In the study covering the period of 2004-2017, the tax buoyancy effect of the Corporate Tax Law No. 5520, which came into force in 2006, was estimated as short and long term. According to the results obtained, the expected effect from the reform was achieved. Because the tax buoyancy effect of the tax was found to be above 1 in both the short and long term.
Topal & Şentürk (2019)	Turkey	1965-2016	Proportional adjustment method approach and ARDL econometric estimation method	In the study, the tax elasticity and tax buoyancy effect of the Turkish tax system is approximately 1.06 and it is not sufficient for an effective tax system. It was concluded that the SCT reform of 2002 did not have a significant effect on short and long-term tax elasticity and long-term tax buoyancy effect, while it reduced the tax buoyancy effect in the short term.
Birhanu (2018)	Ethiopia	12 Years	Panel data analysis	As a result of the study, the tax buoyancy coefficient of total tax revenues is 0.78, the buoyancy coefficient of personal income tax is 0.81, corporate tax (commercial profit tax) is 1.09, the buoyancy coefficient is 1.78 for the taxes collected due to the rental of buildings and 2.13 for VAT.
Belinga, et. al. (2014)	OECD countries	1965-2012	Vector error correction model	In the study, short and long term tax buoyancy effect is estimated. The results obtained are as follows. The short-term tax buoyancy coefficient for total tax revenues is not significantly different from each other in most of the countries; It is that it has increased since the late 1980s so that tax systems generally become better automatic stabilizers. While corporate taxes are the most taxing in the short and long term, consumption taxes and property taxes are the least. In addition, the tax buoyancy coefficient is above 1 in 14 OECD member countries. While the short-term tax vitality average of countries is 1.01, it is 1.06 in the long-term.

Table 3. (Continue) Empirical Studies on the Effect of Tax Buoyancy

Author/ Year of Study	Country	Period	Econometric Method	Results
Şimşek (2013)	Turkey, 26 Regions	2004-2008	Regional panel data analysis	In the study, total tax revenues, corporate tax revenues, income tax revenues and value added tax revenues are discussed. In the analyzes made, the tax elasticity for all tax types in our country is below 1. Another expression is not language sensitive. It has been observed that the dummy variable used in both tax types (total tax revenues and corporate tax revenues) for tax buoyancy effect increases the tax elasticity, but still remains below 1. In the tax effort model; For all tax types, the tax effort index was observed above 1 in the regions where the developed and economic activities are intense, and it can be said that there is excessive taxation in these regions. In other regions, the tax effort index was observed below 1 and it can be said that there is incomplete taxation in these regions.
Ertürk Atabey, Avşar & Bulut (2009)	Turkey	1986-2006	Regression analysis	In the study, the tax buoyancy coefficient was tried to be estimated by regression analysis by using the total tax revenues, Corporate Tax revenues, Value Added Tax revenues (current prices) and GDP (current prices) data of Turkey between the years 1981-2006. A one-unit increase in the real percent change in GDP increases the real percent change in total tax revenues by 0.69, the real percent change in Corporate Tax revenues by 0.95 and the real percent change in Value Added Tax revenues by 0.75. The tax buoyancy coefficients were found to be positive values and these results are consistent with the theoretical results. Since all three estimated tax buoyancy coefficients are less than 1, the taxes in question are not viable. In addition, whether the tax buoyancy coefficients found were significant or not was examined with the t-statistic and it was concluded that all coefficients were significant.

5. Econometric Analysis

The aim of the study is to determine the buoyancy effect of direct taxes. Direct taxes are taxes on earnings, income, or wealth. However, personal income tax and corporate tax represent direct taxes in our study[3]. Within the scope of the study, the buoyancy effect will be analyzed based on the discretionary regulations in 2006, which is a reform for both taxes. The buoyancy effect will be determined separately using panel data analysis for the six incentive regions created by the Decision on State Aids in Investments numbered 2012/3305 in Turkey. In the study, first of all, the cross-sectional dependence between the six regions that make up the panel will be examined using the Breusch-Pagan (1980) LM and Pesaran (2004) tests. Then, the Hsiao (2013) test will be used for the homogeneity test. For unit root testing, Pesaran (2007)

[3] Since the share of wealth taxes in total tax revenue is low ,and the accrual and collection amounts of motor vehicle tax on a provincial basis can be obtained since 2006, these taxes are excluded from the scope of the study.

will be performed with CIPS unit root testing. The panel cointegration relationship will be examined with the Westerlund (2007) cointegration test, which considers cross-sectional dependence and heterogeneity. Finally, the Eberhardt and Bond (2009) AMG method will determine the long-term cointegration coefficients.

In the regression model, 2006 was taken as the base year. Because in 2006, tariff changes were made for income tax, which is included indirect taxes, the discrimination in wage income was removed, and the rates for all incomes were reduced to the range of 15%-35%, and the tax tariff was reduced to four tranches. With the Corporate Tax Law No. 5520, which entered into force on 13.06.2006, the rate was reduced from 30%, which is the lowest level, to 20%. The year 2006, when these discretionary regulation were made, was taken as the base year. The artificial variable included in the model as a dummy variable was coded as "0" for pre-2007 and "1" for 2007 and after. Dummy variables, which are used to measure the effect of discretionary changes in tax rates and tax structures on tax revenues, are more commonly preferred (Rasheed, 2006: 6). This method is one of the measurement methods of calculating tax buoyancy. It involves the introduction of a dummy variable for each exogenous tax policy change. The dummy variable takes zero (0) before the discretionary change and one (1) after the change. The coefficient estimates the revenue elasticity. The summation takes care of the possibility of multiple changes during the period covered (Omondi et al., 2014: 99; Sen, 2006: 172).

5.1. Introduction of Data

The study covers the period of 2004-2019. The data covering the said period were analyzed with the statistical package E-views 12 and Stata 16, taking into account the six incentive regions in Turkey. Since the GDP data on a regional basis and the accrual and collection amounts in terms of tax types on a regional basis could not be obtained from any source, the study started in 2004. All variables are annual and included in the analysis by taking the logarithm of the other variables, except for the tax effort variable

Table 4. Description of the Variables Used in the Model

Examined Period: 2004-2019		**Number of Horizontal Sections Constituting the Panel: 6**
Abbreviation of Variables	Definition of Variables	Source
Indirect	Income and Corporate Tax Total Collection Amount[4]	General Directorate of Accounts "Budget Statistics"
lngdp	Real GDP	Turkish Statistical Institute
lnpop	Population	Turkish Statistical Institute
taxeffort	Direct Tax Effort Rate	Calculated by us[5].
lntaxpayer	Income and Corporate Tax Total Number of Active Taxpayers	Revenue Administration "Numbers of Taxpayers by Month"

Since the aim of the research is to estimate the tax buoyancy effect of direct taxes, personal income tax and corporate tax in the tax system were taken into account as direct taxes. The model's dependent variable included in the study is the amount of direct taxes collection (Indirect[6]), and the independent variables are GDP (lngdp[7]), the population (lnpop[8]), the number of direct

[4] Deflated based on 2005 base year.

[5] We calculated the tax effort rate by proportioning the collection amount to the accrual amount on a regional basis.

[6] It is in the form of values that have been made real using the deflator and taken the logarithm based on the year 2005.

[7] Chained volume index values are used and their logarithms are taken.

[8] Logarithmic values were used.

taxpayers (lntaxpayer[9]) and the effort coefficient for direct taxes (taxeffort). Analyzes were made for the period 2004-2019, the standard period for all series, and the data were analyzed at annual frequencies.

The model is given by the following equation;

$$Indirect_{it} = \alpha_{it} + \beta_1 \ln gdp_{it} + \beta_2 taxeffort_{it} + \beta_3 \ln pop_{it} + \beta_4 \ln taxpayer_{it} + \beta_5 D_{2007} + \varepsilon_{it}$$

5.2. Testing for Cross-Section Dependency

Cross-section dependence means that the effect on any cross-section units also affects other cross-section units. Before starting the panel data analysis, it is essential to determine whether the variables contain cross-sectional dependence. Because, according to the cross-sectional dependency results, it is decided which of the first and second-generation unit root tests will be applied to the variables.

The tests in the literature for the cross-section dependency test are the Breusch-Pagan (1980) LM test (CDLM1), the Pesaran corrected LM test, the Bias corrected LM test, and the Pesaran (2004) CD test. In our study, analyses were carried out using the Breusch-Pagan LM (Pesaran, 2004: 1-4) and Pesaran (2004) test, used in cases where the time dimension is greater than the cross-section dimension. The hypotheses created for these tests are as follows:

H_0: There is no cross-section dependency.

H_1: There is a cross-section dependency.

[9] Logarithmic values were used.

Table 5. Cross Section Dependency Test Results

Variables	CD Tests	BP (1980) LM Test	Pesaran (2004) CD Test
lndirect	T statistic	238.6302	15.44765
	p Value	0.0000*	0.0000*
lngdp	T statistic	238.6436	15.44806
	p Value	0.0000*	0.0000*
taxeffort	T statistic	226.1354	15.03616
	p Value	0.0000*	0.0000*
lnpop	T statistic	226.5721	15.04746
	p Value	0.0000*	0.0000*
lntaxpayer	T statistic	209.9202	14.46867
	p Value	0.0000*	0.0000*

Note: p, * denote 1%, significance, respectively.

According to the results of both Breusch-Pagan (1980) LM and Pesaran (2004) CD tests in Table 5, the H_0 hypothesis was rejected because the probability values of all variables were less than 0.05 (0.0000). As a result, it was determined that the series has a cross-section dependence. In this case, the results obtained in other analyses were considered, and second-generation tests were applied.

5.3. Homogeneity / Heterogeneity Test

After the cross-sectional dependency test, another pre-test that should be done before proceeding to the cointegration test is the homogeneity/heterogeneity test. The purpose of the homogeneity/heterogeneity test is to determine whether other cross-sectional units are affected at the same level by a change in one of the cross-sectional units in the panel data analysis. Although there are many homogeneity tests in the literature, the Hsiao (2013) test was used in our study.

The Hsiao test is based on three different hypotheses: H_1, H_2, and H_3. According to these assumptions, the null hypothesis of H_1 states that the coefficients are homogeneous and the alternative is heterogeneous. While the H_2 hypothesis accepts homogeneity like the H_1 hypothesis, its alternative accepts heterogeneity. The H_3 hypothesis differs from the other two hypotheses. While the null hypothesis of H_3 accepts homogeneity, its alternative accepts partial heterogeneity (Turgut ve Uçan, 2019: 10).

Table 6. Hsiao Homogeneity Test Results

Variables		Hypothesis		
		H_1	H_2	H_3
lngdp	F statistic	49.96056	1.714045	94.41946
	p value	3.91E-31	0.140248	4.71E-34
taxeffort	F statistic	172.7464	2.815816	310.9557
	p value	1.30E-51	0.021194	9.43E-55
lnpop	F statistic	153.0973	44.98010	75.26078
	p value	1.58E-49	2.38E-22	1.84E-30
lntaxpayer	F statistic	9.332023	0.238416	19.24922
	p value	3.21E-10	0.944429	6.12E-13

Note: p, * denote 1% significance, respectively.

When the probability values of the H_1, H_2, and H_3 hypotheses of the variables in Table 6 are examined, it is concluded that all the variables have a heterogeneous structure. When the results of the analysis are examined, it can be said that the model has a heterogeneous structure since all the variables are heterogeneous.

5.4. Panel Unit Root Test

When working with non-stationary panel data models, the problem of spurious regression can be encountered. For this reason, it is essential to test the stationarity of the panel data before making the estimation and to determine whether the series contains a unit root or not (Yerdelen Tatoğlu, 2020: 4). In this study second generation unit root tests that take into account cross-sectional dependence, was used. Since the cross-sectional dependence between the regions forming the panel was determined in the study, the stationarity analysis of the series was carried out with the Pesaran CIPS test, one of the second generation unit root tests. The hypotheses created for the CIPS test are as follows;

H_0: Series contains unit root.

H_1: Series do not contain unit root.

Table 7. Pesaran CIPS Test Results

Variables	Level Test Statistic / Probability Value	First Difference Test Statistic / Probability Value
Indirect	-2.29947 [<0.10]	-3.84978 [<0.01]
lngdp	-1.75634 [>=0.10]	-3.14676 [<0.01]
taxeffort	-1.83350 [>=0.10]	-4.24746 [<0.01]
lnpop	0.52305 [>=0.10]	-3.32225 [<0.01]
lntaxpayer	-0.41379 [>=0.10]	-2.73357 [<0.01]

According to the CIPS test results given in Table 7, all series have unit roots in their level values. It is concluded that the series are stationary when the first difference is taken.

5.5. Panel Cointegration Analysis

The existence of an equilibrium relationship between the variables in the long run may be possible, and the existence of this relationship can be tested using panel cointegration tests. Likewise, when working with panel data, the existence of a long-term relationship between non-stationary variables at the level can be tested with panel cointegration tests. In this study, which considers the buoyancy effect of direct taxes, the long-term relationship between the direct tax collection amount, which is the dependent variable that becomes stationary in the first difference, and the independent variables are analyzed with the "Westerlund Cointegration Test". Analysis findings are presented in Table 8.

Table 8. Westerlund Cointegration Test Result

Statistics Value	Probability Value	Result
4.1632	0.0000*	H_0 reject

Note: p, * denote 1% significance, respectively.

When the Westerlund Co-integration Test results are examined, it is concluded that the H_0 hypothesis is rejected, and there is cointegration between the variables since the statistical value is less than 0.05 at the 5% significance level. Therefore, it can be said that there is a long-term relationship between the variables.

5.6. Estimating Long-Run Cointegration Coefficients

After determining a long-term relationship between cointegration and variables, there are many tests to estimate the coefficient of the relationship in question. The tests, as mentioned above, differ in terms of considering the cross-section dependency and being homogeneous-heterogeneous.

AMG (Extended Mean Group Estimator) method was used in the study as the cointegration coefficient estimator that considers the cross-sectional dependence. The method in question was brought to the literature by Eberhardt and Bond (2009). The reasons for preferring the Panel AMG (Augmented Mean Group Estimator) method are that the estimator takes into account the cross-section dependence, the series becomes stationary when the first difference is taken, and finally, it is an effective estimator in the error term-induced endogeneity problem (Göçer, 2013: 233). In addition, another advantage of the AMG estimator is that it provides results for the overall panel and the coefficients for the horizontal sections. In this context, the long-term cointegration coefficients were estimated by the Panel AMG method[10].

[10] The AMG test was estimated using the Stata 16 program.

In assigning the dummy variable to be used for direct taxes, since there was a discretionary regulation made for both income and corporate taxes in 2006, a dummy variable was assigned to the model by taking 2007 as a reference. Since the effect of a fiscal policy decision on the economy can only be seen after 6-18 months, the dummy variable is coded as 1 for 2007 and after, and 0 before. In Table 9, AMG panel estimation results and test results for each cross-section are presented together.

Table 9. Panel AMG Test Results on Direct Taxes

Long-Run Cointegration Coefficients: Dependent Variable (Indirect)					
	lngdp	taxeffort	lnpop	lntaxpayer	D_{2007}
1st district	-0.052 (0.692)	2.697 (0.000) ***	0.082 (0.958)	0.539 (0.012) **	0.010***
2nd district	0.321 (0.001) ***	2.783 (0.000) ***	-1.812 (0.495)	1.011 (0.000) ***	0.000***
3rd district	0.662 (0.000) ***	2.687 (0.000) ***	0.340 (0.726)	0.327 (0.234)	0.018***
4th district	0.538 (0.003) ***	3.334 (0.000) ***	2.742 (0.020) **	0.045 (0.909)	0.006***
5th district	-0.023 (0.817)	2.724 (0.000) ***	-2.353 (0.000) ***	-0.040 (0.838)	0.000***
6th district	0.374 (0.017) **	2.266 (0.000) ***	-2.348 (0.189)	-0.867 (0.110)	0.059**
MODEL	*0.303* (0.011) **	2.749 (0.000) ***	-0.558 (0.495)	0.109 (0.625)	*0.000***

Note: p, ***,**,* denote 1%, 5% and 10% significance, respectively.

In Table 9, the AMG estimation results separately for each incentive region, and the test results represent the overall model. In the classification made by incentive regions, it is known that the developmental differences between regions change from region 1 to region 6. Because the provinces are divided into regions, taking into account the socio-economic development indices. Therefore, seeing the results at each

cross-sectional level in the analysis will be beneficial in estimating the tax buoyancy effects of the regions and comparing the impact on tax revenues with the development differences between regions.

According to the results of the analysis, the positive effect of the direct tax effort on the direct tax collection amount was determined for all six incentive regions and the overall model. Therefore, by the literature, as tax effort increases, tax collection also increases. The tax effort coefficient obtained by the tax collection ratio to tax accrual is similarly significant and positive at the level of 1% and is in line with the expectation. The reason why there is a positive relationship between tax effort and tax revenue, which can also be expressed as an indicator of the success of the tax administration in collecting taxes, is that tax revenue is a function of tax effort.

When the table is examined, it is seen that the coefficient of the dummy variable is also significant. This means a significant relationship between the discretionary regulation for income tax and corporate tax and the amount of collection. It was seen that the dummy variable used for the discretionary change indirect taxes in 2006 was significant ($p<0.01$ and $p<0.05$) for the whole model and all the incentive regions in the panel. From this point of view, discretionary regulations have impacted tax revenue. In the model in which the dummy variable is included, the buoyancy effect of direct tax is determined as 0.30. The buoyancy effect is weak because this value is closer to zero. When analyzed based on regions, it is seen that the highest buoyancy effect is realized with 0.66 in the third[11] region.

The "population" variable, among the independent variables, is meaningless throughout the model. When viewed on a regional basis, this effect is significant in the fourth[12] and fifth[13] regions. This effect is negative in the fifth region. The provinces in the fifth region have a lower population density, and population growth reduces tax revenues. In the fourth region, this effect is positive. The relationship between population and tax revenues can be interpreted from different perspectives. From the other point of view, it is not possible to evade taxes because businesses and structures are institutionalized in places where the population is high. For this reason, tax evasion and avoidance can be seen more in places where the population is low. Variables such as population density, composition and structure of the population, and the rate of increase in population, which are among the variables related to population, is generally accepted in the literature as factors affecting tax revenues. Although population density, like urbanization rates, has an increasing effect on tax revenues, the first effect is negative since institutional factors have not developed enough, especially in developing countries, with population density. However, the increase in public expenditures in these countries results in a higher increase in tax revenues. It is understood that there is a negative relationship between population density and tax revenues, especially in developing countries, due to the large size of the informal economy, the increase in tax evasion, and the ineffective work of the tax administration.

Another independent variable, "the number of taxpayers", did not have a significant effect on tax revenue throughout the model, but only first[14] and second[15] was found to be significant ($p<0.01$ and $p<0.05$) in the region. With this result, the increase in the number of direct taxpayers has

[11] Balikesir, Bilecik, Burdur, Gaziantep, Mersin, Manisa, Samsun, Trabzon, Usak Zonguldak, Karaman, Karabuk.

[12] Afyonkarahisar, Amasya, Artvin, Corum, Bartin, Duzce, Elazig, Erzincan, Hatay, Kastamonu, Kirşehir, Kutahya, Malatya, Nevsehir, Rize, Sivas, Kirikkale.

[13] Adiyaman, Cankiri, Aksaray, Bayburt, Erzurum, Giresun, Gümushane, Kahramanmaras, Nigde, Ordu, Sinop, Tokat, Tunceli, Yozgat, Kilis, Osmaniye.

[14] Ankara, Antalya, Bursa, Eskisehir, Istanbul, Izmir, Kocaeli, Mugla.

[15] Adana, Aydın, Bolu, Canakkale, Denizli, Edirne, Isparta, Kayseri, Kirklareli, Konya, Sakarya, Tekirdag, Yalova.

increased the tax revenues in the provinces where the population density is relatively higher, namely in the first and second regions.

As a result of the analysis, the buoyancy effect of direct taxes in Turkey is estimated, and the buoyancy effect is calculated as (0.30) in the study, which deals with the period 2004-2019, it is seen that this value is very weak since this value is close to zero. This situation reveals that the effect of fiscal policy is insufficient in terms of direct tax revenues. In addition, Turkey does not have a fully effective tax system. Discretionary regulations are not effective enough because of the low tax awareness in Turkey, the relatively high tax losses and evasion, and the size of the shadow economy. In addition, the ineffectiveness of tax administrations in providing the expected collection is also one of the reasons for not achieving the expected effect from discretionary regulations. The shadow economy is an issue that deserves particular attention. High tax rates, unfair distribution of tax burden, and psychological reasons are among the causes of the informal economy. By solving these problems, the size of the shadow economy will be reduced, and thus the effect of discretionary regulations will be seen more.

When we compare with the other researches that were written recently Monday, George and Chukwu (2022), covering the period 1980-2017, aimed to determine the tax buoyancy effect of direct taxes in Nigeria. According to the findings obtained from the study, the tax buoyancy coefficient is less than 1. In another study analyzing the buoyancy effect of direct taxes, Khadan (2020) discussed 12 Caribbean countries covering the period 1991-2017 and estimated 1.23 as the buoyancy coefficient of direct taxes. The other research is about the direct tax buoyancy effect written by Yousuf and Huq (2013). They estimated the leverage effect of direct taxes for Bangladesh in the analysis covering the period 1980-2011, and the results show that the effects of direct taxes are higher than sales tax and VAT when flexibility and buoyancy estimates are evaluated. As it can be seen from the literatüre that there are various studies covering different periods with different country examples, and the findings are different.

Conclusion

In addition to fulfilling public needs, states also benefit from taxes to intervene in economic and social life. Taxes are the most important source of income for states. While financing public expenditures is the fiscal purpose of taxes, the use of taxes for social and economic reasons is among the different fiscal purposes. Taxes are classified in various ways, and the most frequently used indirect-direct tax distinction is among these distinctions. In this classification, reflection and continuity of tax are taken as criteria. Taxes that can be easily reflected according to the reflection criterion and taxes whose subject and source are not continuous and whose taxpayer cannot be determined beforehand are considered indirect taxes according to the efficiency criterion.

As in all other areas, states are making many regulations in finance. While some of these regulations serve the purpose of providing income, some of them also serve various purposes, such as ensuring fairness in income distribution and financial sustainability. The success of the regulations can be evaluated by estimating the tax buoyancy effect because the tax buoyancy effect expresses the total effect on national income as a result of discretionary measures taken together with both automatic changes in tax revenues in a given year.

Although the concepts of tax elasticity and the buoyancy effect of taxes are used interchangeably from time to time, they are two different concepts. The most crucial factor here is that the tax buoyancy effect includes administrative regulations. The

concept of administrative regulation, on the other hand, includes the regulations made by the fiscal policy practitioner, excluding automatic changes. It is also a fact that every administrative regulation may not have an increasing effect on tax revenues. In this case, the tax buoyancy effect may weaken. The reason for this situation is that administrative regulations can cause negative effects. However, in most administrative arrangements, the aim is to increase public revenues. Therefore, countries want their tax elasticity and tax buoyancy to be higher than 1.

This study it is aimed to estimate the buoyancy effect of direct taxes in a certain period in Turkey. According to the results of the analysis in which income and corporate taxes are taken into account within the direct taxes in the period of 2004-2019, the buoyancy effect was found to be weak with 0.30. According to the result of the study, in which income and corporate taxes, which have the highest total among direct taxes, are evaluated together, it is concluded that the effect of fiscal policy in Turkey is insufficient in terms of direct taxes. In the study, panel data were used, and the incentive regions included in the application were considered horizontal sections. In the classification where 81 provinces are divided into six regions, it is known that the interregional development differences change from region 1 to region 6. It is estimated that seeing the results at each cross-sectional level will be beneficial in estimating and comparing the tax buoyancy effects of the regions. The direct tax buoyancy effect is estimated to be 0.30 throughout the model. However, when looked at on a regional basis, the highest coefficient was calculated as 0.66 in the third region. This value does not mean a high buoyancy effect because it is less than 1. Therefore, when analyzed both on a regional basis and in terms of the model, the income-generating effect of fiscal policy measures in Turkey in the period under consideration was weak. As a result, the ineffectiveness of tax regulations can be shown as the low tax awareness in Turkey, the relative excess of tax losses and evasion and the size of the informal economy, and the failure of tax administrations to ensure tax collection. In this respect, these issues can also be taken into account in future studies. Therefore, various suggestions can be made to increase the tax system's efficiency.

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