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CAUSALITY BETWEEN EXCISE TAX REVENUE AND GOVERNMENT SPENDING IN OECD COUNTRIES

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Abstract: The aim of this study is to examine the relationship between excise tax revenues and government spending areas in OECD countries. Panel data causality analysis were performed for 20 OECD member countries using yearly data for the 1995-2016 period to investigate the relationship between government spending in education, health, public services, defense, and social protection areas and excise tax revenues. At the end of the analysis, two-way causality relationship between excise tax and defense, education, health, general public services, and social protection spending have been observed. The results support both the spend-tax hypothesis and the tax-spend hypothesis. Furthermore, the tax-spend hypothesis is stronger in social protection spending and the spend-tax hypothesis is stronger in general public spending. Health spending strongly supports two hypotheses. It can be inferred that the increases in defense, education, and general public services spending in the economies of OECD countries are financed by an increase in excise tax revenues. The bi-directional causality between health spending and excise tax revenue shows that increased excise tax revenue is directed towards health spending and excise revenues are used to cover health spending.

Keywords: *Excise tax, government spending, causality analysis, tax-spend hypothesis, spend-tax hypothesis.*

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OECD ÜLKELERİNDE ÖZEL TÜKETİM VERGİ GELİRİ VE DEVLET HARCAMALARI ARASINDAKİ NEDENSELLİK

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Öz: Bu çalışmanın amacı, OECD ülkelerinde tüketim vergisi gelirleri ile devlet harcama alanları arasındaki ilişkiyi incelemektir. Devletin eğitim harcamaları, sağlık, kamu hizmetleri, savunma ve sosyal koruma ile tüketim vergisi gelirleri arasındaki ilişkiyi incelemek üzere, 20 OECD üyesi ülke için 1995-2016 dönemine ait yıllık veriler ile panel veri nedensellik analizi yapılmıştır. Analizin sonunda, tüketim vergisi ile savunma, eğitim, sağlık, genel kamu hizmetleri ve sosyal koruma harcamaları arasında iki yönlü nedensellik ilişkisi saptanmıştır. Sonuçlar, hem harcama vergi geliri hipotezini hem de vergi geliri-harcama hipotezini desteklemektedir. Ayrıca, vergi geliri- harcama hipotezi, sosyal koruma harcamalarında daha güçlü iken genel kamu harcamalarında ise harcama-vergi hipotezi daha güçlüdür. Sağlık harcamaları iki hipotezi kuvvetle desteklemektedir. Savunma, eğitim ve genel kamu hizmetlerinde OECD ülkelerinde harcamaların artmasının, tüketim vergisi gelirlerindeki artışla finanse edildiği çıkarımında bulunulabilir. Sağlık harcaması ve tüketim vergisi geliri arasındaki iki yönlü nedensellik, artan tüketim vergisi gelirinin sağlık harcamalarına yönelik olduğunu ve tüketim harcamalarının sağlık harcamalarını karşılamak için kullanıldığını göstermektedir.

Anahtar Sözcükler: *Özel tüketim vergisi, devlet harcamaları, nedensellik analizi, harcama-vergi geliri hipotezi, vergi geliri-harcama hipotezi.*

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INTRODUCTION

In recent years, the tasks undertaken by the state have intensified and diversified depending on both increasing social needs and social state vision. This situation causes the widening of the activity area of the public economy. Tax revenues and public expenditures, which are the two main instruments in the process, have important effects on each other and different macroeconomic dimensions. If government policy is subject to a temporal budget limitation, large budget deficits should eventually be followed by higher taxes or lower expenditures (Bohn, 1991).

Studies on the relationship between tax revenues and government spending have been ongoing for a long time. Because government expenditures and tax revenues are of great importance in the formulation and implementation of fiscal policy (Owoye, Onafowora, 2011). The aim of this study is to contribute to the literature by analyzing the causality relationship between tax revenues and government expenditures of twenty member countries within the Organization for Economic Cooperation and Development (OECD). This study categorizes government expenditures with 6 different headings and examines the causality relationship between each of them with excise tax revenue. Thus, causal relationships between excise tax revenue and health, education, defense, social protection, and general public spending are revealed separately for each member country. A bootstrap panel Granger causality analysis developed by Kónya (2006) was performed by using data obtained from OECD indicators (2018). This method provides efficient results even in panels with cross-sectional dependency and heterogeneity problems. In this respect, it expands the previous studies.

The importance of exploring the causal relationship between public expenditures and public revenues stems from the policy recommendations that can be drawn from this relationship. For example, if tax increases lead to an increase in public spending, it may be said that increasing taxes would not be a proper method to reduce budget deficits (Akçağlayan, Kayıran, 2010).

In traditional public finance theory, it is assumed that political decision-makers consider the long-term budget constraint of the public sector in the decision-making process of changes in government revenues and expenditures. Here, it is assumed that revenues and expenditures will be balanced in the long term. Governments can logically follow one of three strategies to meet this budget constraint. First, expenditures can be fixed at a given value and revenues can be adjusted for this expenditure level. This strategy is usually determined as the spend-tax hypothesis. Second, revenues may be taken as given and expenditures can be adjusted properly. This strategy is defined as tax spend hypothesis. Third, as a mixed strategy, it can be adopted over time by changing its roles as target and tool variables (Koren, Stiassny, 1995).

Although there is extensive empirical literature on government spending and taxation, studies that specifically investigate government spending in areas such as education and health have been limited. The main purpose of this paper is to fill this gap in the literature and examine the relationship between government spending areas and excise tax. Investigating the nexus between government spending in different areas and excise tax can provide beneficial results pertaining to the optimal policies to taxation.

The following part (Section 2) considers the theoretical frame of public finance. Section 3discusses the related literature. Section 4 presents the recent trends in excise tax revenue and government spending in OECD countries. Section 5 explains the methodology and findings. Section 6 contains the conclusion.

1. THEORETICAL FRAMEWORK

Several hypotheses have been developed to explain the causal relationship between public revenues and expenditures (Çiçek, Yavuz, 2014). The tax-spend hypothesis initially proposed by Friedman (1978) suggests that changes in public revenues lead to changes in public spending. According to Friedman, because the increase in taxes will lead to an increase in expenditures, it will not be possible to reduce budget deficits. On the other hand, Buchanan and Wagner (1978) claim that indirect taxes cause an increase in public expenditures. Therefore, they propose an increase in tax revenue as a solution for budget deficits. When expenditures are financed by instruments other than direct taxes, the public will believe that the cost of public expenditure on indirect taxes is lower than that of direct taxes (Akçoraoğlu, 1999). There are four alternative public finance theories explaining the relationship between taxes and public expenditures. These theories are tax–spend hypothesis, spend-tax hypothesis, fiscal synchronization, and institutional separation.

1.1. Tax-Spend Hypothesis

Friedman (1978) argues that there is a causal relationship between taxes and expenditures and argues that tax increases lead to an increase in public spending. According to this approach, the use of tax increases to reduce the budget deficit provides governments with an opportunity to increase public spending and does not serve the desired purpose. Buchanan and Wagner (1978) also confirm this hypothesis, but they argue that the causal relationship between tax revenues and public spending is negative. This approach is based on tax deduction. The deduction of taxes is perceived by the public as a reduction in the cost of public expenditure. This leads to an increase in the demand of public services and thus increases public spending.

1.2. Spend-Tax Hypothesis

Peacock and Wiseman (1979) begin the analysis with the assumption that the level of taxation is a limitation of the increase in expenditures and propose the idea of a tolerable level of taxation. This theory states that changes in public expenditures cause changes in public revenues. Temporary public spending will result in increased tax revenue and increased public spending. In fact, the first increase in expenditures to meet unusual events will be temporary. However, this increase in the expenditure will lead to an increase in tax revenues generated by tax increases. Tax increases will be maintained at high levels to enable spending at a higher level (Quintieri, Bella, 1997).

1.3. Fiscal Synchronization

This theory suggests that governments make decisions about income and expenditure at the same time. The theory of financial synchronization underlines the traditional theories of demand for public goods. According to these theories, all voters decide on the desired level of public expenditure and taxation at the same time, and it is assumed that the type and quantity of goods offered by the public sector reflect the preferences of the society. Musgrave (1966) and Meltzer-Richard (1981) suggest that voters compare the marginal benefits and marginal costs of public services in deciding on the right levels of expenditures and revenues. Thus, according to the financial synchronization theory, revenue and spending decisions are made jointly and they affect each other.

1.4. Institutional Separation

The institutional separation theory, expressed by Baghestani and McNown (1994), relates to the institutional discretion of the government's taxation and spending decisions. This approach implies that revenues and expenditures are independent of each other (Ewing, Payne, 1998). State spending and taxation functions are independently determined by the executive and legislative parts of the state. Both execution and legislation have a share in the budget process, but the lack of accordance between these two parts destroys the efforts to balance the budget deficit.

2. REVIEW of the RELEVANT LITERATURE

The literature on examining the relationship between excise tax revenue and government spending is very limited. The majority of the relevant studies examine the nexus between government revenue and spending. In this sense, the study contributes to the literature as it focuses on the relationship between excise tax revenue and government spending and examines the sub-fields of government spending separately.

Anderson, Wallace, and Warner (1985) examined the relationship between revenues and expenditures by Granger causality analysis using annual data for the period between 1946 and 1983. They have found that expenditures lead to higher taxes. Employing a vector autoregression model, Von Furstenberg, Green, and Jeong (1986), obtained the same result. Blackley (1986) used annual data for 1929-82 and revealed the existence of the opposite relationship. Ram (1988) concluded that there is a Granger causality from taxes to spending at the federal level but there is a reverse causality at the state level.

Miller and Russek (1990) employed annual data for 1946-86 and their results based on the error-correction method indicated a bidirectional causality between taxes and spending. Owoye (1995) examined the causal relationship between tax revenues and expenditures in the G7 countries by applying cointegration and error-correction models. The empirical results indicated the existence of a bidirectional causality between taxes and expenditures in five of the G7 countries. Ewing and Payne (1998) utilized the error-correction approach to investigate the relationship between revenues and expenditures relative to real GDP and found bi-directional causality between revenues and expenditures supporting the fiscal synchronization hypothesis**.** Darrat (2002) used annual data for 1985-97 for Lebanon and 1975–97 for Tunisia and employed Granger causality test and error correction models. Empirical results indicated the existence of the tax-spend hypothesis for both countries. Reddick (2002) examined the empirical linkage between government revenue, spending, and debt in the provinces of Canada using the error-correction method showed causality from expenditures to taxes.

Nyamongo, Sichei, and Schoeman (2007) investigated the nexus between government expenditure and government revenue in South Africa using monthly data for the period between October 1994 and June 2004. The results based on the vector autoregressive (VAR) approach indicated that tax revenue and government expenditure are linked bidirectionally in the long-run, while there is no evidence of bidirectional relation in the short-run.

Elyasi and Rahimi (2012) analyzed the causal relationship between government revenue and government expenditure in the Islamic Republic of Iran by using annual data for 1963-2007. Empirical findings based on the bounds testing approach showed a bidirectional causal relationship between government expenditure and tax revenues in both the long-run and short-run. Obeng (2015) analyzed the revenue-expenditure nexus for Ghana by employing the Ordinary Least Squares (OLS) method and Vector Autoregressive (VAR) method using annual data for 1980- 2013. Empirical findings indicated a unidirectional causality running from revenue to expenditure.

Olayungbo and Olayemi (2018) investigated the relationships among non-oil revenue, government spending and economic growth in Nigeria using annual data for 1981-2015. The granger causality analysis revealed a unidirectional causality running from government spending to economic growth and a unidirectional causality running from government spending to non-oil revenue.

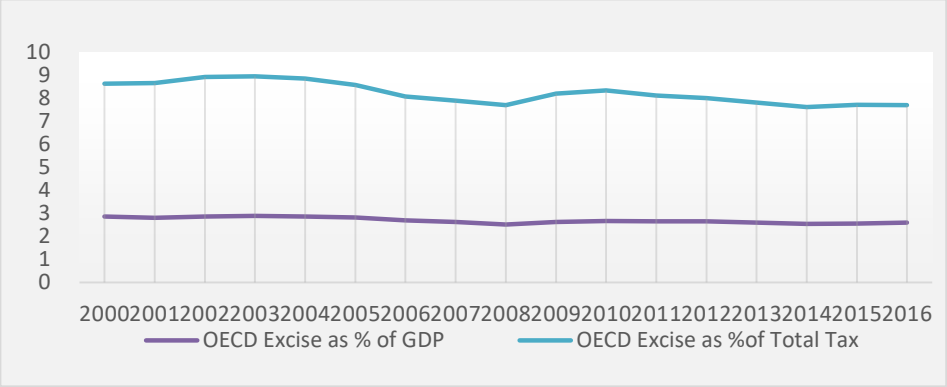
Gurdal, Aydin and Inal (2020) examined the relationship between tax revenue, government expenditure, and economic growth for G7 countries using annual data for 1980-2016 and employing two different panel causality approaches. Empirical findings from the time domain panel causality test indicated a bidirectional causality between economic growth and government expenditure but unidirectional causality between tax revenue and government expenditure. On the other hand, findings from the frequency domain causality test showed a bidirectional short-run and long-run causality between economic growth and tax revenue, and long-run causality between economic growth and government expenditure.

3. EXCISE TAX and GOVERNMENT SPENDING in OECD COUNTRIES

Excise tax, which is different from general consumption taxation, is applied for certain substances. In addition to the revenue goal, excise taxes can serve different policies by taxing certain groups of goods that are not socially beneficial or even considered harmful (Bulutoğlu, 2003).

Taxes are extremely important for states as financial source to cost of public services such as education, defense, and health. Thus, with the ease of collecting, excise tax supplies a high amount of income to the treasury. Excise taxes have been implemented for a long time and are now widely used by governments. While the spread of income tax and value-added tax reduce the importance of excise tax as a state source of income, most governments are still collecting substantial taxes on petroleum products, tobacco products and alcohol. In all OECD countries, alcoholic beverages, fuel products and tobacco products are subject to special consumption tax. Figure 1 shows the excise tax revenue in OECD countries. In 2016, the share of excise tax revenue in the total tax revenue was 7.7 percent for OECD. However, this share was 18.2 percent for Turkey and 3.2 percent for the United States (OECD, 2018).

Figure 1. Excise Tax Revenue in OECD

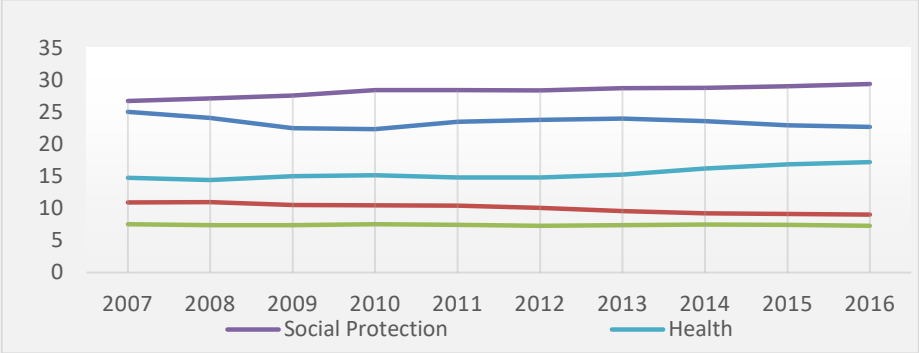


Source: OECD (2018), General Government Revenue (Indicator)

The level of development of countries is important in the distribution of social expenditures. In general, social spending is kept high in developing countries to increase human capital, to direct markets and to enable the private sector to invest. These countries devote more of their GDP to social expenditures such as education and health compared to developed countries. In OECD countries, the largest share of social expenditures is in retirement payments and health expenditures. The average life expectancy increases with the countries' development levels. Thus, the proportion of the elderly population in the community is increasing. The rise of this rate increases retirement and health payments.

In OECD countries, average social protection spending as % of GDP was 26.74 percent in 2006 and increased to 29.34 percent in 2016. Likewise, health spending increased from 14.78 percent in 2006 to 17.21 percentage in 2016. On the other hand, general public service spending decreased from 25 percent to 22.69 percent in the same period. Similarly, education and defense spending also decreased during this period.

Figure 2. Government Spending in OECD



Source: OECD (2018), General Government Spending (Indicator)

4. METHODOLOGY

4.1. Data Set

The data for 20 OECD countries is used in the analysis[1]. In the choice of the period, data availability is taken into consideration and the period is limited to 1995-2016. In the study, excise tax revenue as % of GDP has been used as excise tax data and government spending for defense, health, social protection, public services, and education as % of GDP have been used as spending data of each area. Annual data are obtained from the OECD database.

Table 1. Definitions of Variables in Model

Variable	Definition	Source
EX	Excise Tax Revenue as % of GDP	OECD (2018), General government revenue (indicator)
DEF	Defense Spending as % of GDP	OECD (2018), General government spending (indicator)
HLTH	Health Spending as % of GDP	OECD (2018), General government spending (indicator)
SOCPRO	Social Protection Spending as % of GDP	OECD (2018), General government spending (indicator)
GRLPUBSER	General Public Services Spending as % of GDP	OECD (2018), General government spending (indicator)
EDU	Education Spending as % of GDP	OECD (2018), General government spending (indicator)

4.2. Cross Sectional Dependency Test

Cross-section independence is based on the assumption that the degrees of exposure of all countries to a shock to any of the units constituting the panel are the same. Thus, it is predicted that other countries in the panel are not affected by a macro economic shock in any of the countries.

A possible cross-sectional dependency problem in a panel analysis often results in inconsistent and upward prediction results (Bai, Kaob, 2006). Therefore, cross sectional dependency should be tested before the analysis. In this study, Pesaran (2004) method was used to investigate the presence of cross-sectional dependence. Pesaran (2004) proposed that the cross-sectional dependency (CD) test should be distributed asymptotically as standard, even in standard sample-size panels. This test statistic can be written as follows:

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\ \sum_{J=i+1}^{N}(\hat{\rho}_{ij})\right) \quad (1)$$

In the equation 1, N is the number of countries, T is the time, and ρij shows the sample estimation of the double correlation of error terms.

Table 2. CD Test Results

Variables	EX	DEF	HLTH	SOCPRO	GRLPUBSER	EDU
CD-test	23.41(*)	30.34(*)	35.80(*)	19.95(*)	19.12(*)	9.51(*)

Note: The term '*' denotes significance at the level of 1%.

According to the test results presented in Table 2, the null hypothesis is rejected at the level of 1% and it is concluded that there is dependence between the horizontal sections.

4.3. Causality Test

The possibility of cross-sectional dependence and heterogeneity needs a causal analysis that can consider these problems. Therefore, in this study, a bootstrap panel Granger causality analysis developed by Kónya (2006) is employed.

Konya (2006) method is based on Seemingly Unrelated Regression (SUR) systems and Wald tests with country specific bootstrap critical values. This method has several advantages. First, it does not assume that the panel is homogeneous, so it takes into account possible simultaneous correlations between countries and makes it possible

to test Granger causality on each panel member separately. Secondly, this approach by generating country specific bootstrap critical values does not require pretesting for unit roots and cointegration. Lastly, bootstrapping provides an opportunity to account for the distortions caused by small samples (Boubtane, Coulibaly, and Rault, 2013). In this case, variables are used at their level.

Kónya (2006) heterogeneous panel causality test is expressed by the following equation system:

$$EX_{1,t} = \alpha_{1,1} + \sum_{i=1}^{ky} \beta_{1,1,i}\, EX_{1,t-i} + \sum_{i=1}^{ke} \delta_{1,1,i}\, DEF_{1,t-i} + \varepsilon_{1,1,t} \quad (2)$$

$$EX_{2,t} = \alpha_{1,2} + \sum_{i=1}^{ky} \beta_{1,2,i}\, EX_{2,t-i} + \sum_{i=1}^{ke} \delta_{1,2,i}\, DEF_{2,t-i} + \varepsilon_{1,2,t}$$

$$EX_{N,t} = \alpha_{1,N} + \sum_{i=1}^{ky} \beta_{1,N,i}\, EX_{N,t-i} + \sum_{i=1}^{ke} \delta_{1,N,i}\, DEF_{N,t-i} + \varepsilon_{1,N,t}$$

&

$$DEF_{1,t} = \alpha_{2,1} + \sum_{i=1}^{ky} \beta_{2,1,i}\, EX_{1,t-i} + \sum_{i=1}^{ke} \delta_{2,1,i}\, DEF_{1,t-i} + \varepsilon_{2,1,t} \quad (3)$$

$$DEF_{2,t} = \alpha_{2,2} + \sum_{i=1}^{ky} \beta_{2,2,i}\, EX_{2,t-i} + \sum_{i=1}^{ke} \delta_{2,2,i}\, DEF_{2,t-i} + \varepsilon_{2,2,t}$$

$$DEF_{N,t} = \alpha_{2,N} + \sum_{i=1}^{ky} \beta_{2,N,i}\, EX_{N,t-i} + \sum_{i=1}^{ke} \delta_{2,N,i}\, DEF_{N,t-i} + \varepsilon_{2,N,t}$$

&

$$EX_{N,t} = \alpha_{1,N} + \sum_{i=1}^{ky} \beta_{1,N,i}\, EX_{N,t-i} + \sum_{i=1}^{ke} \delta_{1,N,i}\, HLTH_{N,t-i} + \varepsilon_{1,N,t} \quad (4)$$

&

$$HLTH_{N,t} = \alpha_{2,N} + \sum_{i=1}^{ky} \beta_{2,N,i}\, EX_{N,t-i} + \sum_{i=1}^{ke} \delta_{2,N,i}\, HLTH_{N,t-i} + \varepsilon_{2,N,t} \quad (5)$$

&

$$EX_{N,t} = \alpha_{1,N} + \sum_{i=1}^{ky} \beta_{1,N,i}\, EX_{N,t-i} + \sum_{i=1}^{ke} \delta_{1,N,i}\, SOCPRO_{N,t-i} + \varepsilon_{1,N,t} \quad (6)$$

&

$$SOCPRO_{N,t} = \alpha_{2,N} + \sum_{i=1}^{ky} \beta_{2,N,i}\, EX_{N,t-i} + \sum_{i=1}^{ke} \delta_{2,N,i}\, SOCPRO_{N,t-i} + \varepsilon_{2,N,t} \quad (7)$$

&

.

$$EX_{N,t} = \alpha_{1,N} + \sum_{i=1}^{ky} \beta_{1,N,i}\, EX_{N,t-i} + \sum_{i=1}^{ke} \delta_{1,N,i}\, GRLPUBSER_{N,t-i} + \varepsilon_{1,N,t} \quad (8)$$

&

$$GRLPUBSER_{N,t} = \alpha_{2,N} + \sum_{i=1}^{ky} \beta_{2,N,i}\, EX_{N,t-i} + \sum_{i=1}^{ke} \delta_{2,N,i}\, GRLPUBSER_{N,t-i} + \varepsilon_{2,N,t} \quad (9)$$

$$EX_{N,t} = \alpha_{1,N} + \sum_{i=1}^{ky} \beta_{1,N,i}\, EX_{N,t-i} + \sum_{i=1}^{ke} \delta_{1,N,i}\, EDU_{N,t-i} + \varepsilon_{1,N,t} \quad (10)$$

&

$$EDU_{N,t} = \alpha_{2,N} + \sum_{i=1}^{ky} \beta_{2,N,i}\, EX_{N,t-i} + \sum_{i=1}^{ke} \delta_{2,N,i}\, EDU_{N,t-i} + \varepsilon_{2,N,t} \quad (11)$$

In equation sets 2,3,4…, and 11; The EX refers to excise tax revenue as % of GDP, DEF refers to defense spending as % of GDP, $HLTH$ refers to health spending as % of GDP, $SOCPRO$ refers to social protection spending as % of GDP, $GRLPUBSER$ refers to general public services spending as % of GDP, and EDU refers to education spending as % of GDP. Also, N is the number of countries, T is the period, and k is the length of the delay.

In the analysis of the causality relationship, the δ and β coefficients in the mutual equation sets between the excise tax revenues and the government spendings variables are examined. For each country (j) in the equations, if all $\delta_{1,j,i}$ are not zero and all $\beta_{2,j,i}$ are equal to zero, then there is a one-way Granger causality $(X \rightarrow Y)$ relationship and if all $\delta_{1,j,i}$ are zero and all $\beta_{2,j,i}$ are not zero, then there is one-way and reverse Granger causality $(Y \rightarrow X)$ relationship. On the other hand, if all $\delta_{1,j,i}$ and $\beta_{2,j,i}$ are not zero, there is a bidirectional Granger causality $(X \leftrightarrow Y)$ relationship and if all $\delta_{1,j,i}$ and $\beta_{2,j,i}$ are zero, there is no causality relationship.

Table 3. Causality Test Results of Excise Tax Revenue and Defense Spending

Country	Ho: EX does not Granger cause DEF Test-stat.	Ho: DEF does not Granger cause EX Test-stat.
Austria	19.19 ***	39.35 ***
Belgium	0.63	2.71 *
Czech Republic	37.1 ***	3.2 *
Denmark	9.02 ***	328.74 ***
Finland	2.52	66.61 ***
France	0.16	0.79
Germany	10.35 ***	0.81
Hungary	18.19 ***	46.64 ***
Israel	595.8 ***	1.34
Italy	17.13 ***	13.3 ***
Korea	2.08	13.18 ***
Luxembourg	9.68 ***	2.01
Netherlands	3.94 **	20.21 ***
Norway	18.8 ***	12.77 ***
Portugal	2.35	34.36 ***
Spain	2.3	12.73 ***
Sweden	44.06 ***	20.44 ***
Switzerland	0.19	191.52 ***
United Kingdom	1.14	8.21 ***
United States	4.47 **	4.05 **

Note: *, ** and *** denote the significance for at 0.1, 0.05 and 0.01 levels.

Table 4. Causality Test Results of Excise Tax Revenue and Health Spending

Country	Ho: EX does not Granger cause HLTH Test-stat.	Ho: HLTH does not Granger cause EX Test-stat.
Austria	39.57 ***	32.65 ***
Belgium	402.33 ***	2.8 *
Czech Republic	25.74 ***	11.43 ***
Denmark	78.22 ***	134.8 ***
Finland	33.49 ***	6.69 ***
France	24.05 ***	7.47 ***
Germany	34.85 ***	10.43 ***
Hungary	0.15	3.81 *
Israel	390.83 ***	0.3
Italy	14.91 ***	16.83 ***
Korea	19.73 ***	31.26 ***
Luxembourg	0.93	24.25 ***
Netherlands	7.4 ***	63.5 ***
Norway	15.75 ***	18.75 ***
Portugal	20.39 ***	24.89 ***
Spain	34.43 ***	20.09 ***
Sweden	198.62 ***	62.71 ***
Switzerland	2.17	269.15 ***
United Kingdom	30.69 ***	6.36 **
United States	267.23 ***	6.74 ***

Note: *, ** and *** denote the significance for at 0.1, 0.05 and 0.01 levels.

Table 5. Causality Test Results of Excise Tax Revenue and Social Protection Spending

Country	Ho: EX does not Granger cause SOCPRO Test-stat.	Ho: SOCPRO does not Granger cause EX Test-stat.
Austria	24.61 ***	25.34 ***
Belgium	220.24 ***	14.5 ***
Czech Republic	12.47 ***	5.64 **
Denmark	45.9 ***	38.08 ***
Finland	844.03 ***	62.97 ***
France	197.65 ***	11.93 ***
Germany	0.75	10.64 ***
Hungary	0.45	2.29
Israel	265.73 ***	0.82
Italy	211.2 ***	52.75 ***
Korea	14.36 ***	57.79 ***
Luxembourg	25.56 ***	11.83 ***
Netherlands	2029.84 ***	0.82
Norway	37.42 ***	0.98
Portugal	508.83 ***	37.87 ***
Spain	332.22 ***	6.73 ***
Sweden	132.26 ***	8.92 ***
Switzerland	6.67 ***	0.71
United Kingdom	88.25 ***	0.14
United States	23.29 ***	0.71

Note: *, ** and *** denote the significance for at 0.1, 0.05 and 0.01 levels.

Table 6. Causality Test Results of Excise Tax Revenue and General Public Services Spending

Country	Ho: EX does not Granger cause GRLPUBSER Test-stat.	Ho: GRLPUBSER does not Granger cause EX Test-stat.
Austria	13.27 ***	88.04 ***
Belgium	73.49 ***	17.18 ***
Czech Republic	23.3 ***	83.88 ***
Denmark	0.49	111.07 ***
Finland	13.96 ***	350.23 ***
France	0.63	1.69
Germany	4.19 **	21.82 ***
Hungary	10.65 ***	7.93 ***
Israel	5.84 **	12.31 ***
Italy	0.74	12.99 ***
Korea	3.02 *	32.76 ***
Luxembourg	9.3 ***	2.22
Netherlands	6.58 **	5.48 **
Norway	0.3	11.8 ***
Portugal	75.67 ***	0.83
Spain	92.22 ***	23.74 ***
Sweden	22.66 ***	44.38 ***
Switzerland	4.11 **	240.52 ***
United Kingdom	0.45	10.81 ***
United States	79	0.38

Note: *, ** and *** denote the significance for at 0.1, 0.05 and 0.01 levels.

Table 7. Causality Test Results of Excise Tax Revenue and Education Spending

Country	Ho: EX does not Granger cause EDU Test-stat.	Ho: EDU does not Granger cause EX Test-stat.
Austria	8.38 ***	61.07 ***
Belgium	67.44 ***	26.29 ***
Czech Republic	2.98 *	25.56 ***
Denmark	60.18 ***	69.43 ***
Finland	46.86 ***	119.28 ***
France	9.97 ***	2.95 *
Germany	12.44 ***	0.74
Hungary	0.33	14.56 ***
Israel	7.36 ***	14.1 ***
Italy	0.45	64.82 ***
Korea	4.5 **	107.75 ***
Luxembourg	0.2	0.66
Netherlands	5.62 **	14.09 ***
Norway	3.54 *	1.63
Portugal	13.19 ***	2.86 *
Spain	8.11 ***	1.71
Sweden	40.33 ***	20.96 ***
Switzerland	1.44	13.67 ***
United Kingdom	1.71	1.32
United States	1.99	8.83 ***

Note: *, ** and *** denote the significance for at 0.1, 0.05 and 0.01 levels.

According to the test results presented in Tables 3, 4, 5, 6, and 7, it is seen that generally there are two-way causality relationships between excise tax and defense, education, health, general public services, and social protection spending. Furthermore, two-way causality relationships between excise tax and health spending are more obvious (observed in 16 of the 20 countries). These findings, which support the spend-tax hypothesis and tax-spend hypothesis, are consistent with earlier studies (see, for example: Miller, Russek, 1990; Owoye, 1995; Nyamongo *et al*., 2007; Elyasi, Rahimi, 2012). However, it was seen that the causality relation from excise taxes to social protection (observed in 18 of the 20 countries) and the causality relationships from general public services (observed in 16 of the 20 countries), education (observed in 15 of the 20 countries) and defense spending to excise revenues (observed in 16 of the 20 countries) were stronger. In this context, the stronger causal relationships from excise

revenue to social protection spending strongly support the tax spend hypothesis. The causality relationships from general public services, education and defense spending to excise revenues suggest the spend tax hypothesis.

On the other hand, it has been concluded that there is no causal relationship between excise tax revenue and government spending areas in some countries. Defense spending for France, education spending for Luxembourg and England, general public service spending for France and the United States, social protection spending for Hungary did not show significant results.

CONCLUSION

There is a wide range of literature on the relationship between public expenditures and tax revenues. Tax revenues have a significant share in the budget and are one of the leading sources of finance for public spending. The adjustment of tax revenues by decision-makers has created various theoretical approaches for the relationship between expenditures and tax revenue. These theoretical approaches can be listed as spend tax hypothesis, tax spend hypothesis, fiscal synchronization hypothesis and institutional separation hypothesis. The spend tax hypothesis argues that the increase in public expenditures is met by the increase in tax revenues, and that the increase in tax burden is an important factor in the increase of public expenditures. Tax-spend hypothesis argues that the increase in tax revenues gives governments the opportunity to spend and growing revenues increase public spending.

Tax policies have many purposes other than income. Excise tax can be applied to certain groups of goods and can serve other purposes besides supplying income to the governments. Moreover, the fact that they are applied to goods that are harmful or not socially beneficial makes them easier to accept by the society. With these features, excise tax is often used to create resources by governments. In this study, the causal relationships between excise tax revenues and health, education, defense, general public services and social protection spending have been investigated for 20 OECD member countries within the framework of the theoretical approaches mentioned above.

The findings of the study can be summarized as follows:

(1) There are two-way causality relationships between excise tax and defense, education, health, general public services and social protection spending. The results support both the spend-tax hypothesis and the tax-spend hypothesis.

(2) The tax-spend hypothesis ssems to have a stronger effect in social protection spending, while in general public spending, the effect of spend tax hypothesis is stronger. Health spending strongly supports two hypotheses.

In view of the above findings, it can be interpreted that the increases in defense, education and general public services spending in the economies of OECD countries are financed by an increase in excise tax revenues. The fact that bidirectional causality between health spending and excise tax revenue is strongly seen in OECD countries shows that increasing excise taxes revenue is directed towards health spending. On the other hand, it can be concluded that social protection spending is increased with the increase in excise tax revenue, in other word excise taxes revenues are directed to social protection spending. Therefore, the existence of a causal relationship between public spending and excise tax revenues requires a more detailed planning of policies to be implemented to prevent budget deficits. Policies will be more effective when they include the combined objectives of increasing excise tax revenues and reducing unnecessary public spending.

NOTLAR

[1] Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Israel, Italy, Korea, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

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