



Crowding-Out Effect: Evidence from OECD Countries

Dışlama Etkisi: OECD Ülkelerinden Kanıtlar

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ABSTRACT

The concept of the crowding-out effect, which is used to describe how an expansionary fiscal policy would reduce private investments, has become one of the major areas of research in the economy. This study aims to investigate whether or not the crowding-out effect is applicable in OECD countries. For this purpose, Panel Data Analysis was performed for the period 1995-2017. This analysis uses private investments of countries as dependent variables and, in addition to GDP and total government expenditures, it uses education, health, general public services, social protection, economic affairs, defence, public order and safety expenditures of the government as independent variables. Panel Data Analysis was performed using Huber-Eicker-White Estimator in line with the results of econometric tests required for this analysis such as stationarity, model determination, heteroscedasticity and autocorrelation. As a result, in OECD countries, while economic growth and defence expenditures of the government positively affect private investments, total government expenditures and social protection expenditures of the government have a crowding-out effect on private investments.

Keywords: Crowding-out effect, Government expenditures, Panel data analysis

JEL Classification: E62, H30, C33

ÖZ

Genişletici maliye politikasının özel yatırımları azaltacağını iddia eden dışlama etkisi görüşü ekonomide önemli araştırma alanlarından biri olmuştur. Bu çalışma, OECD ülkelerinde dışlama etkisinin geçerli olup olmadığını araştırmayı amaçlamaktadır. Bu amaçla, 1995-2017 dönemi için Panel Veri Analizi yapılmaktadır. Bu analizde, ülkelere ait özel yatırımlar bağımlı değişken olarak; GDP ve toplam hükümet harcamalarına ek olarak hükümet tarafından yapılan eğitim, sağlık, genel kamu hizmetleri, sosyal koruma, ekonomik işler, savunma, kamu düzen ve güvenlik harcamaları bağımsız değişkenler olarak kullanılmaktadır. Panel



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Veri Analizi, bu analiz için gerekli olan durağanlık, model belirleme, heteroskedasite ve otokorelasyon gibi ekonometrik testlerin sonuçları doğrultusunda Huber-Eicker-White Tahmincisi ile yapılmıştır. Sonuç olarak, OECD ülkelerinde ekonomik büyüme ve hükümetin savunma harcamaları özel yatırımları pozitif etkilerken, toplam hükümet harcamaları ve

hükümetin sosyal koruma harcamaları özel yatırımlar üzerinde dışlama etkisine sebep olmaktadır.

Anahtar Kelimeler: Dışlama etkisi, Hükümet harcamaları, Panel veri analizi

JEL Sınıflaması: E62, H30, C33

1. Introduction

One of the most important areas of interest in economic theory has been the advantages and disadvantages of the fiscal policies proposed by Keynes against the economic collapse and excessive unemployment rates caused by the Great Depression. The crowding-out effect, which predicts that private investment expenditures would decrease with an expansionary fiscal policy, is one of the most debated issues in this field (Butler, 1977, p. 309-311). These debates have significant differences including the many arguments raised by the Classical and Keynesian approaches for the economy in general. Differences of opinion, such as the distinction between short term and long term, the issue of the economy being in full employment or underemployment, and whether or not the prices formed in the markets are flexible or rigid, lead to differentiation of the opinions about the crowding-out effect. Accordingly, the Classical view, which claims that the economy will automatically come to full employment thanks to flexible price, wage and interest mechanisms, argues that there is a crowding-out effect in the economy by establishing a negative relationship between expansionary fiscal policies and private investments. In fact; when government spending increases or taxes are reduced, the government's borrowing requirement increases, and thus, interest rates increase in the loanable funds market. Private investments decrease due to increasing interest rates; in other words, private investments are crowded out of the market due to the fiscal policy (Palley, 2013, p. 179-198). Conversely, the Keynesian view, claiming that the economy has a flexible employment balance due to the rigidity of prices, wages and interests, argues that total demand will increase thanks to expansionary fiscal policies and thus, total production will expand in the economy. In fact, the increase in total demand helps economic growth to accelerate and total revenue to increase, with the consequence that stimulated investments will also increase. Thus, the Keynesian view, which establishes a positive relationship between public expenditures and private investments, argues that there is no crowding-out effect in the economy (Balcerzak and Rogalska, 2014, p. 80-86). Monetarists and New Classical economists who follow the classical view argue that the crowding-out effect is valid while New Keynesian and Post Keynesian economists who follow the Keynesian view argue that the crowding-out effect will not occur in the short term (Snowdon and Vane, 2005, p. 163-474).

Different views on the crowding-out effect have been tested through various applied studies. This study aims to investigate the relationship between fiscal policy and the crowding-out effect. For this purpose, following a literature review, Panel Data Analysis is carried out for the period 1995-2017 using data from OECD countries. The originality of the study is based on the inclusion of public expenditures in the analysis as total government expenditures, education expenditures, health expenditures, general public services, social protection, economic affairs, defence expenditures, public order and safety. Extension of the examined period to 2017 supports the originality and novelty of the study. The study consists of an introduction, literature review, method and data set, econometric analysis, and conclusion sections.

2. Literature Review

The literature on the crowding-out effect has been shaped by testing the hypotheses developed within the framework of various views of economic theory on this subject through applied studies. These applied studies include analyses that use data belonging to a country or group of countries in a given period. In this context, various models of Time Series Analysis and Panel Data Analysis have been used as econometric estimation methods to be consistent with the data. The results obtained in the applied studies related to the crowding-out effect vary according to the examined period and country and the estimation methods used.

Nieh and Ho (2006, p. 137-146) investigated whether the expansionary fiscal policy had a crowding-out effect by using data from OECD countries for the period 1981-2000. For this purpose, the relationship between government expenditures and private consumption was examined individually through Panel Cointegration Test and Horizontal Section Analysis. The results of the analysis show that, when government expenditures increase in OECD countries, private consumption also increases and no crowding-out effect occurs.

Basar and Temurlenk (2007, p. 98-102) searched how government spending affected private sector investments in Turkey's economy during the period 1980-2005. During the study, Time Series Analysis was performed using a Vector

Autoregressive Model, and it was concluded that a crowding-out effect had arisen in the Turkish economy. Since this effect was rather low, expansionary fiscal policies positively affected economic growth in Turkey's economy.

In their study, Furceri and Sousa (2011, p. 519-530) tried to find the effects of government expenditures on private sector investments using data from 145 countries in the period 1960-2007. The study used Panel Data Analysis, and econometric estimations were made individually according to Pooled OLS, Fixed Effects and Random Effects models. The conclusion that this study came to was that government expenditures had a significant crowding-out effect on private sector investments according to all three models.

Cavallo and Daude (2011, p. 69-79) investigated the relationship between government investment expenditures and private investments using data from 116 developing countries in the period 1980-2006. In the study where the econometric estimations were made using the Generalized Method of Moments (GMM) approach, the data of government investments, relative price of investment, domestic credit to private sector and real exchange rate volatility were used as independent variables. According to the analysis results, government investments in developing countries had a crowding-out effect on private investments.

Dahmardeh, Pahlavani and Mahmoodi (2006, p. 141-145) researched the effects of government spending on private consumption in their Panel Data Analysis performed using the data belonging to developing Asian countries for the period 1990-2006. In the analysis where total disposable income was used as an explanatory variable, the causalities between the variables were tested by Kao and Pedroni Cointegration models. The results of the model suggested that government spending in developing Asian countries had a crowding-out effect on private consumption.

Afonso and Sousa (2012, p. 4443-4453) investigated the macroeconomic effects of government spending using data on Italy, Germany, UK and the USA for the period 1970-2004. Within the framework of Time Series Analysis, the relations between expansionary fiscal policy and total consumption, investment,

government debt and interest payments were tested by the VAR Model. The results of the analysis suggested that government expenditures in those countries had a significant crowding-out effect.

Gjini and Kukeli (2012, p. 272-275) studied the relationship between government investment expenditures and private sector investment expenditures in transition economies for the period 1991-2009. In the study where the econometric estimations were made by Panel Data Analysis, government spending and interest rate, inflation and domestic credit provided by banking sector data were used as independent variables. The study concluded that transition economies showed no crowding-out effect on private sector investments stemming from government investment expenditures.

In a study conducted by Hur, Mallick and Park (2014, p. 1121-1130) data of Asian countries for the period 1990-2009 was used to investigate whether expansionary fiscal policies had a crowding-out effect. In the study where long-term analysis was performed for the country group by the Panel Data Model and short-term analysis was performed individually for the countries by the VAR Model, government revenues, policy interest and export data were used as explanatory variables. According to the results of the analysis, there was no crowding-out effect arising from government expenditures in developing Asian countries in the short or long term.

Xu and Yan (2014, p. 6-10) investigated the relationship between government investment expenditures and private sector investments in their Time Series Analysis using data from China during 1980-2011. In the study carried out using the Granger Causality Test within the framework of VAR Model, government investments were diversified according to the areas where expenditures were incurred. In conclusion, it was determined that the government investment expenditures in the fields of commerce, industry and private goods in China had a crowding-out effect on private sector investments.

Lin, Ali and Lu (2015, p. 37-47) tried to find the causality between defence expenditures and social welfare expenditures in the Panel Data Analysis

performed using the data from OECD countries for the period 1988-2005. The analysis made by GMM approach used GDP, total consumption, education and health expenditures, population and total tax data as explanatory variables. According to the results of the analysis, defence expenditures positively affected education and health expenditures creating no crowding-out effect.

Bekmez and Destek (2015, p. 98-106) investigated the crowding-out effect caused by defence expenditures using data from 72 countries for the period 1988-2012. To this end, Panel Data Analyzes were conducted for developed, developing and underdeveloped countries with the help of Fixed Effects and Random Effects Models. The results of the analysis suggested that defence expenditures for all three country groups had a greater crossing-out effect compared to other government expenditures.

Cural, Ericok and Yilanci (2012, p. 80-83) researched the relationship between public investments and private investments in Turkey's economy during the period 1970-2009. In the Time Series Analysis performed for this purpose, short- and long-term causalities were tested with Carrion-i-Silvestre and Sanso (2006) Cointegration analysis. In their conclusion, it was determined that private investments were positively affected by public investments and no crowding-out effect arose in the Turkish economy.

Demir (2017, p. 79-85) studied the effects of expansionary fiscal policy on private investments in the Turkish economy during the period 1983-2013. In the model established by means of Autoregressive Distributed Lag (ARDL) approach, public investments and public debts were used as explanatory variables. The analysis results suggested that the Turkish economy showed no crowding-out effect arising from expansionary fiscal policy and the public investments increased private investments.

Demirel, Erdem and Eroğlu (2017, p. 7-15) performed Panel Data Analysis using data from European Union countries for the period 2000-2015 to investigate whether the fiscal policies caused any crowding-out effect. For this purpose, they investigated how government expenditures, public debt and budget deficit, which were determined as independent variables, affected private

investments through Panel Cointegration and Fully Modified OLS analyzes. In their conclusion, it was determined that there was a crowding-out effect due to the fiscal policy in European Union countries and the said independent variables negatively affected private investments.

Anyanwu, Gan and Hu (2017, p. 135-148) investigated the relationship between government domestic borrowing and real private credit in their Panel Data Analysis for oil-dependent countries for the period 1990-2012. Fixed Effects and Dynamic OLS-based models used government domestic debt and money supply, oil price, inflation and GDP data as independent variables. According to the analysis results, public debts negatively affected private loans to cause a crowding-out effect on private investments.

3. Methodology and Data Set

Panel Data Analysis is used as econometric estimation method in this study, which aims to investigate the crowding-out effect due to public expenditures using data of 17 OECD member countries for the period 1995-2017. This analysis uses private investment data of countries as dependent variables. It uses GDP, total government expenditures and education, health, general public services, social protection, economic affairs, defence, public order and safety expenditures of government as independent variables. All variables included in the Panel Data Analysis performed through the regression model shown in the Table 1 were obtained from the OECD database and their natural logarithms are used in the model (OECD, 2020).

Table 1: Regression Model

$INV_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 GOV_{it} + \beta_3 EDU_{it} + \beta_4 HE_{it} + \beta_5 GEN_{it} + \beta_6 SOC_{it} + \beta_7 ECON_{it} + \beta_8 DEF_{it} + \beta_9 ORD_{it} + U_{it}$	
Variable	Explanation
INV	Investment
GDP	Gross Domestic Product
GOV	Total Government Expenditures
EDU	Education Expenditures of Government
HE	Health Expenditures of Government
GEN	General Public Services Expenditures of Government
SOC	Social Protection Expenditures of Government
ECON	Economic Affairs Expenditures of Government
DEF	Defence Expenditures of Government
ORD	Public Order and Safety Expenditures of Government
U	Error Term

4. Econometric Analysis

A number of econometric tests must be performed first in order to apply Panel Data Analysis, which is the determined estimation method of this study. These tests can be listed as follows: Im-Pesaran-Shin (2001) and Harris-Tzavalis (1996) Unit Root Tests for stationarity (Hall and Mairesse, 2002, p. 458-459), Pedroni Residual Cointegration Test for cointegration (Neal, 2014, p. 684-691), F Test and Breusch-Pagan Lagrange Multiplier Test for model determination (Park, 2010, p. 1-3), White's Test for heteroscedasticity (White, 1980), and Wooldridge's Test for autocorrelation (Drukker, 2003, p. 169-171). Table 2 shows the results of the Im-Pesaran-Shin and Harris-Tzavalis Unit Root Tests for stationarity in order to avoid false regression problems and Table 3 shows the results of the Pedroni Residual Cointegration Test for cointegration in order to test the long run relationship between the variables.

Table 2: Im-Pesaran-Shin and Harris-Tzavalis Unit Root Tests

Variable	Im-Pesaran-Shin Unit Root Test			
	Level		First Difference	
	Statistic	P-Value	Statistic	P-Value
INV	1.2387	0.8923	-8.0016	0.0000
GDP	1.8607	0.9686	-7.0208	0.0000
GOV	2.5956	0.9953	-6.3023	0.0000
EDU	1.4893	0.9318	-6.4504	0.0000
HE	1.8218	0.9658	-6.3366	0.0000
GEN	2.3778	0.9913	-7.2444	0.0000
SOC	3.0206	0.9987	-6.4742	0.0000
ECON	0.8968	0.8151	-9.5171	0.0000
DEF	1.1370	0.8722	-7.6366	0.0000
ORD	1.3886	0.9175	-6.7494	0.0000
Variable	Harris-Tzavalis Unit Root Test			
	Level		First Difference	
	Statistic	P-Value	Statistic	P-Value
INV	0.8993	0.8346	0.1430	0.0000
GDP	0.9480	0.9982	0.2641	0.0000
GOV	0.9484	0.9983	0.2864	0.0000
EDU	0.9442	0.9972	0.2842	0.0000
HE	0.9440	0.9971	0.2838	0.0000
GEN	0.9109	0.9244	0.0304	0.0000
SOC	0.9571	0.9995	0.3308	0.0000
ECON	0.8646	0.3382	-0.1443	0.0000
DEF	0.9141	0.9413	0.0978	0.0000
ORD	0.9400	0.9953	0.2139	0.0000

Source: Author's calculations by using Stata.

Table 3: Pedroni Residual Cointegration Test

Pedroni Residual Cointegration Test				
Sample: 1995-2017				
Included Observations: 374				
Cross-sections included: 17				
Null Hypothesis: No cointegration				
Trend assumption: No deterministic trend				
Automatic lag length selection based on SIC with a max lag of 4				
Newey-West automatic bandwidth selection and Bartlett kernel				
	Statistic	P-Value	Statistic	P-Value
Panel v-Statistic	-1.212063	0.8873	-3.259388	0.9994
Panel rho-Statistic	3.764160	0.9999	4.676176	1.0000
Panel PP-Statistic	-10.77774	0.0000	-8.439635	0.0000
Panel ADF-Statistic	-8.636407	0.0000	-8.594174	0.0000
Group rho-Statistic	6.481367	1.0000		
Group PP-Statistic	-0.061603	0.4754		
Group ADF-Statistic	-7.943241	0.0000		

Source: Author's calculations by using EViews.

According to the results of the Im-Pesaran-Shin and Harris-Tzavalis Unit Root Tests shown in Table 2, all series used in the model contain unit roots, and when the first differences are taken, the series become stable. In addition, according to the results of Pedroni Residual Cointegration Test shown in the Table 3, there is no cointegration and a long run relationship between the variables. In conclusion, it can be seen that the first differences of the series should be taken in the Panel Data Analysis and included in the regression. Table 4 shows the results of F Test and Breusch-Pagan Lagrange Multiplier Test for model determination, Table 5 shows the results of White's Test for heteroscedasticity and Table 6 shows the results of Wooldridge's Test for autocorrelation performed following the stationarity and cointegration tests.

Table 4: F Test and Breusch-Pagan Lagrange Multiplier Test

Number of Observation: 374						
Number of Groups: 17						
Observation per Group		Min: 22 Avg: 22 Max: 22				
F: 221.14		Prob > F: 0.0000				
R ²	Within: 0.8512 Between: 0.7416 Overall: 0.8484					
Variable	Coefficient	Std. Err.	t	P > t	[95% Conf. Interval]	
GDP	1.939838	0.0864249	15.21	0.000	1.801091	2.141053
GOV	-0.4292354	0.1957989	-2.63	0.008	-0.8365833	-0.0663869
EDU	0.0490274	0.0951323	0.49	0.627	-0.1322535	0.2419596
HE	0.123201	0.0792013	1.49	0.137	-0.0255885	0.2859582
GEN	-0.0545215	0.0556908	-0.99	0.322	-0.1650669	0.0539987
SOC	-0.4933751	0.0913936	-3.70	0.000	-0.7013094	-0.3418028
ECON	0.0618504	0.030631	1.75	0.081	0.0033097	0.1238
DEF	0.1015465	0.0344588	2.89	0.004	0.0347111	0.1702587
ORD	-0.1806645	0.0634507	-2.43	0.016	-0.3010719	-0.0514816
Cons	-0.0057446	0.0030849	-1.86	0.063	-0.011812	0.0003229
F test that all u_i=0: F(16, 348) = 0.65				Prob > F = 0.8424		
Breusch and Pagan Lagrangian multiplier test for random effects						
gcf1[st,t] = Xb + u[st] + e[st,t]						
Estimated results	Var		sd = sqrt(Var)			
gcf	0.0158456		0.1258794			
e	0.0024977		0.0499769			
u	0		0			
Test: Var(u) = 0	chibar2(01) = 0.00 Prob > chibar2 = 1.0000					

Source: Author's calculations by using Stata.

Table 5: White's Test

White's test for Ho: homoscedasticity against Ha: unrestricted heteroskedasticity			
chi2(54): 106.24 Prob > chi2: 0.0000			
Source	chi2	df	p
Heteroskedasticity	106.24	54	0.0000
Skewness	8.15	9	0.5193
Kurtosis	4.53	1	0.0334
Total	118.91	64	0.0000

Source: Author's calculations by using Stata.

Table 6: Wooldridge's Test

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 16): 0.593
Prob > F: 0.4525

Source: Author's calculations by using Stata.

According to the results of the F Test and Breusch-Pagan LM Test shown in Table 4, hypotheses that equalise the unit effects and the variance of the unit effects to zero are accepted. According to these two results, Classical Pooled Least Squares Model should be used in Panel Data Analysis to be performed in this study. Again, according to the results of the White's Test shown in Table 5, the hypothesis claiming that the model includes homoscedasticity is rejected and accordingly, there is a heteroscedasticity problem in the model. According to the results of the Wooldridge's Test shown in Table 6, the hypothesis claiming that there is no first degree autocorrelation in the model is accepted and accordingly, there is no autocorrelation problem in the model. According to these results, Huber-Eicker-White Estimator which is resistant to the heteroscedasticity problem should be used in order to perform Panel Data Analysis through the Classical Pooled Least Squares Model. This estimator is run using "xtreg (variables), vce (robust)" command in the Stata Econometrics Program (Hoechle, 2007, p. 284-285). Table 7 shows the regression results of Panel Data Analysis performed using Huber-Eicker-White Estimator.

Table 7: Regression Results

Number of Observation: 374						
F(9, 364): 140.99			Prob > F: 0.0000			
R ²	0.8485					
Root MSE	0.04959					
Variable	Coefficient	Robust Std. Err.	t	P > t	[95% Conf. Interval]	
GDP	1.939838	0.1275343	15.21	0.000	1.689041	2.190634
GOV	-0.4292354	0.2443475	-1.76	0.008	-0.9097454	0.0512747
EDU	0.0490274	0.1037097	0.47	0.637	-0.1549179	0.2529727
HE	0.123201	0.0826722	1.49	0.137	-0.039374	0.285776
GEN	-0.0545215	0.0589876	-0.92	0.356	-0.1705208	0.0614777
SOC	-0.4933751	0.133405	-3.70	0.000	-0.7557164	-0.2310337
ECON	0.0618504	0.0353089	1.75	0.081	-0.0075846	0.1312854
DEF	0.1015465	0.0351157	2.89	0.004	0.0324913	0.1706017
ORD	-0.1806645	0.0742997	-2.43	0.016	-0.3267751	-0.0345539
Cons	-0.0056959	0.0033135	-1.72	0.086	-0.0122119	0.0008201

Source: Author's calculations by using Stata.

According to the regression results shown in Table 7, the F Test is significant and the coefficient of relevance R^2 is 0.8485. These two results suggest that the independent variables used in the model are statistically significant in explaining the dependent variable together. In addition, the model explains the variability in investments, which is a dependent variable, at the rate of 84.85%. According to the results of t-test, the coefficients calculated for GDP, total government expenditures, social protection expenditures of government and defence expenditures of government were statistically significant at 95% confidence interval, whereas the coefficients calculated for the other variables were insignificant. Since all variables used in the model were included in the model by taking their natural logarithms, the coefficients calculated for the independent variables express the increases and decreases in the dependent variable in percentage. In fact, economic growth and government defence expenditures in OECD countries positively affect private investments. Private investments increase by 1.94% when GDP increases by 1%, and private investments increase by 0.10% when government defence expenditures increase by 1%. Conversely, total government expenditures and social protection expenditures of government in OECD countries have a negative impact on private investments. When total government expenditures increase by 1%, investments decrease by 0.43%, and when social protection expenditures of government increase by 1%, investments decrease by 0.49%.

5. Conclusion

In this study, which aims to investigate the crowding-out effect within the framework of the relationship between expansionary fiscal policy and private investments, Panel Data Analysis was conducted using data from OECD countries for the period 1995-2017. As a result of econometric tests, it was found that the series used in the study contain unit root, that they become stable after the first differences are taken, that they are suitable for the Classical Pooled Least Squares Model and that there is a heteroscedasticity problem in the model. Therefore, it was determined that Panel Data Regression analysis should be performed using Huber-Eicker-White Estimator. According to this analysis, economic growth and defence expenditures have a positive effect on private investments, while total government expenditures and social protection expenditures of government negatively affect private investments. So, total government expenditures and social protection expenditures of government cause a crowding-out effect on private investments in OECD countries. In fact, when total government expenditures increase by 1%, investments decrease by 0.43%, and when social protection expenditures of government increase by 1%, investments decrease by 0.49%.

The results of this study may contribute to regulate the fiscal policy to accelerate economic growth and reduce unemployment without causing any crowding-out effect in line with the economic objectives of governments. Accordingly, policy recommendations may be developed regarding the direction of government expenditures. For example, the conclusion that defence expenditures positively affect private investment and cause no crowding-out effect indicates that governments find opportunity to provide an incentive to private investments and increase employment while making this mandatory expenditure. Nevertheless, it may help the policies for increasing human capital to have a greater share of government budgets, in the light of the conclusion that there is no significant relationship between the crowding-out effect and education or health expenditures. Furthermore, the analysis results suggest that economic affairs expenditures, which are expected to positively affect private investments, should be directed to more productive areas. On the contrary, government social

protection expenditures have a significant crowding-out effect on private investments. It is clear that the crowding-out effect resulting from total government expenditures is largely due to social protection expenditures. Therefore, the development of policies to eliminate the crowding-out effect resulting from social protection expenditures will significantly reduce the negative impact of the expansionary fiscal policy on private investments.

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