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The Effects of State Aid on Export Performance: EU15 and Turkey[1]

Devlet Yardımlarının İhracat Performansına Etkileri: AB15 ve Türkiye

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Abstract

Especially in developing countries, fundamental problems such as inadequate development of investments, investment goods and manifactoring sector, excessive foreign dependency, technological backwardness, current account deficit and inadequate savings restrain economic and social development. On the other hand, with the globalization promotion policies have become one of the most important tools which increasing competitiveness and prosperity, having more market share of countries. In accordance with this purpose, the effect of state aid for export on export performance was investigated to EU-15 and Turkey in 1996-2013 period. In this study, state aid, import of machinery and equipment, real GDP and real Export values was used as a variable for estimating the empirical relationship between state aid for export and export performance in EU-15 and Turkey. The results of the unit root test conducted to detect whether the series involve unit root or not reveal that the series are stationary in their first difference. The results of Pedroni and Kao cointegration test show state aid and export performance are cointegrated. According to the findings obtained from the Fully Modified Ordinary Least Square (FMOLS) method, state aid affects export performance statistically 1% at the level in a significant and positive way. Moreover, a unidirectional causality relationship from state aid to export performance is detected according to the error correction model. Finally, this study states that any increase in the state aid, grow up the export performance.

Keywords: Export Promotions, Export Performance, State Aid

Öz

Özellikle gelişmekte olan ülkelerde sanayinin yeterince gelişememesi, yatırımların ve yatırım mallarının yetersizliği, dışa bağımlılığın fazla olması, teknolojik gerilik, dış ödemeler açığı ve tasarruf yetersizliği gibi temel sorunlar, ekonomik ve sosyal kalkınmanın gerçekleşmesini engellemektedir. Öte yandan küreselleşme ile birlikte teşvik politikaları, ülkelerin sosyo-ekonomik kalkınmalarının gerçekleştirmelerinde, rekabet güçlerini artırarak dünya pazarlarından daha fazla yararlanmalarında ve böylece refah düzeylerini artırabilmelerinde önemli araçlarından birisi konumuna gelmiştir. Bu amaç doğrultusunda çalışmada, ihracata yönelik devlet yardımlarının ihracat performansı üzerindeki etkisi Avrupa Birliği üyesi 15 ülke (AB 15) ve Türkiye için 1996-2013 dönemi itibariyle araştırılmıştır. Çalışmada değişken olarak, reel ihracat değerleri, ülkelerin yardım değerleri, ithal edilen makine ve teçhizat değerleri ile reel GSYH değerleri kullanılmıştır. Serilerin birim kök taşıyıp taşımadıklarının tespiti için yapılan birim kök testi sonuçları serilerin birinci farkında durağan olduklarını ortaya koymuştur. Pedroni ve Kao eşbütünleşme testi sonuçları ihracata yönelik devlet yardımları ve ihracat performansının eşbütünleşik olduğunu ortaya koymuştur. Tam Değiştirilmiş En Küçük Kareler (FMOLS) yönteminden elde edilen bulgulara göre ihracata yönelik devlet yardımlarının ihracat performansını istatistiksel olarak %1 anlamlılık seviyesinde anlamlı ve pozitif yönde etkilediği belirlenmiştir. Ayrıca hata düzeltme modeli sonuçlarına göre ihracata yönelik devlet yardımlarından ihracat performansına doğru tek yönlü bir nedensellik ilişkisi tespit edilmiştir. Bu ampirik bulgular, ihracata yönelik uygulanan devlet yardımlarındaki artışın ihracat performansını artırabileceği sonucunu ortaya koymuştur.

Anahtar Kelimeler: İhracat Teşvikleri, İhracat Performansı, Devlet Yardımları

JEL Codes: F30, F35

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Introduction

State aid in the European Union (EU) which adopted market economy is allocated to stimulation of investments, environmental protection, employment growth, export development, helping the survival of companies in difficult conditions and restructuring. In order not to let increasing competition caused by Economic and Monetary Union and formation of Single (Internal) Market harm their industries, EU countries have started to grant more state aid.

Besides promoting Europe 2020 Strategy of which the main themes are *smart growth*, *sustainable growth* and *inclusive growth*, Europe also develops project-based supports along with regional, sectoral and horizontal aids to increase export potentials of enterprises. With export support, it is aimed to help member countries keep and increase their market share in world trade. In this context, it can be said that manufacturing industry which is a sub-sector itself is the most-supported sector within the framework of industrial and competition policies. EU export subsidies – though differ from country to country – are similar with regard to its content.

State aid for export in Turkey has been categorized within the context of *horizontal aid* which are part of the EU state aid. Within the scope of 2023 Turkey Export Strategy and Action Plan, especially technology-intensive production and state aid for export are highly crucial in reaching USD 500 billion export target for the year 2023, the 100$^{th.}$ anniversary of Turkish Republic. For, it's pretty clear that state aid which is not contributing adequately to export performance is indeed a burden on public.

Today, considering the difficulties of competition in international markets and acquiring high market share, creating a sound and sustainable industrial base within the context of Europe 2020 Strategy (*European Strategy for Smart, Sustainable and Inclusive Growth*) is of high importance for raising global competitiveness and exports of especially Small and Medium-Sized Enterprises (SMEs). Whether there is a strong relationship between the state aid carried out within the scope of 2023 Turkey Export Targets and the export performance, if there is, finding out to what extent this interrelation is also significant because it will guide the policy makers. In this regard, the aim of this study is to find out how state aid affects export performances of EU-15 and Turkey. In line with this purpose, in the second part of the study data set and econometric method, in the third part econometric findings and analysis results respectively have been evaluated.

Even though there are many studies in scientific literature examining the relationship theoretically between state aid for export and export performance, empirical studies are so scarce. Therefore, studies in scientific literature including the studies which are similar to this one have been presented briefly in Table 1.

Table 1: Literature

Author(s)	Period	Countries	Methodology	Results
Stöllinger and Holzner (2013)	1995-2011	EU-27	Panel Data Analysis	A 10% increase in aid increases Export by 0,67%for average EU countries
Buts and Jegers (2013)	2005-2008	Belgium	Panel Data Analysis	Subsidies influence market share but this effect is two years later.
Ghimire (2013)	1995-2010	122 Developing Countries	Panel Data Analysis	Trade promotions increased the export performance
Criscuolo et al. (2012)	1993-2000	UK	Panel Data Analysis	Effect of regional aid on investment and employment is positive, but there is no effect on total factor productivity.
Jalali (2012)	2011 July /August	Iran	Structural Equation Modeling	Export promotion programmes effects export positively.
Kim (2012)	1996-2010	151 Developing Countries	Panel Data Analysis	Trade promotions effects export diversity positively.
Aghion et al. (2011)	1995-2007	EU-15	Panel Data Analysis	Effect of sectoral aid on export performance is positive.

Felbermayr and Yalçın (2011)	2000-2009	Germany	Panel Data Analysis	A 10% increase in export credit guarantees increases Export by 12-17%
Martincus and Carballo (2010)	2001-2005	Peru	Difference-in-differences	Export promotions increase both market share and export performance.
Girma et al. (2008)	1999-2005	China	Tobit Model	Promotions encourage firms to export activity.
Çelik (2007)	1996-2005	Turkey/Kayseri	Panel Data Analysis	Promoted firms have an increase at export performance.
Polat (2007)	1996-2004	Turkey	Correlation Analysis	There is a significant relationship between export promotion and export performance.
Wilkinson and Brouthers (2006)	1992-1999	USA	Regression Analysis	Export promotion activities have significant effect on export performance.
Gual and Jodar (2006)	1992-2003	EU-11	Panel Data Analysis	Sectoral aids have positive and weak effect on growth of total factor productivity.
Görg et al. (2005)	1983-1998	Ireland	Panel Data Analysis	Huge amount of sectoral aids have more effect on firms to direct export.
London Economics (2004)	1995-2002	EU	Panel Data Analysis	Aid given firms grow stronger in terms of employment, profitability and labour productivity than other firms.
Danish Competition Authority (2001)	1994-1997	Denmark	Panel Data Analysis	There is a positive relationship between productivity and horizontal aid given manufacturing sector.
Alvarez and Crespi (2000)	1992-1996	Chili	Quasi Experimental Design	Effect of export promotions on export performance is positive.

In terms of establishing model and revealed this study, followed Görg et al. (2005), Wilkison and Brouthers (2006), Martincus and Carballo (2010), Aghion et al (2011), Jalali (2012), Buts and Jegers (2013) and Stöllinger and Holzner (2013).

1. Econometric Model and Data

In estimating the empirical relationship between state aid for export and export performance in EU-15 and Turkey, Görg et al. (2005), Wilkison and Brouthers (2006), Martincus and Carballo (2010), Aghion et al (2011), Jalali (2012), Buts and Jegers (2013) and Stöllinger and Holzner (2013) was used. The functional form of the model is specified below in Eq.(1).

$$EX=f(AID, GDP, IMPCAP) \quad (1)$$

Where EX is export value in year, GDP is the real GDP in constant 2005 U.S. dollars, IMPCAP is import of machinery and equipment in constant 2005 U.S. dollars, AID is state aid for export in constant 2005 U.S. dollars. The description of the model variables and data sources are presented in Table 2.

Table 2: Variables Description

Variables	Descriptions	Data Sources
EX	Export Value (2005$)	World Development Indicators (WDI)
GDP	Real GDP (2005$)	World Development Indicators (WDI)
IMPCAP	Import of Machinery and Equipment (2005$)	World Trade Organization (WTO)
AID	State Aid (2005$)	ME*, EC Staff Working Paper*

*ME: Republic of Turkey Ministry of Economy. EC: European Commission

Annual data was employed for the 1996-2013 period to investigate relationship between state aid for export and export performance in EU-15 countries namely Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherland, Portugal, Sweden, Spain, United Kingdom and Turkey. Panel data analysis was preferred in this study. Each variable is presented in its natural log. Therefore, the model can be written as follows in Eq.2:

$$LEX_{it} = \alpha_{it} + \beta_1 LAID_{it} + \beta_2 LGDP_{it} + \beta_3 LIMPCAP_{it} + \varepsilon_{it} \quad (2)$$

Where β_1, β_2 and β_3 represent the slop coefficients, i represent cross section [1…16 (EU15-Turkey)], t is the time period (1996-2013), and ε is the error term.

2. Econometric Metodology and Results

Descriptive statistics of data used relationship between state aid for export and export performance for the 1996-2013 period in EU15 and Turkey are given in Table 3.

Table 3: Descriptive Statistics

Variables	LREX	LIMPCAP	LGDP	LRAID
Mean	25,8339	24,5143	21,54723	26,86675
Median	25,94636	24,59146	21,13875	26,62422
Maximum	28,09178	26,71138	32,96627	28,78223
Minimum	23,18246	21,89466	16,29904	23,90001
Standard Deviation	1,099592	1,133318	3,229664	1,156875
Observations	288	285	288	288

For the 1996-2013 period maximum state aid was given by Denmark in 2008, minimum one is given by Turkey in 2002. Germany has the maximum value in terms of GDP and machinery-equipment import in 2013 and 2008 respectively. Turkey and Luxembourg have the minimum value about GDP and machinery-equipment import in 2002 and 1996 respectively.

It is an important problem to choose the proper technique in order to reveal the long term relationship between the variables. Co-integration is one of the most proper methods of choosing long term relationship. In this study, three steps have been adopted as an empirical strategy. Firstly, unit root tests, and then co-integration tests and fully modified ordinary least square (FMOLS) test, lastly Granger causality test will be employed.

The Fisher-type tests using the ADF(Augmented Dickey Fuller) and the PP (Phillips-Perron) unit root test will be employed along with Im, Pesaran ve Shin (IPS) in this study because they are well tested for unbalanced panels (Al-Mulali and Ozturk, 2015: 384).

To investigate the stationarity of the series used, we used the unit root tests on panel data. The results of these tests are presented in the following Table 4.

The results presented in Table 4 revealed that at level all the variables were not significat, thus, the null hypothesis of a panel unit root cannot be reject. Therefore, the variables are not stationary. However, all the variables were significant at the first difference. Thus, the null hypothesis of a unit root can be rejected and therefore they are stationary at the first difference.

Table 4: Panel Unit Root Test Results (Trends and Intercept)

Variables	Im, Pesaran ve Shin (IPS) W-stat	MW-ADF Fischer Chi-square	MW-PP Fischer Chi-square
LREX	-1.01113	30.99	20.8617
LRAID	-0.76088	35.6665	19.3803
LRIMPCAP	2.18793	15.3904	14.8977
LGDP	3.36061	12.8263	9.59609
ΔLREX	-4.4417[a]	72.5184[a]	108.724[a]
ΔLRAID	-4.34201[a]	75.3345[a]	116.62[a]
ΔLRIMPCAP	-6.85305[a]	99.9941[a]	162.93[a]
ΔLGDP	-5.64237[a]	85.2561[a]	148.545[a]

Note: a denote significance at the 1% level.

The results of the unit roots in panel, shows that all the variables for the 16 countries in Level are not stationary, but in first differences all variables are stationary. Stationarity for all countries in the first difference leads us to study the existence of a long-term relationship. We have seen that all variables are integrated, based on test results panel unit root, we proceed to test co-integration

panel, and that by relying on tests Pedroni and Kao. In this sudy, to examine a lon-term relationship between the variables, panel cointegration testing methods will be used. By the way, Pedroni cointegraion test will be employed. Pedroni cointegration test is performed as follows in Eq 3 (Pedroni, 1999: 656):

$$y_{i,t} = \alpha_i + \delta_i t + \beta_{1i}x_{1i,t} + \beta_{2i}x_{2i,t} + \ldots + \beta_{Mi}x_{Mi,t} + \varepsilon_{i,t}$$

for $t = 1, \ldots, T$; $i = 1, \ldots, N$; $m = 1, \ldots, M$ (3)

where;

T: time period,

N: cross-sectional units,

M: independent variables,

β: slope coefficients

α_i: individual effects,

ε_{it}: residuals,

$\delta_i t$: individual lineer trends.

Pedroni made two types of cointegration tests namely panel tests and group tests. Panel tests consist of four statistic tests (panel v, panel rho, panel PP, and panel ADF) and are based on within dimension. Group tests are based on between dimension and consist of three statistic tests (groupp, group PP, and group ADF). If the results of seven statistical tests, four probability values are less than 5%, there is a relationship of co-integration between the variables in the model[3].

Another co-integration test will employed this study is Kao co-integration test. This test based on Engle-Granger cointegration test. Kao cointegration test is performed as follows in Eq 4 (Bai and Kao, 2005: 2):

$$y_{it} = \alpha_i + \beta_i x_{i,t} + \beta_{2i}x_{2i,t} + \ldots + \beta_{ki}x_{ki,t} + \varepsilon_{i,t} \quad (4)$$

where i = 1, …, N; j = 1, …, k refers to the number of observations over time, i is the number of cross-sectional units, and K refers to the number of independent variables. β_{1i}, β_{2i} … β_{3i} are the slope coefficients of the model, and ε_{it} is the stationary regression error. The results of Pedroni and Kao cointegration test is shown follow in Table 5.

Table 5: The Results of Pedroni and Kao Co-integration Tests

Pedroni Co-integration Test

	Tests	Statistics	p-values
Wihhin Dimension	Panel v-statistic	2.468976	0.0068
	Panel rho- statistic	3.182321	0.9993
	Panel PP- statistic	-1.74779	0.0403
	Panel ADF- statistic	-5.97522	0.0000
Between Dimension	Grup p- statistic	4.396517	1.0000
	Grup pp- statistic	-3.23276	0.0006
	Grup ADF- statistic	-8.54218	0.0000

Kao Co-integration Test

Tests	Statistics	p-values
ADF statistic	-1.325724	0.0925

Note: The optimal lag based on the Akaike Information Criterion (AIC).

Table 5 summarizes the results of seven (7) Statistical Co-integration Pedroni, four probability values are less than 5%. It is mainly (Panel PP-Statistic) and (Panel ADF-Statistic) regarding intra-individual tests, and we have (Panel PP-Statistic) and (Group ADF-Statistic) for testing inter individual, all this proves that there is a relationship of co-integration between the variables (REX, RAID, RIMPCAP and GDP) in the model.

[3] See Pedroni (1999) for details on the heterogeneous panel and heterogeneous group mean panel cointegration statistics.

Verifying the cointegration among the series will be utilized whether RAID, RIMPCAP and GDP have any sides of relationship (negative or positive) with the dependent variable REX. It can be concluded by using the panel FMOLS (Fully Modified Ordinary Least Square). The panel FMOLS is employed and the results are presented in Table 6.

Table 6: The Panel FMOLS Results with LREX As the Dependent Variable

	LRAID	LRIMPCAP	LGDP
Coefficients	0.183407[a]	0.70413[a]	0.507048[a]
Standard Error	0.034345	0.051457	0.147182
p-value	0.0000	0.0000	0.0007

Note: a denote significance at the 1% level.

The results show that state aid, machinery-equipment import and GDP have a long run positive effect on the export performance. The one percent increase in state aid, machinery-equipment import and GDP will increase the export by 0.18%, 0.70%, and 0.50% respectively.

When there is cointegration among variables, panel vector error correction model (VECM) is estimated to perform Granger casuality test to examine short-run casuality. Short-run Granger causality can be established by conducting a joint test of lagged the coefficients of the right side variables based on the F-test or X^2 test. The long-run causal relationship, on the other hand, can be established through the significance of the lagged error correction term in the VECM, based on the t test. The following equations (5)-(8) introduce the VECM Granger causality model:

$$\Delta LREX_{it} = \beta_{1i} + \sum_{J=1}^{n} \beta_{11ij} \Delta LREX_{it-j} + \sum_{J=1}^{n} \beta_{12ij} \Delta LRAID_{it-j} + \sum_{J=1}^{n} \beta_{13ij} \Delta LRIMPCAP_{it-j} + \sum_{J=1}^{n} \beta_{14ij} \Delta LGDP_{it-j} + \delta_{1i} \varepsilon_{it-1} + \varphi_{1it} \quad (5)$$

$$\Delta LRAID_{it} = \beta_{2i} + \sum_{J=1}^{n} \beta_{21ij} \Delta LRAID_{it-j} + \sum_{J=1}^{n} \beta_{22ij} \Delta LREX_{it-j} + \sum_{J=1}^{n} \beta_{23ij} \Delta LRIMPCAP_{it-j} + \sum_{J=1}^{n} \beta_{24ij} \Delta LGDP_{it-j} + \delta_{2i} \varepsilon_{it-1} + \varphi_{2it} \quad (6)$$

$$\Delta LRIMPCAP_{it} = \beta_{3i} + \sum_{J=1}^{n} \beta_{31ij} \Delta LRIMCAP_{it-j} + \sum_{J=1}^{n} \beta_{32ij} \Delta LRAID_{it-j} + \sum_{J=1}^{n} \beta_{33ij} \Delta LREX_{it-j} + \sum_{J=1}^{n} \beta_{34ij} \Delta LGDP_{it-j} + \delta_{3i} \varepsilon_{it-1} + \varphi_{3it} \quad (7)$$

$$\Delta LGDP_{it} = \beta_{4i} + \sum_{J=1}^{n} \beta_{41ij} \Delta LGDP_{it-j} + \sum_{J=1}^{n} \beta_{42ij} \Delta LRAID_{it-j} + \sum_{J=1}^{n} \beta_{43ij} \Delta LRIMPCAP_{it-j} + \sum_{J=1}^{n} \beta_{44ij} \Delta LREX_{it-j} + \delta_{4i} \varepsilon_{it-1} + \varphi_{4it} \quad (8)$$

The t denotes the time (1996-2013), i denotes the cross sections (1…16 EU15 and Turkey), εit is the error term, and the δ_{ji}[(ect(-1)] is the lagged error correction term. For the short-run causality among the variables, F-test values and null hypothesis (first deference of variables equaled to zero as a group) is compared. If the F-test is statistically significance, the null hypothesis is rejected and decided to short-run causality from independent variables to dependent variable. The lagged error correction term ect(-1) reveals the existence of the long run causality between all the variables. The results are given in Table 7.

Sixth column of the Table 7 shows the lagged error correction term. If the lagged error correction is statistically significance, there is long-run causality from

independent variables to dependent variable. The results show that [(ect(-1)] coefficients of as a dependent variables REX, RIMPCAP and GDP are -0,24, -0,21 and -0,04 respectively. Moreover, those coefficients are statistically significance at 1% level. So that,there is a causality from RAID, RIMPCAP and GDP to REX in the long-run. In addition, there is causality from REX, RAID and GDP to RIMPCAP in the long-run. Finally, there is causality from REX, RAID and RIMPCAP to GDP in the long-run.

Table 7: Panel Granger Causality Test Results

	Short Run Causality				**Long Run Causality**
Variables (1)	ΔLREX (2)	ΔLRAID (3)	ΔLRIMPCAP (4)	ΔLGDP (5)	δ_{ji} (ECT(1)) (6)
ΔLREX		2.628204[#] (0.1050)	2.071154[#] (0.1501)	13.88215[#a] (0.0002)	-0.238290[a] [0.055699]
ΔLRAID	3.216367[#c] (0.0729)		0.720802[#] (0.3959)	0.364259[#] (0.5462)	0.094023 [0.121652]
ΔLRIMPCAP	0.561371[#] (0.4537)	1.867648[#] (0.1717)		2.214960[#] (0.1367)	-0.205509[a] [0.078834]
ΔLGDP	20.97801[#a] (0.0000)	0.616825[#] (0.4322)	1.878772[#] (0.1705)		-0.037439[a] [0.012840]

Notes: The optimal lag based on the schwarz information criterion (SIC). # represents F-statistics for the explanatory lagged variables in first differences. Bracketed values represent p-value of F-statistics. Square bracket represents standard error of the lagged error correction term. a and c denotes significance at the 1% and 10% level.

Conclusion and Discussion

Today, considering the difficulties of competition in international markets and acquiring high market share, creating a sound and sustainable industrial base within the context of Europe 2020 Strategy (*European Strategy for Smart, Sustainable and Inclusive Growth*) is of high importance for raising global competitiveness and exports of especially Small and Medium-Sized Enterprises (SMEs). Whether there is a strong relationship between the state aid carried out within the scope of 2023 Turkey Export Targets and the export performance, if there is, finding out to what extent this interrelation is also significant because it will guide the policy makers.

In line with this purpose, this study aims to determine how state aid for export affects export performances of EU-15 and Turkey by employing Pedroni and Kao co-integration analyses along with error correction model. According to the basic results of this study, Pedroni and Kao co-integration analyses indicate that state aid for export in the EU-15 and Turkey has improved their export performances. It appears that a rise in state aid by 1 %, has led to a 0,18 % rise in export performance. The relationship between real GDP (which is another explanatory variable within the model) and export performance is positive and there exists 1 % statistical meaningfulness effect and it can be told that 1 % growth in real GDP has led to a 0,51 % rise in export performance. Analysis of causation results based on error correction model indicate that there is a *unidirectional* causal relationship which is flowing from state aid for export to export itself in the long run. In addition, it is discovered that there is a bidirectional causal relationship between GDP, machinery-equipment import and export in the long term. Findings gathered evidently show that state aid for export contributes to export performance.

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