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How Do Diesel Price Fluctuations Affect Economic Convergence Over Agriculture Sector Among OECD Countries?

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Abstract

Energy/oil trade has formed large part of the World trade since its usage has been increased in time and became an important factor of production in the World via an important input in agricultural sector along with usage of intensive mechanization in it. Therefore, fluctuations in diesel prices in the World have influenced the cost of production up and down. In oil importing developed and developing countries, another reason of the fluctuations in diesel prices following up increases in world oil price has been induced by higher tax on oil levied by incumbent governments. On the one side, higher tax on oil increases tax income for government; however, this high tax rate negatively can affect agricultural sector in terms of agricultural products' export and import rate, added value, prices of these products etc. In regard of our case in the paper, levied tax rate creates different diesel prices in the member countries of the OECD. The aim of this study initially is to test the relationship between diesel prices and agricultural productivity and then, to search for another chain relationship between the productivity and economic growth rate in developed and developing countries in the OECD. In short, we propose a study which analysis how diesel price fluctuations can affect economic convergence across OECD countries in terms of agricultural productivity in a multifaceted sense.

For this reason, we assemble data for a panel of OECD countries for 1988-2009 to test the variables such as diesel prices, tax rates on diesel, quantity indices of agricultural products' export and import, agricultural good prices, and economic growth rates. It is important to determine how agricultural policy convergences have affected macroeconomic convergences with the sample covering before and after the crises period (from the early 1990s to 2008). We use the World Bank, Eurostat, and FAO databases from different sources. However, by any account, conventional economic wisdom suggests that growth and increasing integration in the body of OECD leads to some sort of economic convergence. This convergence should occur in terms of per-capita output and other important macroeconomic variables, at least in the conditional sense of Barro and Sala-i-Martin (1992, 1995), i. e. controlling for heterogeneity across countries. We conclude that tax levy on diesel oil has affected agricultural products export and import ratios of some countries in the OECD. Hence, this study carries out an important role for policy guidance for future.

Introduction

In the global economy, the effects of crude oil prices have been a notably important issue among the politicians and the economists. The researchers have mostly focused on the effects of oil price shocks on the net importing developed countries. The effects of oil price shocks can differ according to organizational structures, sector compositions and the level of economic development of countries. However, to our knowledge, in current literature the effects of particular levied taxes within oil prices have been ignored.

Compared to other sectors, agriculture is known as a market that is intervened due to its different characteristics in economic structure. Orthodox fiscal policies implemented in agricultural sector along with neo-liberal policies has accompanied intervention resulted negative effects in this sector. While some countries implement or enforce orthodox fiscal policies in agriculture, others do not implement them. Due to these policies, the abatement of backstopping in agriculture proposes the tax boost. To see results of some kind orthodox fiscal policies, this study embraces tax policy which is levied on input prices used in agriculture.

Diesel oil has become one of the most important inputs in agriculture along with intensive usage of mechanization in it. On the other hand in conjunction with oil price surge, diesel oil as a result of intensive mechanization in agriculture becomes an essential cost element in agricultural enterprises. In oil importing countries, the high price of fuel oil results from not only oil price surge but also high tax collection of government. As high tax rates on diesel prices in some oil importing countries affect negatively the agricultural firms, they also affect adversely our international competition in the globalized world. In the research conducted by Aktaş et al. (2010), it is defined that high tax rates on diesel oil negatively affect the agricultural sector (p.23). Therefore, this study aims to investigate the effects of high tax rates on diesel oil, accompanied with orthodox fiscal policies among selected OECD countries, over agricultural sector.

When the average energy price increase of OECD countries between the years 1993-2005 is studied, the differences among the countries are obvious. To illustrate, the energy prices are %5.3 on the basis of USA Dollar, whereas the increase in Turkey is %55.3. With its energy price increase, Turkey is ranked at the first place within OECD countries (OECD, 2007). The diesel oil portion within the cost of some agricultural products of USA, occupying an important position in the world agriculture market, and also, of Turkey (for detail, see Aktas et al. (2010, p.21). When we compare the rates of diesel oil cost within total production cost in some agricultural products in Turkey and in USA; its portion in the agricultural production cost in Turkey is 4 or 5 times more than that of USA (Aktas et al., 2010, p.23).

As happened in most of the oil importing countries, the taxes collected on fuel oil creates an important source of income (PETDER, 2008). When the diesel oil prices are examined in terms of ex-refinery prices and pump sale prices, the tax on diesel oil is found to be in a considerable amount in one country. As a matter of fact, this amount overpasses %50 in some countries (OECD, 2008; Tasyurek, 2007). In the EU countries, different taxation is implemented according to place of usage (Kulu, 2001). In some countries on the condition that it is not used with the exception of agricultural purposes, tax exemption or tax reduction is applied on fuel oil in a considerable extent (Washington State Department of Revenue, 2009). Another example, in Kenya, the effects of the tax collection in energy importation on the economy are examined. In this study, it is presumed that the taxes collected from energy usage increased incomes in Kenya, even though they affect the economic progress in a negative way (Haji ve Haji, 1994:205).

The sharp increases in the price of oil generally have significant influence on both economic activity and macro-economic policies. A great number of economic researches investigate that through which channels the oil price shocks affect economic variables. Numerous economists present theoretical statements which suggest reverse correlation between the variances of oil price and the level of economic activities (Aktas et al., 2010).

Oil price shocks are the indicator of the increase in energy shortages. The increase in oil prices not only slow the economic growth, but also cause an escalation of inflation (Cologni, Monera, 2008, 857). Jimenez and Rodrigez (2008) intended to measure the effects of oil price shocks on the outcome in basic manufacturing industry by using the data of six OECD countries through VAR model. According to the findings of research, in terms of four European Union member countries, the effect of oil price shocks on industrial output is multifarious, whereas the effects are similar for UK and US (Jimenez and Rodrigez, 2008; 3104-3105).

Hamilton (1983) has found statistically significant relation between the reel GSMH growth and the changes in oil price in the US, respectively for the periods 1948-1972 and 1973-1980. The negative correlation between oil price movements and economic growth reflects a causal link from oil price to total economic activity. Some other studies, as well, confirm the findings of Hamilton (cited by Cologni and Monera, 2008, 859).

Kumar (2004) analyzed the effects of oil price shocks for India, a country which imports oil. According to the research results, the increase in reel oil prices negatively affects the industrial production, in linear and non-linear amounts. An increase of %100 in reel oil prices for the economy of India reduces the growth in industrial production %1. Besides, inflation rate and short-term interest rates are also affected positively by the increase in oil prices. That an oil shock occurring in a more stable economy would create more extensive economic results considering a volatile economic environment is stated in the conclusion part (Kumar, 2009;1; 11).

Numerous economic analyses related to the effect of oil shocks start with a production function which is based on the relation between capital, labor, and energy input and the output. While an exogenous decline in power supply reduces the productivity by diminishing it directly, it also reduces indirectly by the way of mark-up pricing, capacity utilization margins, and lower wages. According to these models, there is a linear relationship between the deferment of reel GSMH and the deferment of reel oil prices. These models show recessions as demand pull rather than supply push. Besides, relatively limited number of economic analysis mentions that the demand-side effects of oil price has increased. In these models, an increase in oil prices will raise the global price level under the assumption of wage rigidity of Keynesian theory (Hamilton, 2003: 365).

According to the light of all these related studies which have not raised the issue of tax levy on oil prices, the energy price surge or the high taxes levied on energy prices generates adverse effects on economies. Thus, the purpose of this study is to estimate the effects of the taxes application on diesel oil among some OECD countries on reel rate and export-import ratio of agricultural products. For this reason, next section gives detail information about data and methodology. Third section evaluates test results and finally, concluding remarks comes.

Data and Methodology

This study examines that the effects of tax applied to diesel oil in 9 countries[1] addressed upon export-import ratio in agricultural. For this purpose, in the consideration of the availability of data, the annual data of 9 countries with the period of 1988-2009 are used. In the study, the data of tax amount levied on diesel prices are acquired from Energy Prices and Taxes, published quarterly by the OECD. Besides, to acquire export-import ratio in agricultural sector, export and import values are gotten database of FAO (Food and Agriculture Organization). Finally, in the study, the series of exchange rate are used, and the data is obtained from World Development Indicators, published by the World Bank. To use the data in the econometric analysis, E-views 6.0 Beta, WinRATS Pro 7.0 and Gauss 9.0 packaged software are used to complete the analysis. This study examines the effect of tax applied to diesel oil upon export-import ratio in agricultural sector, and thus, it employes panel data analysis methods. Panel data analysis can be defined as gathering the cross sectional observations in a certain time of period (Baltagi, 2008: 1).

$$lnXM_{i,t} = \beta_0 + \beta_1 lnTAX_{i,t} + \beta_2 lnY_{i,t} + \beta_3 lnREDK_{i,t} + \varepsilon_{i,t} \qquad (1)$$

In this model, InXM represents the export-import ratio; InTAX represents the tax collected on diesel oil; InY represents the agricultural production amount; and InREDK represents the real exchange rate, respectively. In the study, panel cointegration method is used. Unit roots properties of the series have great importance in the method. However, both panel unit root tests and panel cointegration analysis form hypothesizes on whether cross-sectional dependency exists or not according to circumstance, among the groups that comprise panel data set. In this connection, while the first generation panel unit root tests discount the cross-sectional dependency, the second generation unit root tests consider the cross-sectional dependency. Hence, as whether there is a cross-sectional dependency in panel data set or not has a great importance, the presence of cross-sectional dependency in the series to the matter in hand should be principally examined.

To test the cross-sectional dependency, three tests are used in common. First one is CD_{BP} Test which is developed by Breusch-Pagan (1980). This test is significant when N is invariant and T is infinite (T→∞) that is T>N; and it is calculated with the equation number (2):

$$CD_{BP} = T \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{i,j}^2 \qquad (2)$$

[1] Australia, Canada, Denmark, France, Italy, Holland, Turkey, England and United States of America

In this equation, $\hat{\rho}$ shows the approximations of cross-sectional correlations among the remains which are acquired from separate least squares predictions. CD_{BP} test, being developed under the null hypothesis "There is no cross section dependency" possesses N(N-1)/2 degree of freedom and $\chi 2$ range.

The second one of the cross section dependency tests is CD_{LM} test,which is developed by Pesaran (2004). This test is significant in the event of T and N are great (when it goes, N→∞ and T→∞). CD_{LM} Test which possesses a normal distribution under the null hypothesis "There is no cross section dependency" is computed with the equation number (3):

$$CD_{LM} = \sqrt{\frac{1}{N(N-1)}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}(T\hat{\rho}_{i,j}^{2}-1)} \tag{3}$$

The third and the last one of the cross section dependency tests is CD test developed by Pesaran (2004). This test possessing a normal distribution under the null hypothesis "There is no cross section dependency" is valid when T is invariant and N is infinite (N→∞), in other words N>T; and it is computed with the equation number (4):

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{i,j}\right) \tag{4}$$

Unit root properties of the variants are important for the selection of a technique in panel cointegration test. Therefore, unit root properties belonging to the variants are analyzed first generation panel unit root tests (see Levin, Lin, Chu (LLC), 2002) and Cross-Sectionally Augmented Dickey Fuller (CADF) test which is developed Pesaran (2007) from second generation panel unit root tests.

In the panel unit root test developed by LLC (2002), the model number (5) is initially estimated as following:

$$\Delta Y_{i,t} = \delta Y_{i,t-1} + \sum_{L=1}^{p_i}\theta_{iL}\Delta Y_{i,t-L} + \alpha_{mi}d_{mt} + \varepsilon_{i,t} \quad m = 1,2,3. \tag{5}$$

In this model, while Yi,t represents the series to which unit root analysis will be performed, Δ represents the first degree price discrimination, and d_{mt} represents the deterministic vector variable; α_{mi} represents coefficients vector which is defined in the equation number (6) and which points out how a stochastic Yi,t series is constituted.

Model 1: $\Delta Y_{i,t} = \delta_{1,i}Y_{i,t-1} + u_{1,i,t}$ (No Intercept and No Trend Model)
Model 2: $\Delta Y_{i,t} = \alpha_{0,i} + \delta_{2,i}Y_{i,t-1} + u_{1,i,t}$ (Only Intercept Model) (6)
Model 3: $\Delta Y_{i,t} = \alpha_{0,i} + \alpha_{1,i}t + \delta_{3,i}Y_{i,t-1} + u_{1,i,t}$ (Intercept and Trend Model)

LLC (2002) panel unit root test bases upon the hypotheses that cross sections are independent; the fixed effect changes from one cross-section to the other; and the coefficient δi is homogeneous for every cross section in panel data set. Under these hypotheses, the null hypothesis tests that "panel data set does contain unit root (H0: δi=0)", while alternative set are also included. In this sense, the panel unit root test, named as Cross-Sectionally Augmented Dickey Fuller (CADF) Test, developed by Pesaran (2007) is used as mentioned earlier. CADF panel unit root test is based on the regression model test, located in the equation number (8).

$$\Delta y_{i,t} = a_i + b_i y_{i,t-1} + c_i \bar{y}_{t-1} + d_i \Delta \bar{y}_t + \varepsilon_{i,t} \quad (7)$$

$$\bar{y}_t = N^{-1} \sum_{j=1}^{N} y_{jt} \quad (8)$$

$$\Delta \bar{y}_t = N^{-1} \sum_{j=1}^{N} \Delta y_{jt} \quad (9)$$

In this model, $\bar{y}_t$ is present as in the equation number (8), and $\Delta \bar{y}_t$ is present as in the equation number (9); and $\varepsilon_{i,t}$ represents the error term. The average of cross-section$\bar{y}_t$, situated in the regression model, its lagged values ($\bar{y}_{t-1}, \bar{y}_{t-2}, \ldots$) and $\Delta \bar{y}_t$ are included in the regression model as a proxy which makes cross-sectional dependency taken into consideration, depending upon general factor structure (Pesaran, 2007: 269).

In Pesaran's (2007) CADF panel unit root test, the null hypothesis tests the proposition of "The series belonging to each cross-section that structures the panel does contain unit root" (Ho: bi=0 for each cross section); while the alternative hypothesis tests the proposition of "The certain part of cross-section that structures the panel does not contain unit root" (H_1:b_i<0 (i=1,2,…,N1) , b_i=0 (i=N1+1, N1+2, …, N)) (Pesaran, 2007: 267-269).

That the critical values needed for the test of hypotheses are given in Pesaran (2007: 274-275-276); and the bi coefficients in the CADF test are CADF statistics, By comparing the t-statistics belonging to them with the current critical values it is determined whether the series of each cross section contains unit root or not. To test whether the panel data set is stationary or not, the average of CADF statistics is calculated, and cross-sectionally augmented IPS (CIPS) test statistic is acquired as in (10).

$$CIPS = N^{-1} \sum_{i=1}^{N} CADF_i \sim N(0,1) \quad (10)$$

Finally, whether the panel data set contains unit root is determined by comparing CIPS given in Pesaran (2007: 279-280-281) by the critical values.

In this study, to test the cointegration relation among the variables, Pedroni (1999) panel integration test, which is frequently used within the panel integration analyses, is employed. In stationarity testing, Pedroni panel cointegration test presents validity when the series have the situation of I(1), in other words when they are stationary at first order. Moreover, in Pedroni (1999) panel cointegration test, the series should not have the cross-sectional dependency. However, if the series have cross-sectional dependency, the effect of cross-sectional dependency can be dispelled by clearing of each cross section for every variable from its time average. In this case, Pedroni (1999) panel cointegration test can be used. The first stage in Pedroni's test is estimated by the following Ordinary Least Squares model:

$$Y_{i,t} = \alpha_i + \delta_i t + \beta_i X'_{i,t} + e_{i,t} \tag{11}$$

In this equation, when the first variation are taken, Y and X become stable variable; and t represents the trend and αi represents the fixed effects. From the estimated model, the error terms ($e_{i,t}$) are acquired and at the second stage, the error term ($\eta_{i,t}$) is acquired from OLS assumption of the model number (12).

$$\Delta Y_{i,t} = \beta_i \Delta X'_{i,t} + \eta_{i,t} \tag{12}$$

At the third stage, the long-run variance (L^2_{11i}) of error term ($\eta_{i,t}$) is calculated by using Newey-West (1987) estimator. At the fourth stage, from the separate estimations for non-parametric tests and parametric tests, the variance of error terms is acquired. For non-parametric tests, the model number (13) is estimated, and the variance of error terms ($\hat{u}_{i,t}$) and long-run variance ($\hat{\sigma}_i^2$) are obtained.

$$\hat{e}_{i,t} = \hat{\gamma}_i \hat{e}_{i,t-1} + \hat{u}_{i,t} \tag{13}$$

Then, the term ($\hat{\lambda}_{i,t}$) is obtained by using the equation $\hat{\lambda}_{i,t} = 1/2\left(\hat{\sigma}_i^2 - \hat{s}_i^2\right)$. For parametric tests, the model number (14) is estimated and the variance of the variance ($\hat{s}_i^{*2}$) of error terms ($\hat{u}^*_{i,t}$) is obtained.

$$\hat{e}_{i,t} = \hat{\gamma}_i \hat{e}_{i,t-1} \sum_{k=1}^{K_i} \hat{\gamma}_{i,k} \Delta \hat{e}_{i,t-k} + \hat{u}^*_{i,t} \tag{14}$$

At the fifth and the last stage, seven panel cointegration tests – on condition that first four have internal sections and the last three have intersections--developed by Pedroni (1999) are formulated with the help of the equations below:

Internal section panel cointegration tests:

1. Panel v-statistics:

$$T^2 N^{3/2} Z_{\hat{v}_{N,T}} \equiv T^2 N^{3/2} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1} \tag{15}$$

2. Panel ρ-statistics:

$$T\sqrt{N} Z_{\hat{\rho}_{N,T^{-1}}} \equiv T\sqrt{N} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right) \tag{16}$$

3. Panel t-statistics: (Non-Parametric)

$$Z_{t_{N,T}} \equiv \left(\tilde{\sigma}_{N,T}^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right) \tag{17}$$

4. Panel t-statistics: (Parametric)

$$Z^*_{t_{N,T}} \equiv \left(\tilde{s}_{N,T}^{*2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}^*_{i,t-1} \Delta \hat{e}^*_{i,t} \tag{18}$$

Intersections panel cointegration tests:

5. Group ρ-statistics:	$$TN^{-1/2}\tilde{Z}_{\hat{\rho}N,T^{-1}} \equiv TN^{-1/2}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{e}_{i,t-1}^{2}\right)^{-1}\sum_{t=1}^{T}(\hat{e}_{i,t-1}\Delta\hat{e}_{i,t}-\hat{\lambda}_{i})$$	(19)
6. Group t-statistics: (Non-Parametric)	$$N^{-1/2}\tilde{Z}_{t_{N,T}} \equiv N^{-1/2}\sum_{i=1}^{N}\left(\hat{\sigma}_{i}^{2}\sum_{t=1}^{T}\hat{e}_{i,t-1}^{2}\right)^{-1/2}\sum_{t=1}^{T}(\hat{e}_{i,t-1}\Delta\hat{e}_{i,t}-\hat{\lambda}_{i})$$	(20)
7. Group t-statistics: (Parametric)	$$N^{-1/2}\tilde{Z}_{t_{N,T}}^{*} \equiv N^{-1/2}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{s}_{i}^{*2}\hat{e}_{i,t-1}^{*2}\right)^{-1/2}\sum_{t=1}^{T}\hat{e}_{i,t-1}^{*}\Delta\hat{e}_{i,t}^{*}$$	(21)

In Pedroni (1999) panel cointegration test, the null hypothesis examines the argument of "There is no cointegration relation for all the cross sections"; the alternative hypothesis on the other hand examines the argument of "there is a cointegration relation for all the cross sections". Along these tests have the standard normal distribution, panel v-statistics shows positively skewed distribution and the others show negatively skewed distribution.

When it is extrapolated that there is a cointegration relation among the variables, how to acquire long-run coefficients of variables matters. Panel DOLS (Panel Dynamic Ordinary Least Squares) estimators which have found an area of usage in panel data analysis in recent years and were developed by Pedroni (2001) are used in this study. The reason why Panel DOLS estimators have found quite a lot area of usage in econometric literature in recent years is that Panel DOLS estimators are more efficient when compared to Panel OLS estimator, in terms of overcoming the internality between the independent variables and the error terms, and the problem of auto-coupling of error terms. Panel DOLS estimator suggested by Pedroni (2001) is implemented with the number (22) regression estimator:

$$y_{i,t} = \alpha_i + \beta_i x_{i,t}' + \sum_{k=-K_i}^{K_i}\gamma_{i,k}\Delta\beta_{i,t-k} + \mu_{i,t}^{*} \qquad (22)$$

In the equation number (22), $(-K_i)$ and (K_i) represent leads and lags. In Panel DOLS, it is assumed that the cross sections of panel do not contain cross-sectional dependency. At the first stage in Panel DOLS, to acquire the panel cointegration vector, the equation number (22) is estimated for each cross section. At the second stage, arithmetic mean of these estimations belonging to each cross section is calculated as in the equation number (23) and then panel cointegration coefficients are obtained.

$$\hat{\beta}_{GD}^{*} = N^{-1}\sum_{i=1}^{N}\beta_{D,i}^{*} \qquad (23)$$

$(\beta_{D,i}^{*})$ which is presented in the equation number (23) represents the cointegration coefficients obtained from DOLS estimators that belong to each cross section. The relevance of Panel DOLS estimators is defined by t-statistics and t-statistics is stated as in the equation number (24):

$$t_{\hat{\beta}_D^{*}} = N^{-1/2}\sum_{i=1}^{N}t_{\hat{\beta}_{D,i}^{*}} \qquad (24)$$

In the equation number (23), ($t_{\hat{\beta}^{*}_{D,i}}$) represents t-statistics concerning the cointegration coefficient which is obtained from DOLS estimator for each cross section.

Test Results

When the panel cointegration test analysis is finalized, it becomes more of an issue of whether there is a relation among the cross sections in the panel data set or not. For this reason, at first whether the series contain cross-sectional dependency is examined in this study. According to the test results given in Table 1, it is strongly acknowledged in three tests that there is a cross-sectional dependency in the series of InTAX and InREDX.

However, an obvious result with regard to the existence of cross-sectional dependency in the series of InXM and InY cannot be observed. With reference to these results, panel unit root tests and panel cointegration analyses are performed in this study; supposedly the series contain cross-sectional dependency.

Table 1: Cross-Sectional Dependency Test Results

	CDBP	CDLM	CD
lnXM	47,413 (0,096)*	1,345 (0,089)*	-1,092 (0,137)
lnTAX	144,835 (0,000)***	12,826 (0,000)***	3,635 (0,000)***
lnY	48,774 (0,076)*	1,506 (0,066)*	-2,271 (0,012)**
lnREDK	103,822 (0,000)***	7,993 (0,000)***	-1,910 (0,028)**

Note: The values inside the parentheses show the probability values. ***, ** and * respectively represents statistically significance at the level of %1, %5 and %10.

As there is a cross-sectional dependency in the series, unit root properties of the series are examined by both first generation panel unit root tests and second generation panel unit root tests. When the results presented in Table 2 are examined, all the series become stable when the first degree discrimination is taken, in other words, they show the characteristic of I(1) according to both LLC panel unit root test and CIPS test results.

Table 2: Panel Unit Root Test Results

	LLC	CIPS
lnXM	-0,710	-2,260*
lnTAX	-1,482*	-3,109***
lnY	-1,262	-1,165
lnREDK	1,084	-1,843
ΔlnXM	-5,976***	-3,536***
ΔlnTAX	-10,365***	-4,424***
ΔlnY	-15,245***	-3,352***
ΔlnREDK	-3,446***	-2,757***

Note: A stable term is added to the estimated models in the tests. ***, ** and * respectively represents statistically significance at the level of %1, %5 and %10. In LLC test, the lag length is determined according to Modified Schwarz Information Criterion, and is obtained as of 3 maximum. Also, in CIPS test, it is obtained as of 3 maximum. In LLC test, Barlett Kernel method is used and the bandwith is defined by Andrews method.

The critical values for CIPS test are gathered from Pesaran (2007: 280) and then for the significance at the level of %1, %5 and %10, they are determined respectively as -2,60, -2,34 and -2,21.

In the study, Pedroni (1999) panel cointegration test results for the model numbered (2) is given in Table 3. According to the test results, the four of the seven test statistics given by Pedroni are found significant at the level of 5% at least. This case shows that there is a long-run cointegration relation among the variables in the model.

Table 3: Pedroni (1999) Panel Cointegration Test Results

Test Statistics	
Panel v statistics	0,310
Panel ρ statistics	-0,665
Panel t statistics (Non-parametric)	-2,940***
Panel t statistics (Parametric)	-2,178**
Group ρ statistics	0,179
Group t statistics (Non-parametric)	-3,902***
Group t statistics (Parametric)	-2,450**

Note: In the cointegration test, the maximum lag length is taken as 3. ***, ** and * respectively show that the statistics belonging to the significance levels at %1 (+/-2,326), %5 (+/-1,645) and %10 (+/-1,282) reject the null hypothesis.

Finally, as cointegration relation among the variables is established, the long-run coefficients of variables are determined by using Panel DOLS estimator. According to the results presented in Table 4 below, a 1% increase in the tax on diesel oil decreases the agricultural export-import ratio by 0,017 % in long-run; whereas a 1% increase in exchange rate increases the agricultural products' export-import ratio by 0,029 % in long-run. On the other hand, we did not come up with a statistically significant relation between the agricultural production amount and the export-import ratio.

Table 4: Panel DOLS Results

Dependent Variable lnXM	Coefficient	t-statistics
lnTAX	-0,017	-2,362***
lnY	-0,033	-0,642
lnREDK	0,029	3,919***

Note: ***, ** and * respectively represents statistically significance at the level of %1, %5 and %10.

Concluding Remarks

Energy, as happened in every sector, has become one of the most important elements in agricultural sector. Especially, with the intensive mechanization in agriculture, the diesel oil usage has been one of the essential inputs in agricultural sector. In numerous micro-economic analyses on this issue, energy comes forward as the most important political factor.

On the one hand, the high tax levy on diesel oil in oil importing countries provides an important source of tax income for that country; on the other hand, it creates a negative effect on the economic efficiency. Particularly along with orthodox fiscal policies, high taxes and the abatement of support feature this case.

In the panel cointegration analysis carried out in this article, whether there is a relation between the cross sections in panel data set becomes more of an issue and therefore, at first, whether the series contain cross-sectional dependency is examined in this study. As the result of analysis conducted, in the study panel unit tests and panel cointegration analyses are carried out, hypothesizing that series contain cross-sectional dependency and it is estimated that there is a long-run cointegration relation among the variables in the model.

In the analysis carried out, as there is no the cointegration relation among the variables, the long-run coefficients of variables are estimated by using Panel DOLS estimator. In the estimation, a 1% increase which takes place in the tax on diesel oil decreases the agricultural export-import ratio by 0,017 % in long-run; whereas a 1% increase in exchange rate increases the agricultural export-import ratio by 0,029 % in long-run. On the other hand, there is not a statistically significant relation between the agricultural production amount and the export-import ratio.

In conclusion, it is estimated that the tax levy on diesel oil has negatively affected the agricultural export-import ratio of the OECD countries: Australia, Canada, Denmark, France, Italy, Holland, Turkey, England and United States of America negatively; whereas the reel exchange affects it positively. Therefore, the first effect creates some divergence; however, the other one did convergence among mentioned countries above. By the way, we should run another test to sort out the new effects of tax levy on diesel oil among countries. For policy implication, in these countries, the abatement of agricultural dependency, and heterodox fiscal policies instead of orthodox fiscal policies is suggested. To get this study reach to further level, we think of that the separation of developed and developing countries in terms of oil importing and exporting condition may guide us different policy implications.

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