

THE LONG-RUN RELATIONSHIP BETWEEN EXPORTS AND IMPORTS IN THE OTTOMAN STATE: 1840-1913*

OSMANLI DEVLETİNDE İHRACAT VE İTHALAT ARASINDAKİ UZUN DÖNEM İLİŞKİSİ: 1840-1913

Rahmi YAMAK**
Nebiye YAMAK***
Sinem KOÇAK****

Abstract:

In the 1830's the Ottoman government initiated a series of liberalization measures, including several trade agreements, aimed at integrating domestic economy to the world economy. The agreement known as the Treaty of Balta Liman has been subject to numerous debates. Many scholars argue that this agreement was an indication of the economic collapse in the State because of worsening the trade account and external debt position and also the liberalization reforms caused the State to loose political and economic independence and to collapse soon afterwards. The purpose of this paper is to investigate the long-run relationship between exports and imports in the Ottoman state for the period of 1840-1913 using Engle and Granger (1987) and Johansen and Juselius (1990) co-integration tests to determine whether the macroeconomic policies and liberalization reforms applied by the State were effective in making the trade deficit a short-run phenomenon. The co-integration test results indicate that there exists a stable long-run relationship between exports and imports of the Ottoman State for the period of 1840-1913. The existence of long-run relationship between exports and imports in the Ottoman State implies that the Treaty of Balta Liman is not responsible for worsening external debt position of the Ottoman State.

Keywords: Exports, Imports, Treaty of Balta Liman, Co-integration.

Öz:

Osmanlı Devleti, 1830'lu yıllarda bir dizi ticari serbestleşme hareketi gerçekleştirerek ekonomiyi dünya ekonomisine entegre etmeyi amaçlamıştır. Balta Limanı olarak bilinen ticaret antlaşması ise birçok tartışmayı da beraberinde getirmiştir. Bu antlaşma dış ticaret dengesi ve dış borç pozisyonunu olumsuz etkileyen bir gösterge olarak kabul görmesi ve içerdiği serbestleşme reformlarıyla devletin ekonomik ve politik bağımsızlığını kaybetmesine yol açtığı gerekçesiyle birçok araştırmacı tarafından tartışılmaktadır. Bu çalışmanın amacı 1840-1913 dönemi itibarıyla Osmanlı Devleti'nde uygulanan makroekonomik politikaların ve serbestleşme reformlarının, kısa dönem dış ticaret açığı olgusu oluşumunda etkili olup olmadığını, ihracat ve ithalat arasındaki uzun dönem ilişkisi Engle ve Granger (1987) ve Johansen ve Juselius (1990) eşbütünleşme testlerini kullanarak belirlemektir. İhracat ve ithalat arasında uzun dönem ilişkinin mevcut olması Osmanlı Devleti'nin dış borç pozisyonunun kötüleşmesinde Balta Limanı Antlaşması'nın etkin olmadığını göstermektedir.

Anahtar Kelimeler: İhracat, İthalat, Balta Limanı Antlaşması, Eş-Bütünleşme.

* Makale Gönderim Tarihi: 24.06.2016

Makale Kabul Tarihi: 18.08.2016

** Ph.D., Professor, Karadeniz Technical University, Department of Econometrics, yamak@ktu.edu.tr.

*** Ph.D., Professor, Karadeniz Technical University, Department of Economics, nyamak@ktu.edu.tr.

**** Research Assistant, Karadeniz Technical University, Department of Econometrics, sinemkocak@ktu.edu.tr.

INTRODUCTION

In the 1830's the Ottoman government initiated a series of liberalization measures, including several trade agreements, aimed at integrating domestic economy to the world economy. The agreement in August of 1838 between the Ottoman State and England, known as the Treaty of Balta Liman, has been subject to numerous debates. According to the terms of the Treaty, the Ottoman State removes all monopolies and lets British merchants to have full access to all Ottoman markets. Many scholars argue that this treaty was an indication of the economic collapse in the State. There has been a widespread agreement on that worsening the trade account and external debt position, the liberalization reforms caused the state to loose political and economic independence and to collapse soon afterwards.

Some recent studies in the literature have employed co-integration analysis to investigate whether macroeconomic policies are effective in making exports and imports converge toward equilibrium in the long-run. The existence of the co-integration relationship with co-integrating coefficient equal to unity between exports and imports is usually interpreted as an indication of the effectiveness of macroeconomic policies in bringing exports and imports to an equilibrium in the long-run. Bahmani-Oskooee (1994) investigated Australia's experience for the period of 1960-1992 and found that Australian imports and exports are co-integrated with the slope coefficient very close to unity in the long-run. In another study, Bahmani-Oskooee and Domac (1995) reached somewhat different conclusion for the case of Turkey. When they employed total exports and imports, they found no long-run relationship between total exports and imports, but between non-raw material exports and imports. Using quarterly data and Johansen co-integration approach, Arize (2002) found that exports and imports are co-integrated in 35 of 50 countries for the period of 1973-1998. In his paper, Rahman (2011) employed Engle-Granger and Johansen co-integration tests for the cases of Indonesia and Malaysia. He reported no long-run relationship between exports and imports in Indonesia. But his empirical findings supported the existence of the long-run relationship between two variables for the case of Malaysia. Babatunde (2014) detected the existence of the long-run relationship for Nigeria. His co-integration tests demonstrated that exports and imports in Nigeria are co-integrated with the co-integrating coefficient nearly equal to unity. Recently, Husein (2014) showed that that there is no long-run relationship between two variables for Algeria, Sudan, Syria, Egypt, and Morocco. But, in the same study the co-integration relationship was found for Jordan, Iran, Israel and Tunisia.

The purpose of this paper is to investigate the long-run relationship between exports and imports in the Ottoman state for the period of 1840-1913 to determine whether the macroeconomic policies and liberalization reforms, especially the terms of Treaty of Balta Liman, applied by the State were effective in making the trade deficit a short-run phenomenon.

1. METHODOLOGY AND DATA

As an initial step in the co-integration test, stationarity tests must be performed for each of the variables in question. There is now a growing consensus that the stationarity test procedure due to Dickey and Fuller (1979) has superior small sample properties compared to its alternatives. Therefore, in this study, the Augmented Dickey-Fuller (ADF) test procedure was employed for implementing stationarity tests. The ADF test procedure requires to run the following regression for both level and first difference of each variable, separately. If necessary, the ADF regression can be run for the higher levels of the variables.

$$\Delta LX_t = \alpha + \gamma trend + \Phi LX_{t-1} + \sum_{i=1}^m \delta_i \Delta LX_{t-i} + w_t \quad (1)$$

where LX is the logarithmic form of the variable in question, α and trend are a constant term and a time trend, respectively, Δ is the first difference operator, w is the white noise residual and m is the lagged values of ΔLX that are included to allow for serial correlation in the residuals. In the context of the ADF test, a test for nonstationarity of the series, LX, amounts to a t-test of $\Phi=0$. The alternative hypothesis of stationarity requires that Φ be significant negative. If the absolute value of the computed t-statistics for Φ exceeds the absolute critical value given in MacKinnon (1990) then the null hypothesis that the log level of X series is not stationary must be rejected against its alternative. If, on the other hand, it is less than the critical value, it is concluded that the logarithmic level of X, LX, is nonstationary. In this case, the same regression must be repeated for the first difference of the logarithmic value of the series.

If two variables (exports and imports) are not stationary in their levels but in their first or higher differences, performing co-integration tests for both variables is theoretically possible. The long-run relationship between exports and imports is investigated by using the tests for co-integration developed in Engle and Granger (1987), Johansen (1988) and Johansen and Juselius (1990) separately. Engle and Granger co-integration test (hereafter EG) supposed a two-step estimation procedure. If the unit root tests indicate that both of the variables in consideration are I(1), the long-run equilibrium relationship can be estimated by using the equation (2).

$$LY_t = \beta_0 + \beta_1 LX_t + \varepsilon_t \quad (2)$$

The second step in EG approach is to determine if these variables are co-integrated or not. If the residual series obtained from the equation (2), $\hat{\varepsilon}_t$, is found to be stationary, it is then said that LY_t and LX_t sequences are co-integrated. If the residual series is not stationary, the variables in consideration are not co-integrated.

The Johansen method applies the maximum likelihood procedure to determine the presence of co-integrating vectors in nonstationarity time series. This procedure sets up the nonstationary time series as a vector autoregression (VAR).

$$\Delta Z_t = C + \sum_{i=1}^K \Gamma_i \Delta Z_{t-i} + \Pi Z_{t-1} + \eta_t \quad (3)$$

where Z is a vector of nonstationary (in log levels) variables and C is the constant term. The information on the coefficient matrix between the levels of the series Π is decomposed as $\Pi = \alpha\beta'$ where the relevant elements of the α matrix are adjustment coefficients and the β matrix contains the co-integrating vectors. Johansen and Juselius (1990) specify two likelihood ratio test statistics to test for the number of co-integrating vectors. The first likelihood ratio statistic for the null of exactly “ r ” co-integrating vectors against the alternative of “ $r+1$ ” vectors is the maximum eigenvalue statistic. The second statistic for the hypothesis of at most “ r ” co-integrating vectors against the alternative is the trace statistic. Critical values for both test statistics are tabulated in Johansen and Juselius (1990). The number of lags applied in the co-integration test are based on the information provided by the multivariate generalization of the Akaike Information Criteria (AIC).

The data used in this study are annual and cover the period of 1840-1913. All data come from “Ottoman Foreign Trade in the 19th century” prepared by Pamuk (1995)¹. Both variables are measured in both million of British pound sterling and Ottoman lira. XS and MS are the symbols used for nominal exports and imports expressed in million of British pound sterling respectively while XL and ML for nominal exports and imports expressed in million of Ottoman lira, respectively.

2. EMPIRICAL FINDINGS

Table 1 presents the results of the ADF test with and without the inclusion of a trend detecting a unit root in the levels and first differences of the variables.

Table 1: ADF Test Results

Variable	ADF-tstatistics (without trend)	p	ADF-tstatistics (with trend)	p
Log XS	-1.665	2	-2.186	1
Log MS	-1.470	2	-1.963	2
Log XL	-1.926	2	-2.318	1
Log ML	-1.521	2	-1.997	2
Δ Log XS	-6.942	1	-6.901	1
Δ Log MS	-7.728	1	-7.790	1
Δ Log XL	-7.564	1	-7.626	1
Δ Log ML	-7.981	1	-7.949	1

Note: The critical values of the ADF statistics with trend and without trend at the 5% level of significance are -3.472 and -2.902, respectively. These values are from MacKinnon (1990). p is the selected lag lengths of dependent variable in the ADF regression by using the information criterion provided by Akaike (1979).

The calculated ADF- t statistics for the levels of the variables indicate that the nonstationarity of the logarithm of the levels of exports and imports can not be rejected at the 5% level of significance, while the calculated ADF- t statistics for first difference of each series reject the null hypothesis which implies the presence of the unit root for all

¹ Data source is the first volume of a new project called the Historical Statistics Series being published by the State Institute of Statistics of Turkey in 1995. Although data cover the period of 1830-1913, the period of 1830-1839 is excluded because of the reliability of data.

series at the 5% level. However, the growth rates of nominal exports and imports appear to be stationary according to the ADF test statistics calculated for the first differences of the variables.

As required by two-step procedure of Engle and Granger (1987) the static regression of logarithm of the levels of exports on a constant and logarithm of the levels of imports was run in order to test co-integration relationship. The results are shown in the Table 2. The residuals of the static regression equation, $\hat{\epsilon}_t$, was used for the construction of the ADF regression which, in this case, tests the rejection of the null of non-co-integration in favor of the hypothesis of co-integration. As in the unit root tests, the lag structure is determined by means of the Akaike information criterion. The resulting number of lags was found to be one for all regressions.

Table 2: Engle-Granger Co-Integration Test Results

Dependent Variable	Independent Variable	Constant**	Slope	R ²	ADF-t statistics*
Log XS	Log MS	0.037 (0.110)	0.935 (0.039) ^a	0.88	-4.380 [1]
Log MS	Log XS	0.275 (0.107) ^b	0.949 (0.039) ^a	0.88	-4.529 [1]
Log XL	Log ML	0.086 (0.101)	0.926 (0.035) ^a	0.91	-4.204 [1]
Log ML	Log XL	0.177 (0.102) ^c	0.981 (0.036) ^a	0.91	-4.263 [1]

* The critical value of the ADF-t statistics in co-integration equation is -3.422 at the 5% level of significance. This value is from MacKinnon (1990). Number inside the bracket is the lag length of dependent variable in the ADF regression.

** Number inside the parenthesis is the standard error of the coefficient estimate. ^a Significant at the 1% level. ^b Significant at the 5% level. ^c Significant at the 10% level.

As seen from Table 2, the calculated ADF-t statistics exceed the critical value given in MacKinnon (1990). Similar results were obtained from the application of the two-step procedure to the inverse equation in which logarithm of the levels of imports is dependent variable. Because it is not possible to accept the null hypothesis, the analysis of the data points to the conclusion that, in the long-run, exports and imports of the Ottoman Empire moved together, despite possible divergence in the short-run.

Tables 3 and 4 present test results of Johansen-Juselius co-integration technique.

Table 3: The Johansen-Juselius Co-Integration Test Results: [Log XS, Log MS]

H ₀	H ₁	Maximal eigenvalue	95% critical value
r=0	r=1	29.46	14.90
r≤1	r=2	3.29	8.17
H ₀	H ₁	Trace statistics	95% critical value
r=0	r≥0	32.76	17.95
r≤1	r=2	3.29	8.17
Co-integrating vectors		[Log XS, Log MS] [-1.000 1.008]	[Log MS, Log XS] [-1.000 0.992]

Note: The normalized cointegrating vectors are shown inside the brackets. The critical values are from Johansen and Juselius (1990).

Table 4: The Johansen-Juselius Co-Integration Test Results: [Log XL, Log ML]

H_0	H_1	Maximal eigenvalue	95% critical value
$r=0$	$r=1$	21.43	14.90
$r \leq 1$	$r=2$	3.67	8.17
H_0	H_1	Trace statistics	95% critical value
$r=0$	$r \geq 1$	25.11	17.95
$r \leq 1$	$r=2$	3.67	8.17
Co-integrating vectors		[Log XL, Log ML]	[Log ML, Log XL]
		[-1.000 0.963]	[-1.000 1.038]

Note: The normalized co-integrating vectors are shown inside the brackets. The critical values are from Johansen and Juselius (1990).

Table 3 presents the results for the variables expressed in British pound sterling, and Table 4 for the variables expressed in the Ottoman lira. The lag lengths of the VAR models were determined by testing various lag lengths against the alternative of one less lag. The method of testing was the likelihood ratio test corrected for small samples using Sims' (1980) procedure. The resulting lag lengths were found to be one for both models. The calculated test statistics of maximal eigenvalue and trace indicate the presence of one non-zero vector at 5% level for both measures of the variables. In other words, co-integrating test results reveal the presence of stationary long-run relationship between exports and imports. From the normalized equations of the estimated co-integrating vectors, the slope appears to be positive and close to unity. The positive slope means that an increase (decrease) in exports results an increase (decrease) in imports and/or that an increase (decrease) in imports results an increase (decrease) in exports. In addition, the unit slope indicates that making the trade deficit a short-run phenomenon, exports and imports converge toward equilibrium in the long-run. Thus, the series of liberalization measures were effective in integrating the Ottoman economy to the world economy. Also the findings showed that trade deficits of the Ottoman State were sustainable for the period of 1840-1913. Finally, it can be concluded that the Treaty of Balta Liman which has been subject to numerous debates in Ottoman State history was not the primary reason causing the state to loose political and economic independence.

CONCLUSION

In this paper, co-integration analysis is used to see whether macroeconomic policies and liberalization reforms including several free trade agreements of the 1830's in the Ottoman State were effective in bringing exports and imports to an equilibrium in the long-run and thus in making the trade deficit a short-run phenomenon.

Our results show that exports and imports of the Ottoman State are co-integrated for the period of 1840-1913 and that long-run coefficient is almost equal to unity. The existence of the stable long-run relationship with coefficient equal to unity indicates that macroeconomic policies, especially free trade agreements in 1830's, do not appear to be responsible for worsening external debt position of the Ottoman State.

REFERENCES

- Akaike, H. (1979). A Bayesian Extension of the Minimum AIC Procedure of Autoregressive Model Fitting, *Biometrika*, 66, 237-242.
- Arize, A.C. (2002). Imports and Exports in 50 Countries Tests of Co-integration and Structural Breaks, *International Review of Economics and Finance*, 11, 101-105.
- Babatunde, M. A. (2014). Are Exports and Imports Cointegrated? Evidence from Nigeria, *Journal of International and Global Economic Studies*, 7(2), 45-67.
- Bahmani-Oskooee, M. (1994). Are Imports and Exports of Australia Co-integrated, *Journal of Economic Integration*, 9, 525-533.
- Bahmani-Oskooee, M & Domac, I. (1995). The Long-Run Relation Between Imports and Exports in an LDC: Evidence from Turkey, *Metu Studies in Development*, 22, 177-189.
- Dickey, D.A. & Fuller, W.A. (1979). Distribution of the Estimators for Autoregressive Series with a Unit Root, *Journal of the American Statistical Association*, 74, 427-431.
- Engle, R.F. & Granger, C.W.J. (1987). Co-integration and Error Correction: Representation, Estimation and Testing, *Econometrica*, 55, 251-76.
- Husein, J.G. (2014). Are Exports and Imports Cointegrated? Evidence from Nine Mena Countries, *Applied Econometrics and International Development*, 14(1), 123-132.
- Johansen S. (1988). Statistical Analysis of Cointegrating Vector, *Journal of Economic Dynamic and Control*, 12, 231-254.
- Johansen, S. & Juselius, K. (1990). Maximum Likelihood Estimation and Inference on Co-integration-with Applications to the Demand for Money, *Oxford Bulletin of Economics and Statistics*, 52, 169-210.
- MacKinnon, J.G. (1990). Critical Values for Co-integration Tests, *Economic Discussion Paper No. 90-4*.
- Pamuk, S. (1995). Ottoman Foreign Trade in the 19th century, Historical statistics series, *State Institute of Statistics of Ankara, Turkey*, 1, 61-77.
- Rahman, M. Z. (2011). Existence of Exports-Imports Co-integration: A Study on Indonesia and Malaysia, *International Business Research*, 4(3).
- Sims, C.A. (1980). Macroeconomics and Reality, *Econometrica*, 48, 1-49.

