

THE IMPACT OF EXPORT ON EMPLOYMENT: PANEL DATA ANALYSIS FOR REGIONAL BASE IN TURKEY

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Abstract

This study examines the impact of export on regional employment in Turkey. To this end, using the annual export and employment figures of Regional Level 2 (Sub-regions) in Turkey for the 2005-2016 period, the study reveals that regional export in Turkey affected the regional employment rate positively. That is, an increase in regional export activity will lead to an increase in regional employment. This finding indicates that developing policies that will help promote the incentives in regional export rate correspondingly results in the employment rate. It appears that one of the leading problems in developing countries which have limited resources like Turkey is to see the gravity of the significance of the incentive policies that will promote employment.

Keywords: *Regional Export, Regional Employment, Panel Data, Turkey.*

İHRACATIN İSTİHDAMA ETKİSİ: TÜRKİYE İÇİN BÖLGESEL BAZDA PANEL VERİ ANALİZİ

Öz

Çalışmada Türkiye’de ihracatın istihdam üzerindeki etkisi bölgesel bazda inceleme konusu yapılmıştır. Bu amaç doğrultusunda Türkiye Düzey 2’de yer alan tüm alt bölgelerin yıllık ihracat ve istihdam verileri 2005-2016 dönemi için kullanılmıştır. İhracatın istihdama etkisi panel veri yöntemi yardımı ile araştırılmıştır. Elde edilen bulgulara göre Türkiye’de bölgesel ihracatın

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bölgesel istihdamı pozitif etkilediđi belirlenmiştir. Dolayısıyla elde edilen bu bulgu, bölgesel ihracat artışının bölgesel istihdamı artıracakđı sonucu ortaya koymaktadır. Bu bulgunun önemi istihdamı artırmaya yönelik politikalarda bölgesel ihracatın artırılmasına yönelik teşviklerin istihdamın artışına da etki edeceğinin belirlenmesidir. Nitekim Türkiye gibi kaynakları sınırlı olan geliřmekte olan ülkelerde en önemli sorunlardan biri olan istihdamın artırılmasına yönelik yatırımlarda ihracatı teşvik politikalarının ne denli önemli olduğunu görölmektedir.

Anahtar Kelimeler: *Bölgesel İhracat, Bölgesel İstihdam, Panel Veri, Türkiye.*

Introduction

Unemployment is one of the most common and significant problems all around the world, and this reality increases the value of research geared towards the solution of the problem. Therefore, this issue stands as one of the most significant concerns for both policy-makers and researchers. The increasing production rates of countries support export rates which are in line with their search for new markets. Thus, export is a predictor of increased production rates, income level, scale economy, technological development and increased production.

Generally, the relationship between export and employment is explained through Heckscher -Ohlin (HO) model². According to the HO model, if a country has a more intensive production factor, it uses that factor more intensively in production and thus produces comparatively more advantageously than other countries by gaining comparative advantage through specialization. The price of production factor, which is abundant through foreign trade and specialization, will increase. In a labor-intensive developing country, employment is also increasing as foreign trade will increase the production of labor-intensive sectors. Although the main reason of international trade in the model is the difference between the factor prices, the increasing trade eliminates this difference. The factor price equation theory developed by Samuelson was applied to the HO model and the Hecksher - Ohlin - Samuelson (HOS) model was created. According to this model, increased production in a labor-intensive country will increase the total demand for labor. Thus, employment and real

² See Greenaway et al. (1999), Jenkins and Sen (2006), Ayhan (2016) for further information.

wages will increase. This situation reduces the relative price of capital and increases production, productivity and employment in developing countries (Gül and Kamacı, 2012: 24). Thus, the export growth in the developing countries including Turkey is expected to influence employment positively due to the labor-intensive manufacturing processes.

In terms of energy and technology needs in production processes, Turkey is a dependent country. Foreign currency obtained as a result of foreign exchanges is an important input to meet these needs. Export activities on the one hand increase production and it encourages scale economy and production on the other. Thus, with an increase in productivity and decrease in costs, there is a greater need for employment.

In the same manner, by regional export leads to and increase in job opportunities which in turn leads to an increase in income level. The increase in employment opportunities correspondingly leads to an increase in income level and investment. On the other hand, that the small scale- and mid-scale enterprises operating on a regional basis are exposed to foreign competition makes it inevitable for them to consider activities that face foreign competition. Such a situation triggers these enterprises to become large-scale initiatives. That is, in addition to the increase in employment, access to more advantaged rights are expected from such a process. As a result, export stands as an activity that encourages regional employment in all respects. Achieving all these and increasing regional investments could support regional employment.

A basic distinction of development level between the eastern and western parts of Turkey reveals that the western part is more advantageous in terms of production and employment. Migration towards the west, which is a natural consequence of this advantageous position, brings out several problems as well as processes to be handled. Consideration of the issue from this perspective also accentuates possible solutions to problems encountered in migration-receiving regions. Export stands as a significant contributor to employment especially in transforming each and every region to an attraction. Therefore, differences and advantages of each region should closely be investigated; and by supporting employment, export could play a key role to transform each region to an attraction center. In this way industry, agriculture and service sector could be considered to promote the regional employment based on output growth. Such regulation could decrease the discrepancy in income levels of citizens living in the eastern and the western parts of the country, and as a result the citizens will not be compelled to migrate due to differences in income.

The study aims to investigate the impact of regional export on regional employment. The relationship between employment and export which is usually carried out at a macro level needs to be considered on a regional basis. To this end, the panel data were used, and the impact of export on employment was investigated by using the figures of Regional Level 2 (26 Subregions) in Turkey for 2005-2016 period. The study includes three sections. The first section is devoted to related literature. The second section provides the data set, introduces the econometric method used, and the findings obtained are presented. In the conclusions section, the findings are discussed.

1. The Summary of the Literature

In this part of the study, the studies examining the relationship between exports and employment are examined primarily for Turkey and then other countries and regions, methods, findings are presented in summary.

Erlat (2000), examined the impact of current exports on manufacturing employment for Turkey before 1980 and after 1980 over four periods (1969-1978, 1979-1981, 1982-1990 and 1991-1994) via the accounting-based approach. According to the findings, the export-based employment increase could be observed more clearly. However, it was determined that exports prevented employment decreases by acting as a buffer in the decrease of employment for the period after 1980. Akcoraoglu and Acikgoz (2011), estimated the relationship between international trade and employment for Turkey for the 1990: Q1- 2010: Q2 period via the ARDL approach. The results showed a statistically significant and positive relationship between exports and employment in the long term. In addition, the results of Granger causality test have revealed the existence of a one-way causality relationship from exports to employment in both long and short term. On the other hand, Polat and Uslu (2011), estimated the relationship between international trade and employment for Turkey's manufacturing industry for the period 1992-2001 via a dynamic panel data method. The results showed that exports affected employment positively. Therefore, the increase in the exports of the current year was determined to increase the employment of the following year. In the same way, Karaçor and Saraç (2011), investigated the relationship between export and industrial sector employment for Turkey for the 1963-2009 period via the ARDL approach. The results showed that there is a cointegration relationship between export and industrial sector employment. In addition, the results of the ARDL showed that long-term exports had a positive impact on employment. Using panel data, Polat et al (2011), estimated the relationship between exports

and employment for 22 manufacturing firms operating in Turkey for the 2003-2008 period. According to the findings, there was no statistically significant relationship between employment and export. Aktakas et al (2013), investigated the impact of export on employment in seven different sectors exports in Turkey for the 2004-2011 period via static and dynamic panel data model. The results of static panel analysis, which investigated the effect of sectoral (sector-based) exports on sectoral (sector-based) employment, revealed that exports affected employment positively. The results of dynamic panel analysis were performed on three models. Accordingly, the effect of sectoral exports per employee on sectoral employment growth is negative; the effect of sectoral exports on sectoral employment growth is positive; and the impact of sectoral exports on sectoral employment is negative.

Moreover, Göçer et al (2013), investigated the relationship between exports and unemployment in Turkey 2000: Q1-2011: Q1 for the period via the ARDL approach. The findings revealed the existence of a cointegration relationship between exports and unemployment. Moreover, the results of the ARDL model, which was used to determine the long-term relationship, showed that exports decreased unemployment. Akkuş (2014), investigated the impact of export on employment for Turkey's manufacturing industry for the 2003-2010 period via panel data analysis. The findings revealed that the increase in the export demand in the manufacturing industry positively affects the employment. On the other hand, Altay and Yılmaz (2016), investigated the relationship between employment and export for 2005:01-2015:09 period for Turkey via multiple structural break Cointegration test, Fully Adjusted Least Squares (FMOLS) method and error correction model. According to the findings, a cointegration relationship between employment and exports was determined. In addition, it has been determined that exports have a statistically significant and positive effect on employment in the long term. Similarly, Aydiner (2016), investigated the effect of export on employment in Turkey for 2014. In the study, the number of employees (blue and white collar) was a dependent variable and export was used as an independent variable. According to the findings, the increase in the exports of firms positively affects the employment of these firms. Çütcü and Cenger (2017) investigated the relationship between unemployment and export of Turkey in 2005:01-2017:03 period via Gregory-Hansen monthly data cointegration and Toda-Yamamoto causality tests. According to the findings, no long-term relationship was found between the variables. The results of the Toda Yamamoto Causality test revealed the existence of a bidirectional causality relationship between exports and

unemployment. Ayhan (2018) investigated the impact of employment on exports for Turkey in 2005: 01-2014: 02 period by using monthly data limit test approach. Findings revealed the existence of a cointegration relationship between exports and employment. In addition, ARDL model results indicate that export affects employment positively both in short and long term.

Greenaway et al. (1999), investigated the effect of exports on employment for 167 firms operating in the manufacturing industry in the UK via the panel data analysis for the 1979-1991 period. According to the findings, it was determined that exports negatively affect employment. Similarly, Jenkins (2004), investigated the effect of exports on employment for 21 manufacturing and 4 mining companies operating in Vietnam for the 1995-1999 period by using panel data analysis. The findings revealed that export volume has a negative effect on employment.

Gül and Kamacı (2012), investigated the impact of export on employment for the 1980-2010 and 1993-2010 periods in 12 developed countries and 7 developing countries with panel data method (Pedroni cointegration test and Granger causality tests). The findings revealed the existence of a one-way causality relationship from exports to unemployment in both developed and developing countries. On the other hand, the results showed that in the selected periods (1980-2010; 1993-2010), foreign trade and employment are cointegrated in these countries. Dizaji and Badri also (2014), investigated the impact of exports on total employment for Iran in the period of 1976-2005 using the ARDL approach. Findings revealed that exports had a statistically significant and positive effect on employment in the long run. In the same way, Kiyota (2014), investigated the effect of exports on employment for China, Indonesia, Japan and Korea with the input-output method for the period 1995-2009. According to the findings, it was determined that export-related employment increased in China, Japan and Korea. On the basis of sectoral results, exports in China, Indonesia and Korea increased employment in machinery, electrical and optical equipment and transportation equipment sectors. On the other hand, Ko et al. (2015), investigated the relationship between ASEAN5 and its exports to the world and employment by using panel data method for the period of 1991-2012. According to the findings, no effect of the exports on their employment was determined. There was a statistically significant and negative relationship between world exports and employment.

Ajaz (2016), estimated the relationship between export and women employment for Pakistan in the period of 1985-2013 via Johansen cointegration

and error correction model (ECM). The long-term relationship between the variables was determined according to the findings. ECM results revealed a positive relationship between exports and female employment. Similarly, Ha and Tran (2017), investigated the relationship between the number of employees of the firms operating in manufacturing and manufacturing via the panel data method for the period 2010-2015. The results showed that exports affected employment positively. Awad-Warrad (2018), estimated the impact of export on unemployment in 7 Arab countries via the panel data method for the period 1990-2015. According to the findings, exports decreased unemployment. Whang et al. (2018), estimated the impact of export on employment for the sectors operating in the Korean production sector with the GMM for the period 1980-2010. The findings showed that the increase in exports decreased employment in capital intensive (petroleum) industries. In addition, it was revealed that exports increased employment in SMEs.

When the studies in the literature are examined, it is determined that the export in general supports employment. On the other hand, no study examining the relationship between regional employment in Turkey with a regional export operation has been detected so far. Therefore, the fact that the study contributes to this gap in the literature also reveals the importance of the study in another aspect.

2. Data Set and Econometric Method

In this part of the study, data sets and econometric methods used in order to determine the impact of regional exports in Turkey on regional employment are introduced.

2.1. Data Set

In this study, annual export and employment series covering 2005-2016 periods belonging to Regional Level 2 (Subregions) according to Statistical Regional Units Classification (NUTS)³ were used in order to determine the impact of regional exports on regional employment in Turkey.

³ 26 Subregions; TR10;İstanbul, TR21; Tekirdağ, Edirne, Kırklareli, TR22; Balıkesir, Çanakkale, TR31;İzmir, TR32; Aydın, Denizli, Muğla, TR33; Manisa, Afyon, Kütahya, Uşak, TR41; Bursa, Eskişehir, Bilecik, TR42;Kocaeli, Sakarya, Düzce, Bolu, Yalova, TR51;Ankara, TR52; Konya, Karaman, TR61; Antalya, Isparta, Burdur, TR62; Adana, Mersin, TR63; Hatay, Kahramanmaraş, Osmaniye, TR71; Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir, TR72; Kayseri, Sivas, Yozgat, TR81; Zonguldak, Karabük, Bartın, TR82; Kastamonu, Çankırı, Sinop, TR83; Samsun, Tokat, Çorum, Amasya, TR90; Trabzon,

The information about the series is presented in Table 1. The export series in Table 1 has been converted to real terms by CPI. For this purpose, the export series in USD terms has been converted to TL by using nominal dollar purchase rate according to the years obtained from CBRT electronic database. Then, CPI (2003 = 100) was published in Regional Level 2 (Subregions) and the export series was converted into real. All series were analyzed by taking the natural logarithm.

Table 1. Series and Explanations Used in Panel Data Analyses

Name of the Series	Explanation	Source
Employment (Lemp)	Employment by age group [15 years old and over-thousand people]: Total	Turkish Statistical Institute Regional Statistics
Export (Lexp)	Exports by economic activities (ISIC, Rev.3) (1000 USD): Total	Turkish Statistical Institute Regional Statistics

2.2. Econometric Method

The impact of export on employment Regional Level 2 (Subregions) in Turkey was investigated using panel data for the 2005-2016 period. Panel regression estimations can be estimated with the help of the classic pooled least squares model, the Fixed Effect Model (FEM) and the Random Effect Model (REM). FEM and REM unit effective (inter-unit differences) or time-efficient (differences due to inter-unit time) one-way error component model, unit and time-effect (both unit-based and inter-unit differences), bi-directional (two-way error component). However, the differences between the units in FEM are manifested in the fixed term, and these differences in REM are included in the model as a component of the error term (Baltagi, 2005; 12-14,15, Gujarati and Porter, 2009: 596-603).

The effect of regional exports on regional employment was estimated by the equation (1).

$$Lemp_{it} = \beta_{0i} + \beta_1 Lexp_{it} + \epsilon_{it} \quad (1)$$

Ordu, Giresun, Rize, Artvin, Gümüşhane, TRA1; Erzurum, Erzincan, Bayburt, TRA2; Ağrı, Kars, Iğdır, Ardahan, TRB1; Malatya, Elazığ, Bingöl, Tunceli, TRB2; Van, Muş, Bitlis, Hakkari, TRC1; Gaziantep, Adıyaman, Kilis, TRC2; Şanlıurfa, Diyarbakır, TRC3; Mardin, Batman, Şırnak, Siirt.

In (1) Numbered equation i ; Region ($i = 1,2,3, \dots \dots \dots 26$), t ; time [(year) ($t = 1,2,3 \dots \dots \dots 12$)], β_0 ; the constant effect, β_j ; refers to the coefficient that indicates the effect of exports on employment, and ϵ_{it} ; the error term.

In the light of this information, the method of estimating the panel model is determined by a number of tests (F, Breusch Pagan Lagrange Multiplier, LM, LR and Hausman tests, etc.).

The F test reveals whether it is valid or not to estimate with OLS. Ho hypothesis suggests that units and time do not have a significant effect, while the alternative hypothesis posits units and time have a significant effect. Failure to reject H_0 hypothesis means the prediction could be achieved by OLS model, and rejection would mean that FEM is valid.

Breusch Pagan Lagrange Multiplier LM test is used for REM and OLS model comparison. H_0 hypothesis suggests that the variance of the unit effects is zero and the alternative hypothesis is that the variance is different from zero. According to this, H_0 hypothesis is based on that the variance of the effect is zero and the alternative hypothesis is that the variance is different from zero. Failure to refuse H_0 hypothesis reveals that the model can be solved by OLS, while otherwise, REM estimation is more appropriate. The Hausman test examines whether the error term is associated with explanatory variables, that is, if REM is the appropriate model (Gujarati ve Porter, 2009: 603). Accordingly, the selection of REM is appropriate if it is found that there is no relationship between the error term and the explanatory variables. In other words, the hypothesis of H_0 hypothesis suggests that the predictor of random effects is consistent with the alternative hypothesis constant effects estimator.

To determine which unit root tests to be used in series, a cross-sectional dependence test is conducted. Cross-sectional dependence is tested through Perasan CDLM if $N > T$ (Pesaran, 2004:5). Accordingly, H_0 posits that cross-sectional units are independent (there is not cross-sectional dependence), while the alternative hypothesis posits that there is a dependent relationship. When the cross-sectional dependence is identified, whether the series include unit roots or not is investigated through second generation panel unit root tests.

Whether the series include unit roots or not was investigated through Cross-Sectionally Augmented Dickey-Fuller (CADF), which is a second-

generation panel unit root test developed by Pesaran in 2007⁴. This test could also be used when $N > T$ (Pesaran, 2007: 269). The null hypothesis of CADF test assumes that the series has a unit root, while the alternative hypothesis does not.

Lastly, to determine whether the model prediction results are consistent and effective, autocorrelation, heteroscedasticity and inter-unit correlation tests were carried out.

3. Econometric Findings

To investigate the impact of regional export on regional employment, first cross-sectional dependence of the series was analyzed using Pesaran CDLM test. Table 2 shows the cross-sectional dependence test results.

Table 2. Cross-Sectional Dependence Test Results

Pesaran CDLM	Pesaran CDLM	Test Statistics	Prob.
Lemp		34.58	0.000
Lexp		46.71	0.000

As Table 2 shows, the null hypothesis which suggests that there is no cross-sectional dependence for Lemp and Lexp series was rejected at 1% significance level. Such a situation indicates that regions from which the panel data are gleaned are affected from each other.

The results from Pesaran CADF second generation panel unit root tests, which are used to examine the stability of the Lemp and Lexp series, series and cross-sectional dependence, are given in Table 3.

Table 3. Unit Root Test Results

Series	2. Generation Unit Root Test	Constant		Constant-Trend	
		Test statistics	Prob.	Test statistics	Prob.
Lemp	Pesaran (CADF)	-4.402	0.000	-2.623	0.004
Lexp	Pesaran (CADF)	-4.471	0.000	-3.290	0.001

Not: H_0 is rejected at ** % 1 level. Lag length (0)

⁴ The first generation series refer to cross-sectional independence (Levin-Lin-Chu (2002), Hadri (1999), Breitung (2005), Im-Pesaran-Shin (2003), Maddala-Wu (1999) and Choi (2001) tests) and the second generation stands for cross-sectional dependence (Im, Pesaran ve Shin (2003), Taylor and Sarno (1998) (MADF), (Breuer, Mcknown ve Wallace, (2002) (SURADF), Pesaran (2007) and through using unit root tests unit root analysis could be conducted (Bai and Ng, 2004).

According to the results in Table 3, the null hypothesis which posits that Lemp and Lexp series has unit roots was rejected at a significance level of 1%, and it was they were the series was reported to be static. In other words, it was found that they had no unit roots.

In order to determine the impact of regional export on regional employment, a one-way unit effect model (time series was not identified) was used. The test results of the model predictor are presented in Table 4.

Table 4. OLS, FE and RE Prediction Results

	Pooled OLS	FE	RE	Driscoll-Kraay
Constant	6.435111 ^a (0.2595524)	9.93827 ^a (0.2853834)	9.586407 ^a (0.2858026)	9.938272 ^a (0.8761411)
Lexp	0.3020366 ^a (0.0110774)	0.1521345 ^a (0.012209)	0.1671909 ^a (0.0119226)	0.1521345 ^a (0.0374277)
R ²	0.7057	0.3527	0.3527	0.3527
F test	108.74 ^a	108.74 ^a		
LM Test	1215.79 ^a		1215.79 ^a	
Hausman		32.80 ^a		
AR(1)	Baltagi-Wu LBI		1.0188418	
	Durbin-Watson		0.74013498	
	Pesaran		16.092 ^a	
$\chi^2(1)$		636.82 ^a		

Note: a, denotes statistically significant at the 1% level, the values in the brackets are the standard errors.

As Table 4 shows, F test rejects the H₀ hypothesis showing a significance value of 1%. This suggests that the model cannot be predicted by OLS. Similarly, LM test results indicate that H₀ was rejected with a significance value of 1%, indicating that prediction through OLS is not valid. Hausman test statistics, which was conducted to investigate the validity of REM predictor reveals that the prediction is not appropriate for REM (H₀ was rejected with a significance value of 1%,) but for FEM.

To determine whether the model prediction results are consistent and effective, autocorrelation, heteroscedasticity and inter-unit correlation tests were

carried out. The autocorrelation problem in the model was examined using Baltagi and Wu (LBI) and Durbin-Watson tests. Both tests demonstrate that there is an autocorrelation problem as the result was far from the threshold value of 2 in Table 4.

To check heteroscedasticity, the modified Greene Wald Test was applied, and H_0 hypothesis was rejected at a significance level of 1%, which suggests that there is no heteroscedasticity variance problem. To check the correlation between the units, Pesaran (2004) CD test was employed. H_0 was rejected, and it was found that the units were correlated at a significance level of 1%. As a result, the model was found to have modified variance, autocorrelation, and inter-unit correlation problems. The model was predicted by Driscoll- Kraay (1998), which is considerate of all these problems and a strong predictor even in $N>T$ situations (Tatoglu, 2016: 276-277) and the results are provided in Table 4. Accordingly, the regional export at 1% level results in a 0.15% increase of regional employment level.

Discussion and Conclusions

Employment-based policies offer significant results that might influence both economic and social realms. The countries which failed to increase the employment level had to bear higher costs in many aspects. Thus, the applications which aim at promoting employment are of great significance for those countries. To this end, activities that will help increase employment rate is a serious concern both for researchers of economics and policy-makers. The increase in international trade has paved the way for the investigation of employment based on export. The search for new markets will contribute to the increase in export and employment which will be triggered by the increase in production.

Considering Turkey's Regional Level 2 (Subregions) according to NUTS classification, the impact of export on employment was investigated. The relationship was investigated using panel data from 2005-2016 period in 26 subregions, which was obtained through export and employment series. The impact of export on employment was estimated by Driscoll-Kraay estimator. The results obtained from these estimations suggest that for the above-mentioned subregions of Turkey, export is a contributor to employment. The prediction values indicate that a 1% increase in export leads to a 0.15% employment. This finding has revealed a concordant theory. On the other hand, the result also supports the results of applied studies in the literature. For example, Erlat (2000), Polat and Uslu (2011) Akkuş (2014) and Aydiner (2016)

and Ayhan (2018) have found that export likewise has positively influenced employment for Turkey.

The growth in export increases the demand for employment, which in turn affects the employment positively. This result highlights the significance of regional export in decreasing unemployment, which is one of the leading problems of Turkey. The fact that the policies that will promote regional export will lead to an increase in income and employment rates also indicates a sufficient use of the limited sources. If the incentive policies are designed bearing the regional differences and high value-added activities in mind, it will contribute to a sustainable increase in regional export increases and employment level which is based on regional export. It seen clearly that the policymakers' commitment to policies that will help facilitate the access to new markets could also be interpreted as a fight against unemployment. As a result, regional-based policies as a whole could also create more accessible results.

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