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ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

DOES LABOR DEMAND RESPOND TO INTERNATIONAL TRADE? EVIDENCE FROM THE TURKISH MANUFACTURING INDUSTRY

İŞGÜCÜ TALEBİ ULUSLARARASI TİCARETE TEPKİ VERİYOR MU? TÜRK İMALAT SEKTÖRÜNDEN KANITLAR

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Abstract

The aim of this study is to analyze the impact of international trade on employment in the Turkish manufacturing industry over the 2003-2017 period. Specifically, this study analyzes the employment effects of Turkey's trade with its major trading partners, namely, European Union countries, Russia, the United States, Iraq, and China. The findings of the study reveal that increased exports to the selected countries lead to employment generation in Turkish manufacturing. Both exports to and imports from the European Union countries have positive employment effects. Considering only the sectors with the highest employment growth during the period, we can conclude that imports from the United States, European Union, and Iraq have led to a decline in employment; however, imports from China and Russia increased employment in the manufacturing industry.

Keywords: Trade openness; Manufacturing industries; Employment; Panel data estimation.

Öz

Bu çalışmanın amacı, Türkiye'de uluslararası ticaretin imalat sanayi istihdamı üzerindeki etkisini 2003-2017 dönemi için incelemektir. Bu çalışma özellikle Türkiye'nin başlıca ticaret ortakları olan Avrupa Birliği Ülkeleri, Rusya, Amerika Birleşik Devletleri, Irak ve Çin ile ticaretinin istihdam üzerindeki etkilerini analiz etmektedir. Çalışmada elde edilen bulgular, seçilmiş ülkelere yapılan ihracattaki artışların Türkiye imalat sanayinde istihdam artışlarına yol açtığını göstermektedir. Bulgulara göre hem Avrupa Birliği ülkelerine yapılan ihracatın hem de bu ülkelerden yapılan ithalatın olumlu istihdam etkileri bulunmaktadır. Sadece dönem içinde en yüksek istihdam

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artışı olan sektörler ele alındığında ise, Amerika Birleşik Devletleri, Avrupa Birliği ve Irak'tan yapılan ithalatın istihdamı azaltırken, Çin ve Rusya'dan yapılan ithalatın imalat sanayinde istihdam artışına yol açtığı sonucuna ulaşılmıştır.

Anahtar Kelimeler: Ticarete açıklık; İmalat sanayileri; İstihdam; Panel veri tahmini.

1. Introduction

The effects of international trade on employment have been an important research area for both developing and developed countries after the 1980s. On the one hand, the defenders of globalization assert that trade growth will generate new jobs, while the opponents argue that the severe competition resulting from trade expansion will cause job losses. The theoretical foundations of this argument rest on the traditional Heckscher-Ohlin Theory. According to the Heckscher-Ohlin Theory, the demand for labor will increase in labor-abundant developing countries as their openness to trade increases, which results in employment generation in labor-intensive export industries. On the other hand, employment is expected to decrease in the capital-abundant developed countries as their imports of labor-intensive commodities from developing countries increase and substitute their domestic production.

While the theory asserts that international trade will cause employment decreases in developed countries and employment increases in developing countries, the empirical results are contradictory. Gozgor (2016) analyzed the relationship between international trade and manufacturing employment for a group of developed countries, namely Denmark, France, Netherlands, Sweden, the UK, and the US. In the study, international trade is measured by import penetration and export-output ratios, and their effects on employment are tested by the labor-demand approach. Although results differ for countries, it can be said that manufacturing employment is negatively affected by trade. Grossman (1987) used reduced-form industry-level wage and employment equations to test the employment and wage effects of import competition in the US. Among the nine chosen industries analyzed in the paper, only one industry is found to face a large number of job losses, and two industries faced significant wage losses. In a later study, Hiebert & Vansteenkiste (2010) studied how employment responded to trade openness in the US over the period 1977-2003 and found that increased trade openness has a negative but negligible effect on employment. Messerlin (1995) studied the impact of trade on labor markets in France for 1984-1991 period. According to the findings of this study, trade causes a large labor reshuffling between industries but has a modest impact on total employment. Another related study by Tuhin (2015) found that trade has a significant impact on Australian manufacturing employment, with exports being more effective than imports. According to the findings of this study, while export increases generate new jobs, increases in imports cause job losses.

The trade-employment relationship is also analyzed empirically for some developing countries. Both Goldar (2009) and Raju, Chaudhuri & Mishra (2016) analyzed the impacts of international trade on manufacturing employment in India. While the two studies focused on different time periods, the findings of both studies reveal that export increases generate new employment in India, whereas increased imports

cause employment losses. In another study, Herath (2014) analyzed the effects of international trade on employment generation in Sri Lanka. In this study, there is no sectoral segregation, but the results are very similar to the studies mentioned above for India: higher export intensity increases employment, and rises in import penetration decrease total employment. Jenkins & Sen (2006) used both the factor content approach and labor demand function estimations to analyze the employment effects of industry openness for Kenya, Bangladesh, South Africa, and Vietnam for various years and industries. The findings of this study show that the two Asian countries, Bangladesh and Vietnam, succeeded in integrating into the world economy and trade openness created new manufacturing jobs in these countries. However, trade openness had adverse employment effects on African countries in the sample, namely Kenya and South Africa. Econometric estimations in the study reveal that export orientation is associated with increased employment, whereas import penetration has a negative impact on employment.

There exist few studies of the effects of international trade on employment in Turkey. Krishna, Mitra & Chinoy (2001) used plant-level data to test how labor demand elasticities responded to trade liberalization in Turkey between 1983 and 1986. The estimation results of the study show that the link between international trade and employment is very weak for the Turkish case, and the labor demand elasticities do not respond to trade openness. Based on panel data of manufacturing industries for the 1973-2001 period, Aydıner-Avşar & Onaran (2010) estimated the employment effects of trade liberalization. In contrast to other developing countries, the authors found no negative impact of imports on Turkish manufacturing employment. On the other hand, exports had positive but weak employment effects during the analyzed period. Akkuş (2014) investigated the employment effects of international trade and productivity in the Turkish manufacturing industry for the period 2003-2010. The empirical results suggest that an increase in export demand leads to an increase in labor demand, but labor demand decreases as import penetration rises. More recently, Yanıkkaya, Altun & Tat (2019) studied the deindustrialization process in Turkey and attempted to analyze the determinants of lower levels of manufacturing employment in Turkey. The authors observed positive employment effects of exports and negative employment effects of imports between 1995 and 2009.

The above examples from the literature show that the basic trade-employment relationship has been analyzed for many countries with different characteristics. However, recent studies started to focus more on the importance of trade partner effects, especially on the origin of imports. In their pioneering study, Greenaway, Hine & Wright (1999) used a dynamic panel of 167 manufacturing industries to estimate the impact of trade on employment by decomposing UK trade by origin. According to the findings of the study, increases in both exports and imports cause reductions in labor demand, and this effect is stronger for trade with the European Union countries and the US rather than the East Asian countries. The effects of imports on employment in Austria are analyzed by Onaran (2011) for the 1990-2005 period. In this paper, Onaran (2011) considered the origin of imports and estimated different equations for intermediate and final goods. The author found that import penetration in intermediate goods from Eastern European countries resulted in employment losses in manufacturing industries. In this context, a growing body of research also examines the employment effects of increased exposure to imports from China for various

countries. Most of these studies focus on developed countries; some examples are Autor, Dorn & Hanson (2013), Balsvik, Jensen & Salvanes (2015), Acemoğlu et al. (2016), and Hayakawa, Ito & Urata (2021). Nevertheless, still, there is not a sufficient number of studies, especially for developing countries. So this paper contributes to filling this gap in the literature.

The aim of this study is to investigate the effects of international trade, more specifically, trade with major trade partners separately, on employment generation in the manufacturing industries of Turkey for the 2003-2017 period. This study analyzes Turkey's trade with major trading partners, namely, European Union countries, Russia, the United States, Iraq, and China. To the best of our knowledge, this is the first article in the literature to analyze the impacts of trade with different countries separately on manufacturing employment in Turkey. Hence, the findings of the study will provide a guide to frame policies to generate more employment with the help of international trade in the future.

The rest of the paper is organized as follows: Section 2 focuses on the employment and trade structure of the Turkish manufacturing industry. Section 3 describes the data and empirical methodology used in the paper. Section 4 presents empirical results, and section 5 concludes.

2. Manufacturing Trade and Employment in Turkey

Turkey has been implementing a liberal foreign trade policy since the structural adjustment program that went into effect on January 24, 1980. The program was based on an export-led growth strategy and opened domestic markets to foreign competition. After this policy shift, Turkey has achieved rapid trade growth in the last four decades. This study focuses on the post-2003 period, which represents a new phase of trade expansion for the Turkish economy. The IMF-backed stabilization program, which was launched after the 2000-2001 economic crisis, together with the global economic growth trend, supported the fast recovery of the Turkish economy and caused significant increases in international trade. Figure 1 reveals trends in Turkey's manufacturing industry exports, imports, and employment in the post-2003 period. In this figure, the left axis shows manufacturing exports and imports in US$, and the right axis shows manufacturing employment in thousands. During the analyzed period, exports and imports followed a parallel course, but after the 2008 global crisis, the difference between exports and imports increased due to the faster increase in imports. The monetary expansion policy followed by the central banks after the global crisis made it easier for developing countries such as Turkey to find foreign currency, and as a result of this, the Turkish Lira appreciated, causing imports to become relatively cheap and many intermediate goods to be imported instead of domestic production. This situation led to a rapid increase in imports on the one hand and an increase in the import dependency of production on the other hand.

From Figure 1, it can be followed that after 2003 both trade and employment increased, although the increase in employment was slower. The number of people employed in the manufacturing industry increased throughout the period, and the share of the manufacturing industry in total employment rose from 18.2 percent in 2003 to 19.1 percent in 2017 (TURKSTAT https://biruni.tuik.gov.tr/medas/?kn=72&locale=tr). During the analyzed period, the industries with the highest employment

were the manufacture of wearing apparel, the manufacture of food products, the manufacture of textiles, and the manufacture of fabricated metal products except for machinery and equipment, and they remained the same throughout the period. As can be seen, the largest share of employment is held by traditional labor-intensive industries in Turkey.

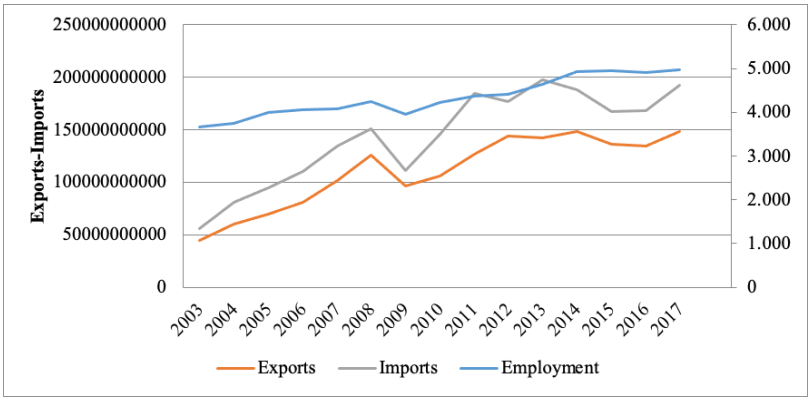

Figure 1. Exports, Imports, and Employment in Manufacturing Industries (2003-2017)

Source: Data are extracted from the Turkish Statistical Institute (TURKSTAT).

Another noteworthy point in the post-2003 period is the change in the shares of selected countries in Turkey's imports. Figure 2 displays the evolution of the import penetration share of the manufacturing sector according to the source country. Import penetration basically shows the magnitude of the imports relative to the domestic market size. The highest import penetration in manufacturing industries belongs to EU countries; however, it decreased from 22.3 percent in 2003 to 15.7 percent in 2017. The pattern that arises is that China is increasing its share, and China's share gains came at the expense of the EU countries' share. In the analyzed period Chinese economy and trade grew rapidly, and Chinese penetration not only in Turkey but in both developed and developing country markets increased.

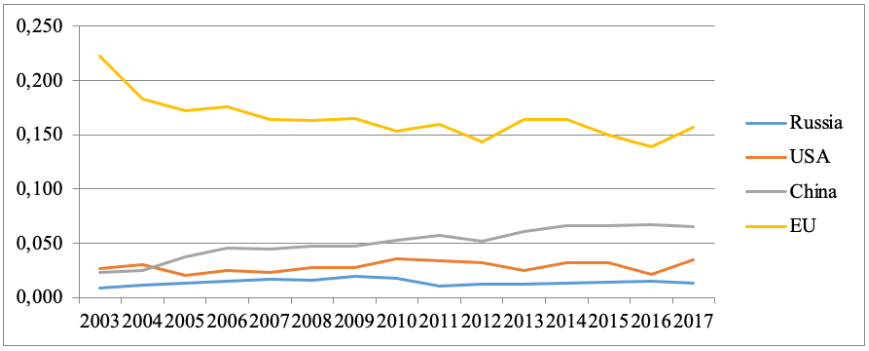

Figure 2. Import Penetration Changes in the Turkish Manufacturing Sector (2003-2017)

Source: Own elaboration based on data from Annual Manufacturing Industry Statistics (TURKSTAT).

Quantitative and structural changes in Turkey's exports and imports have had various effects on economic indicators after 2003. In the coming sections, the effects of these changes on Turkish manufacturing employment are analyzed empirically.

3. Data, Model and Methodology

This paper focuses on the 2003-2017 period. The sample period is determined according to the data availability. We have chosen the five major trading partners of Turkey in order to assess the impact of trade on manufacturing employment. Over the sample period, the average shares of the selected countries in Turkey's exports and imports have been 52 percent and 69 percent, respectively. We also used 20 sectors of the Turkish manufacturing industry [1] classified according to NACE Rev.2. Hence we have established a panel data of 20 sectors for 15 years.

To measure the employment creation effect of international trade in the Turkish manufacturing industry, we will estimate Equation 1. Equation 1 is an econometric approach to labor demand. In this model, labor demand in a manufacturing sector can be viewed as a function of real wages and real output as well as the factors associated with the external/international economic dynamics. Such a decomposition of labor demand rests on both trade theory and labor economics. From the point of view of the trade theory, the Hecksher-Ohlin theorem states that we expect a positive gain from international trade in terms of employment, particularly in the sectors where the economy exhibits a comparative advantage. To this end, trade would expectedly create a positive impact on the employment of net exporter sectors. However, in a labor economics context, exports can be viewed as a source of labor demand in the related sectors. The sectors with higher export orientation would benefit from higher employment.

$$lemp_{it} = \beta_1 + \beta_2 realw_{it} + \beta_3 realcons_{it} + \beta_4 realq_{it} + \beta_5 reer_{it} + \beta_6 trade_{it} + \gamma_i + \mu_t + \varepsilon_{it} \qquad (1)$$

Including the real wages (*realw*) and the real output (*realq*) would provide us a policy implication on whether a reduction in wages or an increase in sectoral production would dominate the change in labor demand. In Equation 1, the real consumption (*realcons*) variable is defined as the difference between the sum of total production and imports by the ith sector and the exports associated with that of sector *i*. We follow Tuhin (2015) and include this *realcons* variable. This variable represents the total domestic consumption associated with that sector, and its coefficient would provide the employment creation ability of the domestic demand of sector *i*. It is known that import dominates the export in many manufacturing sectors in recent years. Hence this may be a source of a supportive channel on the impact of trade on employment in sector *i*. We expect to find a negative impact of *realcons* on labor demand (see, for example, Tuhin, 2015).

Many of the economic variables may have bidirectional endogeneous impacts on each other. Likewise, wage and labor demand may have bidirectional relationship. Following Tuhin (2015), Gaston

1 The list of included sectors is provided in the appendix.

& Trefler (1998) and Greenaway, Hine & Wright (1999), we estimate the above econometric model of labor demand and our interest is on the impact of particularly trade on employment. Employment may also have an indirect impact on trade but economic approach of Hecker-Ohlin Theorem imposes causality from trade towards employment. A pioneering study by Erlat (2000) also rests on the assumption of causality from trade to labor demand. Hence, we estimate the labor demand equation comprising international trade as an exogeneous variable.

To analyze the impact of international trade on employment, we follow two different approaches. To this end, we define the *trade* variable in two different ways and estimate different regression models, respectively. First, we calculate the net exports of each sector in the manufacturing industry. Hence, we find the ratio of exports of sector *i* over the imports by sector *i*. A ratio greater than 1 implies that the sector is a net exporter. Second, we find the ratio of imports by sector *i* to the exports by that sector. Then, the variable with a value greater than 1 implies that sector *i* is a net importer. It is well known that many sectors of the manufacturing industry in Turkey depend on imports to produce exportable goods. Through these two different definitions of the trade variable, we aim to analyze the net effect of exports and imports on employment in the related sectors. Our a priori expectation is a positive coefficient for the net export definition while a negative coefficient for the net import definition of the trade variable.

We also control the impact of competitiveness of the Turkish economy on manufacturing employment. To handle this, we include the real effective exchange rate index (*reer*) in Equation 1. A higher value of *reer* implies that the Turkish Lira has been gaining value; hence the economy becomes less competitive. The descriptive statistics for these variables are reported in Table 1.

Table 1. Descriptive Statistics of Basic Variables of the Regression Model

	Mean	Median	Standard Deviation	Minimum	Maximum
Employment (*lemp*)	11.154	11.174	1.049	8.680	13.102
Real wage (*realw*)	131.761	108.473	78.826	48.009	458.094
Real effective exchange rate (*reer*)	111.080	111.150	8.364	101.090	127.720
Real output (*realq*)	24.348	16.156	3.499	3.499	79.904

Note: Data are extracted from the Turkish Statistical Institute (TURKSTAT). The abbreviations for the variables are presented in the parentheses. *lemp, realw, realcons, reer,* and *realq* denote the natural log of the number of paid workers, real wage rate, real consumption, real effective exchange rate, and real output, respectively.

Table 1 presents the descriptive statistics associated with the basic variables in Equation 1. The interesting figure in the table is about the huge range between the minimum and maximum values of real wage and real output. This indicates particularly the disparities between the sectors in the sample.

To analyze the impact of trade on employment in the Turkish manufacturing industry, considering the origin of trade, we use the net exports and net imports of Turkey with the associated

major partners. The average values are reported in Table 2. The figures represented in Table 2 imply that the Turkish manufacturing industry is obviously a net importer of China; however, evidently a net exporter in terms of Iraq as a trade partner. The figures for the remaining major trading partners, namely, the USA, EU, and Russia, present evidence of a more balanced export-import relationship.

Table 2. Average Net Trade Values

Trade Partners					
	USA	China	EU	Russia	Iraq
Net export (*xm*)	6.346	0.918	2.194	76.103	3116.82
Net import (*mx*)	11.703	371.74	3.129	15.522	5.034

Note: Data are extracted from TURKSTAT. The abbreviations for the variables are presented in the parentheses. *xm* and *mx* denote average values.

The next table, Table 3, reports the number of net exporter and importer sectors annually, in association with the trading partners.The figures in Table 3 support the statistics presented in Table 2. To this end, net exports dominate net imports when Russia and Iraq are considered trade partners. However, when USA and EU are in question, we observe some swings in the number of net exporter/net importer sectors, but we can conclude that the overall Turkish manufacturing industry is in the net importer position. Last but not least, Chinese imports dominate Turkish manufacturing exports in almost every sector over the sample period.

Table 3. Annual Number of Net Exporter and Net Importer Sectors

Years	**USA**		**China**		**EU**		**Russia**		**Iraq**	
	xm	*mx*	*xm*	*mx*	*xm*	*mx*	*xm*	*mx*	*xm*	*mx*
2003	10	10	4	16	8	12	13	7	19	1
2004	8	12	1	19	4	16	13	7	18	2
2005	10	10	0	20	7	13	13	7	19	1
2006	10	10	0	20	7	13	15	5	20	0
2007	9	11	1	19	10	10	14	6	18	2
2008	6	14	1	19	9	11	14	6	18	2
2009	7	13	2	18	8	12	15	5	18	2
2010	7	13	2	18	7	13	14	6	19	1
2011	7	13	2	18	8	12	12	8	20	0
2012	9	11	2	18	6	14	13	7	20	0
2013	8	12	2	18	7	13	13	7	20	0
2014	9	11	1	19	9	11	12	8	19	1
2015	9	11	1	19	10	10	13	7	19	1
2016	8	12	2	18	10	10	12	8	19	1
2017	9	11	2	18	10	10	13	7	17	3

Note: The numbers indicate the number of sectors that are in the state of net exporters or net importers, respectively.

We run four separate regressions for the net exports approach, net imports approach, net exports approach for sectors that experienced maximum employment growth, and net imports approach, which experienced maximum employment growth. The subscripts *i* and *t* in Equation 1 refer to sectors (cross-section groups) and time period (years), respectively. λ captures the sector-specific effect and μ captures the time-specific effect. The normally distributed disturbance term (0, σ^2) is denoted by ε_{it}. We employ panel data estimation techniques to estimate Equation 1. We use a fixed-effects model and test the validity of this model using the Hausman test [2].

4. Empirical Results

We present the impact of trade on manufacturing employment in the following four tables. Table 4 presents the impact of net manufacturing exports on the labor demand in the industry in terms of five major trading partners. To this end, five columns of Table 4 are allocated to the regression results compromising each trade partner. The obtained findings allow us to conclude that manufacturing employment is at most positively affected by the increase in the real output. We observe a negative and significant impact of real consumption and real wage on manufacturing employment. This impact is valid and almost the same for all trading partners. The estimation results also provide an answer to our hypothesis of the positive impact of net exports on the labor demand of the manufacturing industry. All estimated coefficients associated with the net exports (*xm*) variable are statistically significant and positive. Interestingly, net exports to the EU have the highest labor creation potential. The coefficient of *xm* for the EU regression model is about 10 times greater than the coefficients of the other trading partners. This implies that policies that boost the comparative advantage of Turkish exports towards EU countries would help the employment creation in the manufacturing industry. F – statistics indicate that all models are overall significant. Hausman test statistics support the choice of the fixed effects model over the random effects model for each trading partner presented in Table 4.

Table 4. Impact of Trade on Manufacturing Employment (Net exporter)

Net exports (XM)					
	USA	China	EU	Russia	Iraq
Constant	10.260*	10.518*	9.971*	10.252*	10.265*
	(1.093)	(0.684)	(0.667)	(0.700)	(0.703)
realw	-0.006*	-0.006*	-0.006*	-0.006*	-0.006*
	(0.001)	(0.001)	(0.0003)	(0.0003)	(0.0003)
realcons	-0.002*	-0.002*	-0.0001**	-0.001**	-0.002*
	(0.0001)	(0.0001)	(0.0006)	(0.0006)	(0.0001)
reer	0.007	0.005	0.009	0.007	0.006
	(0.009)	(0.006)	(0.006)	(0.006)	(0.006)

2 Hausman test with a null hypothesis of no correlation between individual effects and regressors was developed by Hausman &Taylor (1981). Random effects model assumes that individual effects and regressors are uncorrelated. Rejection of the null hypothesis indicates that fixed effects model will be a better choice.

realq	0.039*	0.040*	0.037*	0.040*	0.041*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.014)
xm	0.003*	0.002*	0.026*	0.001*	0.005**
	(0.001)	(0.001)	(0.004)	(0.0001)	(0.002)
mx	-	-	-	-	-
Hausman statistic	$\chi^2(5)=15.689$ *prob.=0.0078*	$\chi^2(5)=14.016$ *prob.=0.015*	$\chi^2(5)=15.241$ *prob.=0.009*	$\chi^2(5)=10.837$ *prob.=0.05*	$\chi^2(5)=17.528$ *prob.=0.0014*
F(prob.)	*85.541 (0.000)*	*90.198 (0.000)*	*95.486 (0.000)*	*85.133 (0.000)*	*84.121 (0.000)*
Adjusted R^2	*0.876*	*0.892*	*0.888*	*0.876*	*0.874*

Note: Country and time fixed-effects are included in all models. Standard errors are reported in parentheses. P-values for the F-statistic and Hausman test statistic are provided in brackets. *, **, *** denote significance at 1, 5, and 10 percent, respectively.

We also calculate another trade indicator as the ratio of imports of Turkey from each trade partner over Turkey's exports for each sector. We call this the net import (*mx*) variable and estimate Equation 1 accordingly. The results for this equation are presented in Table 5.

Table 5. Impact of Trade on Manufacturing Employment (Net importer)

Net imports (MX)					
	USA	China	EU	Russia	Iraq
Constant	10.30*	10.260*	10.113*	10.272*	10.291*
	(0.701)	(0.693)	(0.692)	(0.711)	(0.708)
realw	-0.006*	-0.006*	-0.006*	-0.006*	-0.006*
	(0.001)	(0.001)	(0.0003)	(0.001)	(0.002)
realcons	-0.001*	-0.001*	-0.0022*	-0.001*	-0.002*
	(0.0001)	(0.0005)	(0.0005)	(0.0005)	(0.0001)
reer	0.007	0.007	0.007	0.007	0.007
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
realq	0.039*	0.040*	0.042*	0.041*	0.040*
	(0.002)	(0.001)	(0.001)	(0.001)	(0.01)
xm	-	-	-	-	-
mx	-0.003*	-0.0012	0.025*	-0.009*	-0.0007***
	(0.001)	(0.0014)	(0.006)	(0.001)	(0.0004)
Hausman statistic	$\chi^2(5)=15.919$ *prob.=0.007*	$\chi^2(5)=7.867$ *prob.=0.163*	$\chi^2(5)=11.899$ *prob.=0.036*	$\chi^2(5)=12.937$ *prob.=0.024*	$\chi^2(5)=11.927$ *prob.=0.035*
F(prob.)	*84.922 (0.000)*	*79.071 (0.000)*	*87.542 (0.000)*	*81.949 (0.000)*	*82.934 (0.000)*
Adjusted R^2	*0.875*	*0.870*	*0.879*	*0.871*	*0.873*

The results reported in Table 5 are almost in accordance with those in Table 4. We observe a negative and significant impact of real wage and real consumption on the labor demand in the manufacturing industry, whereas we find the greatest positive and significant factor that boosts manufacturing employment as the total output. The findings related to the trade variable are interesting; the coefficient of *mx* is negative and significant for the USA, Russia, and Iraq regressions. This indicates that an increase in the net imports of Turkey from these countries will lead to a decline in

manufacturing employment. However, the coefficient is positive and significant when we consider the EU as the trade partner. This finding is valuable in the sense that Turkish manufacturing employment benefits both from exports and imports with the EU. Erduman, Eren & Gül (2020) found that import dependency has increased for exports in Turkey during the 2002-2018 period. Along with this, Turkey's imports from the EU are dominated by machinery and transport equipment, chemicals, and fuel and mining products, with a total share of 71.5 percent. These are mainly used as inputs in the production process and are needed to boost production. This might be the possible reason for the employment creation effect of imports from the EU.

Preceding the analyses comprising the employment-trade dynamics in the overall Turkish manufacturing industry, we focus on the sectors which have witnessed the greatest growth in employment over the sample period. To this end, we have identified 6 sectors: two low technology, two mid-technology, and two mid-high technology sectors [3]. We repeat our previous analyses for the new sample data.

Table 6. Impact of Trade on Manufacturing Employment (Net exporter-Max employment growth sectors)

Net exports (XM)					
	USA	China	EU	Russia	Iraq
Constant	10.636*	10.918*	10.666*	10.989*	11.014*
	(0.391)	(0.571)	(0.419)	(0.381)	(0.553)
realw	-0.004*	-0.007*	-0.007*	-0.006*	-0.008*
	(0.001)	(0.001)	(0.001)	(0.0003)	(0.001)
realcons	0.001*	0.004*	0.004*	-0.003**	-0.0004
	(0.0001)	(0.003)	(0.0008)	(0.002)	(0.0007)
reer	0.002	0.003	0.003	0.004	0.003
	(0.003)	(0.006)	(0.003)	(0.004)	(0.005)
realq	0.040*	0.040*	0.030*	0.043*	0.043*
	(0.002)	(0.001)	(0.002)	(0.003)	(0.033)
xm	0.202*	1.404	0.522*	0.002***	0.0025
	(0.022)	(1.132)	(0.066)	(0.001)	(0.002)
mx	-	-	-	-	-
Hausman statistic	$\chi^2(5)=72.264$ *prob.=0.2017*	$\chi^2(5)=15.275$ *prob.=0.001*	$\chi^2(5)=25.456$ *prob.=0.003*	$\chi^2(5)=21.111$ *prob.=0.000*	$\chi^2(5)=17.846$ *prob.=0.003*
F(prob.)	*71.708 (0.000)*	*31.837 (0.000)*	*61.621 (0.000)*	*33.684 (0.000)*	*31.936 (0.000)*
Adjusted R^2	*0.888*	*0.776*	*0.871*	*0.785*	*0.776*

The results presented in Table 6 indicate that, in selected net exporter sectors, real wage has a negative and significant impact on employment, whereas the real output has a significant positive impact, in accordance with our prior expectations. Coefficients of *xm* variable imply that net exports with the EU, USA, and Russia have the greatest employment-boosting impact on the manufacturing industry. Moreover, among these, net exports with the EU have the greatest impact on manufacturing employment generation. Next, Table 7 presents the results associated with the impact of the

3 These sectors are 16, 22, 25, 27, 28, 31 and the technology classifications are defined according to OECD standards.

mx variable on the manufacturing labor demand. The findings indicate that net imports from Iraq, the EU, and the USA have a negative effect on employment in the manufacturing industry. When the findings for all sectors and sectors with maximum employment growth are compared, it is seen that the employment effects are much stronger for the second group of sectors. When all sectors are considered, both exports to and imports from the EU create employment, and for the high employment growth sectors, we see the same trend for Russia. Keeping in mind that Turkey mainly imports energy from Russia, the importance of import composition for employment generation is seen again. The findings also reveal that net exports to Iraq have a positive impact on manufacturing employment, whereas the impact of net imports from Iraq on labor demand is strongly negative.

Overall, the results indicate that contribution of exports to Turkish manufacturing employment is significant. To this extent, our findings indicate that trade has a critical role in manufacturing employment creation. When we consider the sectors that witnessed the greatest employment growth in the sample period, we find that increase in net exports has a greater contribution. In addition to this, surprisingly, the findings reveal that imports from some countries also generate employment in the Turkish case. The high import dependency of production might be the possible reason for this employment creation effect of imports.

Table 7. Impact of Trade on Manufacturing Employment (Net importer-Max employment growth sectors)

Net imports (MX)					
	USA	China	EU	Russia	Iraq
Constant	11.327*	11.160*	11.472*	11.203*	11.351*
	(0.505)	(0.542)	(0.475)	(0.537)	(0.526)
realw	-0.008*	-0.008*	-0.008*	-0.006*	-0.009*
	(0.001)	(0.001)	(0.001)	(0.0003)	(0.001)
realcons	-0.0003	-0.0003*	0.002*	-0.003**	-0.0002
	(0.0007)	(0.0007)	(0.0008)	(0.002)	(0.0007)
reer	0.002	0.001	0.002	0.004	0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
realq	0.037*	0.044*	0.032*	0.043*	0.043*
	(0.003)	(0.003)	(0.002)	(0.003)	(0.005)
xm	-	-	-	-	-
mx	-0.004*	0.01*	-0.062*	0.002***	-7.822*
	(0.001)	(0.0008)	(0.011)	(0.001)	(2.435)
Hausman statistic	$\chi^2(5)=72.264$ *prob.=0.2017*	$\chi^2(5)=13.083$ *prob.=0.023*	$\chi^2(5)=30.797$ *prob.=0.000*	$\chi^2(5)=21.11$ *prob.=0.000*	$\chi^2(5)=15.098$ *prob.=0.010*
F(prob.)	*26.244 (0.000)*	*32.930 (0.000)*	*46.036 (0.000)*	*33.684 (0.000)*	*36.167 (0.000)*
Adjusted R^2	*0.812*	*0.782*	*0.834*	*0.785*	*0.798*

5. Conclusion

The rapid international trade growth after 2003 contributed positively to the Turkish economy; however, the employment effects of this increase have not been sufficiently analyzed. In this context,

this paper aims to evaluate the employment effects of Turkey's exports to and imports from selected countries and country groups for the 2003-2017 period. The analysis in this study covers 20 manufacturing industries identified at the two-digit level of the NACE Rev.2.

The findings obtained in the study reveal that the increase in manufacturing industry exports increased the demand for labor in Turkey. When trade is disaggregated for trading partners, we find that the relationship between exports and employment is positive and statistically significant for all groups, and this effect is strongest for Turkey's exports to the EU. Since the labor-intensive sectors such as the automotive industry, ready-made clothing and apparel have the highest share in Turkey's exports to the EU, this strong effect can be considered to have emerged. In order for Turkey to create demand for labor through exports, it is necessary to follow policies to increase the exports of labor-intensive sectors, primarily to the EU. At this point, it will be beneficial to expand the export range by diversifying the countries and products.

While theoretically, increases in imports are expected to reduce the labor demand, the findings for Turkey point to a different situation. Considering the entire manufacturing industry, it is observed that imports from the USA, Russia and Iraq decreased labor demand as expected, while imports from the EU created labor demand. The increase in Turkey's import dependency of production since the 2000s and Turkey's import of inputs from the EU, among other things, can be counted among the reasons for the emergence of this situation. When the sectors with the highest employment growth are examined, a similar increase in labor demand is seen as a result of imports from China and Russia. Considering that Turkey's imports of semi-finished goods from China are high, it can be said that imports from China create labor demand through production increases. On the other hand, oil and natural gas constitute a large part of Turkey's imports from Russia. Since these are the basic inputs used in production, it can be said that the increase in imports from Russia is resulting from the increases in production and therefore, leads to an increase in employment.

The overall findings suggest that international trade affects employment in manufacturing industries, and the size and attitude of this effect depends on whom Turkey trades with. The findings once again reveal the importance of trade with the EU countries for the Turkish economy. Although imports from some countries and country groups do not seem to have a negative effect on employment, import substitution in intermediate goods should be given importance in order to accelerate labor demand through forward and backward links. On the other hand, following policies to increase the exports of labor-intensive sectors should not be neglected. If data becomes available by TURKSTAT, it will be possible to extend the analysis with more disaggregated industry data to make more specific policy recommendations on an industry basis.

References

Acemoğlu, D., D. Dorn, G.H. Hanson & B. Price (2016), Import Competition and the Great US Employment Sag of the 2000s, *Journal of Labor Economics*, 34 (1), 141-198.

Akkuş, G.E. (2014), The Effects of Trade and Productivity on Employment in The Manufacturing Industry of Turkey, *İktisat Fakültesi Mecmuası*, 64 (2), 1-44.

Autor, DHH, D. Dorn & G.H. Hanson (2013), The China Syndrome: Local Labor Market Effects of Import Competition in the United States, *American Economic Review*, 103 (6), 2121-2168.

Aydıner-Avşar, N. & Ö. Onaran (2010), The Determinants of Employment: A Sectoral Analysis for Turkey, *The Balsvik Developing Economies*, 48 (2), 203-231.

Balsvik R., S. Jensen & K.G. Salvanes (2015), Made in China, Sold in Norway: Local Labor Market Effects of an Import Shock, *Journal of Public Economics*, 127, 137-144.

Erduman, Y., O. Eren & S. Gül (2020), Import Content of Turkish Production and Exports: A Sectoral Analysis, *Central Bank Review*, 20 (4), 155-168.

Erlat, G. (2000), Measuring the Impact of Trade Flows on Employment in the Turkish Manufacturing Industry, *Applied Economics*, 32 (9), 1169-1180.

Gaston, N. & D. Trefler (1994), The Role of International Trade and Trade Policy in the Labour Markets of Canada and the United States, *The World Economy*, 17(1):45-62.

Goldar, B. (2009), Impact of Trade on Employment Generation in Manufacturing in India, Institute of Economic Growth University of Delhi Enclave, Working Paper Series No. E/297/2009.

Gozgor, G. (2016), International Trade and Manufacturing Employment in Developed Economies: An Empirical Study, *Regional and Sectoral Economic Studies*, 16 (1), 5-16.

Greenaway, D., R.C. Hine & P. Wright (1999), An Empirical Assessment of the Impact of Trade on Employment in the United Kingdom, *European Journal of Political Economy*, 15 (3), 485-500.

Grossman, G.M. (1987), The Employment and Wage Effects of Import Competition in the United States, *Journal of International Economic Integration*, 2 (1), 1-23.

Hausman, J.A. & W.E. Taylor (1981), Panel Data and Unobservable Individual Effects, *Econometrica*, 49 (6), 1377-1398.

Hayakawa, K., T. Ito & S. Urata (2021), Impacts of Increased Chinese Imports on Japan's Labor Market, *Japan and the World Economy*, 59, 101087.

Herath, H.M.S.P. (2014), The Impact of International Trade on Employment Generation: A Sri Lankan Experience, *International Journal of Economics, Commerce and Management*, II (7), 1-8.

Hiebert, P. & I. Vansteenkiste (2010), International Trade, Technological Shocks and Spillovers in the Labour Market: A GVAR Analysis of the US Manufacturing Sector, *Applied Economics*, 42 (24), 3045-3066.

Jenkins, R. & K. Sen (2006), International Trade and Manufacturing Employment in the South: Four Country Case Studies, *Oxford Development Studies*, 34 (3), 299-322.

Krishna, P., D. Mitra & S. Chinoy (2001), Trade Liberalization and Labor Demand Elasticities: Evidence from Turkey, *Journal of International Economics*, 55 (2), 391-409.

Messerlin, P.A. (1995), The Impact of Trade and Foreign Direct Investment on Labour Markets: The French Case, OECD Jobs Study Working Papers No. 9.

Onaran, Ö. (2011), The Effect of Import Penetration on Labor Market Outcomes: The Case of Austrian Manufacturing Industry, *The International Trade Journal*, 25 (2), 163-204.

Raju, S., B.R. Chaudhuri & M.S. Mishra (2016), Trade Liberalization and Employment Effects in Indian Manufacturing: An Empirical Assessment, Working Papers MPIA 2016-19, PEP-MPIA.

Tuhin, R. (2015), Impact of International Trade on Employment: Evidence from Australian Manufacturing Industries. Australian Government, Department of Industry and Science Research Paper: 2/2015.

TURKSTAT, İşgücü İtatistikleri. Retrived January 5, 2022, from https://biruni.tuik.gov.tr/medas/?kn=72&locale=tr.

Yanıkkaya, H., A. Altun & P. Tat (2019), Openness and Deindustrialization: A Turkish Case, *Boğaziçi Journal, Review of Social, Economic and Administrative Studies*, 33 (2), 1-25.

Appendix: Manufacturing Industries Included in the Study (NACE Rev.2, 2 Digit)

10	Manufacture of food products
13	Manufacture of textiles
14	Manufacture of wearing apparel
15	Manufacture of leather and related products
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
17	Manufacture of paper and paper products
18	Printing and reproduction of recorded media
19	Manufacture of coke and refined petroleum products
20	Manufacture of chemicals and chemical products
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
22	Manufacture of rubber and plastic products
23	Manufacture of other non-metallic mineral products
24	Manufacture of basic metals
25	Manufacture of fabricated metal products, except machinery and equipment
26	Manufacture of computer, electronic and optical products
27	Manufacture of electrical equipment
28	Manufacture of machinery and equipment n.e.c.
29	Manufacture of motor vehicles, trailers and semi-trailers
31	Manufacture of furniture
32	Other manufacturing