

AUTOMOTIVE INDUSTRY: ECONOMIC EFFECTS OF FOREIGN DIRECT INVESTMENTS IN TURKEY

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Abstract

Foreign Direct Investment (FDI) and automobile industry have inseparable relationship. The academic studies reveal that FDI has generally positive effects on employment, human resources, management training, GDP, productivity, export and spillover effects on local industry. In this study the economic effects of Foreign Direct Investments (FDI's) on the Turkish Automotive Industry have been analyzed between 1997 and 2010 in terms of export, productivity and employment. The results show significant FDI contribution to the Turkish automotive industry in all three areas considered. The results show that foreign direct investment has significant positive effects on Turkish economy. Policy makers should encourage such investments to stimulate the domestic markets.

Key Words: *Foreign direct investment, automotive industry, motor vehicle, exports, productivity, employment, labor costs, panel data, fixed effects models, random effects models.*

Otomotiv Endüstrisi: Türkiye’de Doğrudan Yabancı Yatırımların Ekonomik Etkileri

Özet

Yabancı sermaye ve otomobil sanayinin birbirinden ayrılmaz ilişkileri vardır. Yapılan akademik çalışmalarda genellikle yabancı sermayenin(FDI) istihdam, insan kaynakları, yönetici eğitimi, gayri safi yurtiçi hasıla, verimlilik, ihracat, yerli sanayi üzerinde yayılma etkisi gibi pozitif etkileri ortaya konulmuştur. Bu çalışmada 1997-2010 yılları arasında yabancı sermayenin ihracat, verimlilik ve istihdam üzerine etkileri analiz edilmiştir. Sonuç FDI’ın araştırılan her üç konuda

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da Türk otomotiv sanayisine önemli bir katkı sağladığını göstermiştir. Bu araştırma yabancı sermayenin Türk ekonomisi üzerine pozitif bir etki yaptığını ortaya koymuştur. Politika üretimlerinde bu durum yabancı yatırımların yerli pazarı hareketlendirmesi için cesaret vermelidir.

Anahtar Kelimeler: *Yabancı sermaye, otomotiv sanayi, motorlu araçlar, ihracat, verimlilik, istihdam, işçilik ücreti, sabit etki modeli, tesadüfi etki modeli.*

1. INTRODUCTION

The aim of this study is to investigate the economic effects of foreign direct investment on Turkish automotive industry. Our study comprises of the datas of cars, light and heavy commercial vehicles and their suppliers. Academic studies made for automotive sector in different countries around the worlds how that vehicle producers with FDI have positive effects on GDP, countries' tax revenues, direct/indirect employment, export and productivity. Vehicle producers and their direct suppliers in Turkey have mainly foreign direct investment. This study analyzes the effect of vehicle producers with FDI on productivity, employment and export. Due to limited access to the datas of automotive industry in Turkey, there are limited papers investigating the effects of automotive sector with FDI on Turkish economy.

The studies done for automotive firms with foreign direct investment in the developed and developing countries reveal that they have positive effects on countries' GDP, general tax revenues, direct and indirect employment, productivity and export income. In this context, our study investigates whether it shows the same positive effects also in Turkey for the automotive companies with the FDI or not.

This study will contribute to understand and promote the FDIs in Turkey over general public opinion. It will also give directions to the policy makers which is especially important because although the very low FDI share in Turkey according to the total FDI, it holds the greatest share in export but it still struggles with heavy regulations. This is the main motivation for this study and aims to obtain positive contribution to literature, representation of automobile industry and responsibilities of the Turkish government on the effects of FDI regarding the increase in employment, productivity and export business.

2. LITERATURE REVIEW

Automotive sector has a leading position in the world economy. Our literature review reveals that FDI is the main power and the fundamental phenomenon behind the automotive industry in Turkey also in other countries around the world. High production costs and tight environmental imposition in developed countries led foreign direct investment to the developing countries with the low cost. Effects of FDI's on growth, productivity, employment, export, development of local supplier, labor force, management training and technology transfers are studied, mainly focusing on the world's developing economies.

Even though the automotive industry is the leading export business in Turkey (General Directorate Industry, 2010/3), to the author's knowledge, the number of studies done on Turkish automotive industry does not match its significance in the country's export volume. There are some studies about the relationship between the FDI inflows and the economic growth, productivity, employment, international market integration, and other spillover effects for Turkish manufacturing industry in general (Aslanoğlu, 2000), (Taymaz and Yılmaz, 2008), (Yaşar and Paul), (Hisarcıklar, Karakaş, Aşıcı, 2009), (Gürsoy, 2010). However, studies related to the impact of FDIs on Turkish automotive sector are missing, probably due to the limited availability of historical data on FDIs for the automotive sector.

This study uses manually collected datas from the Istanbul Chamber of Industry archives to fill the gap in literature and examines the relationship between the FDIs in the Turkish automotive industry and the sector's export, productivity and employment in automotive industry. Employing a panel data and robust statistical procedures, we found that increase in FDIs is significantly associated with the increase in the industries' exports, productivity and employment levels in Turkey between the period of 1997-2010.

The papers contain FDI effects are mainly in manufacturing, textile, electronics and finance sectors. Researches concentrated directly on the effects of FDI for automotive sectors are relatively less, Especially in Turkey. Scantiness of related direct datas, their lack of continuity makes the studies difficult. The studies that were done are mostly for India and China and less for East European and South American countries.

Automotive sector is the most exporting sector in Turkey. The entire motor vehicle producers are worldwide well-known brands such as Daimler-Benz, Fiat, Renault, Toyota, Honda, MAN, Hyundai, Isuzu, and Ford. These producers and their international sub suppliers such as Bosch, Valeo, Yazaki, Autoliv, represent companies with FDI.

Although the motor vehicle production is the backbone of Turkish economy, studies on the its contribution to employment, productivity, growth and export are less. On the other hand, the studies are missing about the poor FDI stock in Turkey compared with East European and Asian countries, and huge drop of FDI inflow in recent years. The causes are the limited released datas by state owned institutions, reports of chamber of industry and commerce.

Makinen (1970) had studied, as one of the first researcher on the FDI topic, pay off periods for foreign direct investment by the United States automotive industry. The aim of the study was to measure the impact of foreign direct investment on current account items. The methodology was focusing on the time of investment return to United States. The datas used are between 1952 and 1965 and were obtained from annual reports of stockholders and publicly available sources. The World had been divided into four regions: Canada, Europe, Latin America and Rest of the world. The investigation reveals that among all the geographic areas, the most favorable effects of the payoff come from under developed countries.

Erdilek (1980) first searched the relation between FDI in Turkish manufacturing and Turkish government. In his book, he analyzes the divergences of FDI effects on the interest of investors and the host country and suggests proper implementations to overcome obstacles for foreign investors. The methodology relies on the questionnaires and interviews which were evaluated empirically. The data used in the research are between 1970 and 1977. FDI statistics were not published by the government because they banned the datas revealment.

Accordingly, interviews made with government officers and prominent Turkish businessmen, the companies who were available for datas strictly banned to reveal their identity. In this period there were 73 active FDI companies. 46 Firms participated in the study which of 7 were on transportation vehicles and tractors. The first FDI motive was to invest in Turkey with mode 3, mean 2.37, by expecting fast growth in Turkish economy and growing demand for the FDI firm products. In the second motive, it was expected high returns in supplying Turkish market with mode 2 and mean 1.58. Ali and Guo (2005) researched determinants of the FDI inflows and relation with the low labor cost. The study was done by using questionnaire, sent to 22 firms representing automotive manufacturing, electronics, telecommunication equipments, and chemical plants. The subjected companies were wholly owned or wholly owned equity joint ventures. The result showed that significant indicators for investment in China are firstly with main score 3.79 large market size and growth, and secondly with main score 3.32 labor cost. Kudina and Jakubiak (2008)

studied FDI inflows in the CIS countries (Ukraine, Moldova, Georgia, and Kyrgyzstan) which were realized by 120 investors. Sample period was between 1997 and 2006. The result suggests that local market, skilled labor, cheap input factors effects the performance of foreign owned companies positively.

2.1. Impact of FDI on Export

Zhang (2006) found that FDI has a positive impact on China's export boom. The econometric model comprised of cross sectional datas between 1980 and 2004 with 186 companies in manufacturing sector. The estimation result explores that, FDI has a positive impact on China's export boom and effects are higher in labor-intensive industries. The other independent variables such as wage rates and scale economies, are statistically significant and have positive effects on export. Sharma (2002) studied multinational enterprises and their export performance between 1970 and 1998 in India. The export performance is investigated in the models of demand and supply function. The result of the export demand reveals that appreciation of the Rupee has negative impact on export demand. Second investigation made on the export supply function model shows that by the increase in the ratio of export prices to domestic, there is an increase in the export supply. There is no statistical significance that FDI increases the export performance. Additionally, there is evidence of statistical significance between infrastructure and export supply. The Impact of foreign ownership on the export performance of the Turkish automotive firms has been tested by comparing the export performance with and without foreign ownership. The Anova test results provide strong evidences that the export level, export orientations and export market performance of the firms with foreign ownership are significantly higher than those of other firms without foreign ownership (Gürsoy, 2010).

2.2. Impact of FDI on Productivity

The effects of FDI companies on productivity performance of the firms have been studied for the different countries. In his study, Aslanoglu (2000) compares the domestic and foreign companies in terms of productivity, export propensity and capital-labor ratio. Sectoral analyses indicate relatively better performance of FDI companies in manufacturing of transport equipments and rubber products. Konigs (2001) has researched productivity performance on three European Countries. The datas of 2321 firms in Bulgaria between the period 1993-1997; 3844 firms in Romania between the period 1994-1997; 262 firms in Poland between 1993-1997 has

been used. The results show that the performance of the domestic companies in Bulgaria and Romania are better as the firms with FDI. In Poland the companies with FDI cooperation prevail better productivity performance. While Poland's traditional industry culture and border with high-industrialized country Germany may have positive effect, Romania and Bulgaria transition takes more time. Buckley, et al (2007) researched the effect of FDI on labor productivity of China's automotive industry. Random effects model is used to estimate the panel data between 1995 and 1999. The results explore that capital intensity, firm size, ratio of foreign investments to total capital, turnover of working capital are positive, statistically significant and positively effects of labor productivity in Chinas automotive industry. Yaşar and Paul (2006) studied the linkage between productivity and FDI, export, import on textile and motor vehicles industries in Turkey. Unbalanced panel data from 1990-1996 has been used. The most positive coefficient of variables indicates that they are statistical significant which means that the companies with international linkage have high productivity level, pay more, are larger and invest more. Smarzynska (2002) used firm level data from Lithuania between 1996 and 2000 and analyzed effects of FDI on domestic firms. She found positive correlation between foreign equity share and productivity growth. Further she found that productivity benefits are associated with local market oriented, not with export oriented FDI. The effect of inward FDI on manufacturing sectors' productivity had been investigated (Bitzer and Görg, 2005) for 17 OECD countries Canada, Czech Republic, Germany, Denmark, Finland, France, Italy, Japan, South Korea, Netherlands, Norway, Poland, Sweden, and the United Kingdom. The used data contains the period between 1973 and 2000. The results show that there are average productivity benefits from inward FDI. However, they also found number of examples where inward FDI is negatively associated with productivity such as Germany, Spain, Italy and Norway.

2.3. Impact of FDI on Employment

Hisarcıklılar, Karakaş, Aşıcı (2009) studied the relation between FDI inflows and employment at sector level between the period 2000-2007 and used dynamic panel data from 19 sectors. They found that there is positive and significant relation between current and lagged of employment but negative and significant relation between current and lagged value of FDI and employment on manufacturing. This result indicates that FDI inflows cause employment losses in Turkey. Taymaz and Yılmaz investigated that Turkish automotive and electronic industries play a very important role in generating employment and productivity growth. Sjöholm (2007) analyzed the relation between FDI and China's manufacturing sector between the

period 1998 and 2004 with firm level data. The research explores that non-private domestic companies' and foreign companies' growth negative and significant, and leads to results that employment growth is lower than private companies. The distribution of jobs in foreign owned companies is also skewed towards the manufacturing sector, which tend to be more labor intensive. Generally, FDI realized through greenfield is more likely to have positive impact on employment (OECD,2008).

3. DATA AND MODEL

This study uses annual data from the companies in the Turkish automotive industry. Due to limited data availability, the subject Turkish automotive companies includes 46 firms which are ranked within the top 1,000 industry companies in terms of their sales revenue, and has complete data during the subjected period. The list of top 1,000 industry firms is listed by the Istanbul Chamber of Industry (ISO) every year. The data was manually collected from the ISO archives for the period of 1997-2010. In our sample, 33 of 46 firms appeared in the ISO top 1,000 firms list every year during the subjected period of 1997-2010. Out of the remaining 13 sample firms, 8 firms did not make the ISO list for two years while 5 firms were not in the list only for one year.

We examine how different levels of FDI involvement in the company effect the export levels, labor productivity and employment levels in the sector. Control variables used in our analysis include foreign exchange rates, industry output and unit labor costs. Datas on aggregate industry figures, and the unit labor cost index for manufacturing industry were collected from the OECD Statistics for Turkey and the exchange rates were obtained from the statistical data section of the Turkish Central Bank website.

The FDI impact models often use the percentage of FDI ownership in companies as an independent variable to study how it affects a particular aspect of a company. We use the following models to examine how exports, labor productivity and employment in the Turkish automotive industry are effected by FDIs after controlling for exchange rates and unit labor costs.

The export model is

$$\ln EX_{it} = \alpha_j + \beta_1 \ln PD_{it} + \beta_2 \ln ULC_{it} + \beta_3 \ln REER_t + \beta_4 \ln FDI_{it-1} + u_{it} \quad (1)$$

where, subscript i indicate the firm i while t is Year t for the period of 1997-2010. The term ln preceding a variable denotes the natural logarithm of that variable

EX_{it} = annual exports of firm i in US dollars.

PD_{it} = annual productivity of firm i, estimated as the firm's gross value added during the period divided by the number of employees in the firm.

ULC_{it} is unit labor cost for firm i. Data extracted from OECD-stat (2011) manufacturing sector for Turkey.

$REER_{it}$ = annual real exchange rate. Turkish Lira/U.S.D. parity. We preferred due to export datas of companies in U.S.D. In the first equation, EX_{it} firm i in US dollars.

The second model is productivity model:

$$\ln PD_{it} = \alpha_i + \beta_1 \Delta \ln EMP_{it-1} + \beta_2 \ln FDI_{it-1} + u_{it} \quad (2)$$

Where; Δ is the first difference operator.

The last model is employment model

$$\ln EMP_{it} = \alpha_j + \beta_1 \ln Y_{it} + \beta_2 \ln FDI_{it} + \beta_3 \ln X_{it} + u_{it} \quad (3)$$

where;

Y_{it} = annual industrial gross output for firm i. This data contains output value of each automotive company at time t from our sample.

X_{it} = the ratio of annual exports to annual gross output firm i. This variable contains each automotive firm value from our sample at time t.

Annual values for firm exports, productivity and industrial gross output are collected from the Istanbul Chamber of Industry. Unit labor costs are obtained from the OECD Statistics and exchange rates are provided by the Turkish Central Bank Statistics. Table 1 presents the descriptive statistics

Table 1. Descriptive Statistics: Turkish Automotive Industry during the period of 1997-201

Variables	Mean	Median	Std. Dev.	Skewness	Kurtosis
$\ln EMP_{it}$	7.059	7.194	0.976	-0.136	2.571
$\ln EX_{it}$	18.115	18.208	1.607	0.140	3.012
$\ln FDI_{it}$	17.109	17.525	1.861	-2.814	24.892
$\ln PD_{it}$	10.341	10.629	1.681	-4.667	28.671
$\ln REER_{it}$	4.617	4.605	0.165	0.160	1.696
$\ln Y_{it}$	19.016	19.076	1.419	-0.580	7.256
$\ln ULC_{it}$	4.489	4.437	0.128	0.529	2.201
$\ln X_{it}$	-0.923	-0.666	0.877	-2.357	10.058

Mean, median, standard deviation, skewness and kurtosis values are reported for each variable used in analyses. EMP is annual employment level, ULC is from the OECD Turkish Statistics and the rest of the variables are from the Istanbul Chamber of Industry archives. Ln is the natural logarithm. There are a total of 644 annual observations for the 46 auto-industry firms, which were in the top 1000 firms based on the ranking of sales revenue.

Our final sample includes 46 firms from the auto-industry with 644 observations during 14 years between 1997 to 2010. Table 1 shows the descriptive statistics for the aggregate sample while Table 2 represents the pair wise correlations among the economic variables used in the analyses.

Table 2 shows that linear and positive relationships exist among the variables. Particularly, there is a high correlation among annual industrial gross output, employment, export, and FDI.

Table 2. Correlation Coefficients among economic variables for the Turkish Auto-Industry between 1997 and 2010.¹

	EMP_{it}	EX_{it}	FDI_{it}	PD_{it}	$REER_{it}$	Y_{it}	ULC_{it}	X_{it}
EMP_{it}	1							
EX_{it}	0.788	1						
FDI_{it}	0.596	0.584	1					
PD_{it}	0.177	0.255	0.435	1				
$REER_{it}$	0.249	0.476	0.336	0.31	1			
Y_{it}	0.850	0.798	0.657	0.323	0.434	1		
ULC_{it}	0.250	0.445	0.346	0.316	0.868	0.426	1	
X_{it}	0.124	0.564	0.038	0.047	0.206	0.008	0.138	1

¹ Correlations among variables EXP , EMP , FDI , PD , $REER$, Y , ULC and X . Please refer to Table I for description of the variables. Results are presented for the overall sample of 46 auto-industry firms in the top 1000 firms based on the ranking of sales revenue during the sample period.

4. METHODOLOGY

We apply a panel data analysis for 46 firms over 14 years to estimate effects of FDI on the Turkish Automotive Industry. The panel data analysis has considerable advantages over both cross-sectional and time series analyses. Pooled ordinary least square (OLS), fixed effects, and random effects are the three common methodological models used with panel data. Using an inappropriate model would result in inconsistent coefficient estimates. Therefore, we conduct the Hausman (1978) test to decide which of these three models is the most appropriate for our data.

The general framework for the panel data analysis is a regression model of the form

$$\text{for } \dots i=1,2,\dots,N; \text{ and } t=1,2,\dots,T \quad (4)$$

N and T are the cross section and time series dimensions respectively and x_i a vector of K regressors. The vector of disturbance terms u_{it} is assumed to be uncorrelated with the x_{it} 's and the α_i 's have zero mean and constant variance, σ_u^2 . This model restricts the coefficients on x to be common across i and t and is known as pooled OLS method. The model estimates a common constant for all cross-sections. Practically, common constant model implies that data set is a priory homogenous.

In the fixed effects (FE) method constant is treated as group-specific. In other words, the model allows for different constant for each group. The fixed effects estimator is called as the least squares dummy variables (LSDV) because it includes a dummy variable for each group to allow for different constants for each group;

$$y_{it} = \alpha_i + \beta_1 x_{1it} + \beta_2 x_{2it} + \dots + \beta_k x_{kit} + u_{it} \quad (5)$$

where the dummy variable, is the one that allows for different group-specific estimates. The standard F-test can be used to test fixed effects against the common constant OLS method. The null for the constants are homogenous;

$$H_0: \alpha_1 = \alpha_1 = \dots = \alpha_N. \quad (6)$$

When N is large, random effects (RE) model becomes more useful than fixed effects. In random effects model constant can be written as;

$$\alpha_i = \alpha + v_i. \quad (7)$$

where, v_i is a zero mean standard random variable. The random effects model takes following form;

$$y_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + \dots + \beta_k x_{kit} + (v_i + u_{it}) \quad (8)$$

In order to make a choice between the fixed effects and random effects models Hausmann (1978) proposed the following test;

$$H = \left(\hat{\beta}^{FE} - \hat{\beta}^{RE} \right)' \left[\text{var} \left(\hat{\beta}^{FE} \right) - \text{var} \left(\hat{\beta}^{RE} \right) \right]^{-1} \left(\hat{\beta}^{FE} - \hat{\beta}^{RE} \right) \square \chi^2(k) \quad (9)$$

For small values of the Hausmann statistic, random affects estimator more appropriate.

Before proceeding to the Panel data analyses, it is needed to examine the panel Granger causality between the variables existing in the models. In this context, introduction of the panel Granger causality test seems to be an appropriate procedure for investigating the causality between the variables. Panel causality test approach can be explained by the considering the bivariate regression below:

$$\begin{aligned} y_{it} &= \alpha_{0i} + \alpha_{1i}y_{it-1} + \dots + \alpha_{li}y_{it-l} + \beta_{1i}x_{it-1} + \dots + \beta_{li}x_{it-l} + \varepsilon_{it} \\ x_{it} &= \alpha_{0i} + \alpha_{1i}x_{it-1} + \dots + \alpha_{li}x_{it-l} + \beta_{1i}y_{it-1} + \dots + \beta_{li}y_{it-l} + \varepsilon_{it} \end{aligned} \quad (10)$$

Where, t denotes the time period dimension of the panel, and i denotes the cross-sectional dimension. Depending on these equations, panel causality test can be formed in a standard way as in Granger causality. In this method, it is assumed that all coefficients are same across all cross-sections, i.e. there is no causality between the variables:

$$\begin{aligned} \alpha_{0i} &= \alpha_{0j}, \quad \alpha_{1i} = \alpha_{1j}, \dots, \alpha_{li} = \alpha_{lj}, \forall i, j \\ \beta_{1i} &= \beta_{1j}, \dots, \beta_{li} = \beta_{lj}, \forall i, j \end{aligned} \quad (11)$$

Using a Wald statistic, it can be tested whereas the null that all the coefficients are equal to the zero. For the large value of this Wald statistics, it can be said that y_{it} is Granger cause of x_{it} .

5. EMPIRICAL RESULTS

Empirical results of models and panel causality test and three models which explore the relation between variables. FDI has positive effects on export, productivity and employment. Table 3 presents the panel causality test results between the variables existing models.

Table 3. Panel Granger Causality Test Statistic

Direction of Causality		F-value	p-value
Productivity	➡ Export	2.947	0.033
Export	➡ Productivity	2.423	0.065
Unit labor cost	➡ Export	3.915	0.004
Export	➡ Unit labor cost	2.301	0.058
Real exchange rates	➡ Export	3.246	0.022
Export	➡ Real exchange rates	2.305	0.076
FDI	➡ Export	5.198	0.001
Export	➡ FDI	1.071	0.344
Employment	➡ Productivity	6.517	0.011
Productivity	➡ Employment	3.258	0.061
FDI	➡ Productivity	4.198	0.016
Productivity	➡ FDI	0.077	0.926
Industrial output	➡ Employment	4.917	0.008
Employment	➡ Industrial output	1.991	0.137
FDI	➡ Employment	4.168	0.000
Employment	➡ FDI	2.825	0.094
Export-output ratio	➡ Employment	3.548	0.019
Employment	➡ Export-output ratio	1.625	0.112

According to Table 3, it can be said that productivity, unit labor costs, real exchange rates, and FDI are Granger causes of export for the first model; employment and FDI are Granger causes of productivity in the second model; and lastly, industrial output, FDI, and export-output ratio are Granger causes of employment for the third model in the Turkish automotive industry.

Certain aspects of the Turkish automotive industry were examined to see the impact of FDI involvement on the export, productivity, and employment levels. The aggregate sample includes the largest 1000 companies of the Turkish industries in terms of sales revenue between the period of 1997-2010. The variables under consideration include annual figures for export levels (EX), labor productivity (PD) calculated as the ratio of gross value added to employment (EMP), unit labor cost index for the manufacturing industry (ULC), real exchange rates (REER), and the industrial output (Y). Table 4 illustrates the results of our panel data analysis using the random effects methodology.²

² Since the data used for estimation depends on the sample of 46 auto-industry firms in the top 1000 firms based on the ranking of sales revenue during the sample period of 1997-2010, RE models were considered in the study. Furthermore, the existence of a time-invariant variable (unit labor cost) made necessary this choice for Model 1.

Table 4. Estimation results of the panel data analysis

Dependent Variable:	Model 1 $\ln EX_{it}$	Model 2 $\ln PD_{it}$	Model 3 $\ln EMP_{it}$
Independent Variables			
Constant	2.668 (1.935)	Constant 7.551 (15.718)	Constant -3.181 (-5.875)
$\ln PD_{it}$	0.058 (2.522)	ΔEMP_{it-1} 0.102 (0.002)	$\ln Y_{it}$ 0.517 (18.575)
$\ln ULC_{it}$	0.906 (2.261)	$\ln FDI_{it-1}$ 0.139 (3.342)	$\ln FDI_{it}$ 0.025 (1.975)
$\ln REER_{it}$	1.263 (5.639)		$\ln X_{it}$ 0.098 (4.444)
$\ln FDI_{it-1}$	0.289 (6.343)		
<i>N</i>	644	644	644
Adjusted <i>R</i> ²	0.412	0.137	0.607

Note: *t*-values are in parentheses.

As seen in table 4 model 1, the lagged values of FDI ownership has positive effect on the sector export where every 1 percent increase in FDI stock is associated with a 0.289 percent increase in the export of automotive industry. Model 2 shows that every 1 percent increase in the lagged value of FDI ownership results in a 0.139 percent increase in industry productivity. In the employment model, model 3, FDI has positive effects with a 1 percent increase resulting in a 0.025 percent increase in the employment. The FDI coefficient in all three models are statistically significant at least 5 percent confidence level. Similarly, the control variables used in each model have also statistically coefficients and theoretically expected signs in relation to the dependent variable in each model. Controlling for the FDI's percentage ownership in the company, labor productivity and the exchange rate, there is statistically positive relationship between the unit labor cost industry and the export levels.

6. CONCLUSION

We found that nearly in every country, importance of FDI is penetrated and as well as other countries' governments, Turkey also struggles to attract the FDI. We have investigated to find out the relationship between the econometric variables of productivity, employment and export. Using robustness tests, we applied a fixed effects methodology to examine the FDI impact on the Turkish Automotive industry exports, productivity,

employment after controlling for the variations in the exchange rates and the industrial output. The results have showed that the FDI has significant effects to increase productivity, employment and export.

Our first model investigated the relationship between FDI and Export. In our research, we found that FDI has positive effect on growth of Turkish export. Our literature research shows similar effects with Zhang (2006), also revealing the positive effect of FDI between 1980 and 2004 of manufacturing sector on export China. Sharma's (2002) investigation on Indian export between 1970 and 1998 shows that FDI increases the Indian export statistics significantly. Gürsoy(2010) surveys about export performance of Turkish automotive companies with FDI and without FDI explaining that the companies with foreign ownership have higher export performance. Increase of export due to inward FDI in Turkey and in other developing countries confirm the effects of FDI on export. In our next survey we have proved the relationship between FDI and productivity. We found that FDI has positive impact on productivity in Turkish automotive industry. Our findings overlap with findings of academic studies which are researched in our literature review. Konigs' (2001) surveys with companies in Bulgaria, Romania and Poland has positive and negative results. While FDI has no significant effects on local firms in Bulgaria and Romania, it has significant effects in Poland due to traditional industry culture and having direct borderline with Germany. Buckley *et al* (2007), researches using panel labor data set consisting five subcontractors between 1995 and 1999 and exploring positive effects of FDI on China's automotive industry. Paul and Yaşar (2007) evaluated relationship between productivity and FDI in Turkish automotive industry. Estimation of models confirms that firms with international linkage are more productive. FDI and export ratios are positively related to plant level productivity. Smarzynska's (2002) survey between 1996 and 2002 explores that in Lithuania growth has with foreign equity positive relation. Productivity has associated with local market oriented FDI.

Our third model investigated the relationship between FDI and employment. We founded that inward FDI causes increasing employment in Turkish automotive industry. Hisarcıklılar's et al (2009) research for the period between 2000-2007 reveals that current and lagged value of FDI has negative and significant relationship with employment. This result indicates that FDI inflow causes employment loses in Turkey. OECD (2008) survey MNEs affiliates further employment increase.

We found that the automotive industry with their suppliers is the most important sector in the developed and developing countries.

Automotive industry is the back bone and driving force of other industrial sectors and effects directly macroeconomic values.

During our analyzes and literature examinations regarding Turkish automotive industry, we found that there are limited studies available with the poor and inappropriate content. The Turkish automotive industry is the biggest export sector of the country and hosts second biggest plants of the vehicle producers and supplier industry such as Fiat, Renault, Bosch, Delphi, Yazaki after their plants in home countries. In spite of the significance of the sector, the lack of available data on the companies operating in the sector led to a gap in literature analyzing.

This study aims to fulfill the deficit in literature and contribute a new prospect to better understanding of automotive industry and close relationship with Foreign Direct Investment in Turkey. The results of this study showing the positive impact of FDIs for the Turkish automotive industry may help the policy makers of the Turkish government when regulating the automotive industry imports and foreign direct investments as well as the Turkish entrepreneurs of the auto industry in their interactions with the foreign investors.

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