

## FOREIGN AFFILIATED FIRMS AND EMPLOYMENT: EVIDENCE FROM TURKEY<sup>1</sup>

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### ABSTRACT

*Employing a firm level dataset over the period 2003-12, employment effects of foreign affiliation is examined for Turkish firms. The employment changes of firms via foreign direct investment are investigated through treatment models by using Propensity Score Matching techniques jointly by Difference in Difference methodology. In an attempt to see the strength of the sustainability of fdi's positive effects on employment, the post-treatment period is extended and accordingly two different treatment groups are established. The results of the study robustly show that fdi acquisition improves firm level employment immediately after the acquisition and, this effect is sustainable even in the preceding years.*

**JEL Classification:** D22, F16, F23

**Keywords:** Foreign Direct Investment, Employment, Firm, Propensity Score Matching

## DOĞRUDAN YABANCI YATIRIMLAR VE İSTİHDAM İLİŞKİSİ: TÜRKİYE ÖRNEĞİ

### ÖZ

Bu çalışmada, 2003-12 zaman aralığına ait firma düzeyinde bir veri seti kullanılarak, doğrudan yabancı yatırımların istihdam üzerindeki etkileri incelenmektedir. Analizlerde örneklem seçim problemini önleyecek şekilde, doğrudan yabancı yatırım alma durumunu içeren uygulama (treatment) modelleri oluşturulmakta ve bu modellere Eğilim Skoru Eşleştirmesi (Propensity Score Matching) ile birlikte Fark-içinde-Fark (Difference-in-Difference) teknikleri uygulanmaktadır. Doğrudan yabancı yatırımların firma istihdamı üzerindeki sürdürülebilir etkilerini görebilmek üzere uygulama sonrası zaman periyodu uzatılarak farklı uygulama grupları oluşturulmaktadır. Çalışmanın sonuçları, firmaların istihdam düzeyinin doğrudan yabancı yatırıma maruz kalmanın hemen ardından arttığını ve söz konusu etkinin takip eden yıllarda da sürdüğünü göstermektedir.

**JEL Sınıflaması:** D22, F16, F23

**Anahtar Kelimeler:** Doğrudan Yabancı Yatırımlar, İstihdam, Firma, Eğilim Skoru Eşleştirmesi

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## 1. INTRODUCTION AND BACKGROUND LITERATURE

Foreign direct investment (fdi) impacts on the economic performance of host countries directly and indirectly by contributing to capital savings, increasing production capacity and, bringing along technology diffusion and management skills. Besides, fdi inflows and the presence of multinational firms could lead to job creation which is an important challenge mainly for the developing regions of the World.

The aim of this paper is to provide microeconomic evidence on the employment related effects of fdi in Turkey-a high-middle income country. In particular, we investigate whether fdi acquisition of formerly domestically owned firms affects the employment level of these firms in Turkish manufacturing industry over 2003-12 period. Indeed, over the last decade, Turkey has witnessed a remarkable foreign direct investment inflow. In fact, Turkey has integrated into the globalized world as well as transforming into one of the major recipients of fdi in its region<sup>2</sup>.

While the majority of the existing empirical literature on the fdi related effects concentrate on economic growth, productivity and export spillovers; there remain relatively few studies investigating the fdi inflows and employment nexus. On the other hand, the regarding literature does not provide a consensus on the employment effects of fdi i.e. these effects can differ according to country or sector specific components. It has been usually argued that, at the first instance, fdi inflows which generates new assets in the host economy are more likely to have positive effects on employment with respect to mergers and acquisitions (McDonald et al., 2003; Ernst, 2005). Whereas, vertical and horizontal linkages within the domestic economy can also provide employment increases in the longer run.

Studies asserting the positive employment effects of fdi generally argue that fdi promotes demand for labor in the host country conditional upon the fact that advanced multinational firms creates technology spillovers in the domestically owned firms. Some studies such as Karlsson et al. (2009) for China, Driffield (1999) for UK, and Figini and Görg, (1999) for Ireland Nunnekamp and Ajaga (2008) for US suggest positive employment effects of fdi, whereas some others like Mariotti et al. (2003) for Italy, and Brady and Wallace (2000) for US find negative employment effects. Axaroglou and Pournarakis (2007) reports differing employment effects of fdi inflows among US industries. Aitken and Harrison (1999) and De Loecker and Koning (2003) suggest that competition effects combined with labor switching effects from domestic firms towards foreign owned firms may

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<sup>2</sup> According to the 2013 World Investment Report of the United Nations Conference of Trade and Development (UNCTAD), Turkey has been ranked 14th among the developing countries and 1st within the West-Asia Region in terms of fdi inflows.

cause negative productivity effects for the domestically owned firms averting the positive employment effects of fdi.

There exists even less studies exploring the effects of fdi inflows on employment for Turkey. Using quarterly country level data over the periods 1970-2005 and 2001-2007 respectively, Karagöz (2007) and Aktar and Ozturk (2009) employ time series techniques and cannot find a causal relationship from fdi inflows to employment. Hisarcıklılar et al. (2009) find a negative relationship between fdi and employment employing GMM approach to sectoral level data over 2000-2007. Similar results are reported by Vergil and Ayaş (2009) for 1992-2006 period. Ekinci (2011) uses 1980-2010 country level yearly data and cannot find any relationship between fdi and employment as a result of Granger causality tests. Employing time series analysis, Saray (2011) cannot find significant a long term relationship between fdi and employment in Turkey over the period 1970-2009.

While studies on Turkey discussed so far provide mixed and aggregate evidence on the employment effects of fdi inflows, we contribute to this limited literature by providing firm level evidence on the issue. While doing so, we utilize the Propensity Score Matching (PSM) technique as well as Differences-in-Differences (DID) methodology and eliminate the selection bias problem in identifying the causality from fdi to employment. That is, by PSM-DID methodology we aim to accurately identify the employment effects raised by foreign affiliation.

The remainder of this paper has the following organization: Section two introduces the data and methodology we employ and, provides the results of our empirical investigation. Section three includes concluding remarks.

## **2. DATA, METHODOLOGY AND EMPIRICAL RESULTS**

In this study we use the most recent and comprehensive panel of Turkish firms based on the Industry and Service Statistics<sup>3</sup> data collected by TURKSTAT<sup>4</sup>. The whole population of private Turkish manufacturing firms with more than 19 employees<sup>5</sup> is selected and this unbalanced panel includes longitudinal data of approximately 20,000 firms over the period 2003-2012 on average<sup>6</sup>.

Throughout the study, in order to test the ex-post effects of foreign affiliation in terms of employment, two treatment models are established. In the first model, the treatment group covers

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<sup>3</sup> These statistics are collected as a census for firms with more than 19 employees while it is a representative survey for firms with less than 20 employees, where firms are classified according to their main activity, identified by NACE codes.

<sup>4</sup> These datasets are available under a confidential agreement and all the elaborations can only be conducted at the Microdata Research Centre of TURKSTAT under the respect of the law on the statistic secret and personal data protection.

<sup>5</sup> Firms with more than 19 employees constitutes a large share of the Turkish manufacturing industry. e.g. in 2009, they constitute 75% of employment with a share of 87% in production value, where a similar pattern can be observed during the previous and following years.

<sup>6</sup> The original sample size was slightly larger. We applied a cleaning procedure on the dataset which is fundamentally based upon Hall and Mairesse's (1995) study.

firms that do not have foreign ownership at time  $t-1$ , and have foreign ownership which is greater than zero (i.e. *fdi starters*) at  $t$ , whereas in the second model; the treatment group covers firms that do not have foreign ownership at time  $t-1$ , have foreign ownership which is greater than zero at  $t$  and, having foreign share of at least time  $t$  at time  $t+1$  (i.e. *fdi sustainers*). In both models the control group includes firms that are totally domestically owned over the sample period. By this way, for the first and second treatment models, we have nine cohorts that each corresponds to a year between 2004-2012, and eight cohorts that each corresponds to a year between 2004-2011, respectively. The average treatment effect on the treated (ATT) is calculated as in the following:

$$ATT = E(Y_{it}(1) - Y_{it}(0)|D_i = 1) = E(Y_{it}(1)|D_i = 1) - E(Y_{it}(0)|D_i = 1) \quad (1)$$

Equation (1), e.g. for the first model, indicates the difference between the employment level after the firm, which was formerly domestic ( $D_i = 1$ ), gains foreign share ( $Y_{it}(1)|D_i = 1$ ) and the potential employment level it would have if it would have never had foreign affiliation ( $Y_{it}(0)|D_i=1$ ). The potential outcome of the model cannot be known. Still, we can derive the outcome for the control group, which can be defined as  $E(Y_{it}(0)|D_i = 0)$ . Hence, when ATT is calculated, a selection bias can arise<sup>7</sup>. To get along the possible selection bias, we will apply PSM technique together with the DID methodology in order to test the impact of foreign direct investments on the employment level of the firms. Besides, DID estimators improve the quality of our results as suggested by Blundell and Costa-Dias (2000).

In this study, the reason behind using PSM algorithm is to compare the firms with very similar observable features. Accordingly, these firms have very similar probabilities (i.e. similar propensity score) of receiving treatment, while one of them have foreign share, and the other does not. After the propensity scores are calculated, large group of non-treated units (domestic firms) are matched to the treated ones. Next, by comparing the means of the explanatory variables within matched and unmatched samples, the matching procedure's effectiveness is checked. Finally, we calculate ATTs by employing Kernel matching techniques where all treated units are matched with a weighted average of all control units<sup>8</sup>. The resulting ATTs explain whether and in what direction foreign affiliation changes the employment level of the firms.

The propensity score is defined as the conditional probability of receiving treatment given pre-treatment characteristics by Rosenbaum and Rubin (1983):

$$P_i(Z_i) \equiv \Pr(D_i = 1|Z_i) = E(D_i|Z_i) \quad (2)$$

where  $D_i = \{0,1\}$  is the indicator of treatment and,  $Z_i$  is the vector of covariates over which the matching is applied. In this regards, the propensity score  $P_i(Z_i)$  is computed from a probit model

<sup>7</sup> See Dehajia and Wahba (2002) for further explanations.

<sup>8</sup> We calculate the propensity scores and average treatment effects by utilizing the algorithm suggested by Becker and Ichino (2002). The standard errors provided in Tables 2-3 are the analytical standard errors.

specification where the dependent variable is a binary variable indicating whether the firm is an fdi receiver or not. In the probit regressions, the covariates' vector includes the logarithms of total factor productivity (TFP), number of employee (EMP) and, capital intensity (CAPINT), a dummy variable indicating whether a firm has made intangible investments, average sectoral capital intensity, CR4 ratio and, sectoral export share at four digit industry level as well as year, region and 2-digit sector dummies. All of the covariates are lagged one period.

Nevertheless, PSM cannot get over all the biases, particularly the biases arise because of time-invariant unobservables. In order to overcome these biases and thus improve the quality of matching, we further make use of the DID estimators after PSM and call these estimates as the PSM-DID estimates. For this purpose, we apply the Kernel matching technique where the outcome is the difference between the pre- and after-treatment employment levels. By this way, the resulting ATTs provide us the difference between the average treatment effects of treated and non-treated groups where we eliminate the time-invariant unobservables. The PSM-DID estimators are defined as follows:

$$\Delta^{PSM-DID} ATT = E(Y_{it}(1) - Y_{it}(0)|D_i = 1) - E(Y_{it}(1) - Y_{it}(0)|D_i = 0) \quad (3)$$

To begin, we construct the matched sample and test the effectiveness of our matching procedure. Particularly, we check whether the means of observable variables are significantly different from each other in matched and unmatched samples. In Table 1, one can observe that significant differences arise between the means of firm level covariates within the unmatched samples, while these differences largely removed in the matched samples. For example, the difference in the mean TFP between *fdi starters* and *domestic firms* is 0.04 after matching, while it is 0.38 for the unmatched sample. In terms of the significance of the regarding difference, it is significant before matching while it turns to be insignificant after matching with the corresponding t-ratios of 17.4 and 0.64. Thus, these results suggest that the differences for the means of covariates are removed after matching.

As the matching procedure is proved to balance the means of observable variables for both treated and control groups, next we move into ATT estimations. For the first treatment model ATT indicates the effect of receiving fdi on the employment of firms which were formerly domestic, compared to their employment levels in the non-existence of fdi. In the second model, ATT gives the impact of receiving fdi and sustaining (or increasing) it in the next period, on the employment level of the firms that were formerly domestic.

**Table 1. Comparison of Treatment and Control Groups: Matched vs. Unmatched**

<b>PANEL A</b>						
Treatment group: FdiStarters Control group: domestic firms						
	<b>Matched Sample</b>			<b>Unmatched Sample</b>		
<b>(Lagged values)</b>	FdiStarter	Domestic	T-Test for the Mean Differences	FdiStarter	Domestic	T-Test for the Mean Differences
<b>TFP</b>	7.92	7.88	0.64	7.94	7.56	17.4
<b>EMP</b>	4.08	4.02	0.75	4.06	3.76	10.13
<b>CAPINT</b>	11.37	11.31	0.61	11.38	10.59	11.42
<b>Sample Size</b>	455	455		559	188,440	
<b>PANEL B</b>						
Treatment group: FdiSustainers Control group: domestic firms						
	<b>Matched Sample</b>			<b>Unmatched Sample</b>		
<b>(Lagged values)</b>	FdiSustainer	Domestic	T-Test for the Mean Differences	FdiSustainer	Domestic	T-Test for the Mean Differences
<b>TFP</b>	7.97	7.86	0.93	7.99	7.55	17.8
<b>EMP</b>	4.1	4.03	0.92	4.11	3.76	10.67
<b>CAPINT</b>	11.39	11.31	0.91	11.42	10.58	11.53
<b>Sample Size</b>	310	310		392	188,607	

Table 2, presents the PSM estimates of average treatment effects on treated (ATT) firms from Kernel matching procedure. Our results suggest that receiving fdi do statistically increase employment level of firms in Turkish manufacturing industry. Specifically, while gaining foreign share does have a significant impact on the number of employees at time  $t$  (i.e. when firm receives fdi), this effect improves at time  $t+1$  and, it scales down at  $t+2$ . These results indicate that at the year of acquisition fdi receivment leads to an 29 percentage points employment increase for domestic firms while this increase is 31 and 28 in the following two years respectively. When we consider *fdi sustainers*, employment effects of fdi inflows are strongerly evident. That is for the firms who pursue their foreign share, fdi receivment leads to an 32 percentage points increase in the employment level of domestic firms while this increase is 33 and 29 in the following two years respectively. Extending the horizon for the post-treatment period enables us to see that the positive effect of fdi on firm employment is sustainable.

**Table 2. Average Treatment Effects of Receiving FDI on the Employment of Firms**

PSM estimates			
	$EMP_t$	$EMP_{t+1}$	$EMP_{t+2}$
<b><i>ATT (FdiStarter)</i></b>	0.29***	0.316***	0.288***
	(10.321)	(11.111)	(7.517)
<b><i>ATT (FdiSustainer)</i></b>	0.324***	0.33***	0.294***
	(8.744)	(10.228)	(7.379)

Notes:(1)  $t$ -values are shown in paranthesis. (2) \*\*\*, \*\*, \* indicates statistical significance at 1%, 5% and 10% respectively.

Next, we use DID methodology to be able to eliminate the biases rose by time-invariant unobservables. In Table 3, we present the PSM-DID estimation results. These estimates represent the difference between the pre- and after-treatment employment levels of the firms, i.e. the differences between the outcomes at  $(t-1$  and  $t)$  and,  $(t-1$  and  $t+1)$ , respectively. They support the findings obtained from PSM estimates. Results show that employment level of the firm significantly rises by 3.1 percentage points, if the firm was formerly domestically owned and takes fdi at  $t$ . The improvement in employment for *fdi sustainers* is even stronger and more significant.

**Table 3. Average Treatment Effects from PSM-DID Estimates**

	$EMP_t - EMP_{t-1}$	$EMP_{t+1} - EMP_{t-1}$
<i>ATT (FdiStarter)</i>	0.031*	0.056**
	(1.903)	(2.534)
<i>ATT (FdiSustainer)</i>	0.05***	0.087***
	(2.741)	(3.512)

*Notes:*(1) *t*-values are shown in paranthesis. (2) \*\*\*, \*\*, \* indicates statistical significance at 1%, 5% and 10% respectively.

### 3. CONCLUSION

This study contributes to the debate on fdi and job creation by providing empirical results for Turkish Manufacturing Industry based on a recent and comprehensive firm level panel over the period 2003-2012. Utilizing PSM together with DID methodology our results show that fdi acquisition improves firms' employment level immediately after the acquisition. Moreover, this effect is sustainable even in the preceding years. In order to provide more robust evidence, we use two different cohort definitions of fdi receivment in one of which, we are able to see how fdi affects firms who were formerly domestic over a longer time horizon. By this way, our analysis adds more convincing evidence on our fundamental finding that fdi improves employment level of firms.

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