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THE EFFECTS OF FOREIGN DIRECT INVESTMENT (FDI) ON TOTAL FACTOR PRODUCTIVITY (TFP): THE CASE OF TÜRKİYE

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Abstract

The aim of this study is to empirically investigate the short- and long-run effects of foreign direct investment (FDI) on total factor productivity (TFP) in Türkiye for the period 1990-2023. The methodology of this study involves analyzing the relationship between TFP—calculated using the growth accounting approach—and FDI stock, financial development, and human capital variables through the ARDL bounds testing approach. The findings of this study indicate that FDI has a positive and significant effect on TFP in the short run, whereas this effect disappears in the long run. Additionally, only financial development is found to have a significant and positive effect on TFP in the long run, while human capital does not have a significant impact on TFP in either the short or long run. In sum, FDI has positive effect in the short run, but this effect diminishes in the long run.

Keywords: *Foreign Direct Investment (FDI), Total Factor Productivity (TFP), Growth Accounting, ARDL Bounds Test, Financial Development*
JEL Classification: *F21, O47, O11*

DOĞRUDAN YABANCI YATIRIM(DYY)'IN TOPLAM FAKTÖR VERİMLİLİĞİ(TFV)'NE ETKİSİ: TÜRKİYE ÖRNEĞİ

Öz

Bu çalışmanın amacı, 1990-2023 dönemi için Türkiye'de doğrudan yabancı yatırımların (DYY) toplam faktör verimliliği (TFV) üzerindeki kısa ve uzun dönemli etkilerini ampirik olarak incelemektir. Bu çalışmanın yöntemi olarak, büyüme muhasebesi yaklaşımı ile hesaplanan TFV'nin, DYY stoku, finansal gelişmişlik ve beşeri sermaye değişkenleri ile ilişkisi ARDL sınır testi yöntemiyle analiz edilmiştir. Bu çalışmanın bulguları, DYY'nın kısa dönemde TFV üzerinde pozitif ve anlamlı bir etkisi olduğunu, ancak uzun dönemde bu etkinin ortadan kalktığını göstermektedir. Ayrıca, uzun dönemde TFV'yi yalnızca finansal gelişmişlik değişkeninin anlamlı şekilde etkilediği, beşeri sermaye değişkeninin ise hem kısa hem uzun dönemde anlamlı bir etkisinin bulunmadığı tespit edilmiştir. Sonuç olarak, Türkiye'de DYY'nın TFV üzerindeki olumlu etkisinin ancak kısa vadede görüldüğü, uzun vadede anlamlı bir etki yaratmadığı sonucuna ulaşılmıştır.

Anahtar Kelimeler*: Doğrudan Yabancı Yatırım (DYY), Toplam Faktör Verimliliği (TFV), Büyüme Muhasebesi, ARDL Sınır Testi, Finansal Kalkınma*
JEL Sınıflandırması: *F21, O47, O11*

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1. Introduction

Foreign direct investment (FDI) is an important source of development for countries. It is particularly vital for developing countries with a savings deficit. Therefore, they are trying to attract FDI through tax incentives or tax deductions (Alfaro et al., 2004). According to the IMF (2009), foreign direct investment (FDI) occurs when an investor in one country acquires at least 10 per cent of the voting rights of an enterprise in another country with the aim of establishing a lasting interest and significant influence in the control of the enterprise. It is the foundation on which Multinational Enterprises (MNEs) are built, as they use these investments to establish and control businesses in several countries.

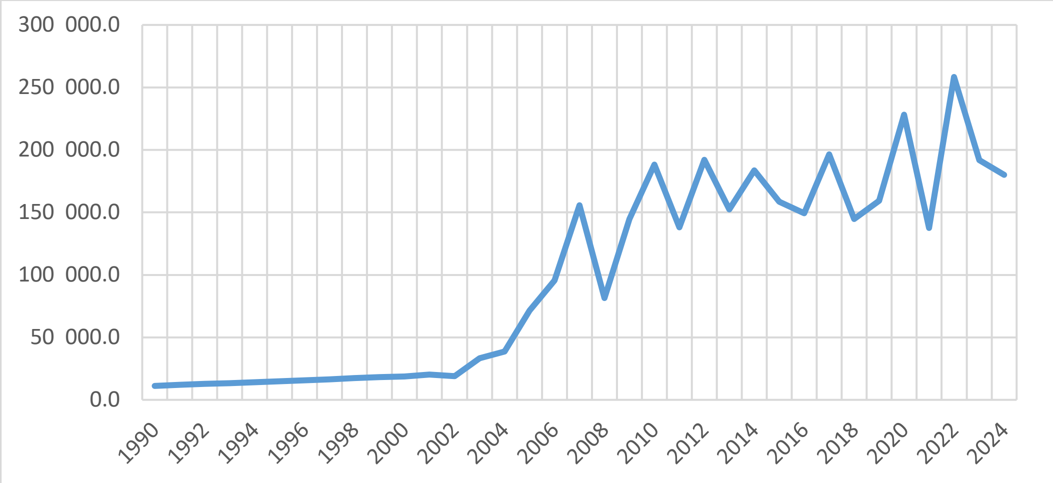
It is argued that MNEs' investments increases economic growth via two channels. First, FDI increases the capital stock of the host country (de Mello, 1999; Herzer, 2012; Akinlo, 2004; Akaridi et al., 2019). Through the production function, this translates into higher economic output and hence economic growth. However, this channel is short-lived. FDI may increase economic growth in the short run, but since capital has diminishing returns (Solow, 1957), this effect disappears in the long run (Herzer, Klasen and Nowak-Lehman, 2008; Iamsiraroj and Ulubasoğlu, 2015; Iamsiraroj, 2016). The second and more permanent channel operates through total factor productivity (TFP), which measures how efficiently an economy transforms labour and capital into output, induced by technological progress and productivity improvement. This channel has a more persistent effect on economic growth, as suggested by endogenous growth models (Romer, 1986).

In theory, FDI contributes to TFP in several ways. First, it leads to knowledge spillovers to the host country (Glass and Saggi, 1998; Baltabaev, 2014). Local firms adopt technology from MNEs, which increases their productivity (Wang and Blomström, 1992). MNEs train their employees, which improves human capital and productivity, respectively (Aitken and Harrison, 1999). Also, when these employees are hired by local firms, their productivity increases as a result (Biswas and Dasgupta, 2012). Moreover, the training and skill upgrading of the labour force spills over through backward and forward linkages, which enhances the productivity of the entire economy (Iamsiraroj and Ulubaşoğlu, 2015). The inflow of FDI through MNEs increases competition in the host country and leads to a more efficient use of available technologies (Glass and Saggi, 1998; Görg and Greenaway, 2004). Hyun (2006) also highlights that FDI promotes institutional quality, which also contributes to TFP.

However, the empirical literature does not allow for clear-cut conclusions. Micro-level studies examining the relationship between FDI and productivity generally find a negative relationship (Aitken and Harrison, 1999; Görg and Greenaway, 2004; Harrison and Rodríguez-Clare, 2010). However, these micro-level studies fail to capture aggregate TFP. Therefore, macro-level studies focus on aggregate TFP derived from growth regressions (de Mello, 1999; Baltabaev, 2014; Woo, 2009; Li and Liu, 2005; Wang and Wong, 2009; Alfaro et al., 2009; Herzer and Donaubauer, 2018; Abdullah and Chowdhury, 2020). The empirical literature on the relationship between FDI and TFP reports inconclusive evidence, mostly due to heterogeneity across countries (Alfaro et al., 2009; Herzer, 2012; Wang and Wong, 2005). Differences in economic structures, institutional settings, and stages of technological progress account for these mixed results. Therefore, this research focuses exclusively on Turkiye to examine the specific effects of FDI on TFP.

Turkiye is a developing country with a savings deficit and is an attractive destination for MNEs due to its geographical location and customs union with the European Union (EU). FDI inflows average around 1% of GDP. However, this ratio exceeded 3.6% in 2006 and remained relatively high until the global financial crisis. In its aftermath, FDI inflows did not recover, leading to a modest increase in the FDI stock. Graph 1 shows the evolution of the FDI stock. As can be easily seen from the graph, the FDI stock has risen after 2002. However, the stocks have not been significantly risen afterwards as a result of a sharp decline in FDI inflows.

Graph 1: **FDI Stock in Türkiye**



Source: (UNCTAD n. d.).

This study examines the impact of FDI stocks on TFP in Turkiye for the period 1990-2023. The use of FDI stocks rather than FDI flows allows the long-term and permanent effects of foreign capital accumulation to be captured (Ramirez, 2006; Chintrakarn et al., 2012; De Sousa and Lochard, 2011; Abdullah and Chowdhury, 2020). FDI stocks also allow the accumulation of knowledge necessary for TFP growth to be captured (Herzer and Donaubauer, 2018). TFP is calculated by means of growth accounting and human capital adjustment is introduced, which differs from the methods of de Mello (1999), Wang and Wong (2009), and Baltabaev (2014). Due to the potential endogeneity between FDI and TFP, an autoregressive distributed lag (ARDL) model is utilized to examine the data. This study makes a significant contribution to the literature by providing new evidence on the relationship between FDI and TFP in Türkiye using annual data for the period 1990–2023. Unlike much of the prior work that focused on FDI inflows or firm-level data, the paper employs FDI stock and a growth accounting approach augmented with human capital, analyzed through the ARDL bounds testing framework.

In this context, the next section is devoted to the literature review. Then the third section presents the model and reveal the empirical results. Finally, the last section discusses the conclusions and policy implications.

2. Literature Review

The literature on the impact of FDI on TFP is divided into two strands. One of them focuses on the micro-level studies. These micro-level studies do not support the argument that FDI positively and siginifacntly effects TFP, especially in developing countries (Görg and Greenway, 2004; Harrison and Rodriguez-Clare, 2010, Aitken and Harrison, 1999). There may be several reasons for this. According to Görg and Greenway (2004), multinationals have lower marginal costs and can therefore be more competitive than their domestic competitors. When multinationals enter the market, domestic firms reduce their production capacity and this would discourage TFP (Aitken and Harrison, 1999). Ayyagari and Kosová (2010) go a step further and argue that MNEs crowd out domestic firms. In addition, these MNEs require less domestic inputs and reduce domestic output accordingly (Rodriguez and Clare, 1996).

Alternatively, there are some studies that find a positive effect of FDI on TFP at the firm level (Cipollina et al., 2012), and some of them argue that the positive effect depends on the ability of firms to absorb the new technologies (Blomstrom and Kokko, 2003). There are also researches at firm level that focus on horizontal and vertical spillovers and find different results (Jovarcik, 2004; Benli, 2016).

The second strand of literature focuses on aggregate TFP and examines the effect of FDI on TFP -estimated from the growth regressions. These papers also report mixed results. Woo (2009) examines the effect of FDI on TFP in a sample of 22 developed and 70 developing countries for the period 1970-2000. He uses cross-country OLS and reports a positive and significant effect of FDI on TFP. This result also holds for subsamples of developed and developing countries.

However, de Mello (1999) argues that the result differs between developed and developing countries. In his article, de Mello (1999) examines the effect of FDI on TFP in 16 developed and 17 developing countries for the period 1970-1990. He reports that FDI has a positive effect on TFP in developed countries. In contrast, the effect is insignificant for developing countries. The rest of the literature also fails to find a positive and significant relationship between FDI and TFP in developing countries. Satoğlu and Gümüş (2023) also focus on 17 developing countries for the period 2002-2019. Again, they find that FDI has a negative effect on developing countries' TFP. Herzer and Donnabauer (2018) examine the relationship between FDI and TFP in 49 developing countries for the period 1981-2011. They report that increasing FDI in developing countries reduces TFP. They attribute this to the vertical nature of FDI in developing countries. Increased productivity leads to higher wages and then discourages FDI. Abdullah and Chowdhurry (2020) used 77 low- and middle-income countries and applied GMM to account for endogeneity. Nevertheless, they failed to find a significant impact of FDI on TFP. They argued that the insignificant result was due to the lack of absorptive capacity in these countries.

Some of the literature finds a positive and significant relationship conditional on some specific characteristics. Alfaro et al. (2009) concentrate on 19 developed and 43 developing countries for the period 1975-1995. They use cross-country OLS regression and report that the impact of FDI on TFP growth is positive for countries with developed financial markets. Wang and Wang (2009) focus specifically on 69 developing countries for the years 1970-1989. They report that the effect depends on the level of human capital. When human capital is low, the effect is negative and insignificant, but when human capital is higher, the effect is positive. Baltabaev (2014) also focuses on the 21 developed and 28 developing countries for the years 1974-2008. He reports a positive effect, but this effect also hinges on the technological gap, which is represented by the country's GDP per worker relative to the GDP per worker of the United States. If the country has a technological gap, then FDI has a positive effect on TFP.

Literature on Turkiye is also scarce. For micro-level studies, Arslanoğlu (2000) used the survey data of 500 firms collected by the Istanbul Chamber of Commerce and found no evidence of a positive impact of FDI on TFP. Benli (2016) used a quantile regression in Turkish manufacturing firms for the period 2003-2013. He concluded that FDI generated positive spillovers and boosted productivity when firms increased their absorptive capacity and upgraded their technology. Macro-level studies on Turkiye also report mixed results. Arısoy (2012) conducted a cointegration analysis on Turkiye for the period 1960-2005. He concluded that FDI has a positive impact on TFP. Yanar and Oğuz (2019), employed ARDL cointegration analysis in Turkiye for the period 1985-2014. They could not conclude a significant relationship in the short and long run.

3. Empirical Framework

The study consists of two steps. First, TFP is calculated using a growth accounting framework. Second, the level of stock FDI is assumed to improve the efficiency of firms and the efficiency of resource distribution across firms (Hsieh and Klenow, 2010). This improved efficiency would lead to higher TFP growth.

3.1. Estimating TFP in a Growth Accounting Model

In this study, TFP is derived using the Cobb-Douglas growth function (see Equation 1). The Cobb-Douglas function illustrates the relationship between output and the main inputs, such as capital and labor. TFP represents the part of growth that cannot be explained by these inputs alone, reflecting improvements in efficiency or technology.[1]

$$Y = AK^{\alpha}h(L)^{(1-\alpha)} \qquad where\ 0 < \alpha < 1 \tag{1}$$

Here, Y, A, K, and L represent the output of the economy, TFP, the capital stock of the country, and the labor force, respectively. Different from our predecessors (Baltabaev, 2014; Arısoy, 2012), we augment the labor force with human capital, hL. This is the human capital augmented labour force (Herzer and Donaubauer, 2018). According to Hall and Jones (1999), h is calculated by,

$$h_t = e^{\phi(E_t)} \tag{2}$$

E denotes the year of schooling, $e^{\phi(Et)}$is a function that constant ϕ differs with the specific range. α and (1-α) represents the factor shares in total income. Then, the capital stock is calculated by applying the perpetual inventory method,

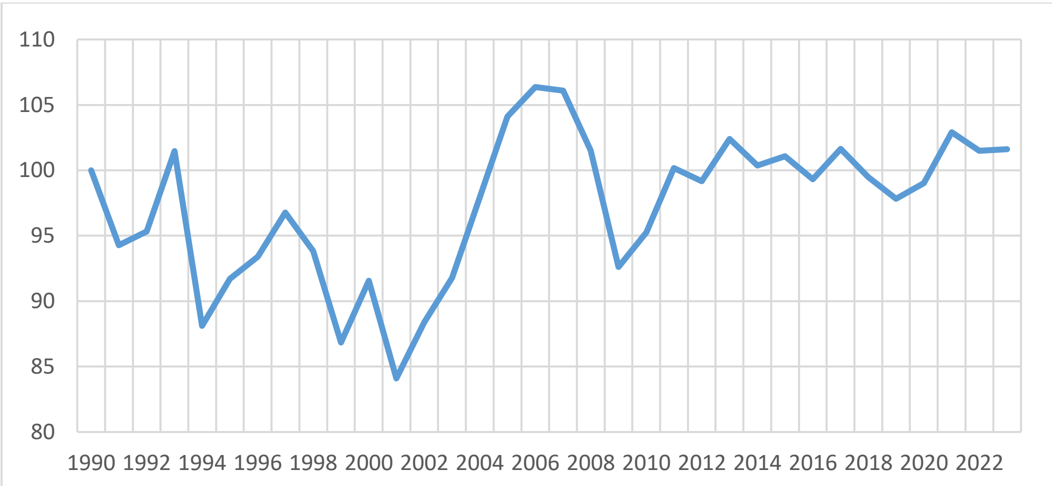
$$K_{t+1} = (1-\delta)K_t + I_t \tag{3}$$

where K and I are the capital stock and gross capital formation, respectively, and δ is the depreciation rate, assumed to be %6 according to Bakış and Acar (2021)[2]. Nevertheless, in order to construct the series K, K0 is needed. This is also calculated by,

$$K_0 = \frac{I_0}{g+\delta} \tag{4}$$

I_0 is initial gross capital formation, g is long-run growth rate[3] and δ is the depreciation rate. The factor shares are calculated where α=0,51.[4] From the growth accounting framework, the growth rate of A - which corresponds to TFP - is calculated.

Graph 2: **Total Factor Productivity (TFP)**



Besides the growth accounting approach used in this study, other macro-level methods have also been applied in the literature. For instance, Färe et al. (1994) employed the Malmquist productivity index, Aigner, Lovell and Schmidt (1977) introduced stochastic frontier analysis, Hsieh

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[1] Besides the growth accounting approach used in this study, other macro-level methods have also been applied in the literature. For instance, Färe et al. (1994) employed the Malmquist productivity index, Aigner, Lovell and Schmidt (1977) introduced stochastic frontier analysis, Hsieh and Klenow (2009) examined misallocation-based measures of aggregate TFP, and Fernald (2014) provided a utilization-adjusted TFP series using a state-space model with Kalman filtering.

[2] See Hall and Jones (1999) and Bakış and Acar (2021) for details.

[3] The long-term growth rate is calculated 4,6% from our sample, average real GDP growth rate.

[4]The literature traditionally assumes 1/3 for α, especially in cross-country studies. However, studies focusing on Turkiye have found different capital shares. Bosworth and Collin (2003) estimated 0.35, Saygılı et al. (2005) 0.51, Altuğ et al. (2008) 0.40, Bakış and Acar (2021) 0.51 and Saylam Bölükbaş (2023) 0.48.

and Klenow (2009) examined misallocation-based measures of aggregate TFP, and Fernald (2014) provided a utilization-adjusted TFP series using a state-space model with Kalman filtering.

$$g_A = g_Y - \alpha g_K - (1-\alpha) g_L \quad (5)$$

Then the TFP is constructed in a cumulative form, which is transformed into an index as illustrated in Graph 2.

Methodology

To test the impact of FDI on TFP, the following empirical model is developed,

$$TFP_t = \beta_0 + \beta_1 FDI + \beta_2 FD + \beta_3 H + \varepsilon_t \quad (6)$$

Here, TFP is computed using the growth accounting framework explained in the previous section. FDI is represented by the stock of foreign direct investment obtained from UNCTAD. FDI stock is preferred because it clearly captures the long-term and permanent effects of foreign capital accumulation (Ramirez, 2006; Chintrakarn et al., 2012; De Sousa and Lochard, 2014; Herzer and Donaubauer, 2018; Abdullah and Chowdhury, 2020). FD refers to financial development, which is acknowledged to be important in the TFP literature (Arizala et al., 2012; Pal et al., 2024). Following Alfaro et al. (2009) and Kılınç et al. (2017); the ratio of private credit to GDP (private credit/GDP), obtained from CBRT statistics, is used as a proxy for financial development. Human capital (H) is also included in the model to measure its impact on TFP. For this purpose, the human capital index developed by Hall and Jones (1999) is used. The study uses annual data between 1990 and 2023 due to data availability.

Equation (6) is transformed into logarithmic form as shown in Equation (7).

$$lnTFP_t = \alpha_0 + \alpha_1 lnFDI + \alpha_2 lnFD + \alpha_3 lnH + u_t \quad (7)$$

Equation (7) is estimated using the Autoregressive Distributed Lag (ARDL) model to analyse both the short-run and long-run effects of the stock of FDI on TFP. The ARDL model has been widely used in econometrics to analyze the relationships between variables over time. A key advantage of the ARDL approach is its ability to handle variables that are stationary at either I(0) levels or I(1) first differences (Pesaran et al., 2001). It effectively captures both short-run and long-run dynamics by incorporating lagged values of the dependent and independent variables (Pesaran and Shin, 1999). In this regard, ARDL provides reliable estimates even with relatively small sample sizes, making it more suitable for a variety of empirical studies (Narayan, 2005).

The Equation (7) could be rewritten as an ARDL formula as follows;

$$\Delta lnTFP_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta lnTFP_{t-i} + \sum_{i=0}^{p} \beta_{2i} \Delta lnFDI_{t-i} + \sum_{i=0}^{p} \beta_{3i} \Delta lnFD_{t-i} + \sum_{i=0}^{p} \beta_{4i} \Delta lnH_{t-i} + \beta_5 lnTFP_{t-1} + \beta_6 lnFDI_{t-1} + \beta_7 lnFD_{t-1} + \beta_8 lnH_{t-1} + \gamma D_{2004} + u_t \quad (8)$$

In Equation (8), Δ represents the difference operator; β_1, β_2, β_3, β_4 indicate the short-run parameters, while β_5, β_6, β_7, β_8 denote the long-run parameters, and ut represents the error term. Furthermore, the short-run dynamics and the error correction term can be derived by using the following ARDL model:

$$\Delta lnTFP_t = \delta_0 + \sum_{i=1}^{p} \delta_{1i} \Delta lnTFP_{t-i} + \sum_{i=0}^{p} \delta_{2i} \Delta lnFDI_{t-i} + \sum_{i=0}^{p} \delta_{3i} \Delta lnFD_{t-i} + \sum_{i=0}^{p} \delta_{4i} \Delta lnH_{t-i} + \eta ECM_{t-1} + u_t \quad (9)$$

3.3 Empirical Results

The ARDL approach is advantageous as it allows the analysis of I(0) and I(1) series, but Ouattara (2004) notes that even if the series are stationary in the second difference, i.e. I(2), the critical values may not be reliable. Therefore, ADF and PP tests are performed to determine the order of integration of the series. According to the outcome of the ADF and PP unit root tests, as revealed in Table.1, none of the variables are I(2).

In addition, the Zivot-Andrews (1992) unit root test is employed to check for structural breaks. Table. 2 presents the results of Zivot-Andrews structural break unit root tests for each variable used in the study under three different models: intercept only (model A), intercept and trend (model B) and trend only (model C).

Table 1**: Unit Root Tests Results**

	ADF Unit Root Test		**PP Unit Root Test**	
	Level	**1St difference**	**Level**	**1St difference**
LTFP	-2.55 (0.1128)	-6.77*** (0.0000)	-2.55 (0.1123)	-8.06*** (0.0000)
LFDI	-1.18 (0.6707)	-8.56*** (0.0000)	-1.25 (0.6376)	-8.10*** (0.0000)
LFD	-1.11 (0.6949)	-4.03*** (0.0038)	-0.91 (0.7701)	-4.07*** (0.0035)
LH	-0.44 (0.8888)	-4.31*** (0.0001)	-0.44 (0.8892)	-4.19*** (0.0026)

Note: ****Significant at 1%. The probability values could be followed in parenthesis. The models reported are the models with intercept, but the other models also reveal the same result.*

Table 2: **Zivot- Andrews (1992) Unit Root Test Results**

	Model A *(Intercept)*		**Model B *(Trend and Intercept)***		**Model C *(Trend)***	
	Level	**1St difference**	**Level**	**1St difference**	**Level**	**1St difference**
LTFP	-5.58*** (2004)	-7.17*** (2009)	-6.02*** (2004)	-7.21*** (2009)	-4.29 (2012)	-6.67*** (2005)
LFDI	-4.31 (2004)	-10.47*** (2002)	-4.62 (2004)	-10.60*** (2002)	-3.25 (2013)	-9.93* (2007)
LFD	-2.58 (2021)	-6.61*** (2004)	-2.49 (2019)	-6.47*** (2004)	-2.66 (2021)	-7.45*** (2012)
LH	-5.49*** (2020)	-4.39*** (2017)	-4.39 (2010)	-5.43** (2019)	-5.13*** (2019)	-5.10*** (2023)

Notes: ****significant at 1% level, **significant at 5% level. The Critical values for 1%, 5% and 10% for model A are -5.34, -4.85 and -4.60 respectively; for Model B -5.72, -5.17 and -4.89; for Model C -5.06, -4.52 and -4.26. Break dates could be followed in parenthesis.*

The findings show that the dependent variable (TFP) is stationary at levels in models A and B, with a statistically significant structural break in 2004. The variable becomes stationary at first difference in model C. FDI and FD are not stationary at levels but become stationary after differencing, indicating that these variables are integrated of order 1, I(1). H is stationary at levels in models A and C, with significant structural breaks identified mainly in 2020 and 2019. In short, the mixed order of integration of the variables - the dependent variable (TFP) as I(0), the independent variables (FDI, FD) as I(1) and H in general as I(0) - justifies the use of the ARDL approach. In addition, the structural break identified in the TFP in 2004 is explicitly included in the ARDL model as a dummy variable in order to capture the structural break.

Table 3: **Bounds Test Results for ARDL (1,3,0,0) Model**

H_0: $\beta_5=\beta_6=\beta_7=\beta_8=0$ *(no cointegration)*	**Bounds Critical Values**		
		I(0)	I(1)
k=3	10%	3.008	4.150
Calculated F Statistics: 6.217996**	5%	3.710	5.018
	1%	5.333	7.063

Notes:**means statistical significance at the 5% level and k is the number of regressors.
Critical values are drawn from Narayan (2004)

The optimal length of the lag (p) is determined using the Akaike Information Criterion (AIC) and the Schwarz Information Criterion (SIC), and it is found to be three. Consequently, an ARDL (1,3,0,0) model is estimated. The existence of a long-run relationship between the variables is tested using the ARDL bounds test, and the results are presented in Table 3.

As shown in Table 3, the calculated F-statistic (6.27996) exceeds the upper bound critical value (5.018) at the 5% significance level. Thus, the null hypothesis of no cointegration, which implies no long-run relationship between total factor productivity (TFP), foreign direct investment (FDI), financial development (FD) and human capital (H), is rejected at the 5% level. Consequently, the variables are cointegrated, indicating a stable long-run relationship. Given this evidence of cointegration, it is now appropriate to estimate the short-run and long-run coefficients within the ARDL framework.

As can be observed from Table.4 Panel C, based on the results of the diagnostic tests for the ARDL (1,3,0,0) model, there is no evidence of autocorrelation, heteroskedasticity, or model specification error. All diagnostic tests confirm that the ARDL model is properly specified and econometrically robust. Moreover, the residuals are normally distributed. Since the model appears to be statistically reliable, the next step is to estimate the long-run coefficients.

Table 4: **Estimated Long and Short Run Results**

	Coefficient	**Std. Error**	**t-Statistic**	**Probability**
		Panel A: Long-run Coefficients		
LFDI	-0.0477	0.0440	-1.0848	0.2875
LFD	0.1327**	0.0589	2.2514	0.0324
LH	0.1399	0.2268	0.6169	0.5423
		Panel B: Short-run Coefficients		
Δ *LFDI*	0.052570**	0.023708	2.217347	0.0359
Δ *(LFDI (-1))*	0.144395***	0.030166	4.786713	0.0001
Δ *(LFDI (-2))*	0.083229***	0.027962	2.976469	0.0064
DUM2004	0.015199	0.037256	0.407970	0.6868
C	2.956523***	0.558866	5.306496	0.0000
ECM	-0.686691***	0.129166	-5.316354	0.0000
		Panel C: Diagnostic Test Results		
		Test Statistics	**Probability**	
Serial Correlation (Breusch-Godfrey)		F = 4.7953	0.1918	
Heteroskedasticity (Breusch-Pagan-Godfrey)		F = 1.2957	0.2961	
Model Specification (Ramsey RESET)		F = 0.5607	0.5810	
Normality of Residuals (Jarque-Bera)		JB = 1.1184	0.5717	

Notes: ****significance at 1%, ** significance at 5% and *significance at 10%*

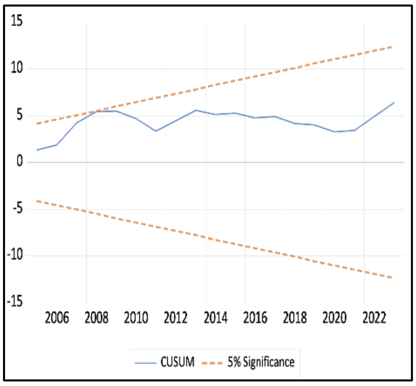
There is no significant relationship between the stock of FDI and TFP in the long run, as shown by the results of the long-run coefficients from the ARDL model (Table 4, panel A). However, financial development has a positive impact on TFP at the 5% significant level. Specifically, a 1% rise in financial development leads to a rise in TFP of about 0.13% in the long run. Moreover, human capital (H) has no statistically significant long-run effect on TFP.

The short-run results can be seen in Panel B of Table 4. The error correction coefficient, ECM, is negative and statistically significant at the 1% level, indicating that about 68.7% of the imbalance of the previous year is corrected in the current period. In the short run, FDI stock has a positive and significant impact on TFP. The short-run dynamics of the ARDL model show that FDI has a statistically significant and cumulative impact on TFP over a three-period horizon. Specifically, a 1% increase in FDI stock leads to a 0.0525% increase in TFP in the current period, followed by 0.1444% and 0.0832% increases in the first and second lags, respectively. The dummy variable representing the 2004 structural break is statistically insignificant in the short-run model. This means that the structural change in 2004 does not have a significant effect on TFP in the short run.

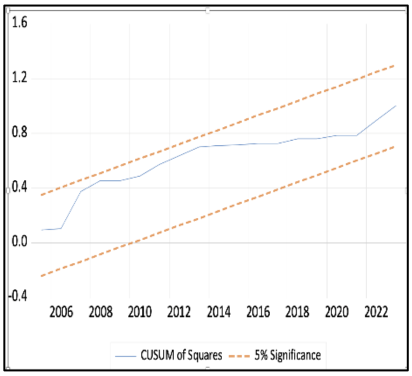
After estimating the short-run and long-run coefficients, the stability of the ARDL model was further assessed using the CUSUM and CUSUM of Squares tests developed by Brown et al (1975). As can be seen in Figure 3, both statistics remain within the 5% significance level throughout the sample period. This indicates that the parameters of the model are structurally stable, and there are no significant changes in the error variance over time. The stability of the model strengthens the reliability of the previous findings, especially the significant long-run relationship between financial development and TFP, as well as the error-correction mechanism, which indicates convergence to equilibrium.

Graph 3: **CUSUM and CUSUM of Squares Test Results**

Panel a: Plot of CUSUM Test



Panel b:. Plot of CUSUM Squares Test



To sum up, the empirical results show that the stock of FDI has a positive effect on TFP in the short run. These results are consistent with the studies of Woo (2009) and Arısoy (2012). However, this positive effect disappears in the long run. In particular, the results show that financial development contributes positively to TFP in the long run, which confirms the findings of Alfaro et al. (2009). On the other hand, human capital has no significant effect on TFP in either the short or the long run.

4. Conclusion

For most developing countries, struggling with low domestic savings and technological capacity, foreign direct investment (FDI) has long been touted as the best recipe for growth. Multinational enterprises (MNEs) bring not only capital but also new technologies, know-how and business practices that can spill over to local firms and industries, both vertically and horizontally. This spillover is supposed to improve the technological base of the host economy and thus raise its overall total factor productivity (TFP). However, despite this theoretical expectation, empirical studies - especially those focusing on Turkiye - have yet to reach a consistent conclusion.

To fill this gap, this study explores the relationship between FDI and TFP in Turkiye, a developing country struggiling the attract FDI. Using time series data for the period 1990-2023 and the ARDL method, the study examines short-run and long-run dynamics. TFP is calculated by employing the growth accounting method with the use of labor-adjusted human capital.

The empirical findings show that the stock of FDI has a statistically significant positive effect on TFP in the short run. However, this effect disappears in the long run, implying that the productivity gains from FDI may not be sustainable. The only variable with a positive impact on TFP in the long run is financial development. Human capital, on the other hand, has no significant effect in either the short or the long run.

These results are in line with the literature in finding short-run productivity benefits from FDI but raise important questions about the long-run nature of the relationship. The long-run effect of FDI on TFP may disappear because the initial gains from technology transfer and capital inflows diminish over time, while sustained productivity growth depends more on domestic factors such as financial development.

The results suggest that Türkiye cannot rely solely on foreign direct investment to achieve lasting productivity improvements. Instead, strengthening the domestic financial system should be prioritized to transform short-term gains from FDI into long-run growth. Policies that deepen financial markets, improve access to credit, and foster innovation financing can amplify the positive spillovers of FDI. Further research is needed to explore the long-run relationship between productivity and FDI, especially for the case of developing countries such as Turkiye.

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