Ankara Hacı Bayram Veli Üniversitesi
İktisadi ve İdari Bilimler Fakültesi Dergisi 22/3 (2020) 913-936
E-ISSN 2667-405X

Outward Foreign Direct Investment and Domestic Investment Nexus in Turkey: Crowding out or Crowding in?

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Geliş Tarihi (Received): 02.06.2020 – Kabul Tarihi (Accepted): 12.08.2020

Abstract

The last decade has witnessed a remarkable surge in outward foreign direct investment (OFDI) from developing countries. The growth of multinationals in a number of developing economies has renewed the importance of OFDI from developing countries for global investment patterns and increased the concerns about the effects of OFDI on the domestic investment in these countries. Over the last few years, the considerable rise in OFDI flows from Turkey as a newly emerged investor country has encouraged us to examine the role of OFDI on domestic investment. This paper investigates whether outward foreign direct investment (OFDI) crowds out or crowds in domestic investment in Turkey for the period of 1970-2018 by using linear and nonlinear ARDL approaches. The results provide evidence of a symmetric and negative long run relationship between OFDI and domestic investment suggesting that OFDI robustly crowds out domestic investment. Our paper highlights the need for consideration of crowding out effect in formulating policies centered upon promoting domestic capital formation.

Keywords: Outward foreign direct investment, domestic investment, linear and nonlinear ARDL approaches

Türkiye'de Yurtdışına Doğrudan Yabancı Yatırımlar ve Yurtiçi Yatırımlar İlişkisi: Dışlama mı, çekme mi?

Öz

Son on yılda gelişmekte olan ülkelerin yurtdışına doğrudan yabancı yatırımları dikkat çekici bir biçimde artmaktadır. Pek çok gelişmekte olan ülkede çok uluslu şirketlerin ortaya çıkması ve büyümesi, yurtdışına doğrudan yabancı yatırımların küresel yatırım düzenindeki önemini yeniden gündeme getirmekte ve bu ülkelerde yurtdışına doğrudan yabancı yatırımların yurtiçi yatırımlar üzerindeki etkilerine olan ilginin artmasına neden olmaktadır. Son birkaç yıldır, yeni bir küresel yatırımcı olarak Türkiye'nin yurtdışına doğrudan yatırımlarının önemli ölçüde artması, bizi yurtdışına doğrudan yabancı yatırımların yurtiçi yatırımlar üzerindeki rolünü incelemeye teşvik etmektedir. Bu çalışmada Türkiye'de yurtdışına doğrudan yabancı yatırımların yurtiçi yatırımları dışlayıp dışlamadığı ya da çekip çekmediği doğrusal ve doğrusal olmayan ARDL yaklaşımları kullanarak 1970-2018 dönemi için incelenmektedir. Çalışmanın sonuçları, yurtdışına doğrudan yabancı yatırımlar ile yurtiçi yatırımlar arasında simetrik ve negatif yönlü bir uzun dönem ilişki olduğunu ve yurtdışına doğrudan yabancı yatırımların yurtiçi yatırımları güçlü bir şekilde dışladığını göstermektedir. Bu çalışma, yurtiçi sermaye oluşumunu merkeze alan politikalar oluşturulurken dışlama etkisinin dikkate alınması gerektiğini vurgulamaktadır.

Anahtar Kelimeler: Yurtdışına doğrudan yabancı yatırım, yurtiçi yatırım, doğrusal ve doğrusal olmayan ARDL yaklaşımları

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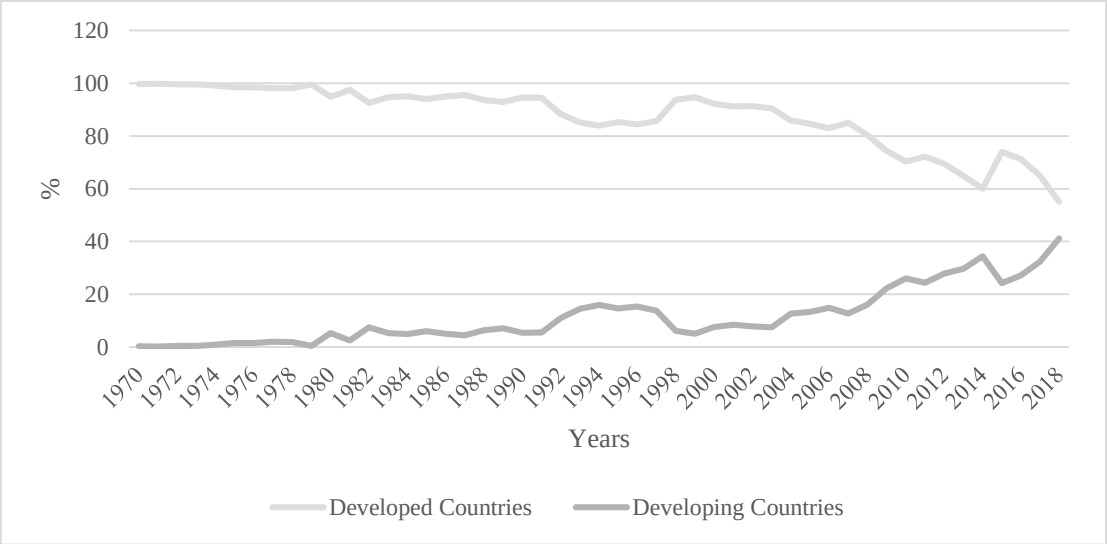
Introduction

Over the past decades, researchers have always considered OFDI as a type of investment that originates from developed economies and flows to developing countries and thus, have paid very little attention to the OFDI from developing countries. However, the last decade has witnessed a remarkable increase in OFDI from developing countries. The growth of multinationals in a number of developing economies has renewed the importance of OFDI from developing countries for global investment patterns. Most of these developing countries have become important global investors and changed the landscape of global foreign direct investment flows (Knoerich, 2017). Figure 1 presents the shares of developed and developing countries in world total OFDI flows. In 2018, the share of developing countries in world OFDI flows has increased to 41% in parallel with a remarkable decline in the share of developed countries from 73 % to its historical low of 55 % in past few years (UNCTAD, 2019).

Figure 1: OFDI Flows in Developed and Developing Countries as a Share of World OFDI Flows



Source: UNCTAD FDI Database, 2020.

UNCTAD (2019) also reports that the total amount of OFDI from developing countries surged to US$ 418 billion. Much of this continued expansion of OFDI from developing countries is driven by developing Asian counties. Although China and Singapore are the biggest source countries of OFDI among developing world, the enterprises of Saudi Arabia, United Arab Emirates and Turkey have newly emerged as latecomers from Western Asia. As noted in UNCTAD (2019), OFDI from Western Asia reached a historic high of US$ 49 billion in 2018. It seems that the profound expansion of OFDI flows from developing countries have altered the global foreign direct investment trends.

In the light of recent events in OFDI from developing countries, there is now considerable concern about the effects of OFDI on the domestic capital formation in these countries. Since the domestic investment in the view of capital formation is an important driver of economic development, the role of OFDI on domestic investment is even more crucial. As argued in Li (2007) and Knoerich (2017), countries that undertake OFDI may attain competitive advantages through linkage, leverage and learning as well as lower factor prices, asset returns and creation of new markets. These advantages seem to encourage capital formation in domestic economy. Despite the expected benefits on capital formation, OFDI may harm domestic investment through dividing production process and shifting some parts of production abroad that leads to misallocation of scarce resources and rise in the cost of external financing. All of these implications of OFDI naturally arise an important question of that whether OFDI crowds in or crowds out domestic investment. If OFDI crowds in domestic investment, OFDI and domestic investment are complements, otherwise they are substitutes.

As far as we know, the role of OFDI on domestic investment has investigated for mostly developed countries.[†] Despite this interest to developed economies, little attention has given to implications of OFDI originated from developing economies on their capital formation. Academic research still needs to provide empirical evidence of the possible effects of OFDI on developing economies' domestic investment.

The purpose of this study is to investigate the relationship between OFDI and domestic investment by considering the case of Turkey. Because Turkey has experienced a significant rise in the amount of OFDI flows in recent years, focusing on the question of whether OFDI crowds in or crowds out domestic investment in Turkey is critical as in many developing countries. To the best of knowledge, no one has analyzed the possible implications of OFDI on domestic investment in Turkey. To fill this gap, we examine the association between OFDI and domestic investment by employing recent time series techniques. In our empirical analysis, we apply ARDL framework to identify the long run relationship between OFDI and domestic investment. To find out possible asymmetric effects of OFDI on domestic investment, we also use nonlinear ARDL techniques in addition to linear specifications. Our empirical results indicate that there is a symmetric and negative long run relationship between OFDI and domestic investment suggesting that OFDI crowds out domestic investment in Turkey.

This paper is organized as follows. Section 1 review the previous literature, Section 2 looks at the developments of OFDI and domestic investment in Turkey. Section 3 describes

[†] See Stevens and Lipsey (1992), Feldstein (1995) and Desai et al. (2005).

methods and data issues. Section 4 presents the empirical results of our work. Section 5 includes robustness analysis and Conclusion section interprets the overall results and discusses policy implications.

1. Literature Review

Early models that associate OFDI and domestic investment are constructed along two theoretical lines. Both of these theoretical underpinnings are actually based on capital investment decisions of firms in different locations. The first theoretical argument is based on a neoclassical approach to multinationals that firms decide on investment in different locations abroad by comparing the marginal rate of return of outward capital investment projects and the cost of capital. Given the factors such as factor costs, transportation costs, trade restrictions, tax schemes, proximity and market size that motivate outward investment, firms first take expected profitability into consideration and then decide on the location of investment (Belderbos, 1992). The second theoretical argument states that multinationals prefer internally generated funds and have some capital constraints over these scarce funds. Thus, investment projects at home and abroad compete with each other indicating that firms have to allocate capital in most profitable markets. Herring and Willet (1973) and Noorzoy (1980) are the leading studies investigating the effect of OFDI on domestic investment for US multinationals under these theoretical lines. Herring and Willet (1973) and Noorzoy (1980) find that there is a positive relationship between OFDI and domestic investment. Stevens and Lipsey (1992) augment the existing theoretical explanations by classifying them as production side link and finance side link respectively and confirm the dominance of finance side arguments.

Although these studies find significant evidence of the association between domestic and foreign investment, they all suffer from short time dimension and data limitations. Feldstein (1995) shed interesting light on this relationship by using aggregated data for OECD countries to overcome the main shortfalls of earlier studies. His approach is based on a macroeconomic general equilibrium model underlying the net impact of OFDI depends on the extent to which that OFDI changes the aggregate net outflow of capital from the source country. Feldstein (1995) reaches the conclusion that domestic and foreign investment are full substitutes. On the contrary, Desai et al. (2005) point out that foreign and domestic investments are complements by applying Feldstein (1995)'s aggregate approach to a larger set of countries. Desai et al. (2005) support the view that firms generally decide to combine home production with foreign production to attain a final output. By doing this, multinationals take the opportunity of reducing costs and become more motivated to invest at home. As also argued in Desai et al. (2005), firms are disposed to be integrated with their foreign affiliates in order to import and export

intermediate goods in a cost effective way. Substitutability and complementarity channels proposed by Feldstein (1995) and Desai et al. (2005) seem to be well-founded however, there is no theoretical consensus on the overall impact of OFDI on domestic investment across countries.

There are also several empirical studies investigating whether OFDI and domestic investment are complements or substitutes in source countries and the available empirical evidence of these studies is again ambiguous. A complementarity is found by Herring and Willett (1973), Noorzoy (1980), Desai et al. (2005), Herzer and Schrooten (2008), Braunerhjelm et al. (2005), Arndt et al. (2010). Substitutability is supported by the studies of Belderbos (1992), Stevens and Lipsey (1992), Feldstein (1995). Unlike the confirmation of complementarity and substitutability Hejazi and Pauly (2003) find evidence of no relationship. All of these studies attempt to examine the effects of OFDI on the domestic investment of leading developed countries such as United States, European countries and Canada and offer limited insight for developing countries due to their special focus on just a few advanced source countries that have similar production structure (Hsu et al., 2015, Ali and Wang, 2018). However, as argued in Herzer and Schrooten (2008), each country is different in production structure, technology, economic indicators, government initiatives and policies, institutional framework and financial systems. Therefore, the potential implications of OFDI on domestic investment may differ in developing countries that are newly emerged as global investors. For this purpose, a limited number of studies have recently qualified the impact of OFDI on major developing countries' domestic investment (Al-sadig, 2013; Hsu et al. 2015; You and Solomon, 2015; Tan et al., 2016; Ameer et al., 2017; Ali and Wang, 2018).

Aforementioned studies that concentrate on developing countries are encouraging for us to investigate the impact of OFDI on Turkish domestic investment. Previous works about outward investment only focus on the determinants of OFDI in Turkey (Erdilek, 2003; Kayam and Hisarciklilar, 2009; Armutlulu et al., 2011 and Aybar, 2016) and the patterns in internationalization of Turkish multinationals (Yildirim, 2017). Unfortunately, there is no explicit discussion about the OFDI and domestic investment nexus. To fill this gap in the literature, we seek to quantify the impacts of OFDI on domestic investment in Turkey offering new insights into much debated issue of recent years.

2. Overview of OFDI and Domestic Investment in Turkey

Turkey's rapid integration into global markets since 2001 has been impressive, leading to increased capital flows and making Turkey a promising recipient of FDI inflows and also a source of OFDI. Although Turkey is a net recipient of foreign direct investment, there has been

a noteworthy increasing trend in OFDI over a decade. Over the past few years, increasing economic vulnerabilities and slowdown in growth have slightly reduced FDI inflows whereas OFDI has continued to its upward trend.

Table 1: OFDI Flows of Turkey in between 1985-2018 (current million US$)

	1985-1989	**1990-1994**	**1995-1999**	**2000-2004**	**2005-2009**	**2010-2014**	**2015-2018**
OFDI Flows	1.808	27.8	297.2	554	1639.2	3625.4	3486.25

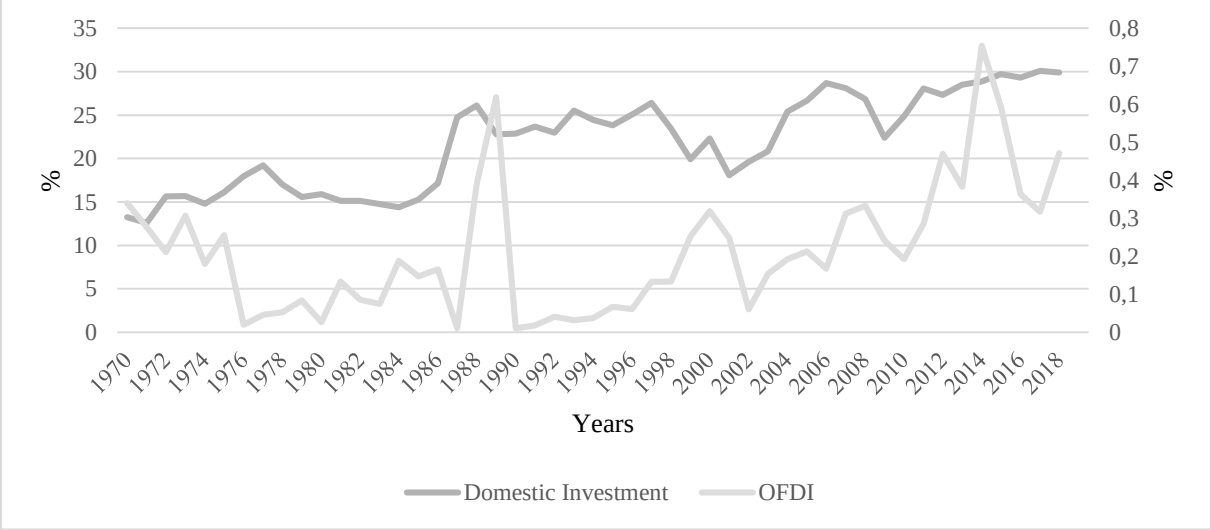
Source, UNCTAD FDI Database, 2020.

Table 1 shows the average total values of OFDI flows between 1985-2018 with five-year intervals. OFDI flows are very low prior to 1990s. After the liberalization of capital account in 1989, Turkey begins to attract foreign direct investments and also invest abroad. Thus, OFDI positively responds to the financial liberalization: the average value of OFDI flows from Turkey increases from US$1.808 million to US$ 27.8 million in between 1990-1994. Although vulnerabilities in economy deepen in mid-1990s, OFDI carries on its acceleration indicating that macroeconomic instability behaves as a push factor (Yildirim, 2017). In between 1995-1999, Turkey also explores new investment locations. As reported in Yildirim (2017), Turkish firms begin to invest in former Soviet Union countries, especially in Turkic countries in Central Asia. Besides the historical and cultural relations between Turkey and Turkic countries, firms invest in these countries in order to benefit from resource and market advantages. Even though in 2000 and 2001 Turkish economy experiences two successive liquidity crises, OFDI continues to expand in these years.

Aftermath of the 2000 and 2001 crises, Turkish economy is restructured by new rules and regulations through structural reform packages. International activities in foreign markets are positively affected from strong institutional transformation, strengthening of macroeconomic indicators and creation of more predictable business environment. Stable macroeconomic environment and decline in uncertainties make Turkish firms more self-confident and thus, given the increased trade openness, firms integrate more into global value chains and increase their internationalization. The period between 2005 and 2014 reflects the substantial amount of efforts to search for new markets and investment locations for Turkish firms. In addition to traditional European markets and former Soviet Union countries, firms begin to invest in Middle East and North African countries during this period. In particular, in between 2008-2010, government supports firms to invest in new locations more in order to rehabilitate the negative impacts of the external shock in 2008. During 2015-2018, Turkey's

OFDI flows grow steadily and the last four-year average of OFDI flows reach to US$3486.25 million. As reported in UNCTAD (2019), since 2000, Turkey has constituted government partnership zones and engaged in the construction of free trade zones in different regions with other economies. Specifically, in 2015, Turkey signed various agreements to create Special Economic Zones where Turkish firms would invest to manufacture and exports goods to East Africa and other regions. UNCTAD (2019) also states that Turkey is the most active country about signing International Investment Agreements in 2018.In summary, the recent surge of OFDI from Turkey represents its considerable efforts to integrate into world economy.

Figure 2: OFDI and Domestic Investment as a Share of GDP



Source: World Bank World Development Indicators Dataset, 2020.

Figure 2 shows the evolution of OFDI and domestic investment as a share of GDP in Turkey between 1970 and 2018. In years between 1970-1980, domestic investment reflects the outcomes of inward oriented policies that capital formation process is designed by development plans. However, steadily increasing levels of domestic investment suddenly declines because of the balance of payment crisis in 1978-1979. This decline continues until 1986 due to ongoing uncertainties that arise after the new economic program launched in 1980. In early years of transformation of economy towards market oriented policies, the reforms targeting the liberalization of trade and capital account become an encouraging factor for the recovery of domestic investment. After 1989, the upward trend in the share of domestic investment in GDP continues until 1997 and reaches 26% for the first time after the introduction of outward policies. In 1998, domestic investment sharply decreases due to possible negative effects of financial crisis in Asian developing economies. This downward trend continues in parallel with deterioration of macroeconomic fundamentals in between 1998-2001. The sharp contraction of economy by 9.4% aftermath of the 2000 and 2001 crises leads domestic investment to fall by

4% in 2001. However, domestic investment begins to increase once again with the new economic program that includes structural reforms in overall economy, especially the reform packages for financial sector and banking system launched in 2002. With the improvements in macroeconomic environment in between 2002-2007, domestic investment reaches its new peak of 28% in 2007. This upward trend is interrupted once again by 2008 Global Financial Crisis. Domestic investment suffers from the significant decline in GDP and its share in GDP falls to 22 %. Starting with 2010, domestic investment recovers and reaches its new high of 30 % in 2018. It seems that domestic investment adopts itself to main policy changes and deteriorations in Turkish economy by fluctuating around 25% of GDP over the period between 1970 and 2018.

3. Methods and Data Issues

In this study, linear and nonlinear ARDL approaches are utilized to analyze the impact of OFDI on domestic investment in Turkey. Since we are interested in analyzing OFDI and domestic investment nexus, we first rely on linear ARDL approach of Pesaran et al. (2001) that is designed to estimate cointegration relationship between variables. Compared to error-correction type cointegration procedures, the linear ARDL approach has many advantages. The most important is that it relaxes the assumption that regressors should be integrated to same order and it allows for different orders of integration. However, The ARDL model presumes that the relationship is symmetric and thus, ignore the potential asymmetric impacts. In order to avoid such an assumption, we revisit the relationship between OFDI and domestic investment by employing nonlinear ARDL (NARDL) approach developed by Shin et al. (2014). The NARDL is essentially based on linear ARDL, but it can decompose total impact of independent variable into positive and negative changes indicating that positive and negative changes in independent variable may have different impacts on dependent variable (Shin et al. 2014).

First, we use Pesaran et al. (2001)'s general representation of a linear ARDL (p, q) approach as follows:

$$\Delta y_t = \alpha + \delta y_{t-1} + \theta x_{t-1} + \sum_{i=1}^{p-1} \varphi_i \, \Delta y_{t-i} + \sum_{i=0}^{q-1} \rho_i \, \Delta x_{t-i} + \varepsilon_t \qquad (1)$$

Where Δ is first difference operator and $\alpha, \delta, \theta, \varphi_i, \rho_i$ shows parameters that are estimated. In Equation (1), if $\delta = \theta = 0$, there is no cointegration between y_t and x_t. In order to test whether y_t and x_t are cointegrated or not in the long run, we need a test statistic. Pesaran et al. (2001) develop a F-statistic (F_{PSS}) and present asymptotic critical value bounds in the form of upper critical values and lower critical values. If the F-statistic exceeds the upper critical value, the null hypothesis of no cointegration is rejected. For robustness, Banerjee et al. (1998)

also develop a t-statistic (t_{BDM}). In this test, the null hypothesis is defined as $\delta = 0$ and alternative hypothesis is defined as $\delta < 0$.

To transform linear ARDL representation into a nonlinear form, Shin et al. (2014) decompose independent variable x_t into two components as follows:

$$x_t = x_0 + x_t^+ + x_t^- \quad (2)$$

In Equation (2), $x_t^+$and x_t^- are partial sums of positive and negative changes in x_t:

$$x_t^+ = \sum_{j=1}^{t} \Delta x_j^+ = \sum_{j=1}^{t} \max(\Delta x_j, 0) \quad (3)$$

$$x_t^+ = \sum_{j=1}^{t} \Delta x_j^- = \sum_{j=1}^{t} \min(\Delta x_j, 0) \quad (4)$$

Combining (3) and (4), the nonlinear asymmetric long run equilibrium is obtained as follows:

$$y_t = \beta^+ x_t^+ + \beta^- x_t^- + u_t \quad (5)$$

Shin et al. (2014) finally incorporate Equation (1) and Equation (5) and present NARDL (p, q) framework as:

$$\Delta y_t = \alpha + \delta y_{t-1} + \theta^+ x_{t-1}^+ + \theta^- x_{t-1}^- + \sum_{i=1}^{p-1} \varphi_i \Delta y_{t-i} + \sum_{i=0}^{q-1} (\rho_i^+ \Delta x_{t-i}^+ + \rho_i^- \Delta x_{t-i}^-) + \varepsilon_t \quad (6)$$

Where θ^+ve θ^- are asymmetric distributed lag parameters. These parameters can be calculated through dividing asymmetric distributed lag parameters to δ:

$$\beta^+ = -\frac{\theta^+}{\delta} \quad (7)$$

$$\beta^- = -\frac{\theta^-}{\delta} \quad (8)$$

In this paper, we use annual data between the period of 1970-2018. Outward foreign direct investment (OFDI) is measured by net outflows of outward foreign investment as a percentage of GDP. Domestic investment (DI) is measured by gross fixed capital formation as a percentage of GDP. We also include some several control variables that may be influential on domestic investment. These variables are GDP growth rate (GDPGRW), trade openness (TRADE) and financial development (FD). GDP growth rate is measured by annual percentage growth rate of GDP at constant 2010 US dollars. We use proxies for TRADE and FD such as total trade on goods and services as a percentage of GDP and domestic credit to private sector from financial institutions as percentage of GDP, respectively. All data is obtained from World Bank World Development Indicators Database.‡

‡ Data descriptions, descriptive statistics and correlations between variables are reported in Appendix Section in the form of Appendix Table 1, Appendix Table 2 and Appendix Table 3, respectively.

4. Empirical Results

Our empirical methodology is composed of four steps. In the first step, we test the stationarity of all variables.[§] Second, we employ linear ARDL approach to explore whether there is a long run cointegration relationship between OFDI and DI. Third, we extend our investigation about the impact of OFDI on DI by applying NARDL framework. In the fourth step, we obtain asymmetric responses of domestic investment to OFDI changes and test the presence of short run and long run asymmetries by using Wald test.

Table 2 summarizes stationarity properties of variables obtained from Augmented Dickey-Fuller (ADF), Elliot, Rothenberg and Stock (ERS) and Phillips-Perron (PP) unit root tests. It is seen in Table 2 that for all tests, the null hypothesis of unit root is rejected for OFDI and GDPGRW for their level series indicating that OFDI and GDPGRW are stationary in their levels. Although test results for DI, TRADE and FD in their levels are inconclusive, after taking the first difference they all reflect a stationary process. All in all, unit root tests show that no variable is integrated at second degree and more and thus, the computed F-statistics are valid in ARDL bounds test.

Table 2: Unit Root Tests

Variable	Test	Levels		First differences	
OFDI		Constant	Constant and Trend	Constant	Constant and Trend
	ADF	-3.3113**	-4.1765***		
	ERS	-3.0508***	-3.7370**		
	PP	-3.2966**	-4.0901**		
DI					
	ADF	-1.5021	-3.4148**	-6.4566***	-6.3869***
	ERS	-0.7124	-3.4467**	-6.2409***	-6.4492***
	PP	-1.4845	-3.1104	-6.7699***	-6.6629***
GDPGRW					
	ADF	-6.7526***	-6.6921***		
	ERS	-6.6176***	-6.8134***		
	PP	-6.7503***	-6.6878***		
TRADE					
	ADF	-1.0777	-3.4364*	-6.1092***	-6.0282***
	ERS	-0.0079	-3.4873**	-5.8234***	-6.0914***

[§] In order to confirm that variables are not integrated at second or more degrees, we control for stationarity properties.

	PP	-0.7999	-3.0078	-6.9249***	-6.7099***
FD					
	ADF	0.4085	-0.7652	-4.4261***	-4.7700***
	ERS	-1.4456	-2.0140	-3.9347***	-4.8347***
	PP	1.1799	-0.4675	-4.3861***	-4.7701***

Notes**:** The optimal lags are selected by Akaike lag selection criteria. *, **, *** show the rejection of null hypothesis at 10%, 5% and1% significance levels, respectively.

After confirming that OFDI, DI, GDPGRW, TRADE and FD are all I (0) or I (1), we continue with testing long run cointegration relationship between OFDI and DI using linear ARDL (p, q) model:

$$\Delta DI_t = \alpha + DI_{t-1} + \theta OFDI_{t-1} + \omega X_{t-1} + \sum_{i=1}^{p-1} \varphi_i \Delta DI_{t-i} + \sum_{i=0}^{q-1} \rho_i \Delta OFDI_{t-i} + \sum_{i=0}^{q-1} \tau_i \Delta X_{t-i} + \varepsilon_t \quad (9)$$

Where DI and OFDI represent domestic investment and outward foreign direct investment, respectively. X is defined as a vector of control variables that involves GDPGRW, TRADE and FD. To estimate Equation (9), first we determine the appropriate ARDL model by using Akaike Information Criteria (AIC) and conclude that the optimal lag specification is ARDL (3, 1, 4, 3, 0). The estimation results of this model reported in Table 3. Diagnostic tests in Table 3 confirms that there are no serial correlation and heteroscedasticity problems and residuals are normally distributed. We verify parameter stability by using CUSUM tests. [**]Then, we continue with the ARDL bounds test approach in order to investigate whether OFDI and DI are cointegrated in the long run.

Table 3: Estimation of ARDL (3, 1, 4, 3, 0) Model

Dependent variable: DI	Coefficients	t-statistics	p-values
DI_{t-1}	0.855***	5.53	0.000
DI_{t-2}	0.217	1.02	0.317
DI_{t-3}	-0.446	-2.67	0.012
$OFDI$	-4.490**	-2.56	0.016
$OFDI_{t-1}$	-2.729*	-1.70	0.100
$GDPGRW$	0.323***	6.17	0.000
$GDPGRW_{t-1}$	0.060	0.85	0.403

[**] Plots of CUSUM tests are given in Appendix Figure A4.

$GDPGRW_{t-2}$	-0.138*	-1.80	0.083
$GDPGRW_{t-3}$	0.029	0.53	0.600
$GDPGRW_{t-4}$	0.140**	2.31	0.028
$TRADE$	0.054	1.00	0.324
$TRADE_{t-1}$	-0.080	-1.06	0.299
$TRADE_{t-2}$	-0.029	-0.40	0.695
$TRADE_{t-3}$	0.170	2.87	0.008
DC	0.050**	2.40	0.023
Constant	2.524*	2.00	0.055
Jarjue-Berra normality test	1.87	-	0.3929
Breusch-Godfrey serial correlation LM test	0.198	-	0.6565
Breusch-Pagan Heteroscedasticity test	18.14	-	0.2552

Note: *, **, *** show the rejection of null hypothesis at 10%, 5% and1% significance levels, respectively.

The results of ARDL bounds test approach are summarized in Table 4. The calculated F-statistic (F_{PSS}) exceeds the upper bound and is statistically significant at 1% level indicating that null hypothesis of no cointegration is rejected. Therefore, there is a cointegration relationship between variables.

Table 4: The ARDL Bounds Test Results

Test statistics	Value	Significance level	I(0)	I(1)
F_{PSS}	5.317***			
		1 %	3.74	5.06
		5 %	2.86	4.01
		10 %	2.45	3.52

Note: *, **, *** show the rejection of null hypothesis at 10%, 5% and1% significance levels, respectively.

After concluding that there is a cointegration among variables, we estimate the error correction form of ARDL (3, 1, 4, 3, 0) model and obtain short run and long run coefficients. We report long run coefficients in Table 5. The long run model of domestic investment suggests that OFDI has a statistically negative impact on domestic investment. The coefficient on OFDI

is -19.307 implying that 1% increase in OFDI leads to 19% decline in domestic capital formation. The strong negative response of domestic investment to the changes in OFDI indicates that OFDI crowds out domestic investment. When control variables are considered, it is observed that GDP growth, trade openness and financial development have statistically positive impacts on domestic investment as expected. Having found that OFDI crowds out domestic investment, we conclude that OFDI and domestic investments are substitutes.

Table 5: Estimated Long Run Coefficients

Variables	Coefficients	t-statistics	p-values
OFDI	-19.307***	-3.32	0.002
GDPGRW	1.110**	2.21	0.035
TRADE	0.309***	6.76	0.000
FD	0.134***	2.95	0.006

Note: *, **, *** show the rejection of null hypothesis at 10%, 5% and1% significance levels, respectively.

Table 6 reports short run responses of variables. It is seen that apart from lag differences of GDPGRW and TRADE, most of the coefficients in error correction model are insignificant. As expected, the lagged error correction term carries a statistically negative sign supporting our findings about cointegration between variables and also implying the presence of convergence to equilibrium.

Table 6: Estimated Short Run Coefficients

Variables	Coefficients	t-statistics	p-values
Constant	2.524*	2.00	0.055
ΔDI_{t-1}	0.229	1.46	0.155
ΔDI_{t-2}	0.446**	2.67	0.012
$\Delta OFDI_{t-1}$	2.7290*	1.70	0.100
$\Delta GDPGRW_{t}$	-0.092	-0.68	0.502
$\Delta GDPGRW_{t-1}$	-0.031	-0.27	0.792
$\Delta GDPGRW_{t-2}$	-0.169*	-1.87	0.071
$\Delta GDPGRW_{t-3}$	-0.140**	-2.31	0.028
$\Delta TRADE_{t}$	-0.061	-1.03	0.312
$\Delta TRADE_{t-1}$	-0.141***	-2.89	0.007
$\Delta TRADE_{t-2}$	-0.170***	-2.87	0.008
EC_{t-1}	-0.373***	-3.91	0.002

Note: *, **, *** show the rejection of null hypothesis at 10%, 5% and1% significance levels, respectively.

While ARDL approach of Pesaran et al. (2001) allows us to examine the impact of OFDI on domestic investment, it implicitly assume that this impact is symmetric. To avoid such an assumption, we apply the nonlinear model of Shin et al. (2014) and decompose changes in OFDI into partial sums of positive and negative changes. Then, we estimate nonlinear version of ARDL (p, q) approach in the following form:

$$\Delta DI_t = \alpha + \delta DI_{t-1} + \theta^{+} OFDI_{t-1}^{+} + \theta^{-} OFDI_{t-1}^{-} + \omega X_t + \sum_{i=1}^{p-1} \varphi_i \Delta DI_{t-i} + \sum_{i=0}^{q-1} (\rho_i^{+} \Delta OFDI_{t-i}^{+} + \rho_i^{-} \Delta OFDI_{t-i}^{-}) + \varepsilon_t \quad (10)$$

In Equation (10), we specify vector of control variables as deterministic variables in order to identify the unique nonlinear effect of OFDI on domestic investment. The results of nonlinear ARDL framework is presented in Table 7.[††] Table 7 shows that the F_{PSS} and t_{BDM} test statistics are both lower than upper and lower critical bounds suggesting the absence of the nonlinear cointegration relationship. Also, the implemented Wald tests do not reject the null hypothesis of symmetry. Consequently, it is evident that the response of domestic investment to OFDI changes is symmetric and identical whether there is an increase or decrease in OFDI flows.

Table 7: Estimation Results of Nonlinear ARDL

Cointegration test statistics	F_{PSS}=1.768 t_{BDM}=-2.156		
Long run asymmetric coefficients	LR_{OFDI}^{+}=-9.790 LR_{OFDI}^{-}=15.061		
Long and short run asymmetry test statistics	$W_{LR,OFDI}$=1.522 $W_{SR,OFDI}$= 0.626		
Dependent variable: ΔDI	Coefficients	t-statistics	p-values
Constant	1.343	0.64	0.527
DI_{t-1}	-0.259**	-2.16	0.038
$OFDI_{t-1}^{+}$	-2.543	-0.69	0.497
$OFDI_{t-1}^{-}$	-3.912	-0.98	0.335
ΔDI_{t-1}	0.199	1.54	0.132
$\Delta OFDI_{t}^{+}$	-0.656	-0.22	0.830

[††] CUSUM parameter stability tests of nonlinear ARDL estimation are given in Appendix Figure A5.

$\Delta OFDI_{t-1}^{+}$	1.533	0.37	0.716
$\Delta OFDI_{t}^{-}$	-2.751	-0.74	0.467
$\Delta OFDI_{t-1}^{-}$	-2.637	-1.11	0.275
$GDPGRW_t$	0.344	5.52	0.000
$TRADE_t$	0.009	0.21	0.834
FD_t	0.014	0.51	0.613
Portmanteau test	20.2	-	(0.508)
Breusch-Pagan heteroscedasticity test	3.179	-	(0.074)
Ramsey RESET test	0.984	-	(0.412)
Jarjue-Bera normality test	16.75	-	(0.0002)

Note: *, **, *** indicate the rejection of null hypothesis at 10%, 5% and1% significance levels, respectively.

5. Robustness Analysis

Above results reveal that the long run relationship between OFDI and DI is symmetric and the response of DI to OFDI is strongly negative. In this section, to assess the robustness of our findings, we test our baseline regressions by adding an additional control variable such as FDI inflows and time dummies representing liquidity and banking crisis in 2000 and Global Financial Crisis in 2008. We also proxy financial development variable by M2 to GDP ratio that is previously utilized by Al-sadig (2013) instead of domestic credit to private sector. All unit roots tests are applied to the FDI inflows and M2 to GDP ratio and it is evident that these two variable are not I (2) or more. Then, we modify our previous analysis with adding these variables. Table 8 reports the results of new specifications for the relationship between domestic investment and OFDI with three different models. In Model I, we only add FDI inflows and interpret the effect of FDI inflows to Turkey as a driver of domestic investment. Model II includes the dummy variable for liquidity and banking crisis in 2000 and Model III involves dummy variable for Global Financial Crisis in 2008. It is seen in Table 8 that for all three models, cointegration test statistics (F-test) indicate the presence of a long run cointegration relationship among variables as in previous section.[‡‡] The long run coefficients of OFDI in all three models

[‡‡]For models II and III, it is important to note that having dummy variables can necessitate the control of the validity of the results regarding the asymptotic theory of bounds testing approach. As argued in Pesaran et al. (2001, footnote 17, p. 307), when a dummy variable is included in the error-correction model, asymptotic theory and associated critical values hold only if the fraction of periods in which the dummy variables are non-zero tends

are still statistically negative suggesting that there is a substitutability link between OFDI and domestic investment or OFDI crowds out domestic investment. When additional variables are considered, the impacts of FDI inflows and dummy variables are on domestic investment is statistically insignificant. Therefore, additional variables and different proxies do not change the main results of our baseline model.

Although we find that the relationship between OFDI and domestic investment is linear, to complete our robustness analysis, we estimate a NARDL model that involves our additional control variables. Further analysis that are presented in Table 9 validates the absence of nonlinearity as we argued in baseline results. Consequently, the results reported in Table 8 and Table 9 indicate that the negative impact of OFDI on Turkey's domestic investment remains unchanged throughout all the alternative models.

to zero with the sample size T. In our analysis, the time dummies are set at one for the years 2000 and 2001 in Model II and for the year 2008 in Model III. In such a case, the fractions of non-zero values in dummy variables are only 4.1% and 2% respectively. Like in the application of Pesaran et al. (2001), since the fractions of the observations where dummy variables are non-zero do not violate the validity of the asymptotic theory, there is no need to modify the associated critical values.

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Table 8: Estimation Results of Alternative ARDL Specifications

Cointegration Test Statistics	Model I DI(OFDI, GDPGRW, TRADE, DC, FDI)			Model 2 DI(OFDI, GDPGRW, TRADE, DC, FDI, DUM_2000)			Model 3 DI(OFDI, GDPGRW, TRADE, DC, FDI, DUM_2008)		
F- test	4.33***			3.74**			3.882**		
Error Correction	ARDL (3,1,4,3,1,0)			ARDL (3,1,4,3,0,0)			ARDL (3,1,4,3,0,0)		
Long run	Coefficients	t-statistics	P values	Coefficients	t-statistics	P values	Coefficients	t-statistics	P values
OFDI	-19.435***	-3.35	0.002	-20.016***	-2.98	0.005	-19.494***	-3.23	0.003
GDPGRW	1.186**	2.27	0.031	1.210**	2.18	0.038	1.193**	2.17	0.038
TRADE	0.356***	5.96	0.000	0.343***	5.38	0.000	0.347***	7.71	0.000
DC	0.131***	2.85	0.008	0.145*	2.59	0.015	0.142	2.97	0.006
FDI	-1.386	-1.41	0.168	-0.895	-0.97	0.339	-1.04	-1.13	0.268
DUM_2000				1.155	0.20	0.840			
DUM_2008							1.551	0.44	0.662
Short run									
Constant	5.62**	2.10	0.044	5.525*	1.95	0.060	5.591*	1.99	0.055
ΔDI_{t-1}	0.246*	1.92	0.064	0.281**	2.11	0.043	0.239*	1.84	0.076
ΔDI_{t-2}	0.497***	4.34	0.000	0.448***	3.84	0.000	0.455***	3.93	0.000
$\Delta OFDI_t$	-4.929***	-3.76	0.000	-4.990***	-3.74	0.000	-4.779***	-3.62	0.001
$\Delta GDPGRW_t$	0.296	7.46	0.000	0.300***	7.16	0.000	0.311***	7.76	0.000
$\Delta GDPGRW_{t-1}$	-0.050	-0.59	0.554	-0.042	-0.49	0.621	-0.039	-0.45	0.694
$\Delta GDPGRW_{t-2}$	-0.193**	-2.57	0.015	-0.184**	-2.46	0.020	-0.177**	-2.38	0.024

$\Delta GDPGRW_{t-3}$	-0.140**	-2.64	0.013	-0.148	-2.74***	0.010	-0.138**	-2.57	0.015
$\Delta TRADE_t$	0.065	1.44	0.161	0.060	1.30	0.203	0.054	1.14	0.263
$\Delta TRADE_{t-1}$	0.134***	-3.33	0.002	-0.130***	-3.14	0.004	-0.135***	-3.29	0.002
$\Delta TRADE_{t-2}$	-0.202***	-4.01	0.000	-0.153**	-2.69	0.011	-0.196***	-3.85	0.000
ΔDC_t	0.132**	2.47	0.020	0.091*	1.72	0.095	0.095	1.79	0.084
ΔFDI_t	-0.594*	-1.71	0.098	-0.365	-0.99	0.330	-0.483	-1.36	0.183
EC_{t-1}	-0.369***	-6.14	0.000	-0.346***	-5.72	0.000	-0.361***	-6.02	0.000
Jarjue-Berra normality test	0.555	-	0.757	0.142	-	0.931	0.134	-	0.935
Breusch-Godfrey serial correlation LM test	0.233	-	0.793	0.096	-	0.908	0.120	-	0.886
Breusch-Pagan Heteroscedasticity test	1.554	-	0.148	1.564	-	0.145	1.299	-	0.264

Note: *, **, *** show the rejection of null hypothesis at 10%, 5% and1% significance levels, respectively.

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E-ISSN 2667-405X

Table 9: Estimation Results of Alternative NARDL Specification

Cointegration test statistics	F_{PSS}=1.629		
	t_{BDM}=-2.12		
Long run asymmetric coefficients	LR^{+}_{OFDI}=-11.824		
	LR^{-}_{OFDI}=16.701		
Long and short run asymmetry test statistics	$W_{LR,OFDI}$=1.268		
	$W_{SR,OFDI}$= 0.719		
Dependent variable: ΔDI	Coefficients	t-statistics	p-values
Constant	1.343	0.63	0.532
DI_{t-1}	-0.273**	-2.13	0.041
$OFDI^{+}_{t-1}$	-3.228	-0.75	0.456
$OFDI^{-}_{t-1}$	-4.560	-1.01	0.318
ΔDI_{t-1}	0.189	1.41	0.168
$\Delta OFDI^{+}_{t}$	-0.442	-0.14	0.889
$\Delta OFDI^{+}_{t-1}$	2.030	0.45	0.654
$\Delta OFDI^{-}_{t}$	-3.269	-0.80	0.430
$\Delta OFDI^{-}_{t-1}$	-2.696	-1.12	0.272
$GDPGRW_t$	0.340	5.25	0.000
$TRADE_t$	0.009	0.21	0.836
DC_t	0.017	0.58	0.564
FDI_t	0.143	0.33	0.741
Portmanteau test	19.52	-	(0.551)
Breusch/Pagan heteroscedasticity test	3.433	-	(0.063)
Ramsey RESET test	0.753	-	(0.528)
Jarjue-Bera test normality test	18.06	-	(0.001)

Note: *, **, *** show the rejection of null hypothesis at 10%, 5% and1% significance levels, respectively.

Conclusion

Over the last decade, developing countries have increased their share in global outward foreign direct investments. The emergence of developing economies as new global investors has encouraged researchers to identify the effects of outward foreign direct investments on the domestic investment in developing areas. Among developing economies, Turkey has also increased the level of outward foreign direct investment flows to different regions and has become an active economy in outbound investment activities. Although previous research has find evidence of positive and negative impacts on domestic investment activities in developing countries, no research has been devoted to case of Turkey. In this study, we seek to provide evidence of effects Turkish outward direct investment on its domestic investment by adopting linear and nonlinear ARDL framework for the period between 1970-2018. We find strong evidence that there is a symmetric and negative long run relationship between OFDI and domestic investment suggesting a substitutability. Our evidence of negative association between OFDI and domestic investment is also robust to alternative specifications confirming the crowding out effect of OFDI on domestic investment. This estimated substitutability relationship may be the evidence of the contractionary effect of OFDI that arises from investing scarce resources and increasing cost of external financing.

Consequently, the results of this study enhances our understanding of how OFDI flows related with domestic investment in Turkey and it is the first step for formulating policies in order to increase capital formation under consideration of outward investment activities. We believe that as any other developing countries, Turkey strives for maximizing the benefits of OFDI and increasing domestic investment activities simultaneously for its development goals. However, as long as there is a negative long run relationship between OFDI and domestic investment, efforts to increase domestic investment will require special emphasis. Therefore, policy makers should design new policies that help to avoid crowding out effect of OFDI on domestic investment. The initial step may be the determination of what mechanisms and conditions lead to crowding out. If policy makers clarify the particular mechanisms, it is possible to produce strategies to maximize the returns of OFDI on capital formation. A more precise understanding of how OFDI crowds out might enable policy makers to implement distinctive policies to solve difficulties in channeling benefits of OFDI to national economy. This is an important issue for future work.

Appendix

Appendix Table A1: Data Descriptions

Variable	Description	Source
DI	Gross fixed capital formation as a percentage of GDP	World Development Indicator Database
OFDI	Net outflows of outward foreign investment as a percentage of GDP	World Development Indicator Database
GDGRW	Annual percentage growth rate of GDP at constant 2010 US dollars	World Development Indicator Database
TRADE	Total trade (total sum of exports and imports) on goods and services as a percentage of GDP	World Development Indicator Database
FD	Domestic credit to private sector from financial institutions as percentage of GDP	World Development Indicator Database

Appendix Table A2: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
DI	21.898	5.373	12.577	30.079
OFDI	0.213	0.170	0.009	0.754
GDPGRW	4.592	4.060	-5.962	11.113
TRADE	35.962	14.454	9.099	60.402
FD	26.881	17.256	13.588	70.854

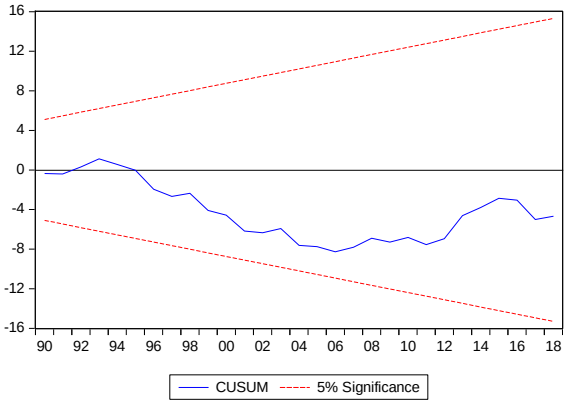
Source: Author's calculations.

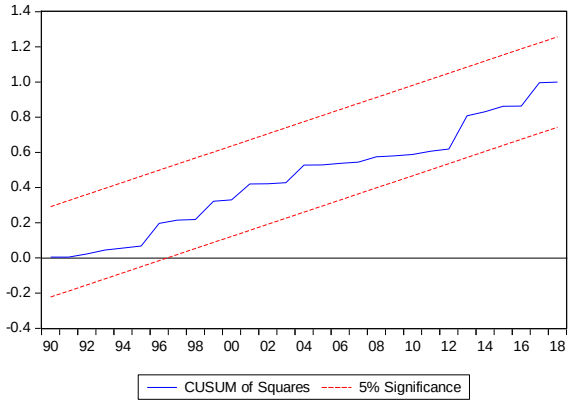
Appendix Table A3: Correlation Matrix

Variable	DI	OFDI	GDPGRW	TRADE	FD
DI	1.000				
OFDI	0.388	1.000			
GDGRW	0.201	-0.063	1.000		
TRADE	0.815	0.375	0.106	1.000	
FD	0.664	0.630	0.162	0.570	1.000

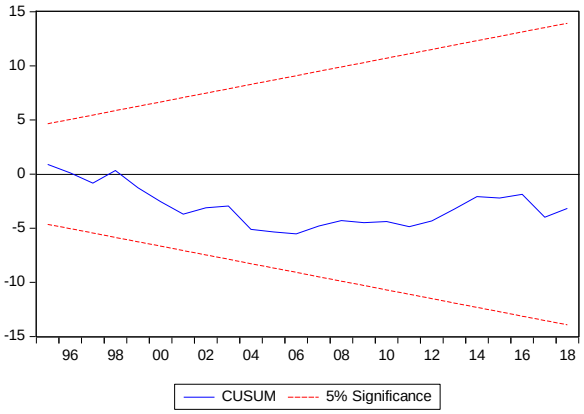
Source: Author's calculations.

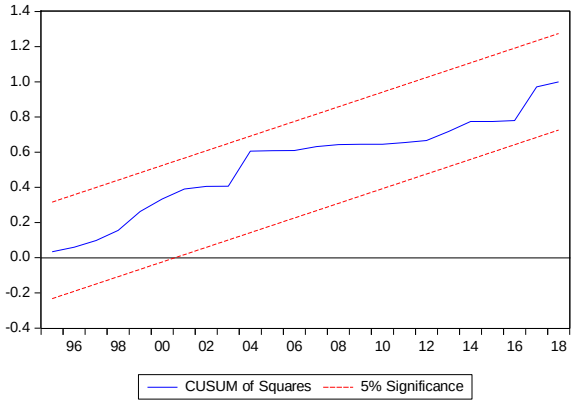
Appendix Figure A4: CUSUM tests for ARDL (3, 1, 4, 3, 0) Model





Appendix Figure A5: CUSUM tests for Nonlinear ARDL Model





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