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Trade Openness and FDI from Turkey: Does It Matter for Economic Growth in African Countries?

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ABSTRACT

International trade and foreign direct investments are beneficial for the economies based on several reasons. Foreign direct investments (FDI) trigger capital formation, competitiveness and economies of scale, and the emergence of new technologies arising from foreign knowledge and, therefore, the development of high value-added goods and services in the host countries. According to economic theory, openness to trade is also vital for development in terms of efficient allocation of resources, increasing productivity, and utilization of comparative advantages. In recent years, African countries have received considerable FDI from Turkey, along with notable progress in openness to trade. This dramatic increase suggests the question of whether the country-specific inflow of FDI with trade openness affects economic growth in Africa.

The study investigates the impact of FDI inflows from Turkey and trade openness on economic growth in selected African countries. We use the panel ARDL method with Pooled Mean Group and the Mean Group estimators and panel VECM Granger causality method in a panel of eight African countries for the period 2006-2017. Firstly, our results show that FDI inflows from Turkey and trade openness are significant determinants of economic growth in African countries in the long run. Secondly, net FDI flows excluding Turkey have a significant negative effect on economic growth. The latter result can be attributed to an insufficient level of human capital, productivity, and infrastructure in these countries. Lastly, we find a unidirectional causality relationship running from trade openness to economic growth in the long run.

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ÖZ

Uluslararası ticaret ve doğrudan yabancı yatırımlar, çeşitli nedenlerle ülke ekonomileri için fayda sağlamaktadır. Doğrudan yabancı yatırımlar (DYY), sermaye oluşumunu, rekabet gücünü, ölçek ekonomilerini, yabancı bilgiden kaynaklanan yeni teknolojilerin ortaya çıkışını ve dolayısıyla ev sahibi ülkelerde katma değeri yüksek mal ve hizmetlerin ortaya çıkışını teşvik etmektedir. Ekonomik teoriye göre, ticari dışa açıklık kaynakların etkin dağılımı, verimlilik artışları ve ticarette karşılaştırmalı üstünlüklerin sağlanması bakımından büyüme için hayati önem taşımaktadır. Son dönemde, Afrika ülkeleri, ticarete açıklıkta kayda değer bir artışla birlikte Türkiye'den önemli miktarda DYY almıştır. Bu çarpıcı artış, doğrudan yabancı yatırım akışının ticari dış açıklık ile birlikte Afrika'daki ekonomik büyümeyi etkileyip etkilemediği sorusunu önemli hale getirmektedir.

Bu çalışma, seçilmiş Afrika ülkelerinde Türkiye kaynaklı DYY girişlerinin ve ticari dışa açıklığın ekonomik büyüme üzerindeki etkisini araştırmaktadır. Çalışmada, 2006-2017 yılları arasında sekiz Afrika ülkesinden oluşan bir panel veri setinde Panel ARDL yöntemine dayalı Havuzlanmış Ortalama Grup ve Ortalama Grup tahmincileri ve Panel VECM Granger nedensellik testi kullanılmaktadır. Sonuçlar ilk olarak, Türkiye kaynaklı DYY girişlerinin ve ticari dışa açıklığın Afrika ülkelerindeki uzun dönem ekonomik büyümenin önemli belirleyicileri olduğunu göstermektedir. İkinci olarak, Türkiye dışındaki DYY akımlarının ekonomik büyüme üzerindeki etkisi önemli ölçüde negatif bulunmuştur. Bu sonucun muhtemel nedenleri arasında, ele alınan ülkelerdeki beşeri sermaye, verimlilik ve altyapı yetersizlikleri gösterilebilir. Son olarak analizde, uzun dönemde ticari açıklıktan ekonomik büyümeye doğru tek yönlü bir nedensellik ilişkisine rastlanmıştır.

1. Introduction

The most notable feature of globalization in the world economy is increasing international trade and FDI flows across several countries. In the context of Africa, the economic effects of openness to trade and FDI in host countries are broadly examined in several studies (Borensztein et al.,1998; Sukar et al., 2006; Ayanwale, 2007; Shimul, 2009; Alege and Ogundipe, 2013; Gui-Diby, 2014; Gizaw, 2015; Zahonogo, 2016; Zekarias, 2016; Adegboye et al., 2017; Awolusi et al., 2017; Güngör et al., 2017; Sakyi and Egyir, 2017; Sunde, 2017; Moyo and Khobai, 2018). Most of these studies emphasize the vital role of both factors in the process of economic growth.

IMF (1993) defines the FDI as "the investments made to acquire a long-run interest in enterprises operating outside of the economy of the investor." FDI has been one of the elements regarded as the primary driver of economies, particularly in developing nations, for the previous several decades (Alzaidy et al. 2017). FDI can enable capital formation in the host countries by accessing more financial resources and integrating into global supply chains (World Economic Forum, 2013). FDI also triggers technical, managerial, and organizational know-how, greater access to high technology capital goods, and the development of high value-added products and services (Caves and Caves, 1996; Branstetter, 2006; Chudnovsky and Lopez, 2008). Thus, FDI is relevant for the emergence of new technologies arising from foreign knowledge diffusion and increased competitiveness resulting from an expansion in international trade (OECD, 2002). In addition, some previous findings indicate that the effect of FDI varies by country-specific conditions related to human capital level, institutional quality, and infrastructure (Borensztein, 1998; Alege and Ogundipe, 2013). In other words, the development level of countries can have somewhat a distorting effect on FDI.

According to economic theory, trade openness is another element that influences economic growth. The trade-led growth approach refers that international trade is vital for economic growth. However, the new theories of growth emphasize the accelerating effect of international trade via various mechanisms in the growth process (Romer, 1990; Grossman, 1991; Young, 1991). In this respect, trade openness can promote growth by increasing efficiency in resource allocation and improving productivity through the diffusion of technology and knowledge absorption (Rivera-Batiz and Romer,1991). Thanks to the increased level of knowledge and technology, firms can be encouraged to invent new and distinct ideas, resulting in an increase in R&D activities and innovations (Coe and Helpman, 1995; Grossman and Helpman, 1991). The positive impact of openness can also arise from channels such as the utilization of comparative advantages, increasing economies of scale, and exposure to competition (Sachs *et al*, 1995; Petrakos and Arvanitidis, 2007). Moreover, it is asserted that in certain scenarios, the relationship between trade openness and FDI can promote economic growth. Accordingly, a greater level of openness enables more investment inflows. At the same time, the increasing volume of trade, especially in importing capital goods with superior technology, is affected by higher FDI inflows and export revenues (Osabuohien, 2007; Villanueva, 2008).

The global stagnation in FDI flows and its negative reflections on growth rates have been a long-run policy concern for developed and transition economies (UNCTAD, 2018). Since foreign investment is an essential tool for sustainable development and persistent cross-country growth differences worldwide, the issue has gained more importance, particularly in developing nations. In this context, African countries have received considerable FDI from Turkey over the last decade.

According to the Turkish Foreign Economic Relations Board (DEIK), North African countries have become more attractive to many Turkish investors from several sectors. Furthermore, Turkey's economic and political advances in Sub-Saharan Africa promote a sustainable investment environment. Recently, Ethiopia has been the biggest investment destination of Turkey in Africa and attracted nearly half of the continent's investment with the amount of about $2.5 billion of a sum of $ 6 billion, while Kenya and Sudan obtained a spot on the outbound investment index and have become a popular destination for Turkish investments (DEIK, 2018; ENA, 2018; Fabricius, 2021).

Turkish FDI differs from other fellow countries' FDI in Africa and Ethiopia. Accordingly, Turkey is the top African investor in terms of job creation, with 16,593 jobs in 2014, compared to China (10,811 jobs) and India (6,193 jobs) (FDI intelligence, 2015). Turkey is also the second-largest investor in Ethiopia with its cutting-edge textile industries and cable manufacturing enterprises (Getachew, 2021). More than 150 Turkish firms are involved in Ethiopia's construction, manufacturing, agriculture, and chemicals sectors. As a result, the companies have created employment for more than 30,000 Ethiopians (AA, 2020). In addition, Turkish entrepreneurs created 78,000 employment in Africa, while Turkish construction firms surpassed $55 billion in several projects. The dramatic increase in Turkish FDI suggests the question of whether the FDI inflows affect economic growth in Africa. However, most of the previous studies in Africa have made little or almost no attention to country-specific datasets of host countries (Anadolu Agency, 2018, 2020).

This study investigates the impact of FDI inflows from Turkey and trade openness on economic growth in selected African countries. Our dataset consists of a panel of eight African countries for the 2006-2017 period, based on the available data sources for Turkish FDI. In the analysis, we use the panel ARDL method to examine short and long-run relationships between variables and the panel VECM Granger causality test.

The remainder of the paper is divided into five sections. Section 2 presents the current state of FDI flows and international trade in Africa. Section 3 introduces an overview of related literature, while the dataset and empirical method are given in section 4. Section 5 reports the empirical findings, and the last section concludes the paper.

2. The Current State of FDI Flows and International Trade in Africa

According to World Investment Report (UNCTAD, 2018), FDI inflow to Africa increased by $ 4,989 billion in 2017 compared to $ 36,783 billion in 2006 (Table 1). Although the recent shrinking in Africa, FDI inflows amounted to $ 41,772 billion in 2017. The 21 percent decline in the 2016-2017 periods can be attributed to the volatility of oil prices and the deteriorating impacts of the commodity crash, which saw flows drop, particularly in bigger commodity-exporting nations in the time under consideration.

East Africa's FDI inflow increased dramatically by $ 7,625 in 2017 compared to $ 2,394 billion in 2006, which is the highest in the African continent. Ethiopia achieved a remarkable increase of $ 3,041 billion at the same time in the region. Furthermore, East Africa, Africa's fastest-growing region, received $7,625 billion in FDI in 2017. Ethiopia received almost half of this total, with $3.6 billion down by 10% compared to 2016, and is now Africa's second-largest FDI recipient.

FDI to Kenya raised by $672 million in 2017 compared to 2016 in the region. FDI flows to West Africa increased by $4,270 billion in the 2006-2017 period and amounted to $11,307 billion in 2017. A dramatic increase of $2,619 billion occurred in Ghana in the same period, while FDI flow to Nigeria decreased by $1395 billion in 2017 in the region. Recently, West Africa's FDI fell by 11 percent to $11.3 billion compared to $12,694 billion in 2016, owing to the remaining depression in Nigeria's economy. Nigeria's FDI inflow decreased by 21% to $3.5 billion in 2017, and the FDI inflow in Senegal also fell by 13% to $532 million in 2017 in the region. FDI to Central Africa increased by $2,974 billion in 2017 compared to $ 2,759 billion in 2006, decreased by 22 percent to $5.7 billion in 2017 compared to $7.3 billion in 2016, while FDI in Cameron and Rwanda increased to $672 and $ 366 million, up 1.2% and 7% respectively at the same period in the region.

Table 1: FDI flows by Region and Selected Countries in Africa (2006-2017)

Region/ Country	FDI net flows (In million USD $)				change in $	% change
	2006	2010	2016	2017	(2006-2017)	(2016-2017)
Africa	36,783	43,571	53,190	41,772	4,989	-21%
North Africa	23,194	15,746	13,831	13,271	-9,923	-4%
Egypt	1, 043	6,386	8,107	7,392	-2,651	-9%
Morocco	2, 449	1,574	2,157	2,651	202	23%
Algeria	1,795	2,301	1,635	1,203	-592	-26%
Libya	2,064	1,909	3-	-	-	-
West Africa	7,037	12,008	12,694	11,307	4,270	-11%
Nigeria	4,898	6,099	4,449	3,503	-1,395	-21%
Senegal	220	266	472	532	312	-13%
Ghana	636	2,527	3,485	3,255	2,619	-7%
Central Africa	2,759	7,777	7,345	5,733	2,974	-22%
Cameroon	16	-1	664	672	656	1.2%
Rwanda	31	251	342	366	335	7%
East Africa	2,394	4,520	7,883	7,625	5,231	-3%
Ethiopia	545	288	3,989	3,586	3,041	-10%
Kenya	51	178	393	672	621	71%
Southern Africa	1,400	3,521	11,437	3,836	2,436	-66%
South Africa	527	-3,227	2,235	1,325	798	-41%
Angola	38	3,636	4,104	-2,255	-2,293	-155%

Note: -: NA.

Source: *UNCTAD, (2012 & 2018).*

In 2017, FDI inflow to North Africa decreased by $9,923 billion compared to $23,194 billion in 2006 and amounted to $13,271 billion. However, FDI inflow to Morocco increased by $202 million, while FDI inflow to Egypt and Algeria decreased. Moreover, FDI inflow to North Africa fell by 4 percent in 2017 compared to 2016; FDI inflows to Morocco increased by 23% to $2.7 billion in 2017 compared to 2016, mostly due to significant investments in the automotive industry. Although the foreign direct investments in Egypt declined by 9% to $7.4 billion in 2017, the country remained the biggest beneficiary in Africa. In Southern Africa, FDI flows increased to $2,436 billion in 2017 compared to $1,400 billion in 2006, while an unexpected decrease of $2,293 billion occurred in Angola in 2017. In contrast, FDI dropped to $3.8 billion by 66% in 2017 compared to $3,836 billion in 2016. FDI inflows to South Africa dropped by 41% to $1.3 billion in 2017 compared to $2,235 billion in 2016 because of the underperforming commodity sector and political insecurity.

In recent years, international trade in African countries has also followed a negative trend. Despite the increased performance of Egypt for the 2006-2017 period, the total volume of international trade decreased to about $101 billion in 2017 compared to $130 billion in 2016. In the same period, the export performance of Algeria decreased from $57.304 billion in 2006 to $37.572 billion in 2017, while the import increased to $37.572 billion in 2017 compared to $25.357 billion in 2006 among northern African countries. Among West African countries, the export performance of Nigeria decreased to $50.764 billion in 2017 compared to $59.233 in 2006. Also, imports in Nigeria increased to $50.850 billion in 2017 compared to $35.911 in 2006. A dramatic increase in exports was achieved by Ghana with $20.437 billion in 2017 compared to $5.110 in 2006. However, exports in Ethiopia increased to $6.636 billion in 2017 from $2.198 billion in 2006. Ethiopia's imports increased to $19.150 billion from $5.276 billion in the same period. Finally, export of South Africa raised to $103.835 billion in 2017 compared to $79.217 billion in 2006, and imports increased to $98.802 billion in 2017 in the same period.

Table 2. International Trade in African Countries (Billion, $)

	2006		2010		2016		2017	
Country	**Export**	**Import**	**Export**	**Export**	**Import**	**Import**	**Export**	**Import**
Egypt	36.680	40.553	48.831	59.862	33.627	67.813	42.831	70.147
Morocco	19.415	23.856	27.045	36.999	34.261	45.198	38.864	49.664
Algeria	57.304	25.357	60.588	50.645	32.747	60.196	37.572	60.128
Libya	37.962	15.783	49.345	30.686	6.850	11.550	-	-
Tunisia	15.891	16.564	22.125	24.240	16.899	21.385	17.584	22.586
Sudan	5.930	9.630	11.646	11.372	4.638	8.918	5.614	9.749
Nigeria	59.233	35.911	82.699	70.853	38.413	46.960	50.764	50.850
Senegal	2.401	4.035	3.212	5.201	-	-	-	-
Ghana	5.110	8.286	9.437	13.925	17.470	20.536	20.437	22.123
Cameroon	4.865	4.653	5.608	6.371	6.247	7.075	6.545	7.267
Congo, Dem. Rep.	3.138	3.797	8.867	10.705	10.108	12.021	13.388	14.828
Ethiopia	2.198	5.276	4.644	9.911	5.906	19.909	6.636	19.150
Kenya	5.946	8.171	8.983	13.531	9.902	16.145	10.440	19.086
Tanzania	3.446	5.113	6.370	9.054	9.269	10.695	8.748	9.570
Uganda	1.736	2.986	3.468	6.178	4.828	6.403	4.989	7.076
South Africa	79.217	83.772	107.735	102.954	91.180	89.270	103.835	98.802
Angola	33.346	16.289	51.452	35.421	28.300	25.657	35.598	28.257
Botswana	5.297	3.364	5.346	6.525	8.241	6.667	6.957	5.905

Note: -: NA.

Source: World Bank, 2019.

3. Literature Review

Several studies have widely discussed the nexus between economic growth, FDI, and trade openness in Africa. However, the findings of these studies offer some mixed results. In a sample of 12 African countries, Sukar et al. (2006) investigate the effects of FDI, openness, and various macroeconomic parameters on economic growth from 1975 to 1999. Based on the results, FDI has a marginally significant effect on economic growth. The analysis also demonstrates that economic growth is driven by factors such as openness, macroeconomic policy, and domestic investments. Another study by Gizaw (2015) examines the relationship between FDI inflows and economic growth in Ethiopia in the period 1974 to 2013. The findings of the VAR model imply that economic growth has a unidirectional relationship with FDI. Similarly, Zekarias (2016) investigates the relationship between economic growth and FDI in a panel of 14 Eastern African nations from the year 1980 to 2013. The results of the GMM estimation within the context of a

conditional economic convergence model show that FDI has a positive and marginally significant effect on GDP growth.

A recent study by Zahonogo (2016) explores the growth impact of trade openness in 42 Sub-Saharan African countries from 1980 to 2012. The findings from PMG estimation reveal that the relationship between economic growth and trade openness is not linear, meaning that there is a trading threshold below which growing trade openness promotes economic growth and beyond which the trade effect on growth diminishes. The economic growth of South Africa as a function of FDI and exports is the subject of another study conducted by Sunde (2017). The results indicate that economic growth and FDI have unidirectional causation running from FDI to economic growth, while FDI and exports have unidirectional causation running from FDI to exports and bidirectional causation between economic growth and exports. The link between FDI, domestic investments, and growth in Nigeria from 1980 to 2015 is explored by Güngör (2017). The results of the VECM-based analysis indicate unidirectional causation between FDI and economic growth, confirming the FDI-led growth theory in Nigeria

Moreover, Adegboye et al. (2017) examine the association between economic growth and FDI in a pooled panel of 39 African nations for the period 1993 to 2012. The results of their LSDV model demonstrate that FDI is a significant determinant of economic growth for host African countries. Lastly, the link between economic growth and trade openness for 11 SADC (Southern African Development Cooperation) nations between 1990 and 2016 is investigated by Moyo (2018). The findings based on the ARDL-bounds test and PMG estimation indicate a long-run relationship between economic growth and trade openness in all countries except Tanzania, Swaziland, Mauritius, and Malawi. However, the results also reveal that trade openness has a long-run negative effect on economic growth. In contrast, Keho, (2017) examines the impact of trade openness on economic growth and shows a granger causality result indicating that trade openness boosts short- and long-term economic growth in Cote d'Ivoire. Besides, Gries and Redlin (2012) studied GDP growth and openness using panel cointegration tests and panel error-correction models (ECM) combined with GMM estimation to explore causality. Their results suggest a long-run relationship between openness and economic growth with short-run adjustments for both directions of dependency. The long-run coefficients show a positive causality from openness to growth and vice versa.

On the other hand, several studies present contradictory results regarding FDI, trade openness, and economic growth in Africa. In a sample of 69 developing nations, including African countries, Borensztein et al. (1998) conclude that FDI is profitable only if the host country has an adequate pool of human capital. However, Ayanwale (2007) argues that openness to trade and availability of human capital is not conducive to foreign direct investment in Nigeria over the period 1970 to 2002. Although the findings of the study imply an insignificant overall effect of FDI on the Nigerian economy, there is a partial positive effect on some sectors, such as communication and oil, while the effect of FDI turns negative in the manufacturing sector. Similarly, Shimul (2009) shows that there is no statistically significant association between FDI and economic growth in Bangladesh over the period 1993 to 2007.

Furthermore, Alege and Ogundipe (2013) find a negative impact of FDI on economic growth in the ECOWAS (Economic Community of West African States) region. They suggest that

the negative effect gets larger with the stage of underdevelopment. It depends on country-specific characteristics such as human capital, institutional quality, infrastructure, and some other factors. Another study conducted by Shawa et al. (2013) does not reach any causality relationship between FDI and economic growth in Tanzania. However, it is concluded that policies to attract FDI are crucial to increasing exports in Tanzania. Some recent studies on FDI and trade openness reach slightly different results in Africa. For instance, Gui-Diby (2014) investigates the effect of FDI on economic growth in a panel of 50 African nations from the period 1980 to 2009. The findings of the system-GMM estimation suggest that FDI had a negative influence on economic development during the period 1980-1994 and had a positive impact during the period 1995 to 2009. However, the findings also show that the lack of human capital in Africa did not negatively influence the role of FDI.

In another study, Sakyi (2017) conducts a system-GMM estimation in 45 African nations for the period 1990 to 2014. Based on two models with interaction factors, short- and long-run estimation results reveal that FDI has a considerable negative impact on economic growth in both the short and long runs. However, the interaction between both trade openness and FDI and the share of export in GDP and FDI on economic growth has a positive and significant effect on economic growth. Thus, it is concluded that the growth effect of FDI increases in direct proportion to a country's degree of openness to international trade. Moreover, Awolusi et al. (2017) studied the selected major African countries, including South Africa, Nigeria, Egypt, Kenya, and the Central African Republic, from 1980 to 2014. The results of OLS and dynamic panel estimations reveal that FDI has a limited or zero influence on economic growth in African nations. In addition, the findings show that FDI is more beneficial in promoting economic growth in South Africa rather than in other regions. As discussed above, the negative or limited growth effect of FDI on the growth of African countries can be attributed to insufficient human capital, sectoral differences in productivity gaps, institutional quality, inadequate infrastructure, and low volume of international trade.

4. Data and Methodology

The study explores the impact of FDI inflows from Turkey and trade openness on economic growth in a selected African nation. The dataset we use in the analysis consists of eight African countries (Algeria, Egypt, Ethiopia, Libya, Morocco, Senegal, South Africa, and Tunisia) between 2006 and 2017 (Figure 1). We consider the availability of FDI data for Turkey at the stage of country selection. In real terms, the Gross Domestic Product (GDP) as an indicator for economic growth is the dependent variable of our econometric model. The main explanatory variables of the model are FDI inflows from Turkey and openness to trade. In order to improve the model's predictive power, total net FDI flows excluding Turkey and population variables, which are other determinants of economic growth, are included in the model as control variables. Furthermore, all the economic variables are expressed in US Dollars ($), and we take the natural logarithms[1] of all the variables in the model. Finally, econometric estimations are conducted with Eviews 10 and Gauss 10.

[1]The logarithmic transformations of the series with negative and zero values are conducted by the "Ln[(x_i-minimum(X))+1]" formula.

Figure 1. Selected African Countries

As given in Table 3, the data for real GDP, total FDI net flows excluding Turkey, trade openness, and the population is compiled from the (World Bank, 2019) World Development Indicators (WDI) database, while FDI data for Turkey is obtained from the Central Bank of the Republic of Turkey (CBRT, 2019) database. There are various definitions regarding the openness to trade in the literature. In line with the World Bank definition, we measure trade openness by the ratio of total trade (imports + exports) to GDP at current prices.

Table 3. Definitions and Sources of Variables

Variable	Abbreviation	Definition	Source
Real GDP	GDP	Gross Domestic Product in 2010 prices ($)	World Bank (2019)
FDI from Turkey	FDI^T	FDI inflows from Turkey (current, $)	CBRT (2019)
Other FDI Flows	FDI^O	Total FDI net flows excluding Turkey (current, $)	World Bank (2019)
Trade Openness	OPN	(Imports + Exports) / GDP (current, $)	
Population	POP	Total population (person)	

To examine the long-run relationship, we use the panel ARDL (Autoregressive Distributed Lag) method suggested by Pesaran et al. (1999) with the Pooled Mean Group (PMG) and the Mean Group (MG) estimators. The general form of our model is given in equation (1).

$$LnGDP_i = \alpha_{0i} + \alpha_{1i} LnFDI^T + \alpha_{2i} LnFDI^O + \alpha_{3i} LnOPN + \alpha_{4i} LnPOP + \varepsilon_i \quad (1)$$

The MG estimator does not impose any constraints on the parameters of the ARDL specification and derives the long-run parameters from the average of the long-run parameters obtained from individual ARDL estimates. On the other hand, the PMG estimator implies that long-run parameters are the same among cross-sections, allowing differentiation of error variance and

short-run parameters. Paseran et al. (1999) suggest the Hausman homogeneity test to choose between these two alternative estimators. The PMG is an effective estimator in long-run homogeneity, despite both MG and PMG being consistent (Paseran et al., 1999). The Panel ARDL form of our model is given in equation (2).

$$Ln GDP_{it} = \alpha_i + \sum_{j=1}^{p} \beta_{1ij} LnGDP_{it-j} + \sum_{j=0}^{q} \beta_{2ij} LnFDI^{T}_{it-j} + \sum_{j=0}^{k} \beta_{3ij} LnFDI^{O}_{it-j} + \sum_{j=0}^{l} \beta_{4ij} LnOPN_{it-j} + \sum_{j=0}^{m} \beta_{5ij} LnPOP_{it-j} + \varepsilon_{it} \quad (2)$$

Equation (2) can be written in error correction form to obtain short and long-run parameters. The error correction form of the panel ARDL model is defined in equation (3).

$$\Delta Ln GDP_{it} = \alpha_i + \beta_{1i} LnGDP_{it-1} + \beta'_{2i} LnFDI^{T}_{it} + \beta'_{3i} LnFDI^{O}_{it} + \beta'_{4i} LnOPN_{it} + \beta'_{5i} LnPOP_{it} + \sum_{j=1}^{p-1} \beta^{*}_{6ij} \Delta LnGDP_{it-j} + \sum_{j=0}^{q-1} \beta^{*}_{7ij} \Delta LnFDI^{T}_{it-j} + \sum_{j=0}^{k-1} \beta^{*}_{8ij} \Delta LnFDI^{O}_{it-j} + \sum_{j=0}^{l-1} \beta^{*}_{9ij} \Delta LnOPN_{it-j} + \sum_{j=0}^{m-1} \beta^{*}_{10ij} \Delta LnPOP_{it-j} + \varepsilon_{it} \quad (3)$$

In equation (3), the term"Δ"is the first difference operator, α_i is a drift term, and β_1 is the error correction coefficient (ECM). β_2 And β_5 represent the long-run relationships, while the $\beta_6 \ldots \beta_{10}$ are the short-run coefficients. The optimal lag length is determined by the Akaike information criterion.

5. Empirical Findings

Before the estimation step, we firstly conduct some preliminary tests for cross-sectional dependence and homogeneity. In the context of cross-sectional dependence, Table 4 shows the results of CDLM1 (Breusch and Pagan, 1980), CD and CDLM2 (Pesaran, 2004), and Bias-adjusted CD (Pesaran and Yamagata, 2008) tests. According to the CD test results, it is concluded that there is no cross-sectional dependence in the panel of eight countries. We also examine the homogeneity of cointegration coefficients with the Delta test introduced by Pesaran and Yamagata (2008). Regarding the Delta test under the null hypothesis -H0: βi=β for each cross-sectional unit- against the alternative hypothesis - H1: βi≠βj; I≠j -, results indicate a heterogeneous structure of slope coefficients. Based on the test results, we prefer first-generation estimation methods which take into account cross-sectional independence and heterogeneity in the following steps.

Table 4. Cross-sectional Dependence and Homogeneity Tests Results

Tests	Test Statistics	p-value
CD_{LM1} (Breusch and Pagan, (1980)	36.580	0.128
CD_{LM2} (Pesaran, (2004)	1.147	0.126
petr	0.261	0.397
Bias-adjusted CD test (Pesaran et al., 2008)	2.284	0.388
$\tilde{\Delta}$ (Pesaran and Yamagata, (2008)	1.941	0.026
$\tilde{\Delta}_{adj.}$ (Pesaran and Yamagata, (2008)	2.645	0.004

Source: Author's calculations

We investigate the stationarity of variables by three tests that allow unit root testing across individual groups. In this regard, the results of Im, Peraran, and Shin (2003), Maddala and Wu (1999), and Choi (2001) unit root tests are given in Table 5. The test results show that all the series have a unit root in level, while the first differences of them are stationary. Thus, it is concluded that the first order integrates all the variables, I(1).

Table 5. Panel Unit Root Test Results

Variables	**Im, Pesaran, and Shin (2003)**		**Maddala and Wu (1999)**		**Choi (2001)**	
Level	**Intercept**	**Intercept and Trend**	**Intercept**	**Intercept and Trend**	**Intercept**	**Intercept and Trend**
LnGDP	0.117	0.715	17.696	15.308	23.870	22.601
	(0.547)	(0.763)	(0.342)	(0.502)	(0.092)	(0.125)
LnFDI^{T}	-1.078	-1.395	23.791	24.308	40.841	43.102
	(0.141)	(0.082)	(0.094)	(0.083)	(0.000)	(0.000)
LnFDI^{O}	0.503	-0.098	11.268	14.403	25.978	32.675
	(0.693)	(0.461)	(0.793)	(0.569)	(0.054)	(0.008)
LnOPN	-1.325	-0.559	25.492	22.934	26.913	22.101
	(0.093)	(0.288)	(0.062)	(0.116)	(0.043)	(0.140)
LnPOP	0.028	0.303	27.628	50.410	24.652	27.315
	(0.511)	(0.619)	(0.035)	(0.000)	(0.076)	(0.038)
First Difference						
ΔLnGDP	-2.516	-2.319	31.285	30.039	55.316	55.967
	(0.006)	(0.010)	(0.012)	(0.018)	(0.000)	(0.000)
ΔLnFDI^{T}	-4.741	-2.585	53.428	44.843	97.364	75.464
	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)
ΔLnFDI^{O}	-3.460	-1.823	42.470	36.555	76.751	53.466
	(0.000)	(0.034)	(0.000)	(0.002)	(0.000)	(0.000)
ΔLnOPN	-2.095	-1.719	54.461	30.415	49.979	30.612
	(0.018)	(0.043)	(0.000)	(0.016)	(0.000)	(0.015)
ΔLnPOP	-4.544	-10.256	53.755	109.953	38.543	41.334
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Notes: The p-values are in parenthesis. The optimal number of lags is determined by the Schwarz information criterion.

Source: Author's calculations.

The integrated series in the same order refers to the possibility of a long-run relationship. We investigate the cointegration relationship within our model by Pedroni (1999, 2004) and Kao (1999) tests which assume heterogeneity and cross-sectional independence. Pedroni (1999, 2004) suggests seven tests of cointegration, including whole panel (Panel v, Panel rho, Panel PP, and Panel ADF) and group (Group rho, Group PP, and Group ADF) statistics. According to Pedroni (2004), the group-rho statistic has more power if the number country is small, while the panel-v statistic is more suitable in a relatively large panel. The null hypothesis of these tests states that there is no long-run relationship between countries, while the alternative hypothesis claims a cointegration relationship in the panel. Similarly, Kao (1999) test examines the cointegration in residuals.

Panel cointegration test results are reported in Table 6. Considering our panel data set is relatively small, the group rho statistic of (Pedroni, 1999, 2004) test seems to be more preferable for interpreting. Furthermore, the group rho statistic in Table 4 is larger than the critical value of 1% significance level, indicating a long-run relationship in the model. Also, (Kao, 1999) ADF statistic confirms the presence of cointegration.

Table 6. Panel Cointegration Tests Results

	Test Statistics	
	Intercept	**Intercept and Trend**
Pedroni (1999)		
Panel v	0.839	0.565
Panel rho	1.507	2.281
Panel pp	-2.117	-2.938
Panel adf	-2.150	-2.562
Group rho	3.139	3.339
Group pp	-0.865	-2.183
Group adf	-0.523	-1.777
Kao (1999)		
ADF	-2.037	
	(0.021)	

Notes: The critical values for 1%, 5% and 10% significance levels are 2.33, 1.64 and 1.28, respectively. The p-value of the ADF statistic is in parenthesis.
Source: Author's calculations.

In the next step, we examine the long-run parameters of each variable in the model. For this purpose, we use the panel ARDL method (Pesaran, 1999) with PMG and MG estimators. Table 7 reports the results of PMG and MG estimations and the Hausman test.

Table 7. Results of PMG and MG Estimations

	Pooled Mean Group		**Mean Group**		**Hausman Test**
***Dependent:* LnGDP**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	
Long run					H_0: PMG
$LnFDI^T$	0.002^{***}	0.000	0.030	0.023	H_1: MG
$LnFDI^O$	-0.054^{***}	0.001	0.025	0.039	
LnOPN	0.238^{***}	0.007	0.268^{*}	0.145	$\chi^2(4)$: 7.390
LnPOP	2.503^{***}	0.005	3.159^{***}	0.790	(0.117)
Error Correction term					
Φ	-0.234	0.156	-0.935^{***}	0.189	
Short-run					
$\Delta LnFDI^T$	0.031	0.031	-0.005	0.005	
$\Delta LnFDI^O$	0.030	0.021	-0.033	0.023	
ΔLnOPN	0.101	0.101	0.066	0.046	
ΔLnPOP	-0.823	5.798	6.711	7.771	
Constant	-3.578	2.622	-26.374	17.416	

Notes: *** and * denote significance at 1% and 10%, respectively. The p-value of Hausman test is in parenthesis.
Source: Author's calculations

In Table 7, the result of the Hausman test statistics shows that the PMG estimator is more appropriate within the model. When the long-run coefficients obtained by the PMG estimator are examined, it is seen that all variables are significant at a 1% significance level. In this respect, $LnFDI^T$ and LnOPN and the control variable have a positive impact on economic growth in African countries. However, it is seen that the coefficient of $LnFDI^O$ is negative in the considered period. In addition, the sign of the error correction term (φ), which explains whether there is a stable and converging long-run relationship between economic growth and explanatory variables, is negative but insignificant. Table 7 also indicates that short-run coefficients of PMG estimator based on error correction model are positive except LnPOP, but not significant.

Based on the results in Table 7, we investigate the short-run coefficients of the countries for PMG estimation. As given in Table 8, the short-run coefficients of $LnFDI^T$ for Libya, Senegal, and South Africa are positive and significant, while the positive coefficient of Ethiopia is insignificant. The short-run coefficients of $LnFDI^O$ are positive in Algeria, Ethiopia, Libya, Senegal, South Africa, and Tunisia but significant only for Algeria, Libya, South Africa, and Tunisia. However, the negative coefficient of $LnFDI^O$ for Morocco is relatively small and significant. Table 8 also indicates that the short-run coefficients of LnOPN for Ethiopia, Libya, and South Africa are positive and significant, whereas the positive coefficients for Algeria and Egypt are insignificant. Besides, the short-run coefficients of LnPOP are positive and significant for Algeria, Libya, and Morocco, while the coefficients for Egypt, Senegal, and Tunisia are significantly negative.

Table 8. Short-run Country Coefficients of PMG Estimation

Variables	Algeria	Egypt	Ethiopia	Libya	Morocco	Senegal	South Africa	Tunisia
EC (φ)	-0.010 (0.210)	0.088 (0.047)	0.010 (0.957)	-0.546 (0.000)	-1.213 (0.000)	-0.165 (0.000)	0.029 (0.396)	-0.068 (0.777)
$\Delta LnFDI^T$	-0.003 (0.097)	-0.001 (0.674)	0.003 (0.426)	0.246 (0.000)	-0.009 (0.000)	0.006 (0.005)	0.004 (0.014)	-0.001 (0.814)
$\Delta LnFDI^O$	0.0004 (0.156)	-0.001 (0.686)	0.002 (0.876)	0.174 (0.000)	-0.006 (0.000)	0.040 (0.258)	0.006 (0.064)	0.022 (0.058)
ΔLnOPN	0.023 (0.711)	0.011 (0.390)	0.040 (0.081)	0.785 (0.000)	-0.139 (0.000)	-0.024 (0.414)	0.128 (0.000)	-0.013 (0.855)
ΔLnPOP	2.416 (0.064)	-8.605 (0.000)	6.673 (0.850)	20.177 (0.008)	16.031 (0.000)	-11.208 (0.003)	-0.874 (0.587)	-31.190 (0.003)
Constant	-.0128 (0.178)	1.826 (0.023)	0.124 (0.965)	-7.366 (0.000)	-20.584 (0.000)	-2.329 (0.000)	0.509 (0.360)	-0.629 (0.858)

Note: The p-values are in parenthesis.
Source: Author's calculations

As a result of the cointegration relationship, we further the examination towards the causality relationship. We use the Panel Vector Error Correction Model (VECM) to determine the causality relationship between variables, suitable for slope heterogeneity and cross-sectional independence. The VECM equations are given in below.

$$\Delta LnGDP_{it} = \gamma_{1i} + \sum_p^k \gamma_{11p} \Delta LnGDP_{it-p} + \sum_p^k \gamma_{12p} \Delta LnFDI^T{}_{it-p} + \sum_p^k \gamma_{13p} \Delta LnFDI^O{}_{it-p} + \sum_p^k \gamma_{14p} \quad (4)$$
$$\Delta LnOPN_{it-p} + \sum_p^k \gamma_{15p} \Delta LnPOP_{it-p} + \varphi_{1i} ECT_{it-1} + \varepsilon_{1it}$$

$$\Delta LnFDI^{T}_{it} = \gamma_{2i} + \sum_{p}^{k} \gamma_{21p} \Delta LnFDI^{T}_{it-p} + \sum_{p}^{k} \gamma_{22p} \Delta LnGDP_{it-p} + \sum_{p}^{k} \gamma_{23p} \Delta LnFDI^{O}_{it-p} + \sum_{p}^{k} \gamma_{24p} \Delta LnOPN_{it-p} + \sum_{p}^{k} \gamma_{25p} \Delta LnPOP_{it-p} + \varphi_{2i} ECT_{it-1} + \varepsilon_{2it} \quad (5)$$

$$\Delta LnFDI^{O}_{it} = \gamma_{3i} + \sum_{p}^{k} \gamma_{31p} \Delta LnFDI^{O}_{it-p} + \sum_{p}^{k} \gamma_{32p} \Delta LnGDP_{it-p} + \sum_{p}^{k} \gamma_{33p} \Delta LnFDI^{T}_{it-p} + \sum_{p}^{k} \gamma_{34p} \Delta LnOPN_{it-p} + \sum_{p}^{k} \gamma_{35p} \Delta LnPOP_{it-p} + \varphi_{3i} ECT_{it-1} + \varepsilon_{3it} \quad (6)$$

$$\Delta LnOPN_{it} = \gamma_{4i} + \sum_{p}^{k} \gamma_{41p} \Delta LnOPN_{it-p} + \sum_{p}^{k} \gamma_{42p} \Delta LnFDI^{T}_{it-p} + \sum_{p}^{k} \gamma_{43p} \Delta LnFDI^{O}_{it-p} + \sum_{p}^{k} \gamma_{44p} \Delta LnGDP_{it-p} + \sum_{p}^{k} \gamma_{45p} \Delta LnPOP_{it-p} + \varphi_{4i} ECT_{it-1} + \varepsilon_{4it} \quad (7)$$

$$\Delta LnPOP_{it} = \gamma_{5i} + \sum_{p}^{k} \gamma_{51p} \Delta LnPOP_{it-p} + \sum_{p}^{k} \gamma_{52p} \Delta LnFDI^{T}_{it-p} + \sum_{p}^{k} \gamma_{53p} \Delta LnFDI^{O}_{it-p} + \sum_{p}^{k} \gamma_{54p} \Delta LnOPN_{it-p} + \sum_{p}^{k} \gamma_{55p} \Delta LnGDP_{it-p} + \varphi_{5i} ECT_{it-1} + \varepsilon_{5it} \quad (8)$$

The term "Δ" in equations (4), (5), (6), (7), and (8) is the first difference operator. In contrast, the term "ECT" defines the error correction coefficient, which is one period lag of the residuals obtained from the cointegration equation. The short and long-run causality results of the panel VECM test are given in Table 9.

Table 9. Panel VECM Granger Causality Results

	Short-run Causality (Waldχ^2)					Long run Causality
⟶	**ΔLnGDP**	**ΔLnFDI$_T$**	**ΔLnFDI$_O$**	**ΔLnOPN**	**ΔLnPOP**	
ΔLnGDP		0.024 (0.877)	0.002 (0.964)	0.083 (0.773)	0.904 (0.342)	-0.113
ΔLnFDI^T	0.122 (0.727)		0.378 (0.539)	0.020 (0.888)	0.239 (0.625)	-0.730
ΔLnFDI^O	0.126 (0.723)	3.035 (0.082)		0.005 (0.946)	0.379 (0.538)	0.879
ΔLnOPN	1.485 (0.223)	0.037 (0.848)	0.134 (0.714)		4.386 (0.036)	0.982**
ΔLnPOP	6.557 (0.010)	0.297 (0.586)	0.063 (0.802)	0.173 (0.678)		-0.005

Notes: The p-values are in parenthesis. ** denotes significance at 5%.
Source: Author's calculations

Finally, the panel VECM Granger causality test results in Table 9 show a unidirectional causality relationship running from LnPOP to economic growth in the short run. Also, it is seen that LnFDI^O is the Granger cause of LnFDI^T in the short run. This result can be interpreted as the attracting effect of total FDI flows in African countries on Turkish FDI. According to long-run causality test results, LnOPN is the Granger cause of economic growth at a 5% significance level. Thus, a causal relationship between openness and economic growth arises in the long run rather than the short run.

6. Concluding Remarks

This study investigates the effect of trade openness and FDI inflows from Turkey on economic growth in African countries. We use the Panel ARDL method with PMG and MG estimators and the Panel VECM Granger causality method in a panel of eight countries between the period 2006 and 2017. The results of the PMG estimation reveal that FDI inflows from Turkey have a positive impact on the economic growth of African countries in the long run. The results also indicate that trade openness is another long-run determinant of African economic growth. These results correspond to previous studies as well as discussions in economic theory. However, the effect of net FDI flows excluding Turkey on economic growth is significantly negative in the considered period. As stated in various studies (Borensztein,1998; Ayanwale, 2007; Shimul et al., 2009; Alege, 2013; Awolusi, 2017; Gui-Diby, 2014; Sakyi, 2017; Shawa, 2013), the latter result can be attributed to insufficient level of human capital, productivity gaps, lack of infrastructure and low level of trade in most African countries. It is also concluded that the African countries still have some limitations in attracting effective FDI to achieve a sustainable growth trend.

The VECM Granger causality analysis shows that there is a unidirectional causality relationship running from trade openness to economic growth in the long run. This result is also in line with some previous studies (Keho, 2017; Gries, 2012; Moyo, 2018; Sukar et al., 2006) conducted in different countries. Our results have an important policy implication for African countries' long-run growth efforts. Openness to trade can enhance economic growth in terms of increasing efficiency in resource allocation, rising competitiveness, improving productivity with foreign technology and knowledge, and utilization of comparative advantages and scale economies. Besides, trade openness may enable long-run growth through international economic integration. Lastly, the results of our analysis also indicate that the FDI net flows excluding Turkey are the Granger cause of FDI inflows from Turkey in the short run. This result can be interpreted as the attracting effect of total FDI flows in African countries on Turkish FDI.

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