https://doi.org/10.52131/joe.2022.0404.0105

*i*RASD Journal of Economics

Volume 4, Number 4, 2022, Pages 647 – 657

Journal Home Page:
https://journals.internationalrasd.org/index.php/joe

Does Sustainable Development Promote Foreign Direct Investment in Pakistan? An ARDL Analysis

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ARTICLE INFO

Article History:
Received: November 07, 2022
Revised: December 26, 2022
Accepted: December 27, 2022
Available Online: December 28, 2022

Keywords:
Foreign direct investment
Sustainable development
Exchange rate
Broad money
Trade

JEL Classification Codes:
F31, L81, P24, Q01

Funding:
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

Foreign direct investment (FDI) has become a cornerstone for the public and private sectors, especially in developing countries as it can enhance social overhead capital and employment opportunities. This study examines the association between sustainable development and foreign direct investment in Pakistan over the period 1972-2021 by using the ARDL estimation technique. The study has used various variables i.e., foreign direct investment, sustainable development index, tax, exchange rate, credit, broad money and trade. The findings reveal that exchange rate, credit, broad money and trade are positively related to foreign direct investment while the tax has a negative effect on FDI. The study also points out that there is a long-run association between sustainable development and FDI. The study recommends that policymakers may enhance foreign direct investment through sustainable development, taxes reduction, financial development, exchange rate stability and trade in Pakistan.

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Citation: Sheikh, M. R., Ali, M., Ahmad, R., & Bashir, F. (2022). Does Sustainable Development Promote Foreign Direct Investment in Pakistan? An ARDL Analysis. *IRASD Journal of Economics*, *4*(4), 647–657. https://doi.org/10.52131/joe.2022.0404.0105

1. Introduction

In present-day society, foreign direct investment is considered a fundamental source of employment creation, poverty reduction, trade and economic progress. Among the major goals of societies, the basic goal is to enhance FDI (Kardos, 2014). The advantages of FDI are technology transfer, human capital formation, an increase in business activities, and development in international trade (UNCTAD, 2006). Moreover, FDI is an important element meant for a country's development in the form of providing the efficient use of resources and technologies (Borensztein, De Gregorio, & Lee, 1998). It cannot be denied that FDI affects the growth rate but the impact of foreign direct investment is different in different countries. Most developing countries are attempting to increase foreign direct investment, which leads to

attaining development (Chudnovsky, López, & Rossi, 2008). Some factors i.e. economic development, human capital, the balance of payment and the international level are important to attract host country FDI (Deng, Li, & Chen, 1997). Two countries can be associated with bilateral FDI when these have identical environmental conditions (Pica & Mora, 2011). The host country's flows depend on the firm's capacity to absorb the FDI (Criscuolo & Narula, 2008). If a country has infrastructure development, and a good economic environment, FDI becomes a source to increase economic progress (Balasubramanyam & Sapsford, 2007).

Global economies in recent decades want to attain sustainable development. The sustainable development concept extended at the end of the 20th century. There is a difference between the quantitative and qualitative change in economic development (Du Pisani, 2006). The process that fulfils the requirements of the existing people without damaging the capacity of the future generation is described as persistent development (UNCTAD, 2004). Sustainable development is a combination of three dimensions which are social, economic and environmental development (Tranh & Thoa, 2016). Sustainable development is necessary due to global challenges like climate change, increasing urbanization, degradation of the environment, increase in poverty, shortage of food for a growing population, and crises in the financial sector (World Economic & Social Survey, 2013).

The study has aimed to discover the association between FDI and sustainable development in the context of Pakistan. In sustainable development, many disciplines and interests are included. There is an exchange between environmental protection and sustainability in developing countries. Sustainable development is difficult to maintain at the initial level because, at the initial level, developing economies maintain the basic needs of the people and the accumulation of capital over a safe environment. Due to the increase in population and consumption, there is a need for an increase in resources, which are not sustainable. From the technological era, we have considered the use of rare metals, which creates a shortage of rare metal resources for living and future generations. Another problem arises which is a shortage of food for future enterprises. So, FDI is vital to overcome the issues.

Various studies have attempted to explore the determinants of FDI by using various approaches. Some of them used economic growth and development as the attracting factors of FDI. But in this study, we are going to present the main determining factors of FDI especially the effect of sustainable development in Pakistan. This study is unique in the sense that it consists of the effect of sustainable development on FDI instead of the influence of FDI on sustainable development. The results of that study will be useful for policymakers to make the best economic policy to enhance the FDI. The rest of the paper is structured as: In Section 2, we have given a summary of the various empirical studies on FDI. Section 3 consists of data, model and methodology. Section 4 demonstrates the results and discussions. Section 5 concludes this study along with policy recommendations.

2. Reviews of Empirical Studies

Table 1 shows the empirical studies on various factors that affect the FDI, which shows alternative results.

Table 1
Summary of Various Studies on FDI

Reference(s)	Period	Country	Methodology	Results
Shamsuddin (1994)	1983	36 LDC	Single Equation method	Market size and aid attract the FDI Inflows.
Asiedu (2002)	1880-1997	71 LDC and SSA	OLS	FDI increase with the increase in Trade openness, stable infrastructure, and a higher rate of return on investment.

Sahoo, Mathiyazhagan, and Parida (2002)	1979-1997	China	OLS, Cointegration	GDP growth attracts FDI.
Magombeyi and Odhiambo (2017)	1970-2002	Ghana	ARDL test	FDI and growth are negatively associated.
Kandiero and Chitiga (2006)	1980-2001	50 African countries	OLS, GMM	Trade openness increases the FDI.
Ramirez (2006))	1960-2001	Chile	VEC, Granger causality	The real exchange rate negatively affects the FDI.
Demirhan and Masca (2008)	200-2004	38 developing countries	Cross-section estimation	Market size, infrastructure development and trade openness positive but tax negatively impact the FDI.
Ang (2008)	1960-2005	Malaysia	Error correction, 2SLS	Trade openness, financial development, and market size positively but tax negatively correlated with FDI.
Shahbaz and Rahman (2012)	1990-2008	Pakistan	ARDL, VECM	Import, financial development and FDI are positively linked with GDP and provide a two-way causality among them.
Mojekwu and Ogege (2012)	1970-2012	Nigeria	Co-integration and Error correction	FDI is negatively related to sustainable development.
Ullah, Haider, and Azim (2012)	1980-2010	Pakistan	Co-integration and Causality test	The exchange rate attracts FDI.
Lily, Kogid, Mulok, Thien Sang, and Asid (2014)	1971-2011	ASEAN countries	ARDL Bound test, Causality analysis	SR and LR causality between ER and FDI in ASEAN countries.
Voica, Panait, and Haralambie (2015)	2000-2012	European Union	Panel least square method	FDI flow and stock had a positive significant effect on sustainable development
Khan and Agha (2015)	1990-2013	UAE	Co-integration and Granger causality test	The growth rate was positively related to CO_2 emission
Abidin, Haseeb, Muhammad, and Islam (2015)	1980-2014	ASEAN countries	ARDL, Granger causality	SR and LR causality connection between EC, FDI, FD and trade
Dua and Garg (2015)	1997-2011	India	VAR, Granger causality test	Exchange rate, credit, and domestic interest rate infrastructure positively affected the FDI.
Tsuchiya (2015)	2008-2013	India	OLS	FDI attracted due to better infrastructure
Abdouli and Hammami (2017)	1990-2012	MENA countries	Simultaneous equation model	CO_2, EC and FDI showed a causal link among one another
Adhikary (2017)	1990-2013	South Asian economies	OLS, 2SLS	ER, market size, financial stability, and financial deepening positively attracted the FDI but showed the changed outcomes due to different socio-economic circumstances of the economies.
Yien, Abdullah, and Azam (2017)	1980-2015	Malaysia	VAR, Granger causality, Variance	Relationship between interest rate, money supply, growth and FDI.

			decomposition analysis	
Magombeyi and Odhiambo (2017)	1980-2014	South Africa	ARDL Bound testing, ECM Granger causality	The link between FDI and poverty reduction is negative
Ayamba, Haibo, Abdul-Rahaman, Serwaa, and Osei-Agyemang (2020)	1996-2016	China	IRF methodology	Foreign direct investments help to stimulate the growth
Azam and Haseeb (2021)	1990-2018	BRICS countries	Fully modified ordinary least squares	GDP, trade and tourism are the basic drivers of the FDI inflows
Gokmen (2021)	1970-2019	Turkey	OLS Regression	There is no long-run effect of net FDI inflows found on real GDP
Hussain, Bashir, and Shahzad (2021)	1995–2016	24 Asian and Middle East countries	Quantile regression and GMM	FDI inversely affects the growth

The review of existing studies reveals that a lot of work has been conducted on the FDI-growth nexus but very few studies have been conducted on the effect of sustainable development on FDI. This study would evaluate the effect of sustainable development along with some other factors on FDI.

3. Model, Data and Methodology

3.1 Model Specification

We have constructed the a-theoretic model of FDI and sustainable development to estimate the relationship between FDI and sustainable development. In this model, we have estimated the main drivers of FDI inflows in Pakistan. The model can be expressed as:

$$FDI = f(SDI, TAX, ER, CREDIT, M2, TRADE) \quad (1)$$

The econometric form of the model can be written as:

$$FDI = \beta_0 + \beta_1 SDI + \beta_2 Tax + \beta_3 ER + \beta_4 CREDIT + \beta_5 M2 + \beta_6 TRADE + \mu \quad (2)$$

3.2 Data Sources and Definition

The study has used the time series data of Pakistan to probe the effect of sustainable development on FDI over the period 1972-2021. To estimate the results, the ARDL approach has been used. Table 2 displays the definition of variables, their description and data sources. To explain the relationship between FDI and sustainable development, we have constructed the sustainable development index (SDI) by applying principal component analysis. United Nations (2007) first introduced the 14 dimensions of SDI with basic indicators. We have used the twelve dimensions for making the SDI due to the insufficiency of data. The data for these dimensions have been taken from the World Development Indicators (WDI).

Table 2
Description and Sources of Variables

Variables	Description	Source
FDI	Foreign Direct Investment (Percentage of GDP)	WDI
TAX	Tax (Percentage of GDP)	
ER	Dollar Rupee Exchange Rate (Percentage of GDP)	
Credit	Credit to the Private sector (Percentage of GDP)	
M2	Broad Money (Percentage of GDP)	
Trade	Trade (Percentage of GDP)	

Description of Variables used in SDI		
SDI	Sustainable Development Index	
Land	Forest area (Percentage of land area)	
	Permanent cropland (Percentage of land area)	
	Arable land (Percentage of land area)	
Atmosphere	CO_2 emission(kt)	
	Other greenhouse gases emissions (Thousand metric tons of CO_2 equivalent)	
Freshwater	Renewable inside freshwater sources (Billion cubic meters)	
Economic development	GDP per capita growth (Annual Percentage)	
	Gross fixed capital formation (Percentage of GDP)	
	Inflation/ GDP deflator (Annual Percentage)	
	External debt stock (Percentage of GNI)	
	Employment to population ratio 15 plus (% modelled of ILO estimation)	WDI
Global economic partnership	Current account balance (Percentage of GDP)	
	Net ODA received (Percentage of GDP)	
Consumption and production	Usage of energy (Kg of oil equitant to per capita)	
	Combustible renewables and waste (Percentage of total energy)	
Poverty	Poverty headcount ratio at the national poverty GINI index (Percentage of the population)	
Governance	International homicides (Per One lac population)	
Health	Morality rate under five (Per 1000)	
	Immunization DPT (% of children ages 12 to 23 months)	
	Prevalence of HIV (% of population ages 15-49 years)	
Demographic	The population on growth (Annual Percentage)	
	Age dependency ratio (% of working age population)	

4. Results and Discussions

4.1 Descriptive Statistics and Correlation Analysis

This section shows the descriptive statistics and correlation analysis of the variables for 1972-2021 in Pakistan.

Table 3
Descriptive Statistics of Key Variables (1972-2021)

	Mean	**Median**	**Max**	**Min**	**SD**	**Skewness**	**Kurtosis**	**JB**	**Prob.**
FDI	0.62	0.45	3.67	-1.56	0.96	1.10	5.67	23.00	0.00
SDI	0.46	0.42	1.00	-0.01	0.35	0.21	1.60	4.07	0.13
TAX	11.32	11.32	37.05	1.87	4.89	3.17	18.52	538.50	0.00
ER	42.84	31.10	112.91	8.68	32.81	0.68	2.17	4.86	0.09
CREDIT	23.88	24.18	29.79	15.44	3.32	-0.54	3.26	2.33	0.31
M2	41.98	41.25	51.30	33.67	4.06	0.25	2.28	1.46	0.48
TRADE	33.50	33.24	38.91	27.72	2.75	-0.15	2.68	0.38	0.83

Table 4
Correlation Matrix of Key Variables (1972-2021)

	FDI	**SDI**	**TAX**	**ER**	**CREDIT**	**M2**	**TRADE**
FDI	1.00						
SDI	0.23	1.00					
TAX	-0.19	-0.15	1.00				
ER	-0.01	0.96	-0.10	1.00			
CREDIT	0.42	-0.28	0.26	-0.42	1.00		
M2	0.52	-0.04	0.39	-0.19	0.69	1.00	
TRADE	0.26	0.03	-0.01	-0.11	0.14	0.12	1.00

4.2 Unit Root Analysis

Table 5 indicates the unit root results of the specified variables and shows the mixed order of integration.

Table 5
ADF Test at Level

Variables	drift	Lags	Drift & Trend	Lags	No drift & trend	Lags	Conclusion
FDI	-1.9939 (0.2884)	1	-1.6065 (0.7743)	1	-1.7687 (0.0732)	1	I(1)
SDI	0.5675 (0.9872)	0	-2.2277 (0.4633)	0	1.0826 (0.9248)	2	I(1)
TAX	-9.0590 (0.0000)	0	-8.8113 (0.0000)	0	-3.5474 (0.0007)	0	I(0)
ER	-3.3352 (1.0000)	0	-0.9671 (0.9384)	0	6.9449 (1.0000)	0	I(1)
CREDIT	-2.7585 (0.0728)	0	-2.7170 (0.2350)	0	-0.7848 (0.3705)	0	I(1)
M2	-3.2289 (0.0247)	0	-3.1937 (0.0986)	0	-0.9935 (0.2826)	0	I(0)
TRADE	-3.4999 (0.0125)	0	-3.4220 (0.0611)	0	0.007399 (0.6797)	1	I(0)

4.3 ARDL Bounds Analysis

Table 6 explains the results of the bounds test. The table shows the existence of a long-run relationship as the value of F-statics is more than the upper bound.

Table 6
Results of F-Test

		5% Critical Value		10% Critical Value	
Model	**F- Statistic**	**Lower Bound**	**Upper Bound**	**Lower Bound**	**Upper Bound**
FDI/ SDI, TAX, ER, CREDIT, M2, TRADE	4.27	2.45	3.61	2.12	3.23

4.4 Long Run Analysis

Table 7 shows the long-run estimates of FDI based on the ARDL model. Firstly, we have elaborated on the relationship between sustainable development and FDI. The results show that there is a positive relationship between FDI and sustainable development. The positive association between SDI and FDI can be justified on the following grounds. We can explain this relationship with the help of growth theories. This relation might be because stable economic growth improves the living standard of the people by reducing the poverty and through the rise of per capita income of the people, foreigners are encouraged to invest in host countries (Magombeyi & Odhiambo, 2017). Our results are in line with Ramirez (2006) which shows that the increase in the real GDP encourages the inflows of FDI in the host nation. The increase in the market size as with the increase in the GDP level cause to encourage the FDI inflows. The work of Tsuchiya (2015) also matches the findings of our study that the GDP per capita positively impacts the FDI inflows as the GDP increases.

Now we discuss the impact of tax on the FDI inflows. Table 7 shows the negative relationship between the tax and FDI inflows. An increase in tax rate discourages investment in the country because the rate of return decreases and the cost of production increases. Demirhan and Masca (2008) explored that the tax has a negative impact on investment in developing

countries. Ang (2008) also indicated that the higher the corporate tax lower the foreign direct investment.

Table 7
ARDL Estimates of FDI-SD Model (1972-2021)

Dependent Variable: D(FDI) Selected Model: ARDL (1, 1, 0, 0, 4, 3, 2)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
SDI	13.718178	2.111812	6.495929	0.0000
TAX	-0.091825	0.046747	-1.964287	0.0612
ER	0.147489	0.023868	6.179421	0.0000
CREDIT	0.166977	0.062298	2.680317	0.0131
M2	0.092658	0.038834	2.386012	0.0253
TRADE	0.100325	0.047740	2.101478	0.0463
C	5.121615	2.592686	1.975409	0.0598

Turning to the link between the ER and FDI, exchange rate coefficient shows that positive relationship between the FDI and the exchange rate. The empirical findings indicate that the depreciation of the host currency causes to increase in the exchange rate, which attracts the FDI flows. Ullah et al. (2012) also concluded the exchange rate is a positive factor of FDI. Adhikary (2017) showed that the exchange rate is positively related to the FDI inflows.

The coefficient of credit shows that there is a positive relationship between FDI and credit. Our results are matched with Dua and Garg (2015) who concluded that credit is positively associated with the FDI. If a country has more foreign exchange reserves and a good international position, they attract the FDI due to the probability of low risk. Internationally good position of the host country lowers the probability of the risk and high liquidity in the economy attracts the FDI.

Broad Money (M2) is another determining factor of the FDI inflows. Results show a positive association between Broad Money (M2) and FDI. The reason for this relationship can be that the increase in the money supply reduces the interest rate, which encourages the investment level, and enhances the growth, output level and employment that in turn promote encouraging foreigners to invest in the host country (Yien et al., 2017).

The next factor that influences foreign direct investment is trade. The coefficient of the variable shows a positive sign which means there is a direct relationship between trade openness and the FDI inflows. Open markets create significant economic stability to attract foreign investors and allocate resources efficiently. Open markets get the benefits of long-run investment, which creates employment, and enhance the level of productivity and growth (Kumar, 2005). Our results also correspond with the study of Ang (2008) which elaborated that trade openness encourages the FDI. As the country is more open to trade, it attracts the FDI. The studies by Kandiero and Chitiga (2006) and Demirhan and Masca (2008) evaluated that trade openness has a positive influence on FDI.

4.5 Error Correction Analysis

The results of error correction show the speed of adjustment in the dynamic model to restore equilibrium. The coefficient of the co-integration equation shows how much time is required to restore the equilibrium. The term should be statistically significant and have a negative sign. In our analysis, the parameter of the cointegration equation is -0.63, which displays that in the long run deviation from the equilibrium shocked by the short is adjusted in more than half a year.

Table 8
Error Correction Estimates of FDI-SD Model (1972-2021)

Dependent Variable: D(FDI) Selected Model: ARDL(1, 1, 0, 0, 4, 3, 2)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
D(SDI)	4.4858	2.5033	1.7920	0.0858
D(TAX)	-0.0582	0.0289	-2.0177	0.0549
D(ER)	-0.0935	0.0170	-5.5047	0.0000
D(CREDIT)	-0.0149	0.0244	-0.6122	0.5462
D(CREDIT(-1))	-0.0259	0.0267	-0.9707	0.3414
D(CREDIT(-2))	0.0445	0.0363	1.2262	0.2320
D(CREDIT(-3))	0.0435	0.0248	1.7542	0.0922
D(M2)	0.0130	0.0203	0.6406	0.5278
D(M2(-1))	-0.0148	0.0244	-0.6043	0.5513
D(M2(-2))	-0.0539	0.0210	-2.5630	0.0171
D(TRADE)	0.0135	0.0272	0.4972	0.6236
D(TRADE(-1))	0.0455	0.0211	2.1573	0.0412
CointEq(-1)	-0.6339	0.1009	-6.2813	0.0000

4.6 Causality Analysis

Table 9 reports different lag length criteria. The table shows that the optimal lag length is 4.

Table 9
Results of Lag Length Criteria

VAR Lag Order Selection Criteria Endogenous variables: FDI SDI TAX ER CREDIT M2 TRADE Sample: 1972 2021						
Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-542.5659	NA	547.1537	26.16981	26.45942	26.27596
1	-282.4163	421.1947	0.024304	16.11506	18.43195*	16.96429
2	-215.8661	85.56455*	0.012839	15.27934	19.62351	16.87165
3	-150.4143	62.335	0.010457	14.49592	20.86738	16.83131
4	-46.04275	64.61097	0.003063*	11.85918*	20.25791	14.93765*

Table 10 reveals the results of the Granger causality test, which indicates the direction of causality among the variables. According to estimations, there is bivariate causality between SDI and FDI.

Table 10
Granger Causality Test Results

Null Hypothesis	**F-Statistic**	**Prob.**	**Conclusion**
SDI ⇏ FDI	3.16	0.03	Bivariate Causality
FDI ⇏SDI	1.60	0.00	
TAX ⇏FDI	1.11	0.37	None
FDI⇏ TAX	1.88	0.14	
ER ⇏FDI	0.59	0.67	Univariate Causality
FDI⇏ ER	3.32	0.02	
CREDIT⇏ FDI	1.65	0.18	Univariate Causality
FDI⇏ CREDIT	3.85	0.01	
M2⇏ FDI	2.12	0.10	Univariate Causality
FDI⇏ M2	1.30	0.29	
TRADE ⇏FDI	0.15	0.96	None
FDI ⇏TRADE	0.53	0.72	
TAX ⇏SDI	0.44	0.78	None
SDI⇏ TAX	1.74	0.17	
ER⇏ SDI	2.43	0.07	Bivariate Causality
SDI⇏ ER	2.60	0.05	

CREDIT ⇏SDI	0.67	0.62	Univariate Causality
SDI⇏ CREDIT	3.62	0.01	
M2⇏ SDI	1.31	0.29	None
SDI⇏ M2	1.58	0.20	
TRADE⇏ SDI	0.89	0.48	None
SDI ⇏TRADE	0.67	0.62	
ER ⇏TAX	0.33	0.85	None
TAX ⇏ER	0.24	0.92	
CREDIT⇏ TAX	1.18	0.34	None
TAX ⇏CREDIT	1.10	0.37	
M2 ⇏TAX	3.50	0.02	Univariate Causality
TAX⇏ M2	0.41	0.80	
TRADE ⇏TAX	3.05	0.03	Bivariate Causality
TAX⇏ TRADE	2.41	0.07	
CREDIT⇏ ER	1.31	0.29	Univariate Causality
ER⇏ CREDIT	3.09	0.03	
M2⇏ ER	2.54	0.06	Univariate Causality
ER ⇏M2	0.67	0.62	
TRADE⇏ ER	2.88	0.04	Univariate Causality
ER ⇏TRADE	1.24	0.31	
M2 ⇏CREDIT	1.01	0.42	None
CREDIT⇏ M2	0.20	0.94	
TRADE ⇏CREDIT	2.80	0.04	Univariate Causality
CREDIT⇏ TRADE	0.40	0.81	
TRADE⇏ M2	1.13	0.36	Univariate Causality
M2⇏ TRADE	2.68	0.05	

5. Conclusions and Policy Recommendations

The focus of the study is to examine the impact of sustainable development on foreign direct investment in Pakistan for the period of 1972-2021 by applying the ARDL technique. Long-run results show that sustainable development positively affects foreign direct investment. The exchange rate is positively associated with foreign direct investment. Similarly, credit to the private sector and broad money also exhibit a positive impact on FDI. Similarly, findings show that as trade openness increases, FDI accelerates. Moreover, a bidirectional causality has been found between sustainable development and foreign direct investment.

According to the results, the study has suggested some policies such as:

- As sustainable development is the main factor that enhances the FDI, it would foster by creating employment opportunities, increasing production and raising the living standard of people. The policymakers may focus on sustainable development to allure foreign direct investment.
- The government of Pakistan may reduce the tax ratio to attract foreign direct investment as tax is negatively associated with foreign direct investment.
- There is a need to accelerate international trade by removing the restrictions on trade such as tariffs, quotas and duties to promote FDI.
- Financial development is also a main factor to enhance FDI, so planners may also give attention to financial development for FDI growth.
- Additionally, the stability of the exchange rate is also needed to attract foreign investors.

Authors Contribution

Muhammad Ramzan Sheikh: critical revision, incorporation of intellectual content
Mehjabeen Ali: literature search, data collection, drafting
Rashid Ahmad: study design and concept, data interpretation
Furrukh Bashir: methodology, data analysis, drafting

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest w.r.t the research, authorship and/or publication of this article.

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