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Macroeconomic Determinants of Trade Openness: Panel Data Analysis

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Abstract

International trade may lead to a rise in economic development and create peace and stability in a country. Therefore, trade openness is an important source and could be measured in economic growth. Project management and motivation are also considered. The key objective of this study is to scrutinize the macroeconomic determinants of trade openness in developing countries. This study used developing countries' panel data over the period of 1996–2020. Panel data usually contains unbalanced data. For unbalanced data, the im-Pesaran test is applied to check the stationarity, or unit root testing. Empirical results reveal that GDPG and FDI are direct and significantly associated to trade openness. Besides, the PSI, CC, LIR, and Pop have a negative impact on trade openness. Moreover, GDP growth and FDI have strongly affected trade openness and play an important role in boosting the economy through trade in developing countries therefore the government may liberalize the trade and encourage FDI to achieve the desired objectives.

Keywords: GDP, FDI, Lending Interest Rate, Control of Corruption, Population.

Introduction

The word "trade openness" is explained as the nation's incorporation between countries. Trade openness seems to be a circumstance where the countries of the world connect with each other so that they have a free variation of labor, capital, and free trade. Moreover, the consequences of trade suggest that it expands competitiveness and increases planning (Osabuohien, 2007). Trade openness is an important source and could be measured in economic growth; project management and motivation should be considered (Ray, 2012). The project management counted as import and export to gross domestic product. The main differentiation with the project management was that trade was affected by the export shape and size of the country instead of trade policy (Shafaeddin 2006). Nations export only goods and services. For example, sub-Saharan African countries normally rely more on trade than countries with different export shapes, and the profit relates only to their openness to free trade. Moreover, in developing countries, free trade is difficult when it takes place in international trade markets, even when all the cramps vanish. That would be the reason for cramped trade through taxes, starting with developed countries (Seyoum et al., 2014; Sun et al., 2020).

Worldwide trade has collected excess observations in the study, although it plays a huge role in the whole world. Internationally, the remarkable part of trade balances in most countries' GDP; in 2007, it balanced 57.3% of the world (Athukorala & Yamashita, 2009). Annually, the export of worldwide goods has been near about $14 trillion USD, and in 2011, the World Bank reported global commercialized export services were worth US$ 3.5 trillion (WB, 2020). In addition to economic impact, trade has the global fact that political as well as social power relies on it, and nowadays conferences and occurrences keep inferring a trade motive. The present faster-growing situations in China and African countries are an ordinary example of this. The establishment of international trade in present history is being experienced because of capitalization. Progress in technology has been observed in the last decade, although ended WWII has led to experience in the field of transport management systems, which prompts a decrease in the cost of international transport. Because of the expansion of trade capacity and universal participation, the spread of production in terms of global series value has been accelerated. The increased worldwide tendency of FDI inflows would have enhanced world trade during the last year (Wako, 2018).

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Another study examined the trade's factors that influence openness and flows in Africa. After that, intra-African trade, which normally happens in Africa outside of BRICI and OECD countries, has also been used in that analysis. The study established an association between growth and trade openness for African countries. The research also considers five countries in the BRICS. These economies also focused on financial institutions and trade liberalization. The data are taken into account in the framework of world development indicators. The final objective of the study is that African and other bilateral trade countries use panel as well as cross-sectional data in the observation during analysis. The country of Africa and other bilateral trade flows used different techniques in the application of the data (Asiedu, 2002; Dou et al., 2021). According to Dobra (2008), there are a few dominating points for increasing productivity through export and import, such as

(a). Effective allocation of resources; trade permits economies to specify in the construction of goods and services which scale of production, raw material, or has a comparative advantage. By changing the part of the production in which the country has a comparative disadvantage.

(b). Economies of scale: they are restricted by the size of the national market without trade. The trade allowed firms and companies to produce in highly efficient ways. Trade increases firms' or companies' innovation, with the aim of a manufacturing firm enlarging its domestic exports along with its exports. In the end, it increased the whole economy's productivity.

(c). Through goods and services trade, trade can offer access to novel technology, especially where states have taken advantage of free trade, leading to various phases of the production method and novel technology. Trade also helps to decline monopolies by providing cheap prices for buyers, which brings larger competition and encourages active competition through firms on the global market.

(d). Investment incentives: it is the better way to export and import markets can refine the opportunity for productive investment through trade can be increased by creating business span rather than growing FDI.

The FDI enhances competition in the world market and brings about technological and innovation improvements, resulting in more effective production. Thus, trade-openness to economic growth has a direct impact on the economy (Hao et al., 2020; Keho, 2017). In another sense, economic activity and openness improve the integration of human society into the market. This is because the riskier quotas to remove may create problems in the balance of payments. Developing countries rely more on domestic industry and a controlled balance of payments. Some important effects could be achieved through the export and import methods. The degree of openness is determined in a state by the geographic concern, size of the population, total area, trading companion, economic development stage, and the trade policy of liberalization. The world-level trade propositions change the products accessible at lower prices and give the chance to deviate the funds for the production's goods which the economy country is fully specialized (Le et al., 2016). It helps the economy move forward, both economically and socially. With the other nation's economy, boundless reform conveys itself to the various sectors of the economy. At the starting of the post-modernization process in 1980, there was a remarkable rise in global finance and trade policy activity (Mussa, 2019; Tahir et al., 2018). The important subject is economic growth's impact on both economic development and international trade. Although both developing and developed countries promote openness around the world, trade openness has different benefits because, through trade, more opportunity has been found in a country for its people. It also raises exports and lowers imports in the economy. The trade also significantly raises economic growth (Dowrick & Golley, 2004; Fontana, 2009; Porter, 2000). Therefore, these economies normally pay attention to expanding the part of the product in the total part of world output to support the significant growth rates. Further, it has two advantages: First, increasing demand for the outputs of new technological progress will raise the level of production, which has been a main engine of economic development for a long time. Second, in accordance with neoclassical and classical economists, trade is an vital improvement to economic-growth and is "the engine of growth." (Stern, 2019).

Furthermore, in a closed economy, trade openness also inspires the nation; therefore, economic growth is faster and the production process also grows more. Normally, emerging market economies are more focused on trade at the international level and making the nation more prosperous. In the case of an open economy, the country has the economic policy and national strategy to resolve its issues in a good way. Particularly developing countries aim to facilitate the

people with macroeconomic strategy planning. Its result could be the betterment of society as a whole. For this reason, a healthy environment takes place in the international marketplace. In all of these nations, open trade is an important focus point in their policy-making processes. Countries like sub-Saharan nations that step away from trade execution eliminate trade barriers, although more countries have launched export-promoted techniques. (Melitz; 2014)

In the three selective countries present, the study tries to explore whether an open economy to trade may increase economic growth. African customs, through increasing trade around the world, help the state member promote this integral part of the economy. In the sequence of the aim of the union, the SACU handled how member countries can make trade easy. Thus, the promotion of trade cooperation has attracted a lot of attention in the SACU recently. The country enhances its trade policy after facilitating trade measures with the help of WTO information. This measure involved trade modernization and strategies that protected agreements on agriculture, taxes, and mechanical restrictions on trade (Yanikkaya, 2003; Haftel, 2013). Botswana's greater use strategy is based on trade after including trade policy measures and methods. Advantages Moreover, the economy has a significant amount of geographical and international trade. In Botswana, the order may vary according to the situation. The country's exports also greatly benefited from Botswana's trade orders. In that sense, Botswana has been involved in the trade. Although Lesotho, Botswana, and South Africa are struggling to increase their trade openness, but in further discussion, the question again arises of how these nations got an advantage through trade (Dornbusch, 1992; Wacziarg & Welch, 2008).

The present study experiment analyses how these three South African Custom Union countries make efforts to increase economic growth. Under the 2002 SACU contract, the South African Customs Union now operates, which, among other things, seeks to encourage the country's participation in the whole world economy through increased trade and investment. Thus, countries with South African members have coordinated tariffs, customs authorities, trade rectification, and other border taxes. The state's focal point is how countries can make trade easier for others. Trade is a more important key constituent instruction, and the goal is to remove the non-taxation restriction. This is all the South Asian instruction about trade. With the imposition of trade facility programming, the state has made the major part of a trade facility providing programming. (SACU, 2016)[1].The key components of Lesotho's trade rectification involved the elimination of calculable restrictions, the delegation of import-duties, and the delegation of non-tariff barriers (WTO, 2003[2]). The country should adopt the procedures to ease high open trade as a reply to the WTO's information. This method involved embracing some trade modernization methods that offset projects on agriculture, trade, tariffs, and mechanical hurdles to trade. In Botswana, the focal point of the trade policy of a country is trade modernization and primitive investment (WTO, 2009[3]).

Objectives of Study:
The basic key point of this study is to examine the macroeconomic determinants of trade-openness on economic-growth in the SAARC nations. For this purpose, the main perspectives are the following:
- To define trade openness in developing countries and how it contributes to the state.
- How trade openness could affect the other independent variables FDI, economic growth, and gross domestic product.
- To study the association between trade and all possible developing economies.

Review of Literature
Chhabra and Alam (2020) investigated the observed trade-openness and inflation in India. Trade was the key to success and powerful investment to remove poverty, inflation, and unemployment. The association between inflation and trade openness became bridge between researchers and policymakers in both advanced and underdeveloped economies. The data nature timer series and period 1974–2016, which is 42 years, and the nature of the data is time series. ARDL, Johansen cointegration, and ECM techniques were used in the analysis. (Samimi et al., 2012; Ul Haq et al., 2016) found that, under Romer's hypothesis, the opposite contribution exists between inflation and openness. The study concluded that positive association between inflation and trade-openness in India, which contradicts the Romer hypothesis.

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[1] https://www.sacu.int/docs/agreements/2016/mercosur-and-sacu-trade-agreement.pdf
[2] https://www.wto.org/english/res_e/booksp_e/anrep_e/world_trade_report_2003_e.pdf
[3] Commitments, T. P. WORLD TRADE REPORT 2009.

Mbogela (2019) studied the factors of trade-openness and their influence on African countries. Trade openness in the African economies played an impressive role in acquiring new knowledge, ideas, and capital information. The panel data and period 1989–2009 used of 49 African countries. The data was taken from the WDI. Econometric techniques such as fixed effect and random effect models are employed. The random-effect-model treats the variables endogenously. While the fixed effect model takes the coefficient as fixed for all countries, trade openness was taken as a predictor, while geographical, economic location, total area, and population size are the stimulus variables. The outcomes have shown that the increase in income per capita, population size, and economic location of the African countries caused trade to rise. A positive relationship was seen in that situation. The study concluded that improvements in the competitive index of the countries in Africa enhanced external trade and economic growth.

(Osei et al., 2019) observed trade openness and its determinants in low-income and lower-middle-income nations in Africa. The purpose of this study was to determine whether low and high incomes comprised a part of economic growth. Trade openness depends upon one-period lag, economic growth, and other control series, such as saving, financial development, labor, gross fixed capital formation and labor. Panel data were used in this study over the period 1980–2015. Openness had been used as a proxy for export-import as a % of GDP. The result showed that economic growth increased openness in particular countries, in the sense that lower-middle-income countries' impact on growth was not strong and was greatly negative. It was also found that relations between low-income countries seem likely to be non-linear and inverted U-shaped. GDP positively affected openness.

Tahir et al. (2018) studied the macroeconomic aspects of trade openness for the SAARC region. Trade-openness acting a remarkable role in the growth of economies. The research pointed to the SAARC affiliate countries, and data used from 1971 to 2011. In this study, two stages, the least squares method (TSLS) and panel data techniques were used to analyses the observed testing. The data was taken from the Penn Word Table (PWT). Trade openness was taken as the dependent variable, and investment and growth in the domestic product are explanatory variables. Efficient macroeconomic variables could enhance trade. The study showed that GDP is positively related to trade openness, other labor force and human capital. The exchange rate negatively affected trade-openness, although the exchange rate or import-export rates of the countries fluctuate according to country circumstances. The study showed that exchange rate stability enhances trade in the long run.

Adeel-Farooq et al. (2017) studied the effect of financial liberalization, trade-openness and economic growth of two state, Pakistan-India. Panel data were used in this study during the period 1985–2014. The techniques used are ARDL, cointegration, ECM, generalized method of momentum, and VECM. The data for all the variables were taken from the WDI and the IMF. Economic growth was taken as dependent and trade-openness, Human and physical capital, and financial liberalization are the exogenous variables. Results of the study showed that in the case of Pakistan's trade, financial liberalization, physical capital and human capital directly affect economic growth. In the case of India, all the variables significantly affected economic growth.

(Balavac & Pugh, 2016) explored the association between export variation, output volatility, trade-openness, and institutions' transition in economies. The study used panel data series from the period 1996–2010. The observation involved 25 transition countries. The techniques used are the generalized method of momentum (GMM), fixed effect, and random effect. The methodological analysis recommended that the fixed effect be the best fit for the study. Output volatility was taken as a dependent variable, and export diversification, openness, and institution are regressor variables. The study showed that openness and diversification had negative effects; however, linkage had positive effects. There was a negative association between weak institutions and output volatility.

Mbogela (2015) observed the impact of trade openness and flow on African countries' ability to enhance trade through different strategies and measures. The survey provided empirical experiments and the state of the art in African and continental. It had been provided with measures and methodologies for these countries where trade levels are low. Countries where trade has been low should experience political independence. The study employed panel-data series acceptable to catch the relationship between the variables and examine bilateral trade flows. The econometric techniques used were random effect, fixed effect, 2SLS, and GMM approaches. The study concluded that in Africa, bilateral trade had been used to enhance intra- and inter-African trade to boost the private sector.

Polat et al. (2015) revisited the association between financial development and trade openness economic-growth in South Africa. The data nature time series and period of 1970–2011. Cointegration, VECM, autoregressive distribution, lag, and ECM techniques were used to analyse the interaction between the series in the long term. The data was taken from WDI. The term used for the population was real GDP, trade, capital, and domestic credit. The study showed the negative effect of trade openness on economic growth in South Africa. Financial development also increases trade openness. The government used developing sources to raise trade and economic growth for the sake of the nation.

Model Specification

Model specification is the action of making a statistical model. It includes choosing a suitable variable for a model. The fundamental purpose of this study is to identify the link between openness and some central factors of trade openness in selected developing nations as well as tries to evaluate their significance empirically in the panel data analysis.

TOP = f (GDPG, FDI, LIR, PSI, CC, POP, GEOED)

In the above model TOP (trade openness) is a dependent variable, while GDPG (gross domestic product), FDI (foreign direct investment), IR (interest rate), and PSI (political stability index), CC (control of corruption),

Pop (population), GEOED (government expenditure on education) are the independent variable. The model shows that TOP is the function of GDPG, FDI, LIR, PSI, CC, POP, and GEOED.

Now we established the model to find the long-run relation between the variables.

TOP = β0 +β1 GDPG +β2 FDI +β3 IR +β4 PSI +β5 CC +β6 Pop +β7 GEOED + ε

TOP=Trade openness, GDPG=Gross domestic product, FDI=foreign direct investment LIR = Lending interest rate, PSI=political stability index, CC = control of corruption, Pop = population, GEOED = government expenditure on education, ε = error term or disturbance term.

In our analysis, β0 is the constant, and β1 to β7 are coefficients.

Data Methodology

Moreover, to examine the effect of macroeconomic determinants on trade openness, panel data analysis was used throughout the observation from 1996 to 2020. Approaches such as the fixed effect model and the random effect model are used to detect directly above the specified model. This model comprises TOP as an endogenous variable, while GDP, FDI, interest rate, political stability index, control of corruption, population, and government expenditure on education are exogenous variables.

Process of Estimation

The process of estimating contains different steps. In this study, all estimation processes are done using computer software on Stata 14.0. Panel data analysis was used in this estimation process using Stata. Stata software has been used to check the stationarity of variables. Stationarity is helpful for choosing which techniques are optimal for the analysis. A panel unit root is applied to examine the stationarity of the variable. Normally, the panel unit root test has two stages: either some variables are stationary on the first level or some of the variables are stationary on the 1st-dfference. But in the Stata panel, root testing has also been checked at two stages: either some series are stationary with a trend (or without a trend). So, after that, we will use the fixed and random effect models for analysis. In the end, we apply the Hausman test specification for choosing both of them in the random and fixed effect models whose models are appropriate. Finally, after the application of the Hausmann specification test, we are able to decide which model is the most appropriate and best fit for our analysis.

Estimation Techniques

Panel data are a mixture of cross-sectional and time series. Cross-sectional data faces the problem of heterogeneity a lot. Therefore, in panel data, the problem of heterogeneity has arisen. Due to this reason, fixed effects and random effects have been used. The fixed effect and random effect models handled this problem of heterogeneity. Because when we apply simple OLS or simple regression techniques, these techniques completely ignore the problem of heterogeneity. In our analysis, cross sections have different characteristics. But the random effect and fixed effect consider these issues and then estimate. After the application of the fixed effect model and the random effect model, the next step is to apply the Hausman specification test to select one of them.

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Data source

All variables used in the analysis of observations whose data is taken by world development indicators and world governance indicators, as well as WDI, are huge sources of conducting data.

Table 1 Summary Descriptive Statistics

Variable	TOP	GDPG	FDI	PSI	LIR	CC	GEOED	POP
Mean	0.74343	3.62258	3.45259	-0.34933	14.3523	11.4312	16.0049	63.4993
Medium	0.65052	4.09201	2.81599	-0.28179	11.9939	9.2395	16.0356	65.1478
Maximum	2.20415	13.9000	54.1693	1.26118	86.3634	56.3465	30.1514	75.6148
Minimum	0.16443	15.1365	40.0811	2.81004	1.47034	8.32442	5.62104	47.1834
Std. Dev	0.35090	3.54885	4.78565	0.81281	10.7504	6.73141	4.51233	6.12347
Skewness	1.0776	-1.43059	3.83156	-0.42683	2.5993	3.52101	0.07296	-0.7743
Kurtosis	4.1703	7.9617	57.384	2.7627	11.337	4.34365	2.39	2.7240

Descriptive statistics are used to report or outline the attributes of a sample or data set, such as the mean, SD, minimum and maximum. If we normally presented raw data, it would be difficult for us to decide the nature of data, especially if there was a lot of it. The table 1, that is given below indicates all descriptive statistics. The mean value of trade-openness is 0.74343, and the SD is 0.3509. The minimum value is 0.1644, and the maximum value of trade openness is 2.2041. The mean of GDPG is 3.62258, the standard deviation is 3.54885, the minimum value is -15.1365, and the maximum value of GDPG is 13.9000. The mean, standard deviation, minimum, and maximum values of FDI are 3.34259, 4.78565, -40.08, and 54.1693, respectively. PSI has a mean of -0.34933, a standard deviation of 0.82281, a min value of -2.81004, a max value of 1.26118, and a medium value of 0.28179. Mean, medium, maxi. The minimum value and standard deviation of IR are 14.352, 11.993, 86.363, 1.470, and 10.750, respectively. The mean of GEOED is 16.0049, the medium is 16.0356, the maximum value is 30.1514, the minimum value is 5.62104, and the standard deviation of GEOED is 4. 5123. The variables population of mean, population of medium, population of maximum, population of minimum, and population of standard deviation are 63.499, 65.1478, 47.1834, and 6.124, respectively. Therefore, CC means value 11.4312, and std. dev value is 6.73141. The variable CC has neither a symmetrical nor a mesokurtic distribution because the skewness value is 3.52101 (>0) and the kurtosis value is 4.34365 (>3). Standard deviation values represent the dispersion from the mean value for the data. To measure the symmetry in a distribution, skewness is observed. The high point of a distribution is its mode. A distribution is said to be skewed if the tail of one side is longer than the other side; otherwise, it is said to be asymmetric. An asymmetric distribution has two sides, one of which is said to be negative skewed and lies on the left side, which is longer than the right side. The mean median mode is used in negatively skewed distributions. As well, if the right-side tail is longer than the left side of the tail, then it is said to have a positively skewed distribution. In a positively skewed distribution, it represents mean > median > mode. The data is said to be normally distributed. If skewness is equal to zero. If skewness is greater than zero, then there is positive skewness of distribution, and skewness less than zero shows negative skewness of data. In Table 1, the variables trade openness, GDP, FDI, government expenditure on education, interest rate, and population has a positive skewed distribution. The political stability index is negatively skewed, as is foreign direct investment. Kurtosis is a statistical measure that is used to describe the length of the tail and peak of the distribution. If the kurtosis is greater than 3, then the data has higher tails than a normal distribution, and if the kurtosis is smaller than 3, then the data has shorter tails than the mean. Table 1 shows that the variables trade openness, GDP, FDI, and interest rate have kurtosis greater than 3, so they have higher tails than the normal distribution and are leptokurtic. The kurtosis value proposes the peakness and flatness of the normal distribution. The above table shows that some variables are positively skewed and some are negatively skewed. So, the variables are positively skewed and leptokurtic because the kurtosis value of four variables is greater than 3. If the value of kurtosis is less than 3, then it is called a platykurtic distribution.

Table 2 Correlation Matrix

	TOP	GDPG	FDI	PSI	IR	POP	CC	GEOED
TOP	1							
GDPG	-0.0386	1						
FDI	0.1858	0.0353	1					
PSI	0.4567	-0.0813	0.2067	1				
IR	-0.2419	-0.0922	0.0058	-0.0279	1			

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POP	0.2650	-0.1020	0.0957	0.2689	-0.0234	1		
CC	0.3070	-0.0686	0.2045	0.6437	-0.1395	0.3098	1	
GEOED	0.0070	-0.0160	-0.0483	0.0582	-0.0807	-0.2606	0.0658	1

Correlation is a statistical method that explains the relationship between two variables that are linearly related. It shows the linear relationship between each other's variables. The correlation matrix explained the association between the series. The range of the correlation-coefficient is -1 to +1. The value of the numeric strength of the variable shows the sign of +1, which is said to be a perfect +ve association between the dependent and independent variables, while -1 refers to a perfect -ve association between the regressand and regressor. A correlation matrix is used to find the efficiency of the relationship between the variables. A correlation matrix is applied to estimate the level of relationship through which variables are correlated. If the values of two variables tend to increase and decrease together, then the correlation value is positive in this way. The problem of multicollinearity between the predictand and predictor variables which is hypothesized by the correlation matrix. Normally, we know that the correlation range is -1 t0 +1. If the value in the correlation matrix is 0.80 or more than 0.80, then serious multicollinearity exists there. A correlation matrix is a table that specifies the correlation coefficient within sets of variables. In Table 2, explain the association between explained and explanatory variables. The correlation of all the variables showed the diagonal position to be 1. Foreign direct investment and the political stability index are positively correlated with trade openness, which is the dependent variable.

Analysis of Panel Data
The fixed effect model and random effect model are used to observe this influence. Before starting the analysis in panel data, we first find the unit root test, im-pesaran, and shin test used for the unbalanced data in panel analysis.

Table 3. Outcomes of Unit-Root-Test

Variable	Without-trend		With trend	
	Statistics	**P-value**	**Statistics**	**P-value**
TOP$	-1.6	0.26	-2.20	0.000
GDPG	-3.01	0.000	-3.22	0.000
FDI	-2.92	0.000	-3.12	0.000
PSI	-1.95	0.0052	-2.70	0.000
LIR	-4.35	0.000	-5.32	0.000
GEOED	--	--	--	--
Pop	-1.68	0.99	0.40	1.000
CC	-1.71	0.12	-2.17	0.000

In Table 3, the panel unit root test is used to find the stationarity of all variables. For this unit root testing, Stata 14.0 is used to check all the variables' stationarity. Some variables are stationary without trend as well as with trend. But some variables are stationary and only have a trend. The variable gross domestic product, foreign direct investment, and interest rate are stationary without trend and with trend as well. All variables like TOP, GDPG, FDI, LIR, PSI, CC, POP, and CC are stationary with a trend; expect the variable government expenditure on education. So, the table of panel unit tests specifies varying degrees of stationarity for particular variables. At the end, we conclude that a fixed-effect model was used for the analysis of the model.

Fixed Effect Model
According to Allison, "concerning the fixed effects model, the variables we have not seen are allowed to have any correlations whatsoever with the noted variables." They can, for example, control or restrict the influence of time-unchanging variables along with their effects. This is real, whether the variations are clearly assessed or not. Unfortunately, the impacts of season-invariant variables that are calculated cannot be projected. For panel data, fixed effect models are currently used to identify the longitudinal assessment of the data. Restrictions of these models are not properly identified, and limitations include omission of variables, minimal statistical influence, partial exterior authenticity, limited time interval, error term, unchanged time, indeterminate variables, unseen heterogeneity, invalid fundamental inferences, rough explanations of factors, foolish contrasts with cross-sectional models, and doubtful involvements regarding earlier work.

Random Effect Model
Allison said, "Unnoticed variables are supposed to be unassociated with all noted variables and are known as random effect models." This supposition will repeatedly be incorrect, although for

exceeding justifications (standard errors may be extremely elevated together with fixed effects). A random-effects model may even be suitable under some conditions. It can be anticipated through generalised least squares (GLS). It needs that undetected heterogeneity follow certain possible limitations, i.e., pursue a specific allocation. The dimensionality restriction is significantly eased; still, exceptionally larger models can be anticipated comparatively quickly. The permitted insertion of variables (i.e., GDP) differs in another aspect, i.e., arbitrary effects. It is easy to estimate only-dimensional RE models in Stata. Random effects depend on a solid idea: simultaneous resistance is usually spread around nations with a given level of variation. The AVW model tells us that multilateral opposition is crucial, but it doesn't tell us everything regarding its dissemination. Thus, Fixed and random effects are used to find the results of macroeconomic determinants of openness and try to evaluate the significance of openness in developing countries. This estimation technique exhibits the relationship between the explanatory or independent variable and the dependent variable.

Table 4. Random Effect Model GLS Regression:

Number of observations	670		Number of groups	45
R^2	0.1058		Prob > chi2	0.0000
Dependent variable: Trade Openness				
Variable	**Coefficient**	**Std. Error**	**z-Statistics**	**P-value**
GDPG	.006	.0015	4.19	0.000
FDI	.003	.0011	2.81	0.005
PSI	-.028	.0145	-1.91	0.056
CC	-.056	.0291	-1.92	0.054
GEOED	-.001	.0021	-0.51	0.608
LIR	-.001	.0009	-1.51	0.130
POP	.003	.0025	-2.50	0.013
Fixed Effect Mode				
Number of observations	670		Number of groups	45
$F_{(7,618)}$	10.74		R^2	0.1271
Prob > F	0.0000			
Dependent variable: Trade Openness				
Variable	**Coefficient**	**Std. Error**	**t-Statistics**	**P-value**
GDPG	.0065	.0014	4.57	0.000
FDI	.0034	.001	3.08	0.002
PSI	-.0463	.0142	-3.26	0.001
CC	-.1190	.0302	-3.94	0.000
GEOED	-0.0007	0.0021	-0.36	0.721
LIR	-0.002	0.0008	-2.30	0.022
POP	-.0122	.0027	-4.47	0.000

Hausman Test Results:

Chi² (7)	**63.71**
P-value	**0.000**

Rule of thumb for Hausman: H_0: The random effect model is appropriate, H_1: The fixed effect model is appropriate.

If the probability value is <0.05, then we reject the H_0 and may not say that the random effect model is suitable. We have to reject the null hypothesis in favor of alternative hypotheses. Our probability value is <0.05 (which is 0.000). So, we conclude that the fixed effect model is suitable in this case. The outcomes show that the probability of our Hausman result is less than 0.05, hence it is significant. So, we accept the H_A and reject the H_0. The fixed effect method is a better choice whenever the concern is only to evaluate the impact of variables that vary over time in the data and involve independent members with heterogeneous quality. Moreover, this study adopts whole data to find variables that are highly correlated to trade-openness; the fixed effect approach is considerably acceptable to recognizes heterogeneity than random effects. The results of all the variables indicate that there is a positive as well as a negative relationship between the dependent and independent variables. (Keho, 2017; Orhan et al., 2021; Kong et al., 2021) all report a positive connection between trade openness and GDP growth. According to Liargovas and Skandalis (2012) and Ponce (2006), trade openness affects foreign direct investment in a positive or negative way, depending on the condition of the host country's trade policy. International trade may lead to an increase in economic

development and create peace and stability in a country. Political stability has a good and positive impact on trade openness, but this positive impact lasts only for a specific time. With the passage of time, instability has come to the economy. Many developing countries, like Pakistan, India, Sudan, etc., do not maintain political stability, so they become unstable after a few years, and the effect will be negative with trade openness. Political instability affects trade because it has a direct effect on income and price and indirectly influences investment in physical capital. The stability of the economy improves the local market. Shocks to relationships are highly persistent and frequently cause changes in political stability. The coefficient value of government expenditure on education (an independent variable) is -0.0007, and the probability value is 0.721, which is insignificant. The theoretical support for the control of corruption is the theory of corruption, which is to grease the wheel and sand the wheel. First, corruption appears to grease the wheels for investment and innovation. Secondly, it depends on economic development to rise. So, it has a direct impact on corruption and trade-openness. Under the "sand the wheels" hypothesis, control of corruption could be costly for economic activity (Mauro 1995; Rose-Ackerman 1999; Obamuyi and Olayiwola, 2019). The country has fragile institutions. So, the impact of controlling corruption on trade openness is negative. According to Nathan (1999), when interest rates are low, people are ready to borrow because they are willing to pay their debts easily (Ladman, 2021). Although when the interest rate is high, people are unwilling to take a loan because the refund of the loan or debt costs are high, some consumers face difficulty repaying their debts. If the interest rate rises faster than the increase in consumer income. In addition, if the interest rate increases quickly, some consumers will default on their debts. These key points pay attention to the fact that high interest rates may cause a reduction in savings and investments and that the cost of the financial system is prohibitive for some borrowers, resulting in low margins. So, all of these facts may decrease trade openness. So, we conclude that there exists a negative relationship between the interest rate and trade openness. The inter-correlation between trade and population relies on one main thing. Growth, the growth of services and goods, as well as the growth of capital and markets, according to the study by Suzzanne York. Krugman and Elizondo (1996) declare that trade and import substitution make it more likely that the population will be spread throughout the country. In favor of this reasoning, I disagree that trade openness is connected with less concentration on population and weaker urban priority (Krugman and Hanson, 1993; Ades and Glaeser, 1995; Hanson, 1998; Nitsch, 2006). On the other hand, the population may have a positive impact on trade openness. A large population has great potential for economic development. Because the more people you have, the more work is done, and when more work is done, more money is created for the people. So, they invest more, and trade increases in that sense. (Guttman and Richard, 2006) analyses Australia and find that countries that are relatively more remote and have a larger population trade less.'

Results Summary of Fixed Effect Model

Dependent variable: Trade openness					
Variable	**Expected sign**	**Variable**	**Expected sign**	**Variable**	**Expected sign**
GDPG	+	FDI	+	PSI	-
LIR	-	CC	-	POP	-
GEOED	+	-			

Conclusion and policy recommendation

The regressor variable is trade openness, and the explanatory variables are GDP, FDI, political stability index, control of corruption, government expenditure on education, lending interest rate, and population. The independent variable GDPG has a positive relationship with TOP**.** Chen and Gupta (2006) support the proposition that, due to the presupposition of an increasing return to scale, economies continuously grow. The researcher disagrees that international trade openness is a source of knowledge spillover, increases productivity, and improves human capital. There is a positive and significant association between FDI and TOP. The results of PSI have a negative impact on trade openness, which is our endogenous variable. Shocks to relationships are highly persistent and frequently cause changes in political stability. The unstable political economy may reduce investment and the level of economic development. Poor economic performance may lead to government collapse and political unrest has a positive and significant interconnection between LIR and TOP. The following policies are suggested for enhancing the trading method: Some economies faced weak institutions and governance formation, which had unpleasant consequences for the economy in terms

of responsible behavior and corruption. To highlight trade as well as investment in industrialization, which are very suitable, modifications and improvements in infrastructure are unavoidable. The government should adopt measures to avoid this situation, which creates problems in the economy. The government takes essential measures to control the population and enlarge the effective workforce to boost economic progress in developing countries. In an international environment where barriers between countries are increasing, the government should have to open this up through trade. It becomes attractive to the economy. Therefore, the government should promote increasing exports and importing less. Through importing, new products are introduced to the market. Increasing the export ranks among countries is a higher priority for any government because it encourages economic growth.

References

Adeel-Farooq, R. M., Bakar, N. A. A., & Raji, J. O. (2017). Trade openness, financial liberalization, and economic growth: The case of Pakistan and India. *South Asian Journal of Business Studies*.

Ades, A. F., & Glaeser, E. L. (1995). Trade and circuses: explaining urban giants. *The Quarterly Journal of Economics*, *110*(1), 195-227.

Asiedu, E. (2002). On the determinants of foreign direct investment to developing countries: is Africa different? *World development*, *30*(1), 107-119.

Athukorala, P. C., & Yamashita, N. (2009). Global production sharing and Sino–US trade relations. *China & World Economy*, *17*(3), 39-56.

Balavac, M., & Pugh, G. (2016). The link between trade openness, export diversification, institutions, and output volatility in transition countries. *Economic Systems*, *40*(2), 273-287.

Chhabra, M., & Alam, Q. (2020). An empirical study of trade openness and inflation in India. *The decision*, *47*(1), 79-90.

Dornbusch, R. (1992). The case for trade liberalization in developing countries. *Journal of Economic Perspectives*, *6*(1), 69-85.

Dou, Y., Zhao, J., Malik, M. N., & Dong, K. (2021). Assessing the impact of trade openness on CO_2 emissions: evidence from China-Japan-ROK FTA countries. *Journal of Environmental Management*, *296*, 113241.

Dowrick, S., & Golley, J. (2004). Trade openness and growth: who benefits? *Oxford review of economic policy*, *20*(1), 38-56.

Fontana, M. (2009). The gender effects of trade liberalization in developing countries: A review of the literature. *M. Bussolo & RE De Hoyos. Gender Aspects of the Trade and Poverty Nexus. A Macro-Micro Approach*, 25-50.

Guttmann, S., & Richards, A. (2006). Trade openness: an Australian perspective. *Australian Economic Papers*, *45*(3), 188-203.

Haftel, Y. Z. (2013). Commerce and institutions: Trade, scope, and the design of regional economic organizations. *The Review of International Organizations*, *8*(3), 389-414.

Hanson, G. H. (1998). Regional adjustment to trade liberalization. *Regional science and urban economics*, *28*(4), 419-444.

Hao, Y., Wu, Y., Wu, H., & Ren, S. (2020). How do FDI and technical innovation affect environmental quality? Evidence from China. *Environmental Science and Pollution Research*, *27*(8), 7835-7850.

Keho, Y. (2017). The impact of trade openness on economic growth: The case of Cote d'Ivoire. *Cogent Economics & Finance*, *5*(1), 1332820.

Kong, Q., Peng, D., Ni, Y., Jiang, X., & Wang, Z. (2021). Trade openness and economic growth quality of China: Empirical analysis using ARDL model. *Finance Research Letters*, *38*, 101488.

Krugman, P., & Hanson, G. (1993). Mexico-US free trade and the location of production. *The Mexico-US Free Trade Agreement. Cambridge, Massachusetts*.

Ladman, J. R. (2021). Loan-Transactions Costs, Credit Rationing, and Market Structure: The Case of Bolivia. In *Undermining Rural Development with Cheap Credit* (pp. 104-119). Routledge.

Le, T. H., Kim, J., & Lee, M. (2016). Institutional quality, trade openness, and financial sector development in Asia: An empirical investigation. *Emerging Markets Finance and Trade*, *52*(5), 1047-1059.

Liargovas, P. G., & Skandalis, K. S. (2012). Foreign direct investment and trade openness: The case of developing economies. *Social indicators research*, *106*(2), 323-331.Ponce, A. F. (2006). Openness and foreign direct investment: The role of free trade agreements in Latin America.

Mauro, P. (1995). Corruption and growth. *The quarterly journal of economics*, *110*(3), 681-712.

Mbogela, C. S. (2015). *Trade openness: an African perspective: examining the determinants of trade openness and bilateral trade flows for the African countries* (Doctoral dissertation, University of Hull).

Mbogela, C. S. (2019). An Empirical study on the determinants of trade openness in the African economies. *Advances in Management and Applied Economics*, *9*(3), 9-42.

Melitz, M. J., & Redding, S. J. (2014). Heterogeneous firms and trade. *Handbook of international economics*, *4*, 1-54.

Mussa, M. (2019). The exchange rate, the balance of payments and monetary and fiscal policy under a regime of controlled floating. In *Flexible Exchange Rates and Stabilization Policy* (pp. 97-116). Routledge.

Nathan, L. (1999). Borrower beware: Equity strippers are preying on elderly homeowners. *Communities and Banking*, (Spr), 6-17.

Nitsch, V. (2006). Trade openness and urban concentration: New evidence. *Journal of Economic Integration*, 340-362.

Orhan, A., Adebayo, T. S., Genç, S. Y., & Kirikkaleli, D. (2021). Investigating the linkage between economic growth and environmental sustainability in India: do agriculture and trade openness matter?. *Sustainability*, *13*(9), 4753.

Osabuohien, E. S. C. (2007). Trade Openness and Economic Performance of ECOWAS Members-Reflections from Ghana and Nigeria. African Journal of Business and Economic Research, 2, 57-73.

Osei, D. B., Sare, Y. A., & Ibrahim, M. (2019). On the determinants of trade openness in low-and lower-middle-income countries in Africa: how important is economic growth?. *Future Business Journal*, *5*(1), 1-10.

Polat, A., Shahbaz, M., Rehman, I. U., & Satti, S. L. (2015). Revisiting linkages between financial development, trade openness and economic growth in South Africa: fresh evidence from combined cointegration test. *Quality & Quantity*, *49*(2), 785-803.

Porter, M. E. (2000). Location, competition, and economic development: Local clusters in a global economy. *Economic development quarterly*, *14*(1), 15-34.

Ray, S. (2012). Globalization and economic growth in India: A Granger causality approach. *JL Pol'y & Globalization*, *2*, 18.

Rose-Ackerman, S. (1999). Political corruption and democracy. *Conn. J. Int'l L.*, *14*, 363.

Samimi, A. J., Ghaderi, S., Hosseinzadeh, R., & Nademi, Y. (2012). Openness and inflation: New empirical panel data evidence. *Economics Letters*, *117*(3), 573-577.

Seyoum, M., Wu, R., & Lin, J. (2014). Foreign direct investment and trade openness in Sub-Saharan economies: A panel data granger causality analysis. *South African journal of economics*, *82*(3), 402-421.

Shafaeddin, M. (2006). Does trade openness helps or hinders industrialization?

Stern, D. I. (2019). Energy and economic growth. In *Routledge handbook of Energy economics* (pp. 28-46). Routledge.

Sun, H., Enna, L., Monney, A., Tran, D. K., Rasoulinezhad, E., & Taghizadeh-Hesary, F. (2020). The long-run effects of trade openness on carbon emissions in sub-Saharan African countries. *Energies*, *13*(20), 5295.

Tahir, M., Hasnu, S. A. F., & Estrada, M. R. (2018). Macroeconomic determinants of trade openness: empirical investigation of SAARC region. *Journal of Asia Business Studies*.

Ul Haq, I., Zhu, S., Shafiq, M., & Khan, A. (2016). Does proxy of openness or methodology matter to hold Romer's hypothesis. *International Journal of Economics, Commerce and Management*, *4*, 1-12.

Wacziarg, R., & Welch, K. H. (2008). Trade liberalization and growth: new evidence. *The World Bank Economic Review*, *22*(2), 187-231

Wako, H. A. (2018). Aid, institutions and economic growth in sub-Saharan Africa: Heterogeneous donors and heterogeneous responses. *Review of Development Economics*, *22*(1), 23-44.

World Bank. (2020). *Mauritania Country Economic Memorandum: Accelerating Growth Through Diversification and Productive Cities*. World Bank.

Yanikkaya, H. (2003). Trade openness and economic growth: a cross-country empirical investigation. *Journal of Development economics*, *72*(1), 57-89.