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The impact of trade openness on FDI inflows amid structural economic vulnerability in three least developed countries (Djibouti, Haiti and Tanzania)during the period 2004 -2018 using panel ARDL model

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ABSTRACT

This study aims to investigate the effect of trade openness on FDI inflows amid structural economic vulnerability for three least developed countries (Djibouti, Haiti and Tanzania) during the period 2004 -2018 using panel ARDL model. The results of our study reveal that FDI inflows react negatively to the structural economic vulnerability index (EVI), in which a 1% increase for EVI will decrease FDI inflows by 0.00937%. The political stability indicator (POLST) has a positive effect on FDI inflows, in which a 1% increase for POLST will increase FDI with 0.003047%. While, trade openness (TO) hasn't any palpable effect on FDI inflows due to the existence of high levels of EVI, which in turn is deemed as a stumbling block to FDI growth.

1. Introduction

Theoretically, FDI inflows could react positively or negatively to trade openness based on the incentives for engaging in FDI activities(Liargovas & Skandalis, 2012).The relationship between trade openness and FDI relies on the form of FDI(Gnangnon, 2022).Greater trade openness would trigger more FDI into host countries when FDI is vertical in nature or is export oriented. Conversely, lower tariffs and non-tariffs barriers to trade would adversely affect FDI inflows when FDI is market seeking in nature(Dua & Garg, 2015).

Trade liberalization is among overriding factors to underpin economic development, it is considered as vital for overall economic development(Desta & Hirsch, 2012). The least-developed countries (LDCs) are deemed as most vulnerable to external and natural shocks. In 1971, the United Nations established the LDCs category, which encompasses low-income countries facing structural obstacles to the attainment of sustainable development. This classification is based on three criteria: (i) the human assets index, (ii) the gross national income per capita, and (iii) the economic vulnerability index(Gnangnon, 2017).

The importance of this study resides in seeking the main determinants, which govern FDI inflows into three least developed countries (Djibouti, Haiti and Tanzania).Our problem was formulated as: what is the effect of trade openness on FDI inflows amid structural economic vulnerability?

In order to address this problem, we supposed the following hypothesis: trade openness has a positive impact on FDI inflows. We used the descriptive approach to shed light over our variables, besides the econometric approach by the application of panel ARDL model based on eviews10 and SATA 15. Study's data cover the period from 2004 to 2018, which were sourced from from the World Bank (WB) database, Fondation pour les études et recherches sur le développement international (FERDI) database, and the Heritage Foundation database.

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This research paper is organized as follow:
Section 1 presents some Literature review. Section 2 we introduce a brief overview of Trade Freedom score and Economic vulnerability. Section 3 indicates methods and material applied. Section 4 refers to the results. Section 5 is devoted to the discussion. and finally in section 6 we present the conclusion.

2. Literature review:

Among the previous studies that addressed some aspect of this topic:
Study of Liargovas & Skandalis.(2012) has addressed the role of trade openness in attracting foreign direct investment (FDI) inflows for 36 developing economies during the period 1990-2008, it has pointed out that FDI inflows react positively to trade openness.

Study of Dua & Garg. (2015) has attempted to determine the macroeconomic factors, which contributed in attracting FDI for India during the period 1997Q3 to 2011Q3. It indicates that trade openness has a negative effect on FDI for India, implying that FDI for India may be tariff jumping in nature.

Study of Gnangnon (2022) has investigated the impact of poverty on FDI inflows in 117 developing countries of which Algeria, during the period 1980-2017. Among explanatory variables, trade openness is the most contributor in attracting FDI for these countries.

3. Trade Freedom score and Economic vulnerability:

3.1Trade Freedom score:

Trade freedom score (i.e., trade policy of the domestic economy) is a component of the economic freedom index, which issued by the Heritage Foundation Company with the collaboration of Wall Street Journal since 1995(Ridha & Farid, 2020; Gnangnon, 2018).Trade freedom score is a synthetic index of the absence of tariff and non-tariff barriers whose influence imports and exports of goods and services(Gnangnon, 2018).
The trade freedom score is based on two inputs:
(i) The trade-weighted average tariff rate
(ii) Non tariff barriers (NTBs)
The base trade freedom score using the following equation:

$$\text{Trade Freedom}_i = (((\text{Tariff}_{max} - \text{Tariff}_i)/(\text{Tariff}_{max} - \text{Tariff}_{min}))*100) - \text{NTB}_i$$

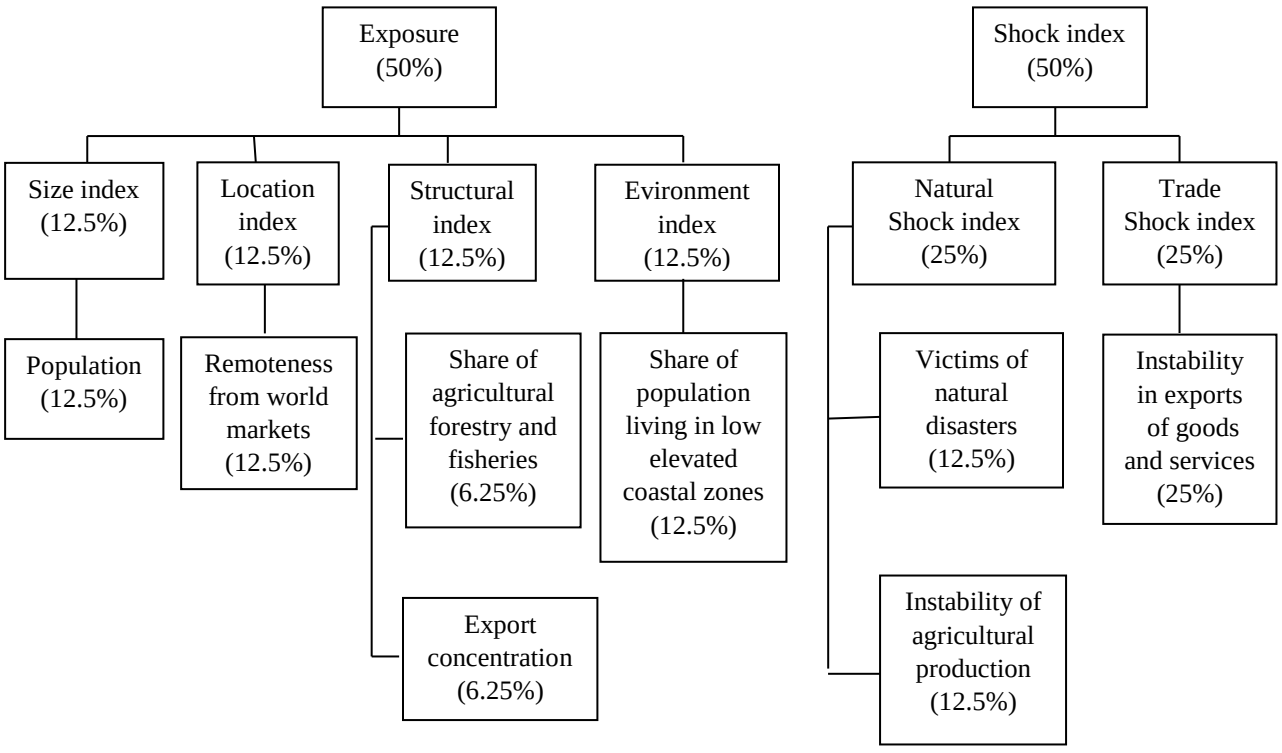
Where:
Trade Freedom_i refers the trade freedom in country i
Tariff_{max} denotes the upper bounds for tariff rates (%)
Tariff_{min} represent the lower bounds for tariff rates (%)
Tariff_i points out the weighted average tariff rate (%) in country i.
NTB_i indicates the penalty which is subtracted from the base score of country i, this penalty ranges from 5 to 20 points(The Heritage Foundation, 2022).
NTBs are determined on the basis of qualitative and quantitative available information. NTBs involve price restrictions, customs restrictions, investment restrictions, direct government interventions, regulatory restrictions, and quantity restrictions. Trade freedom score ranges between 0 and 100, in which high values reflect lower trade barriers, that is, higher trade liberalization, and vice versa(Gnangnon, 2018).
trade freedom index is divided into five sub-categories: from 0 to 49.9 point repressed, from 50 to 59.9 point mostly unfree, from 60 to 69.9 point moderately free, from 70 to 79.9 point mostly free and from 80 to 100 point free (The Heritage Foundation, 2022).

3.2 Economic vulnerability:

Commonly, the concept of vulnerability points out the concept of the risk. It is defined as the potential negative effect of some sort of abrupt shock or perturbation on a system. The concept of vulnerability in the macroeconomic area is deemed as shocks to economic growth, whereas in the microeconomics area, it is mainly considered as shocks to the well-being of individual households. In the macroeconomic area, the system is considered as a country; while the perturbation is referred to as a number of macroeconomic shocks (Gnangnon, 2017). The concept of economic vulnerability is formally put forward by the United Nations Development plan in 1999, in which it primarily indicates

the resilience of an economic entity when affected by sudden external shocks (Wang et al., 2022). The economic vulnerability can be measured by the structural economic vulnerability index (EVI). This index comprises two sub-indexes: (i) Exposure to shocks and (ii) shocks (Gnangnon, 2017; Wang et al., 2022).There are three staple determinants of economic vulnerability the magnitude and the likelihood of shocks, the vulnerability to these shocks, and the resilience for responding to them. The first two determinants primarily rely on the structural characteristics of a country such as exports' structure, geographic localization, and so forth, while resilience depends on the current economic policy of a country. As the EVI is a composite index of the structural vulnerability, so it is independent from the current policy (i.e., the EVI does not take into consideration resilience). Two staple categories of shocks are captured by the EVI: (i) natural shocks, that is, natural disasters such as earthquakes, and (ii) climatic shocks such as floods. The EVI also captures the effects of external shocks such as decrease in external demand, volatility of international commodity price(Feindouno & Goujon, 2016). The first sub-index of the EVI (i.e., exposure to shocks) is a weighted average of 5 component indexes:(i) exports concentration (12.5%), share of population living in low elevated coastal zone (25%), population size (25%), share of agriculture, forestry and fishery in GDP (12.5%) and the remoteness from world markets(25%). The second sub-index of the EVI (i.e., shocks) is a weighted average of 3 component indexes: the instability in the agricultural production (25%), the victims of natural disasters (25%), and the instability in exports of goods and services (50%). the EVI is measured by taking the simple arithmetic average of those 2 sub-indexes, its score ranges from 0 to 100, in which low score signifies a low level of vulnerability, and vice versa (Gnangnon, 2017). High score points out significant structural obstacles to sustainable development(United Nations, 2022).

Figure 1. EVI's subcomponents



Source:(Nguyen & Le, 2021; United Nations, 2022; Feindouno & Goujon, 2016)

4. Methods and Material:

4.1 Model specification:

We have used a panel ARDL model to investigate the prominent affecting factors which govern FDI inflows to a sample of three least developed countries, which are: Djibouti, Haiti and Tanzania.
The panel ARDL model has the form of an ARDL $(P, q, q, \ldots, q)$ model as:

$$Y_{it} = \sum_{j=1}^{P} \alpha_{ij} Y_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} X_{i,t-j} + \gamma_i + \varepsilon_{it}$$

Where: Y represents the dependent variable, X indicates the vector of independent variables, α_{ij} refer scalar coefficients of lagged dependent variables, δ_{ij} denote coefficient vectors, γ_i points out fixed effects, and ε_{it} suggests the error term(Onah, 2022; Uzar, 2020; Silva et al., 2018).

Reparametrizing the above equation, in which, it can be rewritten as:

$$\Delta Y_{it} = \psi_i\left(Y_{i,t-1} - \beta_i X_{it}\right) + \sum_{j=1}^{P-1} \alpha_{ij}^{*}\, \Delta Y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij}^{*}\, \Delta X_{i,t-j} + \gamma_i + \varepsilon_{it}$$

Where: ψ_i indicates the error corrector mechanism impact, β_i points out the long-run effect of independent variables on dependent variable(Uzar, 2020; Silva et al., 2018).

Our model is established based on the modeling framework of Nguyen & Le (2021).

In our model, foreign direct investment net inflows (FDI) with US dollars at current prices in billions is the dependent variable, whereas, the independent variables comprise: (i) the structural economic vulnerability index (EVI), (ii) trade openness score (TO), and (iii) the political stability indicator (POLST) as a proxy for institutional quality.

POLST is one of the six World Bank's worldwide governance indicators(Matallah, 2022). It ranges between 0 (lowest rank or lowest institutional quality) to 100 (highest rank or highest institutional quality)(Jahn & Stricker, 2022).

4.2 Data source:

Data on FDI and POLST were sourced from the World Bank (WB) database, data on EVI were taken from Fondation pour les études et recherches sur le développement international (FERDI) database, data on TO were extracted from the Heritage Foundation database.

It should be noted that the temporal dimension of our study is limited until 2018, since EVI's data are only available until that date.

5. Results:

Table 1. Panel unit root test

Variable	L.L.C		IM Pesaran		ADF-Fisher		Status
	Level	1st diff	Level	1st diff	Level	1st diff	
FDI	0.0001***	/	0.0022***	/	0.0053***	/	I(0)
EVI	0.0633*	0.0000***	0.5419	0.0004***	0.4984	0.0017***	I(1)
TO	0.0082***	/	0.0057***	/	0.0070***	/	I(0)
POLST	0.0952*	0.0000***	0.4132	0.0006***	0.5467	0.0023***	I(1)

Source: Authors' Computation using Eviews 10

***, ** and * indicate significant levels at p<0.01, p<0.05 and p<0.1, respectively.

Table 2. Kao's cointegration result

	t-Statistic	Prob.
ADF	-1.936695	0.0264
Residual variance	0.088488	
HAC variance	0.040515	

Source: Authors' Computation using Eviews 10

Table 3. Long-run estimations results of PMG, MG and DFE

FDI	PMG	MG	DFE
EVI	-0.00937**	-0.01593***	-0.01385
TO	-0.00095	-0.00523	0.00325
POLST	0.003047**	0.01101	0.01359**
ECT	-0.9938***	-1.13041***	-0.76971***

Source: Authors' Computation using STATA 15

*** and ** indicate significant levels at p<0.01 and p<0.05, respectively.

Table 4. Hausman test[1] (PMG vs MG)

	Coef.
Chi-square test value	5.089
P-value	0.165

Source: Authors' Computation using STATA 15

Table 5. Hausman test[2] (PMG vs DFE)

	Coef.
Chi-square test value	0.26
P-value	0.966

Source: Authors' Computation using STATA 15

6. Discussion:

6.1 Stationary test:

Commonly, conducting the data's stationary features is important to avoid spurious inferences. However, unit root tests in panel data differ somewhat from those conducing in standard individual time series. The most widely employed unit root tests are: (i) the Levin, Lin and Chu (hereafter LLC) test, (ii) Im, Pesaran and Shin (hereafter IPS) test, and (iii) the Fisher type unit root test(Çetintaş & Barişik, 2009).

Unit root test involves two hypotheses: null against the alternative, based on the 5% significance level, in which, null hypothesis suggests that series has unit root (i.e., it is non-stationary), if the probability value is upper than 5%, whereas , alternative hypothesis indicates that series has not unit root (i.e., it is stationary), if the probability value is less than 5%(Çetintaş & Barişik, 2009; Dakić & Mijić, 2018; Mohamed & Boutayeba, 2021).

The results of table 1 indicate that both FDI and TO are stationary at the level, while EVI and POLST are stationary at the first difference.

Since the variables are mixed stationary, panel ARDL model is recommended rather than simple cointegration test, due to accurate results that can be provided by the former(Sohag et al., 2015).

6.2 Cointegration test:

As the variables are mixed stationary, the co-integrating relationship among them was examined employing Kao's panel co-integration test. If the probability value is less than 5%, we reject the null hypothesis of no co-integration, and vice versa(Onah, 2022).

The result of table 2 refers that the probability value is less than 5%, that is, existence of the cointegrating relationship among the variables.

6.3 Hausman test:

Hausman test is used to select the appropriate model among PMG (pooled mean group), MG (mean group), and DFE (dynamic fixed effects) (Djamal et al., 2021; Yamarik et al., 2016). If P-values are greater than 5% for both Hausman tests, PMG is the appropriate model instead of MG and DFE models (Sohag et al., 2015). As shown in tables 4 and 5, P-values of both Hausman tests are equal 0.165 and 0.966 respectively (i.e., greater than 5%), meaning that PMG is the fit model.

6.4 Panel ARDL with PMG estimation:

A long-run relationship exists among all variables in an ARDL panel model if the error correction term (ECT) meets three conditions:(i) negative, (ii) significant and (iii) and less than unity, besides, the ECT exhibits the speed of adjustment from short-run to long-run equilibrium path(Hassan et al., 2019) .The results reported in table 3 indicate that the coefficient and p-value of ECT of selected PMG model are equal to -0.9938 and 0.000 respectively; meaning existence a long-run relationship among all variables in this model, moreover, the speed of adjustment from short-run to long-run equilibrium path is equal to 99.38%.

FDI reacts negatively to EVI on long-run, in which an increase of EVI with 1% will decrease FDI with 0.00937%, because a higher EVI deters FDI inflows, which is in line with study of Nguyen & Le (2021).
FDI reacts positively to POLST on long-run, in which an increase of POLST with 1% will increase FDI with 0.003047%. Political stability is deemed as a precondition for attracting desired levels of foreign direct investment, thus, it is an overriding factor for economic diversification(Matallah, 2022).
Absence of any palpable effect of TO on FDI, as its coefficient is insignificant statistically. Attracting more FDI requires a set of determinants such as better infrastructure, GDP per capita and a low inflation rate, besides trade openness and institutional quality(Sabir et al., 2019).

7. Conclusion:

We have tried through this study to examine the effect of trade openness on FDI inflows amid structural economic vulnerability for three least developed countries (Djibouti, Haiti and Tanzania) during the period 2004-2018 using panel ARDL PMG model.
The main findings of our study are:

- Existence a negative relationship on long- run between the structural economic vulnerability index (EVI) and foreign direct investment net inflows (FDI), in which a 1% increase for EVI will decrease FDI with 0.00937%.This result consistent with United Nations perspective (i.e., a higher score of EVI leads to significant structural impediments to FDI growth).
- Existence a positive relationship on long- run between the political stability indicator (POLST) and FDI, in which a 1% increase for POLST will increase FDI with 0.003047%, since political stability is a crucial factor for attracting desired levels of FDI.
- Absence of any noticeable effect of TO on FDI, due to existence of high levels of EVI, meaning that our main hypothesis is rejected.

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