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Original Article

The Effect of Fiscal Decentralization on Foreign Direct Investment in Developing Countries: Panel Smooth Transition Regression

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Abstract: *The main goal of this paper was to investigate the effect of fiscal decentralization on foreign direct investment (FDI) in developing countries during the years 1990-2022. For this purpose, we have used the Panel Smooth Transition Regression method (PSTR). Decentralization is the financial equivalent of the central government transferring resources to local governments. Policies that increase the proportion of provincial government financing allocated to local infrastructure through fiscal decentralization can attract more foreign direct investment. Based on the results obtained from the model estimation, on percent increase the fiscal decentralization causes to increase in foreign direct investment equal to 0.86. So, we can say that providing the necessary fields for the expansion of fiscal decentralization can help to promote foreign direct investment levels in developing countries.*

Keywords*: Foreign direct investment, Fiscal decentralization, Panel smooth transition regression.*
JEL classification: C22, E62, F20, H10.

I. INTRODUCTION

Nowadays, the attraction of Foreign Direct Investment (FDI) as one of the most important economic variables has been considered in most countries, as far as the acquiring of the initiative in this field can fulfill a major part of the economic objectives of the countries. In the meantime, in the host countries and acceptance of foreign capital, a lot of factors can affect the attraction of FDI. Awareness of the manner of affecting these variables on the economic decision-making of these countries can be very useful in order to attract FDI (Wang et al., 2022).

One of these variables that has recently been experimented in empirical studies is “fiscal decentralization”. From the fiscal perspective, decentralization means to transfer the administration of resources and perform expenditures from the central government to local governments. In other words, fiscal decentralization includes giving authorizations from the central government to local governments in order to create revenue, perform expenditures and make decisions around them to perform the assigned duties.

Investors’ decisions to distribute money across countries are influenced by a number of cultural and economic characteristics that either encourage or discourage investment. Whether fiscal decentralization—which is used synonymously with decentralization in this work—attracts or repels foreign direct investment (FDI) is an intriguing institutional topic. Fiscal decentralization might theoretically have an impact in both directions. Federalism may, on the one hand, encourage Foreign Direct Investment (FDI) if competition between independent sub-federal jurisdictions creates investment opportunities. Sub-federal jurisdictions can legitimately indicate through tax autonomy that they would not increase taxes ex-post or after an investment has been made. As a result, FDI will increase with the degree of autonomy of the units. However, suppose several governments have access to the same tax base and are unable to legitimately promise not to raise taxes after the fact. In that case, fiscal federalism may actually have a negative impact on foreign direct investment (FDI) and create a hold-up issue (Feld et al., 2023).

During recent years, many of the developing countries following the developed countries have turned to the policy of fiscal decentralization and have generally performed it. Increasing attention to the category of fiscal decentralization can be looked for in the different causes, such as the increase of prosperity, efficiency, etc. and finally, higher economic growth in a country (Haptari et al., 2023). In the economic literature, also, the fiscal decentralization theories have also been noticed in the direction of increase of productivity and government efficiency and extension of regional equilibrium and balance and also introduce it as one of the basic instruments of transition to the market-based economy in developing countries (Ghaffary fard and

Sadeghi-Shahedani, 2013). However, alongside of benefits resulting from the application of FD, this policy and incorrect enforcement of hold a lot of expenses, which can cause the reduction of economic growth and the other negative effects on society (Rodrıguez-Pose and Ezcurra, 2011).

Now, a question that is raised is whether the application of FD policy in developing countries can help to attract FDI or not?

According to the present paper is trying to experiment with the effects of fiscal decentralization on different indicators (including fiscal decentralization of revenue, expenditure and autonomy power*)* on the attraction of FDI using econometric instruments and the data during the years 1990-2022.

II. LITERATURE REVIEW

A) Fiscal Decentralization

Bird & Vallaincort (1998) characterized fiscal decentralization as a means by which each nation controls the public sector, which in this instance always represents history, topography, political equilibrium, objectives, and other features that are highly variable among nations.

Comprehending the definition of fiscal decentralization is necessary in light of the ambiguous theoretical discussions regarding the impact of this policy on foreign direct investment. The transfer of authority and responsibility for public tasks from the central government to subordinate or quasi-independent entities or the private sector is known as fiscal decentralization, according to Litvack and Seddon (1999). As per Riker's (1964) definition, a political system is classified as federal if it can be divided into two or more levels of government that govern the same nation and populace, each having a distinct jurisdiction and autonomy within its own political sphere; and if each level of government's autonomy is institutionalized in a way that reinforces the restriction of federalism (Feld and et al., 2023).

Generally, it can be said that the application of the FD policy has resulted in the further attraction of FDI through the increase of budget share allocated by provincial governments to local infrastructures (He and Sun, 2014). The results of the numerous studies show that fiscal decentralization in fact, has increased the share of provincial government budget to the local infrastructures.

For example, Estache and Sinha (1995) and Zhang and Chen (2007) have shown that FD increases the expenditure related to public infrastructure. With expansion and improvement of infrastructures, it is expected to attract much more FDI because foreign investors prefer the economies which have more developed channels of roads, airports, energy supply, water supply, telephone and internet. The weak infrastructure increases the cost of economic activities and, at the same time, reduces the rate of return on capital. For example, ceteris paribus, the production costs in countries with strong infrastructures are lower, and it is expected that these economics can attract more foreign capital (Fotros and Emami, 2011: 61). According to He and Sun (2014), we will study the modeling of the impact of fiscal decentralization on FDI.

According to the large literature on fiscal decentralization, they assumed that the government is neither benevolent (Zodrow and Mieszkowski, 1986; Wilson, 1999) nor a Leviathan (Brennan and Buchanan, 1980). Therefore, they assumed that the provincial government's objective is to maximize a weighted mean of the growth rate of the economy and its own consumption. That is, for a representative province i in year t, its objective is Max.

$$\begin{aligned} &\max W_{it} = \alpha g_{it} + (1-\alpha) c_{it} \\ &s.t.: c_{it} + I_{it} = s.T.FDI_{it} \end{aligned} \tag{1}$$

Where git is the regional economy's rate of expansion, cit, Iit, and FDIit are the regional government's usage and local public infrastructure expenditure proportions to the province's GDP, respectively, FDIit is the province's FDI inflow ratio to the GDP, and α is the weight that the provincial government gives to growth.

The local government's budget is the limitation in Equation (1). The local provincial government's retention of tax income is the right-hand side of the local government's budgetary limitation. Where s is the portion of the tax revenue on FDI retained by the province government under fiscal decentralization, and T is the set tax rate imposed on FDI by the central government that is presumed to be fixed in their study. A greater s indicates a more decentralized fiscal system. The growth rate of the provincial economy is linear in the ratio of FDI to GDP. Therefore, the objective function of the provincial government becomes (He and Sun, 2014).

$$\text{Max } W_{it} = \alpha FDI_{it} + (1-\alpha)(s.T.FDI_{it} - I_{it}) \tag{2}$$

They assumed that a higher share of local public infrastructure expenditure in GDP (Iit) attracts more inflows of FDI: $\partial fdi_{it}/\partial I_{it}$. Moreover, they assumed $\partial^2 fdi_{it}/\partial I_{it}^2 < 0$ as in Qian and Roland (1998). That is, the marginal benefit of local

public infrastructure on FDI is positive but decreases as local public infrastructure increases. Therefore, the FOC (first-order condition) associated with Iit for the local government would be $\partial W_{it}/\partial I_{it} = 0$. So that

$$\alpha \frac{\partial FDI_{it}}{\partial I_{it}} + (1- \alpha) \left[s.T \ \frac{\partial FDI_{it}}{\partial I_{it}} - 1 \right] = 0 \quad (3)$$

Given that $\partial^2 fdi_{it}/\partial I_{it}^2 < 0$, W_{it} is concave in I_{it}. Therefore, there is a unique positive level of I_{it} that maximizes the objective of the provincial government. (Ahmadirad, 2024) The province government's limited budget reflects the trade-off it must make between funding local public infrastructure projects and its own consumption. Consequently, in order for an investment to be considered optimal, the marginal benefit of its own consumption—that is, the marginal cost of the expenditure on local public infrastructure—must match the marginal benefit of that expenditure (that is, the first term on the left-hand side of Equation (3), i.e., $\alpha \partial fdi_{it}/\partial I_{it}$ (He and Sun, 2014).

Since they were concerned with how fiscal decentralization (i.e., s) would affect the allocation of the provincial government budget, they conducted comparative statics on Eq. (3). They differentiate Equation (3) with respect to s and I_{it}, yielding.

$$\frac{\partial I_{it}}{\partial_s} = - \frac{\partial^2 W_{it}}{\partial_s \partial I_{it}} \frac{\partial^2 I_{it}}{\partial^2 W_{it}} = - \frac{\frac{\partial^2 W_{it}}{\partial_s \partial I_{it}}}{\frac{\partial^2 W_{it}}{\partial^2 I_{it}}} \quad (4)$$

Using Eq. (2), they have $\partial^2 W_{it}/\partial s \partial I_{it} = (1 - \alpha) \cdot T \cdot \partial fdi_{it}/\partial I_{it}$. Given the assumption $\partial^2 fdi_{it}/\partial I_{it}^2 < 0$, Eq. (2) also yields $\partial^2 W_{it}/\partial I_{it}^2 < 0$. Combining their assumption that $\partial fdi_{it}/\partial I_{it} > 0$, they have

$$\frac{\partial I_{it}}{\partial_s} = - \frac{\frac{\partial^2 W_{it}}{\partial_s \partial I_{it}}}{\frac{\partial^2 W_{it}}{\partial^2 I_{it}}} = - \frac{(1-\alpha) \left[T \frac{\partial FDI_{it}}{\partial I_{it}} - 1 \right]}{\frac{\partial^2 W_{it}}{\partial^2 I_{it}}} > 0 \quad (5)$$

Therefore, a higher degree of fiscal decentralization (i.e., a larger s) would increase the share of the provincial government budget allocated to infrastructure.

Therefore, by raising the portion of provincial government budgetary resources allotted to local infrastructure projects, a higher degree of FD will draw more FDI. Although a lot of studies have been done on the FD effects on economic growth, the size of government, corruption, inflation, income inequality and even health, empirical studies conducted about the effect of FD on FDI are very few.

Wu and Heerink (2016) investigated the foreign direct investment, fiscal decentralization and land conflicts in China. This study examines the impact of fiscal decentralization and foreign direct investment (FDI) on jurisdictional land conflicts using province data on illicit land uses from 1999 to 2010 as a proxy for the intensity of land conflicts. The findings indicate that when there is a high level of fiscal decentralization, the growth rate of FDI positively and significantly affects the growth rate of illicit land usage. We thus offer evidence in favor of the theory that land-related disputes in China are often sparked by regional rivalry for foreign direct investment, which is driven by fiscal decentralization.

Wang et al. (2017), in their study, investigated the effect of FD policy on the attraction of FDI in China. Therefore, they used China's city-level data in 2014 and a spatial Durbin modelling approach. They found that, fiscal decentralization does promote FDI inflows. Also, FDI inflows show significant positive spatial agglomeration and spillover effects.

Van Bon (2019) investigated, employing the two-step GMM Arellano-Bond and FE-2SLS estimators, the impact of FDI on the link between fiscal decentralization and economic growth for a panel dataset of 52 Vietnamese provinces between 2007 and 2016. The calculated findings support the substantial enhancement of economic growth by FDI and fiscal decentralization; however, the growth rate is hindered by their interaction terms. Public investment is another important factor that influences this. The central governments of emerging nations, particularly Vietnam, should take note of these findings and make some significant policy recommendations.

Feld et al. (2022) investigated fiscal federalism and foreign direct investment. In this research, we analyze 83,458 corporate Cross-Border Acquisitions (CBA) between 148 source and 187 host nations between 1997 and 2014, and we also discover that the size, cultural similarity, and common boundaries of the two economies all positively correlate with the number of acquisitions between two countries. CBA is made easier by shared institutions, including membership in a customs union. The findings are applicable to wealthy hosts but not to nations with middle-class populations.

Dewi Haptari et al. (2023) considered the effects of Indonesia's fiscal decentralization policy on foreign direct investment. 514 districts and cities in Indonesia from 2016 to 2020 are the study's objects. Focus Group Discussions (FGD) with respondents who are subject matter experts in order to conduct qualitative research and acquire in-depth analysis using the NVivo software. The quantitative evaluation method's findings indicate that (i) the fiscal decentralization policy has a significant and positive impact on foreign direct investment (FDI), determined by revenue share and spending by the government on roads, water, and electricity; (ii) the economic aspect is measured by regional financial independence, gross regional item, and both renewable and non-renewable natural resources. A substantial and negative impact on foreign direct investment (FDI) is caused by renewable energy; a significant and positive impact is caused by business aspects as determined by the degree of export openness, the number of BUMDs, and the human development index; and an important and adverse effect is caused by the dummy at the district or city level.

III. METHODOLOGY

In this paper, we have used the following general model in order to investigate the effect of fiscal decentralization on the status of foreign direct investment in developing countries.

$$(\mathrm{FDI})_{\mathrm{it}} = \beta_0 + \beta_1(\mathrm{fd})_{\mathrm{it}} + \sum_{\mathrm{m}=2}^{\mathrm{M}+1} \beta_{\mathrm{m}}(\mathrm{Control})_{\mathrm{it}} + \varepsilon_{\mathrm{it}} \quad \mathrm{M} \geq 1 \qquad (6)$$

Dependent variable of FDI also has been used in the form of the net share of FDI inflows from GDP (in percent). FDI is a multi-dimension concept, which is influenced by the extensive spectrum of economics, social, political and natural determiners, and each of them has a share in explaining changes. So FD cannot explain the FDI changes by itself. Based on this idea, in order to increase the explanatory power of the model, and also to prevent bias in the model specification, and according to the principle of explanatory parameters scarcity, the satisfaction of diagnostic tests, significance and a sign of the estimating coefficients and statistical constraints among the different variables influencing over FDI, the variable of inflation rate (inf) (in percent), Exchange rate fluctuations (erf) (which has been measured by the ARCH-GARCH technique and using the variable of the informal exchange rate (er)), and the degree of trade opening (open) (share of total imports and exports from GDP in percent) has been added to the model as the other explanatory variables and control variables. So, we can say that the final model of the research follows below:

$$(\mathrm{FDI})_{it} = \beta_0 + \beta_1(\mathrm{FD})_{\mathrm{it}} + \beta_2(\mathrm{inf})_{\mathrm{it}} + \beta_3(\mathrm{erf})_{\mathrm{it}} + \beta_4(\mathrm{open})_{\mathrm{it}} + \varepsilon_{\mathrm{it}} \qquad (7)$$

Where FDIit is the ratio of FDI to GDP for the ith province in year t; FD is the degree of fiscal decentralization; ui and t stand for the fixed province and time effects, respectively. The research time period is 1990-2022.

A) Panel Smooth Transition Regression Model (PSTR)

With the development of the panel data approach, it became possible for regression coefficients to change over time and for cross-sectional units, while heterogeneous temporal and cross-sectional effects on data in the early regression models of panel data are determined by the random or fixed-effects model. Panel threshold regression models (PTR) are the most rudimentary models among the modified models proposed by Hansen (1999). In these models, regression coefficients can be changed over time for cross-sectional units. The noteworthy point in this model is the existence of observations very close to the threshold value, which are in two different groups due to small differences, and therefore, how they affect is faced with a sharp jump (Chiou et al., 2011). To solve this problem, Fok et al. (2004) presented a panel-mode smooth transition regression (PSTR) model, which was later expanded by Gonzalez et al. (2005) and Colletaz and Hurlin (2006). This model is an extended form of the PTR model by considering the transition function in which the slope of the transition function indicates the speed of adjustment, and the change of regression coefficients by moving from one regime to another is determined by the slope of the transition function (Gonzalez et al., 2005).

B) PSTR model

The basic model of PSTR with two regimes can be expressed as follows:

$$Y_{it} = \mu_i + \beta_0 X_{it} + \beta_1 X_{it} g(q_{it}; y, c) + \mu_{it}$$

$i = 1,2, \ldots, N, t = 1, \ldots, T$

In the above formula, i represents the cross-section, and t represents the time. The dependent variable is Y_{it}, which is scalar; X_{it} is a dimension K vector of exogenous variables. μ_i is an error sentence. $g(q_{it}; y, c)$ is also a continuous and bounded function of the visible variables q_{it} and is normalized to be limited to 0 or 1. Also, these limit values are associated with regression coefficients β_0 and $\beta_0 + \beta_1$, so that the values of q_{it} determine the values of g and, therefore, determine the zero effect of this regression $\beta_0 + \beta_1$ for the section i at time t.?. The transition function can be written as follows:

$$\boldsymbol{G(q_{it}; y, c) = [\,1 + exp(-y\Pi_{j=1}^{m}(q_{it} - c_j))]^{-1}}$$

$$y > 0, c_1 \leq c_2 \leq \cdots \leq c_m$$
$$G(q_{it}; y, c) = \begin{cases} 1 \; if \;\; q_{it} \geq c \\ 0 \; otherwise \end{cases}$$

In the above relation, $c = (c_1, \ldots, c_m)$ is a m vector of the parameters, and in this function, the y parameter is a slope and represents the speed of adjustment from one regime to another and q_{it} is a transition variable or threshold that, According to the study of Colletaz and Hurlin (2006), can be selected from the variables of interrupt, dependent, explanatory or any other variable outside the model that is theoretically related to the model under study and causes a nonlinear relationship. Similarly, $c = (c_1, \ldots, c_m)$ is a vector of threshold parameters or locations of regime change.

C) Test for linearity and absence of a nonlinear relationship

Gonzalez et al. (2005) and Colletaz and Hurlin (2006) provide a diagnostic test process to investigate the presence or absence of a nonlinear relationship between variables to reliably estimate the final model of smooth panel transition regression using the non-least squares method that is equivalent to the maximum likelihood estimator. By performing this test, estimating the final PSTR model requires determining the number of transition functions to fully explain the nonlinear relationship in addition to confirming the existence of a nonlinear relationship between variables.

D) Select the number of threshold locations

The next step after testing the linearity and selecting a transition function is to select the number of threshold locations required for the final model. Gonzalez et al. (2005) consider it sufficient to include one or two threshold values (m = 1 or m = 2) to explain the variability of the parameters and state that for the model m = 1, the model of smooth panel transition due to lower values. Furthermore, most of the transition variables in comparison with the threshold value and with a uniform transition function of the coefficients $\rho_0, \theta_0, \beta_0, \alpha_0$ to $\varphi_0 + \varphi_1$ و $\rho_0 + \rho_1, \theta_0 + \theta_1, \beta_0 + \beta_1, \alpha_0 + \alpha_1$ will have two limit regimes. If y or the slope parameter tends to infinity, this model switches to two-panel threshold (PTR) regimes. In fact, the transition function when $q_{it} \geq c_1$ will have a value of one and otherwise a value of zero. At m = 2, the minimum point of the transition function will be $\frac{(c_1+c_2)}{2}$ and calculates the value of one for less and more values of the transition variable, and if y tends to infinity, the model becomes a three-threshold model. However, with a y-slope of zero and at any number of thresholds, the model will be a linear or homogeneous regression model with fixed effects (Gonzalez et al., 2005).

IV. ESTIMATION RESULTS

A) Stationary test of variable

Before estimating panel models, it is necessary to perform a Stationary test of variables. Before performing this test, the cross-section dependence test must be performed in order to select the appropriate unit root test. Various tests such as Generalized Dickey-Fuller Unit (ADF), Levin, Lin, and Chu (LIC), Fisher Generalized Dickey-Fuller (ADFF) and Phillips-Prone-Fisher (FPF), Im, Pesaran, Shin (IPS), and Britang & Hadry and Pesaran (Britang and Hadry and Pesaran, 2004) and there is a unit root test for Pesaran to examine the stationary of panel variables, and choosing the appropriate test in the first step requires examining the existence of cross-sectional dependence (Baltaji, 2005). In order to examine the dependence between sections, Pesaran's interdependence test (2015), which is the completed version of the Pesaran test (2004), has been used. In this test, which is presented for balanced and unbalanced panels, the null and opposite hypotheses are defined as follows:

$$H_0: \rho_{ij} = \rho_{ji} = E(u_{it}v_{it}) = 0 \quad for\ all\ i \neq j$$
$$H_1: \rho_{ij} = \rho_{ji} = E(u_{it}v_{it}) \neq 0 \quad for\ some\ i \neq j$$

v_{it} and u_{it} are the remainder of the estimation model. For balanced panels, CD test statistics can be calculated as follows:

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right)$$

Where $\hat{\rho}_{ij}$ are Pierson correlation coefficients as a pair of residual statements. The null hypothesis and cross-sectional relationship will be validated if the computational CD statistic, at an appropriate level of significance, exceeds the critical value of the standard normal distribution (Pesaran, 2004). The use of traditional panel unit root techniques, such as the Levin, Lin, and Chou (LIC) test, Im, Shin, Pesaran (IPS), etc., will raise the likelihood of misleading unit root results if the cross-sectional dependence in the panel data is validated. Despite cross-sectional dependence, a number of panel unit root tests, such as the Pesaran unit root test (CIPS), have been developed to address this issue. The results of the cross-sectional dependence test for the studied data are shown in the tables below.

Table 1. Pesaran Cross-section Dependency test

Test result	P-value	Pesaran CD Statistics	Variable
Cross section dependence	0.000	13.628	FDI
Cross section dependence	0.000	12.094	FD
Cross section dependence	0.000	18.376	Inflation
Cross section dependence	0.000	14.787	ERF
Cross section dependence	0.000	8.476	OPEN

As shown in Table (1), there is no dependence between the sections in all the studied variables and the null hypothesis is rejected; therefore, it can be concluded that, in general, there is a cross-sectional correlation between the different sections of data. Since cross-sectional dependence is confirmed in all variables, the appropriate unit root test in this study is the Pesaran unit root test (2003), in which cross-sectional dependence is used. This test is based on the mean of the Dickey-Fuller generalized t-statistic of each section and is in line with the test presented by Im, Pesaran and Shin (IPS, 2003). Pesaran calculated the critical values of t-bar statistics, and the null hypothesis in this test is the existence of a single root. The results of the Pesaran unit root test (2003) are presented in Table (2) below. According to the results of this table, at the 95% confidence level, the model variables are at the stationary level.

Table 2. Pesaran unit root test in case of cross-section dependence

Variable	Z[t-bar]	P-value	Test result
FDI	-2.617	0.008	I (0)
FD	-25.007	0.000	I (0)
Inflation	-1.806	0.021	I (0)
ERF	-2.440	0.006	I (0)
OPEN	-3.081	0.003	I (0)

B) Steps to specify the Smooth transition regression (STR) model

The first step in estimating the PSTR model is to test the existence of a nonlinear relationship between the model variables. This is done using the Lagrange coefficient, Fisher and likelihood ratios. The next step in estimating this model is to determine the number of threshold locations available, which is examined by the Schwartz and Akaike criteria. After determining the number of threshold locations, the number of model regimes is determined. In the final stage, the model under study is estimated for each group, with the number of regimens determined in the previous stage. It should be noted that the estimation of the models in the present study was performed using MATLAB software.

C) Test for nonlinear relationship

Following the above issues, first, the null hypothesis of linearity is opposed to the hypothesis of the existence of a nonlinear pattern by considering information and communication technology as a threshold variable and its results are given in the following tables. As can be seen in Table (3), the results of all statistics of the Lagrange Wald and Fisher LaGrange coefficient and likelihood ratio show that the relationship between the studied variables in groups of the studied countries follows a nonlinear model.

Table 3. Nonlinear relationship test

Statistics	LM_W	LM_f	LR
Value	23.669	3.142	27.050
P-value	0.003	0.004	0.001
H_0: linear model H_1: PSTR model with at least one Threshold Variable			

D) Determine the number of threshold locations

After testing the linearity and selecting a transition variable, the number of threshold locations required for the final model must then be selected. For this purpose, following Colletaz & Hurlin (2006), one PSTR model with one and two threshold locations is estimated, and for each of them, the Schwartz criterion and Akaik information criterion are calculated. The results obtained in the selected countries show a PSTR model with one threshold to investigate the nonlinear behavior between the studied variables.

Table 4. Threshold location test

Threshold point	m=2 PSTR with	m=1 PSTR with	Test
4.834	-4.216	-4.162	AIC
	-3.957	-4.523	BIC

E) Test the number of model regimes

It should be checked whether the present model has one transition function or more. To perform this test, the null hypothesis, including a nonlinear model with a transition function, is tested against the nonlinear model hypothesis with at least two transition functions. The results obtained from this test in the selected countries show that at a significance level of 5%, the null hypothesis is not rejected, and the PSTR model will have one transition function in this study countries.

Table 5. Test the number of regimes in the model

P-value	Value	Test
0.175	8.511	wald
0.327	2.964	Fisher
0.428	8.276	LRT

F) Model estimation results in the group of countries with high IT expenditures

Table (6) below shows the model estimation results in countries. In this model, the slope parameter, which indicates the speed of adjustment from one regime to another, is equal to 1.33, which has a Smooth transition rate.

Table 6. Model estimation results in countries

Linear part of the model			Nonlinear part of the model		
Variable	**Value**	**t-statistics**	**Variable**	**Value**	**t-statistics**
FD	0.532	2.897	FD	0.268	2.176
Inflation	-0.215	-6.142	Inflation	-0.180	-6.165
ERF	-2.114	-5.335	ERF	-1.257	-6.232
OPEN	0.265	2.567	OPEN	0.211	2.165

Since the coefficient of each variable varies according to the value of the exchange rate fluctuation thresholds but is not the same for different countries and over time, the numerical value of the presented coefficients cannot be interpreted directly, and only the signs (Positive or Negative) must be analyzed. According to the results of Table (6), the exchange rate symmetry variable in the first regime (linear part of the model) has a positive impact on financial direct investment, but with the expansion of the exchange rate fluctuation threshold variable and entering the second regime, the effect of this variable has decreased. As can be seen, the result indicates an asymmetric relationship between exchange rate symmetry and, financial direct investment and fiscal decentralization. The reason for this can be attributed to the significant growth of exchange rate fluctuation in recent years in countries. The result given based on the positive effect of FD over FDI has the same direction as the empirical results of He and Sun (2014). The effect of the inflation rate, exchange rate fluctuations, and the degree of trade opening on net FDI in all model exceptions for the inflation rate in the model is based on our expectation sign for variables in the different models. One unit increase in inflation rate at the same time changes net FDI -0.395 unit in the model. One unit increase of exchange rate fluctuations at the same time reduces net FDI by -3.371 units in the model. On unit increasing of the degree of trade opening increases net FDI by 0.476 units in the model.

V. CONCLUSION AND RECOMMENDATIONS

In the direction of the study of the effect of FD on FDI in developing countries, the method of panel smooth transition regression is used. For this purpose, we have used the net share of FDI inflows (dependent variable), indicators of revenue fiscal decentralization, expenditure fiscal decentralization and autonomy power (independent variables), inflation rate, the exchange rate fluctuations and the degree of trade opening (control variables) and the data of years 1990-2022. The results of the evaluation of the model confirm this point that the relation between FD indexes and FDI is positive and significant. The variables of inflation rate, exchange rate fluctuations and the degree of trade opening as expected had negative, negative and positive effects, respectively and were significant on FDI in these countries. Regarding the main result of this research based on the positive effect of FD on FDI, the most important political recommendation is that in order to attract much more FDI, the countries should entrust more authority to the managers of each province in the field of income and expenditures, especially in the provinces in which the level of FD rather is low. Of course, the implementation of this policy should be linked with the compilation of transparent and explicit laws of revenues and expenditures for the definition of the relationships between the different governmental layers (provincial and local governments) so as not to lead to the negative lateral effects of social and economic such as the expanding of corruption and inflation or instability of macroeconomics. Based on the other results, controlling the inflation rate, reduction of exchange rate fluctuations, using monetary and financial instruments and moving toward an open economy can help further attract FDI in these countries.

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