

# Complementary Relationship Between Foreign Direct Investment, Banking Sector Threshold and Economic Growth: Empirical Evidence for the 18 Least Developed African Countries

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The optimal allocation of foreign resources requires a minimum level of domestic development, including financial development to benefit from the potential benefits of foreign direct investment. This study discusses the mediating role of financial development in the effect of foreign direct investment on economic growth and establishes the banking sector threshold for the 18 least developed African countries over the period 2000 to 2020. We used the generalized method of moments (GMM) and the threshold regression (TR) as part of the dynamic panel data model. The results show the non-significant contribution of foreign direct investment and the banking sector to economic growth. After interaction, the effect of foreign direct investment becomes positive but not significant. However, the coefficient of the interaction variable is significantly negative. This implies that the financial system is unable to allocate foreign resources efficiently. For this reason, this paper resorted to applying the threshold regression to determine the minimum threshold of the banking sector and established a threshold of 74.58%. It therefore becomes necessary for the 18 least developed African countries to develop the financial system in order to get full benefits of foreign direct investment.

*Keywords:* foreign direct investment, banking sector, economic growth, GMM, TR

## Introduction

In recent years, economists, politicians and officials have identified capital flows as factors that create growth and economic development for nations. For this reason, they have focused on the attractiveness strategies of foreign direct investment in particular, financial development.

On one hand, the link between foreign direct investment and economic growth is explained by several transmission channels including the transfer of new technologies to physical capital (Haini, Lim, & Loon, 2024; Malikane & Chitambara, 2017; Gharib & Rached, 2019), encouraging exports (Herzer, Stephan, & Felicitas, 2008) and hence improving the state of the trade balance, creating new jobs (Kaulihowa & Adjasi, 2018), improving social welfare (Keita & Baorong, 2022), the encouragement of domestic investment in host countries (Kamil & Bazoumana, 2018; Kurbanov, 2020), the transfer of new knowledge to human capital and consequently the increase of labour input productivity (Su & Liu, 2016; Anetor, Esho, & Verhoef, 2020; Dankyi, Boadi, Olivier, & Yusheng, 2022 ).

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As for explanatory factors for the inflow of foreign direct investment, it is said that the attention of foreign investors depends on the domestic development of the host countries. Indeed, foreign direct investment is directed towards countries with natural resource availability, a skilled workforce (Su & Liu, 2016), a well-regulated institutional framework (Adegboye, Osabohien, Olokoyo, Matthew, & Adediran, 2020; Shittu, Yusuf, El Houssein, & Hassan, 2020), a developed financial system (My-Linh, 2022; Bouzayani & Abida, 2021), a high degree of commercial openness, a more advanced stage of financial and economic integration. Indeed, the combination of these factors can guarantee the profitability of foreign direct investment.

On the other hand, financial development plays a very important role in the processes of creating growth and economic development. Indeed, financial development facilitates the financing of agents following the removal of the ceilings related to the credits granted (Sekali, 2018; Bono, 2025). In addition, interest rate liberalization encourages agents to invest funds in financial institutions. This operation can accumulate and facilitate funding sources. Still, a developed financial system can adequately anticipate and manage the risks of contagion and volatility of short-term capital flows (Pinshi, 2017; Kpégo & Anatole, 2018). Therefore, the availability of resources and funding channels and good anticipation and risk management can encourage economic growth.

As for the determinants of the effect of foreign direct investment on the economic growth of the host countries, it is said to be determined by the type and ebb of foreign direct investment (Chen, Liu, Zhang, Dong, & Ma, 2024), the qualification of the workforce (Kheng, Sun, & Anwar, 2017; Bouzayani & Abida, 2023; Anetor et al., 2020; My-Linh, 2022), the degree of the technology gap between emitting and receiving countries of foreign direct investment (Malikane & Chitambara, 2017; Haini et al., 2024; William & Erasmus, 2023).

The remainder of this study was organized as: The second section presents an overview of the theoretical and empirical literature related to the effects of foreign direct investment and financial development. The third section deals with the data. The fourth section discusses the results. The fifth section presents the conclusions and recommendations.

### **Overview of the Theoretical and Empirical Literature on the Relationship between Foreign Direct Investment, Banking Sector and Economic Growth**

In light of the results of academic research work, foreign resources can improve the economic growth and social well-being of host countries. In this regard, Keita and Baorong (2022) emphasized the contribution of foreign direct investment to improving Guinean social welfare over the period 1990-2017. They noted that the inflow of capital in the form of FDI affects Guinean welfare in the short and long term. They recommended Guinean officials to attract more foreign investment to see more growth and well-being.

On the other hand, theoretical and empirical reviews have explained the contribution of foreign investment to the economic growth of developing economies by stimulating exports. Herzer et al. (2008) tested the causality between foreign direct investment and economic growth in a sample of 28 countries over the period 1970-2003. The result of the Granger cointegration test notes the presence of a long-term equilibrium relationship between FDI and economic growth in all countries except Ecuador, Mexico, Venezuela, and Sri Lanka. Moreover, Herzer et al. (2008) showed that the long-term FDI effect is significant. This relationship is explained by foreign direct investment encouraging exports and consequently economic growth.

Still, several economists have found that FDI and trade are important catalysts of economic growth for developing economies. Shiva and Agapi (2004) discussed a cross-sectional database of a sample of 66

developing countries over three decades. They justified that FDI and trade have a significant positive effect on technical progress and that FDI stimulates domestic investment and trade. They considered sound macroeconomic policies and institutional stability as explanatory factors for achieving FDI-led growth.

Moreover, the results of the Rosdiana's study (2023) indicate a positive bilateral association between FDI and the economic growth of the 10 ASEAN member countries from 2009 to 2020. This signals that FDI affects growth and growth affects the view of foreign investors. Moreover, the results of the Dumitrescu-Hurlin Panel Causality (DHPC) test justify the two-way causality between portfolio investment and GDP. Thus, the results of FMOLS (Fully Modified Ordinary Least Square) and DOLS (Dynamic Ordinary Least Square) show the positive impact of portfolio investment and FDI on economic growth.

In addition, Sopta, Vlatka, and Sanja (2021) processed the Republic of Croatia's database from 2000 to 2020 to study the link between foreign direct investment, exports and economic growth. The result of the Dickey-Fuller unit root test shows the absence of a cointegration relationship between foreign direct investment and short-term economic growth. However, the ARDL (Autoregressive Distributed Lag) test results justify the equilibrium relationship between the 3 variables in the long term.

According to previous studies, the effect of financial development on economic growth depends on the degree of income. Otherwise, the financial development of high-income countries affects economic growth more than that of low-income countries. In this regard, Abbas, Afshan, and Mustifa (2022) examined the relationship between financial development and economic growth in a sample of 44 countries and the relationship between financial development and income inequality in 42 middle-income countries from 1995 to 2018. The results of the ARDL panel model estimate note the significantly positive effect of financial development on long-term economic growth for both groups of countries. Moreover, Granger's causal test results showed a Granger causality justifying the bidirectional relationship between financial development and economic growth. Abbas et al. (2022) concluded that it is important for these countries to implement policies that can strengthen the financial system, in order to improve economic growth and reduce income inequality.

Moreover, previous academic research studies show that the success of international financial integration depends on the macroeconomic framework, financial risks and the degree of monitoring of short-term flows. In this regard, Aiboud, Adouka, and Benbayer (2015) tested the causality between financial development and Algerian economic growth over the period 1980 to 2013. The GMM results note the presence of a significantly positive causality between financial integration and economic growth. Moreover, the results of the Granger causality test show a two-way causality between financial integration and economic growth. In this regard, they note that it is important for Algerian officials to liberalize the banking sector through the liberalization of the interest rate.

As for Kumar and Paramanik (2020), they discussed the link between the broad currency and the growth of Indian gross domestic product over the period from the first quarter of 1996 to the third quarter of 2018. They indicated that long-term financial development has a positive effect on economic growth. In light of these results, Kumar and Paramanik (2020) recommended emerging countries to further free up the financial system to increase long-term economic growth.

On the other hand, the development of the financial system plays a very important role in forecasting risk management. Indeed, good risk management can reduce the inherent effects of short-term flows. In this perspective, Dimitrios and Konstantinos (2020) explored the relationship between financial development and economic growth in normal and crisis periods of 26 EU countries from 1990 to 2020. They measure finance by

financial depth, accessibility and efficiency of banking institutions and stock markets. They showed that in normal times, the significant effect on growth is very important through finance and the stock market. But, in times of crisis the effect becomes significant. This relationship is explained by the fact that the potentially dynamic positive effect of institutions on growth is absorbed by macroeconomic shocks.

Thus, previous theoretical and empirical studies show that the granting of credits to the private sector facilitates investment processes and consequently the encouragement of economic growth. In contrast, Alexiou, Vogiazas, and Nellis (2018) highlighted the effect of granting bank loans on economic growth for 34 European and Commonwealth of Independent States economies. The results justify the negative impact of the credits on economic growth for both groups. Moreover, they showed that the money supply has a significantly positive impact on the economic growth of the countries of the Commonwealth of Independent States.

On the other hand, the positive contribution of financial development to economic growth is not always certain. That is, studies have neglected the linear relationship between engagement and growth. These include the study by Purewal and Haini (2022). They showed that the positive contribution of financial institutions to the economic growth of OECD countries is greater compared to financial markets. Moreover, they justified the existence of an inverse relationship between finance and economic growth in the form of an inverse U. In the light of these results, they concluded that it is important for the countries in question to develop more in the financial sphere in particular, the development of financial markets.

Regarding the complementarity between financial development, FDI and economic growth, the literature reviews agree that the allocation of FDI to economic growth is determined by financial development. In this regard, My-Linh (2022) examined the role of the banking sector and the stock market in strengthening the effect of FDI on economic growth in a sample of 6 countries belonging to South East Asia Nation from 2002 to 2019. The results of the generalized method of moments and the threshold regression showed the significantly positive impact of FDI and financial development under the banking and stock market index on economic growth. In addition, they established a minimum threshold for the banking sector and the stock market of 85.64% and 21.95% respectively. According to these results, My-Linh (2022) found that it is important for the countries in question to develop the stock market so that FDI fully plays its role as a factor creating economic growth.

## **Data and Methodology**

### **Data**

This paper examines data from 18 least developed African countries according to UNDP (2022) over the period 2000 to 2020. These countries are Burundi, Madagascar, Malawi, Mozambique, South Sudan, Niger, Sierra Leone, Burkina Faso, Somalia, DRC, Liberia, Central African Republic, Gambia, Mali, Eritrea, Togo, Chad, and Guinea-Bissau.

### **Model**

The chosen growth model is part of the theoretical framework of endogenous growth models. According to the theory of endogenous growth, economic growth is determined by human capital (Romer, 1986; Lucas, 1988), public expenditure (Barro, 1990), government policies, capital flows, etc. Indeed, the complete formulation of our econometric model is inspired by the work of Chiang and Birtch (2012). It is written as follows:

$$TGDP_{it} = \alpha_0 + \alpha_1 GDP_{it-1} + \alpha_2 IDE_{it} + \alpha_3 BS_{it} + \alpha_4 HC_{it} + \alpha_5 INF_{it} + \alpha_6 POP_{it} + \alpha_7 GXP_{it} + \alpha_8 TOP_{it} + \alpha_9 GCF_{it} + \varepsilon_{it} \quad (1)$$

Where:

$$t = 2000 \dots 2020$$

and

$$i = 1, \dots, 18$$

To identify the role of the banking sector in improving the impact of foreign direct investment on economic growth, the following model should be estimated:

$$TGDP_{it} = \alpha_0 + \alpha_1 GDP_{it-1} + \alpha_2 FDI_{it} + \alpha_3 BS_{it} + \alpha_4 (FDI_{it} \cdot BS_{it}) + \alpha_5 HC_{it} + \alpha_6 INF_{it} + \alpha_7 POP_{it} + \alpha_8 GXP_{it} + \alpha_9 TOP_{it} + \alpha_{10} GCF_{it} + \varepsilon_{it} \quad (2)$$

Where:

$FDI_{it} \cdot BS_{it}$ : The interaction between foreign direct investment and the banking sector.

This paper also aims to establish the minimum threshold of the banking sector to which the interaction between foreign direct investment and the banking sector affects economic growth. So, the equation below presents the equation of the threshold regression.

$$TGDP_{it} = u + FDI_{it}(BS_{it} < y_{it})\beta_1 + FDI_{it}(BS_{it} > y_{it})\beta_2 + u_i + e_{it} \quad (3)$$

Where:

$y$  is the threshold parameter that divides the equation into two regimes with coefficient  $\beta_1$  and  $\beta_2$ .

$u_i$  is the individual effect.

The source of each data and their descriptions are presented in Table 1.

Table 1

*Definition and Measurement of the Variables*

Variables	Description	Source	Measurement
GDP	Economic growth	WDI (2022)	It is measured as GDP per capita growth
FDI	Foreign direct investment	WDI (2022)	It is measured as the percentage ratio of FDI net inflows in the reporting economy to GDP
BS	Banking sector	WDI (2022)	It is measured by domestic credit to private sector (% of GDP)
HC	Human capital	WDI (2022)	This is measured by secondary school enrollment (% gross)
GCF	Gross capital formation	WDI (2022)	It will be measured as the ratio of GCF divided by GDP
TOP	Trade openness	WDI (2022)	It is computed as the percentage ratio of sum of exports plus imports of goods to total output
POP	Population growth	WDI (2022)	It is computed as the annual growth rate
GXP	Government consumption expenditure (% of GDP)	WDI (2022)	It is consist of total expenses and the net acquisition of non-financial assets
INF	Inflation	WDI (2022)	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services

We used the system-based econometric GMM technique proposed by Arellano and Bover (1995) and Blundell and Bond (1998) to solve the problem of country heterogeneity and the problem of omitted variable bias.

In order to provide additional information on the contribution of FDI to economic growth, we applied the regression of the TR threshold proposed by Hansen (2000) to take account of the banking sector threshold so that interaction with FDI positively enhances economic growth. One of the main advantages of the TR model is that it adds increased flexibility in the functional form and, at the same time, is not as sensitive to the curse of dimensionality problems as nonparametric methods (Kourtellos, Stengos, & Tan, 2016).

## Results and Discussion

### Descriptive Statistics

Table 2 presents the descriptive statistics of the variables.

Table 2

#### *Descriptive Statistics*

Variable	Mean	SD	Minimum	Maximum
GDP	1.164	1.892	-12.162	2.694
FDI	5.681	8.541	-3.187	59.329
BS	44.588	25.833	3.069	77.057
HC	67.393	25.719	0.233	97.612
GCF	28.134	81.475	0.492	79.459
TOP	69.496	33.816	17.992	119.761
POP	3.771	1.893	1.879	11.475
INF	13.299	3.019	-6.023	39.273
GXP	57.914	29.362	22.916	75.827

*Note.* Source: Calculated by authors using STATA 15.

According to Table 2, we find that the 18 least developed African countries recorded an average per capita GDP growth rate of 1.164%. Moreover, the results show that the average growth rate of private investment (28.134% GDP) is higher than that of FDI (5.681% GDP).

Again, the results of the descriptive statistics show that the average growth rate of human capital is equal to 67.393% and that the banking sector variable recorded an average growth rate of 44.588% of GDP.

In addition, the results show that the variable “Trade openness” recorded an average growth rate of 69.496% and that the average inflation rate is 13.299%, while the average rate of public expenditure is equal to 57.914% of GDP.

### Correlation Matrix

Table 3 presents the degree of correlation between the variables.

Table 3

#### *Correlation Matrix*

	GDP	FDI	BS	HC	GCF	TOP	POP	INF	GXP
GDP	1								
FDI	0.248 (0.066)	1							
BS	0.032 (0.089)	0.344 (0.056)	1						
HC	0.479 (0.041)	0.019 (0.339)	0.499 (0.009)	1					
GCF	0.530 (0.009)	0.711 (0.000)	0.012 (0.826)	-0.696 (0.894)	1				
TOP	0.121 (0.045)	0.978 (0.000)	0.087 (0.009)	0.552 (0.063)	-0.232 (0.029)	1			
POP	0.342 (0.000)	0.376 (0.076)	-0.067 (0.025)	0.658 (0.056)	0.071 (0.001)	0.294 (0.000)	1		
INF	-0.378 (0.000)	0.076 (0.143)	0.231 (0.006)	-0.295 (0.000)	-0.039 (0.000)	-0.578 (0.056)	0.938 (0.093)	1	
GXP	0.893 (0.082)	0.382 (0.001)	-0.020 (0.000)	0.574 (0.007)	0.318 (0.033)	0.241 (0.000)	-0.037 (0.009)	-0.515 (0.000)	1

*Note.* Source: Calculated by authors using STATA 15.

Table 3 shows the absence of the self-correlation problem between all the variables of the model since the correlation coefficient does not exceed 1 (Ghozali, 2013).

The results of Table 3 show that all variables except the inflation rate are positively correlated with economic growth. In fact, the variable “public spending” is the most positively correlated with economic growth. However, the least positively correlated variable with economic growth is trade openness. Again, we find that the most positively correlated variable with FDI is trade openness. However, human capital is the variable least correlated with FDI.

As for the banking sector, the results show that the variable most correlated with the banking sector is human capital. On the other hand, trade openness is the least positively correlated variable with the banking sector.

### Effect of Foreign Direct Investment on Economic Growth

Table 4 presents the regression results using the econometric GMM system technique.

Table 4

#### *Effect of Foreign Direct Investment on Economic Growth*

Variables	Estimation equation (1)	Estimation equation (2)
GDP per capital growth (-1)	-0.136 (0.002) ***	-0.381 (0.205) n.s
FDI inflow as % of GDP	-0.083 (0.144) n.s	0.129 (0.054) *
Banking sector (FDI.BS)	0.196 (0.247) n.s	0.079 (0.538) n.s
Human capital	-0.282 (0.002) ***	-0.031 (0.000) ***
GCF	0.198 (0.000) ***	0.351 (0.000) ***
Trade openness	0.198 (0.000) ***	0.207 (0.311) n.s
Population growth rate	0.057 (0.037) **	0.001 (0.643) n.s
Inflation	0.303 (0.521) n.s	0.387 (0.000) ***
Government expenditure as % of GDP	-0.128 (0.000) ***	-0.266 (0.003) ***
Constant	0.348 (0.006) ***	0.219 (0.042) **
AR (1)	0.071 (0.027) **	0.009 (0.936) n.s
AR (2)	0.007	0.026
Hansen test	0.156	0.183
Diff-in-Hansen (excluding group)	0.131	0.209
Diff-in-Hansen (H0 = exogenous)	0.168	0.055
Number of observations	0.225	0.234
Number of countries	360	360
Number of instruments	18	18
	20	20

*Notes.* The values in parentheses are the probability. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels, respectively. SGMM model is estimated by using the Blundell and Bond (1998) dynamic panel SGMM estimations and Roodman (2009) STATA xtabond2 command.

Source: Calculated by authors using STATA 1.

Table 4 shows that the FDI coefficient equals -0.083 to a probability of 0.144. This means that the effect of FDI on economic growth is not significant. Indeed, this finding corroborates the results of previous studies by Mohamed, Singh, and Liew (2017) and Mahembe and Odhiambo (2016). In this respect, the lack of a positive allocation of FDI to economic growth may explain the lack of the necessary conditions for the inflow of foreign resources.

Moreover, the banking sector has a positive but statistically insignificant coefficient. This result contradicts the results of previous studies by My-Linh (2022). Indeed, the absence of the significant allocation of the banking sector on economic growth can be explained by the repression of the financial system of the countries in question. Otherwise, it's the cap on private sector credits.

Moreover, the sign associated with the variable GCF is positive and significant at the 1% threshold. This result is consistent with economic logic. In fact, the significantly positive contribution of gross fixed capital formation to economic growth can be explained by the accumulation of the stock of physical capital.

The result of the regression noted that trade openness has a positive and statistically significant impact at the 5% threshold on economic growth. This finding corroborates the results of previous studies by Hye and Lau (2015). Indeed, the increase in the trade openness rate of 1% generates an improvement in the economic growth rate of 0.057%.

Again, the effect of public spending on economic growth is positive and statistically significant at the 1% threshold. This means that the economic growth of the countries in question is based on public spending.

On the other hand, the results have justified that inflation has a significantly negative impact on the economic growth of the sample. This result confirms the result of the study of My-Linh (2022) and Rajab and Zouheir (2025). Indeed, the inverse relationship between inflation and growth can be explained by the general increase in the prices of consumer materials which deteriorates the purchasing power accordingly the weakness of demand and economic growth.

As for human capital, we find that it exerts a negative and statistically significant at the 1% threshold. This finding is consistent with the results of previous studies by Rizal & Nurruhwati (2018). The inverse relationship between human capital and economic growth can be explained by the underdevelopment of human capital. This is the ill-qualified workforce of the countries in question.

In addition, the variable "POP" has a positive coefficient that is not significant for economic growth. This indicates that the population growth rate of the 18 least developed African countries does not affect economic growth.

The results show that the coefficient of a shift in per capita GDP growth is -0.136 and is statistically significant at 1%. The previous economic growth rate has a negative effect on the current economic growth. The negative relationship between the growth rate of the current year and the previous year is explained by the convergence assumption. That is, poor and developing countries converge faster towards an average growth rate than developed countries.

The result of the regression of equation 2 shows that the coefficient linked to the variable "foreign direct investment" becomes positive and statistically significant at the 10% threshold. However, the effect of the banking sector on economic growth remains insignificant. Moreover, the interaction variable has a significantly negative effect on economic growth. This implies that the 18 African countries are characterized by the underdevelopment of the banking sector. Otherwise, the banking sector of the sample countries is unable to allocate the positive FDI spillovers effectively. Therefore, it becomes important to establish a level of the banking sector that could be considered a minimum to ensure the significantly positive contribution of foreign direct investment to economic growth.

### **Results of the Dynamic Panel Threshold Regression**

Table 5 presents the results of the dynamic panel threshold regression.



Table 5

*Dynamic Panel Threshold Results*

y	74.58%
95% confidence interval	[74.59; 74.57]
Impact of regime-independent regressor	
GDP per capital growth (-1)	-0.009 (0.104) n.s
FDI inflow as % of GDP	-0.136 (0.004) ***
Banking sector	-1.821 (0.297) n.s
Human capital	0.345 (0.000) ***
GCF as % of GDP	0.271 (0.169) n.s
Trade openness	0.153 (0.000) ***
Population growth rate	0.264 (0.032) **
Inflation	-0.238 (0.007) ***
Government expenditure as % of GDP	0.129 (0.000) ***
Constant	0.005 (0.017) **
Observations	360
Number of countries	18

Notes. The values in parentheses are the probability. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels, respectively.

Source: Calculated by authors using STATA 1.

Table 5 shows a banking sector threshold of 74.58 for the 18 least developed African countries within a 95% confidence interval. This indicates that when the level of banking sector falls below 74.58, the countries in question would not be able to benefit from the potential positive effects of the inflow of foreign investment and hence the undesirable allocation of FDI to economic growth. In light of this result, we note that it is important for the 18 least developed African countries to develop the financial system so that FDI plays its role as a factor that creates economic growth. That is, the liberalization of banking services, including the granting of bank loans to the private sector.

### Conclusions and Policy Implications

This paper examined the effect of the complementary relationship between FDI and the banking sector on the economic growth of a sample of 18 least developed African countries over the period 2000 to 2020. We used the econometric technique of the generalized method of moments (GMM) in system and the dynamic threshold regression (TR). The results reveal the non-significant contribution of foreign direct investment and the banking sector to economic growth. But, when the interactive term IDE.BS was added to the model, we note that the impact of foreign direct investment becomes significantly positive and that the effect of the interaction variable between foreign direct investment and the banking sector is significantly negative. This indicates that the banking sector in the countries in question is unable to effectively allocate the potential benefits of foreign investment inflows. As a result, this paper used the dynamic threshold regression (TR) to establish the minimum threshold for human capital and established a threshold of 74.58% of GDP. That is, when credits to the private sector fall below 74.58% of GDP, the countries in question would not be able to benefit from the positive effects of foreign direct investment.

As this paper has shown that the banking sector cannot complement FDI to affect economic growth, we see that it becomes relevant for the countries in question to adopt a financial development policy to liberate the banking sector. Alternatively, these countries should also consider liberalizing credits to the private sector in

order to reap the benefits of FDI as soon as possible. In addition, we note that it is important for decision-makers in the 18 least developed African countries to create a favorable investment climate and to decide on economic policies favorable to the attention of foreign resources.

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