

## Investment in Côte d'Ivoire: Determining the Factors that Affect Economic Growth from 1980 to 2020

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### Abstract

Investment is crucial to economic growth, and this study aims to explore the determinants of investment in Cote d'Ivoire between 1980 and 2020. Specifically, this research examines the interactive effect of external debt, communication infrastructures, imports, and inflation on investments in the country. Annual time series data from the World Bank are employed, and various statistical methods are utilized to analyze the data, including the ADF unit root test, Johansen cointegration test, OLS model, Granger causality test, and CUSUM test.

The results reveal that all variables in the model are not stationary at the level but became stationary after first differencing. The cointegration test confirms a significant long-run relationship among the variables. Furthermore, the OLS model indicates that investment is positively and significantly related to communication infrastructures, imports, and inflation, but negatively and insignificantly related to external debt. Imports have the most substantial effect on investment.

The Granger causality test demonstrates no short-run causality relationships between the variables. However, bidirectional long-run causality relationships exist between investment, external debt, and importing, while unidirectional long-run causality relationships run from communication infrastructures and inflation to investment. Additionally, the CUSUM test suggests that no structural changes occurred in the model.

This study recommends that the government use external debt more efficiently, reduce corruption, improve infrastructure, create an attractive investment climate, and reduce tariff and non-tariff barriers to support investment in the country. This research contributes to the literature on investment determinants and provides policymakers with valuable insights into promoting investment in Cote d'Ivoire.

**Keywords:** investment, economic growth, determinants, Cote d'Ivoire, external debt, communication infrastructures, imports, inflation, statistical methods.

### INTRODUCTION

By going through the World Bank full report published in earlier 2021, we can attest, the economic growth of Côte d'Ivoire has indeed encountered some tough periods due to the factors like political instabilities, the fluctuation in the price of its first economy engine and some others factors. However, it still having favourable improvement in the agriculture sector, which has an important percentage in the economic growth of the country. Besides of the sector of agriculture, the country also has some other activity sectors which are not negligible in its economic growth. Among these sectors of activity, we have the area of industry and mining, the energy and petrol sector and the finance and capital market. For the country to avoid the risk of seeing its economy concentrated mainly on agriculture, the government decided to diversify in term of activity. Indeed, industry and mining have an important part in the economy of Côte d'Ivoire. Industry has quickly become a critical component of the Ivorian economy due to an abundance of highly sought-after natural resources. Despite insufficient levels of investment during the recent previous years, the country is gradually trying to

reclaim its former position as West Africa manufacturing centre. The creation of the new industrial zone and renovation of the existing ones have boosted the profile of this sector (Oxford Business Group, 2022).

The economy of Côte d'Ivoire is also relying on the Energy and Petrol sector, with a greater involvement from the private energy companies, especially on the production side. As a result, this involvement has led to an increase in electricity production capacity in 2017. However, increasing electricity production capacity is a key part of the government's energy policy, and this has helped the country to be a net exporter of electricity in countries like Benin, Ghana, Burkina-Faso, Mali and Togo (Oxford Business Group, 2018).

In the same alternative of improving living conditions of the population and encourage the economic growth of the country, the government of Cote d'Ivoire is now focusing on investment or setting businesses in the public and private sectors, by creating a favourable investment climate for investors. From the side of Foreign Direct Investment (FDI), since the years 1980s, it has gradually moved up and down due to some factors like political instabilities that affect the country's economy. Indeed, after the end of the political crisis of 2011, the Foreign Direct Investment (FDI) has quickly been incited to boost the economic growth of the country. As a result, the FDI net inflows moved from US\$ 302 million in 2011 to US\$ 849 million in 2019 (World Bank, 2021). Besides, the government of Côte d'Ivoire has taken some measures to draw the attention of the investor's interest. The Côte d'Ivoire's Investment Promotion Centre (CEPICI) created in June 2012 is now providing information and assistance to local entrepreneurs interested in starting a business or a foreign enterprise interested in setting business in the country. Today, CEPICI provides a "one-stop-shop" for investors, an outreach program to match opportunities with potential investors, and public-private partnership program (CEPICI, 2012).

Hence, given the importance of investment in supporting the economic growth in the country, and based on the Ivorian government's strategy to motivate the investment, it is imperative to investigate the determinants of investment in the country. Thus, the main objective of this study is to determine the factors that affect the investment in Côte d'Ivoire from 1980 to 2020. The organization of this study is as follows. The next section is the literature review and Section 3 provides a brief discussion on the methodology. Section 4 reports the empirical results, and the conclusion and recommendations are presented in Section 5.

## **2. LITERATURE REVIEW**

Many studies have investigated the determinants of investment in many countries by using different econometric methods. A number of these studies tested the effect of external debt, inflation, imports, communication facilities and other factors on the investment. Some of these studies will be reviewed in this section.

Adamu (2018) investigated the effect of external debt on public capital investment in Nigeria from 1970 to 2013. By using autoregressive distributed lag (ARDL) bound testing approach, the empirical results revealed that external debt and debt service negatively influence the public capital investment, but the current GDP affect it positively. Onwe and Iarenwaju (2014) investigated the impact of inflation on corporate investment in the Sub-Saharan African Countries by emphasising on the West-African Monetary Zone (WAMZ). The study aimed at unfolding the short and long-run effect of inflation on corporate investment. Error Correction Mechanism (ECM) was the methodology used to find the eventual influence that inflation has over corporate investment. By following Cobb-Douglas production principles, the result of the analysis revealed that in the long-run, inflation has a positive relationship on corporate investment and in the short-run there exist a negative relationship. Costamagna (2015) tested the relationship between inflation and R&D investment in 15 OECD countries within the period 1981-2008. The result confirmed that the higher inflation rate is related with the lower the R&D investment. However, the study suggested that some features such as monetary stability, regional integration, and currency union could be potential determinants that may increase R&D investment.

Alawneh et al. (2015) investigated the impact of fiscal and quantitative monetary policies on the domestic and foreign direct investment in Jordan during the period of 2000 – 2011. The study used two models such as independent variables monetary policy tools including (re-discount rate) and fiscal tools, which include (taxation and government capital expenditure). The first model was used to assess the effect of fiscal and quantitative monetary policy on the domestic investment. After testing, the study found that the re-discount

rate exerts a negative effect over the domestic investment, but it was not statistically significant, while there is a positive impact with a statistically significant between the mandatory cash reserve and the domestic investment. The study also showed that there exists a negative relationship between taxes and domestic investment, and a positive impact on governmental capital spending and domestic investment. This means that the fiscal impact of the political effectiveness is greater than the monetary policy effects on the domestic investment. Concerning the second model, which tested the effect of fiscal policy and quantitative monetary on foreign investment, the study revealed that there exists a statistically significant negative impact of re-discount rate on foreign investment, while it showed a positive relationship between taxes and foreign investment, because the Jordanian government grants a tax exemption to encourage FDI. Augustine et al. (2019) employed the multiple regression analysis technique and Pearson product-moment correlation to examine the impact of taxation on investment and economic development in Nigeria during the period 2007-2017. The study showed that capital gains tax exerts a positive significant effect on investment and economic development in Nigeria, but the significant level is low.

By using the OLS method of multiple regression analysis, Edame and Okoi (2014) investigated the impact of taxation on investment and economic growth in Nigeria from 1980 to 2010. The result showed that in Nigeria, taxation negatively influences the level of investment and the output of goods and services (GDP), but it has a positive impact on government expenditures. Boahen and Evans (2014) tested the effect of exchange rate volatility on FDI in Ghana by employing a Vector Autoregressive (VAR) model. The study first demonstrates theoretically that nominal interest rate volatility can simultaneously lead exchange rate and affect the foreign investment. It then provides a detailed empirical illustration that looks at the long- and short-run movement of exchange rate volatility, interest rate volatility and foreign direct investment by using the Vector Error Correction model. Here, the study establishes that the stability of the exchange rates and interest rates in the country helps to improve the level of foreign direct investment inflows. On top of that, the study explained that the interest rate indirectly affects the FDI, but it directly has an impact on the exchange rate and the attractiveness of the market, which then affects the FDI in the long-run. Therefore, the study concluded that the exchange rate and interest rate stabilisation policies should be implemented.

Fornah and Yuehua (2017) investigated the influence of interest rates and other determinants on foreign direct investment in Sierra Leone during the period 1990-2016. Adopting the Ordinary Least Square method for the analysis, the results showed that interest rates have a significant impact on FDI inflows and hence can be used for policymaking purposes. Furthermore, the research revealed that trade openness and GDP growth are the major factors that affect FDI in Sierra Leone. Khan et al. (2018) investigated the relationship between FDI, imports and export in Pakistan during the period from 1978 to 2016, by using the annual time series data. For a better understanding of the objective of the study, statistical analysis was first of all conducted to find out the relationship between FDI and its impact on the selected macroeconomic factors (imports and export). For them to analyse the data, the Vector Auto Regression Model (VAR) and (ARDL) was employed for the short- and long-run relationship. However, the study revealed that there is a long-term relationship between FDI and export, while a short-term relationship exists between FDI and imports. To give evidence to the outcome of the VAR model, an additional post diagnostic test was conducted, and they were able to conclude that the regressions have a normal distribution and show a strong correlation between the three variables. Besides, Santi and Wisit (2017) studied the interactions and effects between Imports-exports (international trade) and foreign direct investment in 29 OECD and 6 ASEAN countries from 1980 to 2004, by employing the gravity model approach. They found a positive and statistically significant relationship between international trade and investment, which is consistent with expectations. On top of that, the study detailed that there exists a strong correlation from international trade to FDI inflows, compared to the correlation from FDI inflows to international trade. Therefore, the feedback effect investigation suggested that there is a presence of a bi-directional relationship between the two variables, and the empirical result recommended that if trade creation results from economic integration, regionally or bilaterally, there will be an increase in FDI inflows between trading partners.

Rahman (2011) investigated the relationship between FDI and international trade in Bangladesh during the period from 1972 to 2007. The econometric methods employed are the Johansen LR co-integration test and

the multivariate Granger causality. Indeed, the first test found that there is a co-integration between the variables, while the second one revealed that FDI caused import, but causality in other directions between these and another variable is not identified. However, for Bangladesh, FDI does not cause export enhancement and the necessary trade and investment policies are needed to profit such FDI for economic growth in general and trade particularly. To find the reason behind the weak performance of Ethiopian's private investment, Sisay (2010) conducted a study on the performance trend and main constraints of private investment in Ethiopia. Thereby, motivated by the modified version of the Flexible Accelerator Model of Investment, the empirical investigation used the multivariate single equation ECM estimation methodology on integrated of order one, within the period 1950 - 2003. After testing, the study revealed that, the Ethiopian's private investment is positively impacted by domestic market, return to capital, trade openness and liberalization measures, infrastructural facilities and FDI, but it was negatively affected by the government activities, macroeconomic uncertainty and political instability.

Bosede et al. (2013) investigated the impact of transportation infrastructure improvement on the economic growth of Nigeria during the period 1981-2011, by using the Ordinary Least Square Regression (OLS) technique. The study revealed that transport output and investment made on transport infrastructure in Nigeria has a significant positive contribution to growth, which shows that each impact is statistically significant and strong. Therefore, the study recommended that an economic policy, which will improve the transport infrastructure and investment made in this sector for sustainable economic growth, should be designed. Khurriah and Istifadah (2019) tested the role of infrastructure in Indonesia's economic growth. The study used a growth model derived from aggregate production functions and the generalized method of moment (GMM) estimation techniques to estimate public infrastructure capital as explanatory power in the model. By using infrastructures like roads, energy, water and telecommunication from 34 provinces of Indonesia during the period 2011-2017, the test showed the evidence that water and telecommunication have a positive contribution to economic growth with different values, while road infrastructure is showing a negative effect. Nevertheless, the negative result still means road infrastructure is good. Again, the study showed that the problem could be explained through the U-shaped infrastructure and investment growth relationship which gives a sign of crowding out the effect of private capital if the infrastructure investment is dominant.

Toader et al. (2018) conducted an empirical study about the impact of Information and Communication Technology (ICT) infrastructure on the economic growth of the European Union (EU) countries for 18 years (2000-2017). Using panel data estimation techniques, they investigated how various indicators of ICT infrastructure influence the economic growth. The result indicated that the use of ICT infrastructure exerts a positive and strong impact on the economic growth of EU members states, but the magnitude of the effect depends on the type of technology examined. Qiying (2020) also conducted empirical research on the investment performance of information and communication technology in China. However, by introducing a partial dynamic adjustment model and selecting the panel data of China during the period from 2001 to 2016, the study aimed to study how China's investment in ICT influences its economic growth. The study revealed that such investment has significantly promoted the economic growth of China. Besides, by using Johansen cointegration test, Mohsen (2015) found that investment is positively and significantly related to the trade openness, GDP and population in Syria over the period 1980-2010..

### **3. DATA AND METHODOLOGY**

To achieve the objective of this study, the investment model will be developed to test the effect of external debt, infrastructure, imports, and inflation on the investment in Cote d'Ivoire. Annual time series data over the period 1980-2020 will be used in this study. The data are obtained from the World Bank (WB). The investment model is presented as follows:

$$\ln\text{GFCF} = \beta_0 + \beta_1\ln\text{EXD} + \beta_2\ln\text{TL} + \beta_3\ln\text{IMP} + \beta_4\ln\text{INF} + \varepsilon_t \quad (1) \text{ where } \beta_0$$

is the intercept,  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$ , and  $\beta_4$  are the slope coefficients,  $\ln\text{GFCF}$  is the natural log of gross fixed capital formation (USD),  $\ln\text{EXD}$  is the natural log of external debt (USD),  $\ln\text{TL}$  is the natural log of communication facilities as an indicator to the infrastructure (number of telephone lines),  $\ln\text{IMP}$  is the natural log of imports (USD),  $\ln\text{INF}$  is the natural log of GDP deflator as an indicator to the inflation, and  $\varepsilon_t$  is the error term.

Because this study involves time series data, it is necessary to begin the analysis with the unit root tests. Augmented DickeyFuller (ADF) unit root tests will be conducted on each variable in the model to find out whether the time series data are stationary at the level or first difference. After testing for stationarity and confirming the order of integration of each time series, and if the variables in the model are found to be integrated of the same order, the Johansen cointegration test will be applied to establish whether there is any long-run or equilibrium relationship between the variables in the model. If the variables are cointegrated, then the Granger causality tests will be conducted based on the VECM to determine the long and short run causality relationships among the variables in the model. However, if the Johansen test results indicate no cointegration among the variables in a particular model, then the Granger causality tests will be based on the VAR model. On the other hand, Ordinary Least Squares (OLS) model will be used in this study to estimate the coefficient of the variables, and it will be subjected to a number of statistical diagnostic tests, namely, the normality, serial correlation, and heteroscedasticity tests to ascertain its statistical adequacy. Lastly, stability test based on the cumulative sum (CUSUM) will be applied to determine whether the parameters of the model are stable over the period of the study.

**4. EMPIRICAL OUTPUTS**

In the first step of the analysis, we have carried out the ADF unit root test to determine whether the variables in the model are stationary or non-stationary. Table 1 below shows that all the variables in the model are not stationary at the level, but became stationary after first differencing at the 1% or 5% level of significance. Hence, all the variables in the model are integrated of order one, or I(1).

**4.1. Johansen Cointegration Test Results**

Since all the variables are stationary in the first difference, we can apply the Johansen multivariate cointegration test to determine if there is any cointegration or long-run equilibrium relationship between the variables in the model. However, before running the cointegration test we need to run the VAR model first to determine the optimal lag length, which is 4 based on the minimum AIC.

After having determined the optimal lag length, we then proceeded with the cointegration test for the model. Table 2 indicates that there are at most five cointegration equations based on the trace test and maximum eigenvalue test. In other words, the results reveal that there is more than one long-run relationship among the variables in the system comprising lnGFCF, lnEXD, lnTL, lnIMP, and lnINF.

**Table 1: ADF Unit Root Test Results**

	Level			First Difference		
	Intercept	Trend and intercept	No trend & no intercept	Intercept	Trend and intercept	No trend & no intercept
lnGFCF	0.026770	-2.436989	0.532757	-4.342368**	-4.532736**	-3.635942**
lnEXD	-2.154991	-2.533428	0.603524	-2.625712	-2.8263083	-2.654163**
lnTL	-1.512498	-0.932021	2.771278	-6.352105**	-6.910282**	-2.735901**
lnIMP	-0.164692	-3.267449	1.123346	-4.734247**	-4.840098**	-4.786207**
LnINF	-0.933028	-2.521013	3.236235	-4.143721**	-4.135062**	-3.337543**

Note: \*\* denotes significance at the 1 percent level, and \* at the 5 percent level.

**Table 2: Johansen Cointegration Test Results**

No. of CE(s)	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
r = 0	324.7054**	0.0001	182.0366**	0.0001
r ≤ 1	225.6528**	0.0000	75.26038**	0.0000
r ≤ 2	65.9004**	0.0000	32.73595**	0.0006
r ≤ 3	32.00264**	0.0003	16.99606*	0.0231
r ≤ 4	13.20633**	0.0007	14.06943**	0.0060

Note: \*\* denotes significance at the 1 percent level, and \* at the 5 percent level.

**4.2. Ordinary Least Squares (OLS) Model Results**

After having found a cointegration relationships among the variables lnGFCF, lnEXD, lnTL, lnIMP, and lnINF, so now it can estimate the coefficient of the variables using ordinary least square (OLS) model. Table

3 shows that lnGFCF is positively and significantly related to lnTL, lnIMP and lnINF, but it is related negatively and insignificantly with lnEXD. Besides, R-squared, which indicates how much of the total variation of the dependent variable can be explained by the independent variables, is 86.6% which is more than 60%, then the date of this model is fitted strongly. Besides, F-statistic is used to test if the independent variables jointly influence the dependent variable, and we found the probability of F-statistic is 0.000, which is less than 5%. Hence, F-statistic is significant, which means that all independent variables (lnEXD, lnTL, lnIMP and lnINF) jointly affect the dependent variable (lnGFCF).

**Table 3: OLS Model Results**

Independent Variables	Coefficient	Prob.
lnEXD	-0.031583	0.8675
lnTL	0.846582**	0.0004
lnIMP	1.115300**	0.0000
lnINF	0.967688*	0.0160
c	3.208524	0.5777
Dependent Variable	lnGFCF	
R-squared	0.866725	
F-statistic	55.27775	
Prob(F-statistic)	0.000000**	

Note: \*\* denotes significance at the 1 percent level, and \* at the 5 percent level.

From Table 3, the long-run lnGFCF equation can be written as:

$$\ln GFCF = 3.208 - 0.031 \ln EXD + 0.846 \ln TL + 1.115 \ln IMP + 0.967 \ln INF \quad (2)$$

The cointegration equation given by equation (2) above shows a negative and insignificant relationship between external debt and investment in Côte d'Ivoire, which indicates that the borrowed resources were misallocated or wasted in inefficient way. The continued negative and insignificant effect of external debt will reduce the country's ability to service its debt in future. Besides, the expansion in external debt poses significant negative connotations for investment, fiscal sustainability, economic growth and poverty reduction in case of poor debt management capacity. Our finding is in line with the result of Adamu (2018). However, telecommunication infrastructure plays a vital role in the development of the Ivorian investment activities, in the sense that good infrastructures will enhance the economic growth of the country. If the country has a good economy, this will create an attractive investment environment, and therefore local and foreign direct investment will increase. This result is similar to the results obtained by Khurriah and Istifadah (2019) and Toader et al. (2018). Imports also play an important role in improving the investment in Côte d'Ivoire through supporting the country's needs of investment goods and services such as machinery and new technology, which help in increasing country's productivity and motivating producers to improve and increase their production. Similar results were also borne by Santi and Wisit (2017) and Khan et al. (2018). Besides, inflation has a positive impact on the development of investment activities in Côte d'Ivoire. Indeed, when goods and services are produced, if there are traded at good prices, this will encourage investors to continue investing and even improve the quality and quantity of what they produce. The rise in prices could be more favourable to businesses because they are always seeking for maximising their profit. Our result agrees with Onwe and larenwaju (2014).

#### 4.3. Statistical Diagnostic Tests Results

In order to check the model adequacy, it is essential to subject the model to a number of diagnostic tests, namely, the normality, serial correlation, and heteroskedasticity test. A 5% level of significance will be used in this study. From Table 4, it is clear that the model does not have serial correlation or heteroscedasticity, and the series are normally distributed as well, because the computed P-value is greater than 5% significance level.

**Table 4: Diagnostic Tests Results**

Normality Test	Serial Correlation LM Test	Heteroskedasticity (ARCH) Test
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0.551126	22.96317	13.17225
(0.759145)	(0.1022)	(0.2031)

Based on the results that we got, we can say that the model is the Best Regression Model because R square value is high, Prob (F-statistic) is significant, residuals are normally distributed, and no serial correlation or Heteroskedasticity in the residual.

**4.4. Granger Causality Tests Results**

Since the variables in the model are cointegrated, the Granger causality tests based on the VECM are used to examine the short- and long-run causality relationships among the variables in the model. The F-test results show the significance of the short-run causal effects, while the significance of the coefficient of the lagged error correction term [ect(-1)] shows the longrun causal effect.

The Granger causality test results based on the VECM are shown in Table 5. It is clear that there are no short-run causality relationships between the variables. However, there are bidirectional long-run causality relationships between lnGFCF, lnEXD and lnIMP, and unidirectional long-run causality relationships running from lnTL and lnINF to lnGFCF.

**Table 5: Granger Causality Test Results**

Dependent Variables	Independent Variables					
	$\Sigma\Delta \ln\text{GFCF}$	$\Sigma\Delta \ln\text{EXD}$	$\Sigma\Delta \ln\text{TL}$	$\Sigma\Delta \ln\text{IMP}$	$\Sigma\Delta \ln\text{INF}$	ect(-1)
$\Delta \ln\text{GFCF}$	-	0.372498	-0.291491	-0.223254	0.660018	-0.38403**
$\Delta \ln\text{EXD}$	-0.254048	-	-0.005128	0.665610*	0.496461	0.17425*
$\Delta \ln\text{TL}$	-0.203577	-0.034818	-	0.226029	0.170135	0.07211
$\Delta \ln\text{IMP}$	0.165282	0.396193**	-0.057996	-	0.610669**	-0.35450**
$\Delta \ln\text{INF}$	0.126221	-0.041379	0.001963	-0.298196	-	0.00161

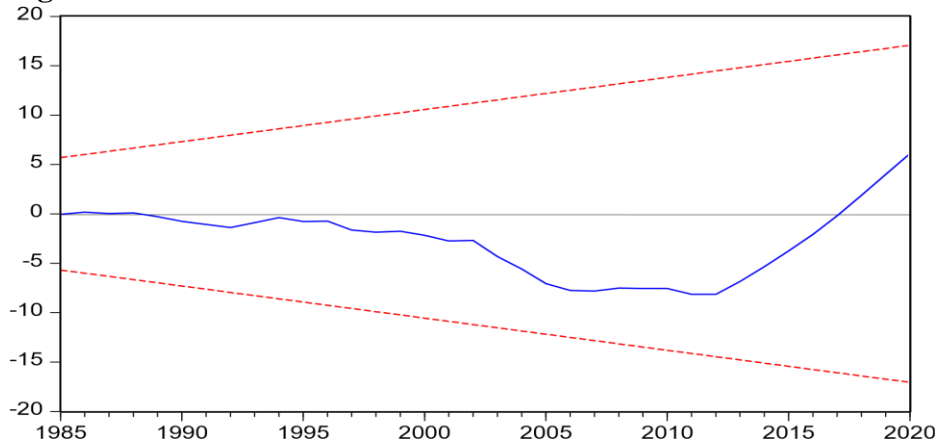
Notes: \*\* denotes significance at 5 percent level and \* at 10 percent level.

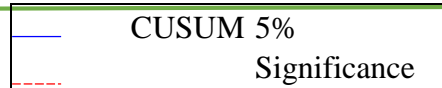
Based on the results that we got, we can say that the model is the Best Regression Model because R square value is high, Prob (F-statistic) is significant, residuals are normally distributed, and no serial correlation or Heteroskedasticity in the residual.

**4.5. The Stability Test Result**

CUSUM statistic is used in determining the parameter stability of the model in this study. The decision about parameter stability is based on the position of the plots relative to the 5 % critical bounds. If the plots of the CUSUM statistic stay within the area in the two critical lines, then the parameters of the model are stable throughout the study. Figure 1 indicates that the position of CUSUM plots stay within the area in the two critical lines, which means there are no structural changes in the model.

**Figure 1: CUSUM Test Results**





## 5. CONCLUSION AND IMPLICATIONS

This study investigated the effect of external debt, communication infrastructures, importing and inflation on the investment in Côte d'Ivoire, using annual time series data from 1980 to 2020. The ADF unit root test, Johansen cointegration test, OLS model, Granger causality test based on the VECM, and lastly CUSUM test, were applied in this study.

The ADF unit root test results indicated that all variables in the model are not stationary at the level but became stationary after first differencing. The Cointegration test pointed to a significant long-run relationship among the variables. Besides, the results of OLS model showed that investment is positively and significantly related with communication infrastructures, importing and inflation, but it is related negatively and insignificantly with external debt. The Granger causality test shows that there are no short-run causality relationships between the variables. However, there are bidirectional long-run causality relationships between investment, external debt and importing, and unidirectional long-run causality relationships running from communication infrastructures and inflation to investment. Lastly, CUSUM test indicated that there are no structural changes in the model.

Based on the results of this study, external debt should be using properly by the Ivorian government to support the local economy through improving the infrastructure and creating an attractive investment climate, which motivates the local and foreign investment in the country. Furthermore, based on the vital role of importing as an important source to supply the production activities with machines and new technology, the government should remove or reduce most tariff and nontariff barriers, which will be reflatd positively on the investment and economic growth in the country. Government should also promote investment by reducing corruption and encouraging private sector by making funds available for those young entrepreneurs as well as small and medium enterprise to help them in expanding their businesses.

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