# THE IMPACT OF IMPORT-EXPORT ON ECONOMIC GROWTH IN MADAGASCAR

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*Abstract: This study investigates the causal relationship between import-export and economic growth in Madagascar by applying Johansen co-integration test and VAR causality model for annual time series data over the period 1975-2017. Based on the findings, import and export can lead to growth of the Malagasy economy. The test of co-integration indicated that there is absence of long run relationship between the variables. According to VAR causality mode, import and export have a unidirectional short run causal effect on economic growth during the studied period. The government should review the planning of trade policies and promote export due to negative trade balance of the country.*

**JEL classification:**

**Keywords**: *economic, export, growth, import, Madagascar.*

## 1.    INTRODUCTION

Madagascar is a country open to the world market where trade accounts 75 percent of GDP including 39 percent for import of goods and services, and 36 percent for export of goods and services in 2017 (World bank database 2019). This ranks the country 135th largest importer and 116th largest exporter in the world (OEC 2019). Madagascar export is dominated by vanilla and clove products which are exported to France, United state of America, Germany and china. The country imports rice from Pakistan, India, Myanmar and Thailand, and petroleum from United Arab Emirates, Kuwait, Saudi Arabia and India (Trademap database 2019).

Economic and social policy aims to improve economic situation of a country. Among the main objectives set out in this policy are production growth and equilibrium of foreign trade which hold important position in both closed and open economy. On the other hand, extroverted growth promotes rapidly an economy of scale provided that the country concerned knows how to control its external constraints. Madagascar has oriented towards an extroverted economic policy by taking growth as an indicator based on export, without abandoning the import of investment goods. Though, trade flows are generally recorded in the trade balance, which has been negative since its independence in 1960, trade is considered as an important issue for the economic development.

This paper attempt to observe the hypothesis if import can lead to growth or export can lead growth. In order to achieve this objective the paper is structured as follows: section 2 review previous work, section 3 present data and methodology, section 4 analyze the result and discussion, and the final section sum up the study.

## 2.    PREVIOUS WORK

The concept of trade has attracted a great interest for university researchers. In recent years, a large number of studies have reviewed the contribution of import, export and economic growth. Some researchers have supported a positive and significant relationship between:

-        import and economic growth/vice versa,

-        export and economic growth/vice versa,

-        Both import-export and economic growth,

Mogoe and Mongale (2014) highlighted the impact of international trade on economic growth: Empirical evidence from South Africa for a quarterly data from 1990Q1-2013Q2 employed vector error correction approach. The results confirmed that export has a positive effect on economic growth and import has a negative effect.

El Alaoui (2015) considered VECM granger causality to establish the causal impact of export, import on economic growth in Morocco and found unidirectional causality from export to import, and bidirectional causality between economic growth and import, and no causality between economic growth and export.

In Madagascar, Seraphin and Yinguo (2015) have found a positive and significant impact on economic growth between 1983 and 2013.

Vardari (2015) examined the association  between import, export and economic growth for Kosovo, country located in South Eastern Europe, for the period of 2004-2014 using Granger causality model. The study found two ways causality between export and GDP growth, and one way causality from import to GDP.

Ucan et al. (2016) found evidence of unidirectional causality running from export to Turkish economy and no evidence of causality between import and GDP growth in their study.

Akter and Bulbul (2017) studied the import led growth and export led growth hypothesis  of eight developing  countries  as  Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan and Turkey using VAR and VECM approach for annual data 2001-2015. They empirically found that Bangladesh and Nigeria support both hypotheses, growth led import in Turkey, growth led export in Egypt, Indonesia, and Malaysia, and finally no hypothesis in Iran, and Pakistan.

Ali et al (2018) employed  vector auto regression techniques based on Granger  Causality  test  to determine  the  causality  between  import, export  and  economic  growth in Somalia. Their findings indicated that there is no evidence of directional causality between import and GDP but found unidirectional causality running from export to GDP growth. Their study support export led growth hypothesis.

Guntukula (2018) evaluated the dynamics of the link between exports, imports and economic growth in India applying Granger causality test for April 2005 to March 2017.  They found bidirectional causality running between export as well as import and economic growth.

Fannoun and Hassouneh (2019) explored  the  relationship between  exports,  imports,  and economic  growth  in Palestine  using  data  from  2000  to 2018.  They applied  Johansen approach and VECM. The analysis revealed the existence of bidirectional relationship between the variables in the long run. For the short run causality, export does not influence growth while import has unique way causality to economic growth.

Miyan and Biplob (2019) analyzed  the  nexus  between  exports,  imports  and  economic  growth in  Bangladesh  using  Johansen co-integration  test  and  VECM  causality  model  for  the

annual data period of 1981 to 2017. They found unidirectional short run causality from export to economic growth and from economic growth to import.

## 3.    DATA AND METHODOLOGY

This paper used annual time series data covering a sample size of 43 observations (1975-217). Secondary data were collected from by the World Bank through the publication of world development indicator (WDI 2019). To achieve the objective of this study, following steps was employed. Test each variable for stationarity or unit root using Augmented Dickey-Fuller test (1979) and Phillips Peron test (1988) whether the variables are integrated or not in order at first difference. Select the optimum lag number through the unrestricted VAR model. Determine Johansen maximum likelihood developed by Johansen and Juselius (1990) for cointegration test using optimal lag selected by the criterion to test if the variables are cointegrated or not between them. The vector auto-regression (VAR) model will be launched to ascertain the short run effect of import and export on economic growth and perform some diagnostics using both residual and stability diagnostics. Finally, pairwise granger causality test is employed to determine the direction of causality between the variables.

The empirical model can be specified as follow:

$$GDP_t = f(M,X)_t \tag{1}$$

Finally, the empirical model will be employed as follows:

$$ln(GDP)_t = \beta_0 + \beta_1 ln(M)_t + \beta_2 ln(X)_t + \varepsilon_t \tag{2}$$

Where:

GDP= gross domestic production;

M= import of goods and services;

X= export of goods and services;

$\beta_0$= indicates constant term;

$\beta_1$ and $\beta_2$ =indicate coefficient of variable independent to be estimated;

$\varepsilon$= error term;

t= time trend from 1975 to 2017;

## 3.    RESULT AND DISCUSSION

### 3.1.    Unit root test

Both ADF and PP in table 1 show that all the variables are not stationary in the level form I (0) because the absolute value of t-statistic for each variable is lower than the absolute value of critical value at 5 percent of significance. The null hypothesis cannot be rejected at level form I (0). In fist difference I (1), all the variables are stationary because the absolute value of t-statistic for each variable is greater than the absolute value of critical value at 5 percent level of significance. This implies that the variables are integrated at first order difference I (1).

**Table 1: Unit root test (ADF, PP)**

| Variables | Augmented Dickey fuller (ADF) | | Phillips Perron (PP) | | Order of integration |
|---|---|---|---|---|---|
| | I(0) | I(1) | I(0) | I(1) | |
| lnGDP | -0.250662 | -7.056222 | -0.250662 | -7.058557 | I (1) |
| lnM | -0.619360 | -6.103681 | -0.572462 | -6.107668 | I (1) |
| lnX | 0.827448 | -6.689868 | 0.950787 | -8.625554 | I (1) |

### 3.2.    Lag order selection criteria

We use Schwarz information criterion (SC) to determine the optimal lag length. The result in table 2 indicates that the optimum lags selected is lag 1. This optimum lag will be used to run Johansen cointegration test and Vector autoregressive Model test as well.

**Table 2: Lag selection criterion**

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | -14.51475 | NA | 0.000493 | 0.898192 | 1.026159 | 0.944106 |
| 1 | 73.04611 | 157.1605 | 8.79e-06 | -3.130570 | -2.618704* | -2.946917* |
| 2 | 80.56914 | 12.34549 | 9.57e-06 | -3.054828 | -2.159064 | -2.733435 |
| 3 | 94.65661 | 20.95059* | 7.55e-06* | -3.315723* | -2.036061 | -2.856591 |
| 4 | 100.6880 | 8.041889 | 9.19e-06 | -3.163488 | -1.499927 | -2.566617 |

### 3.3.    Johansen maximum likelihood co-integration test

Both trace and maximum eigen statistics observed in table 3 show that the statistic value of trace and max eigen is lower than the critical value. The null hypothesis that there is no co-integrating equation is accepted against the alternative hypothesis. Thus, there is no evidence of long run co-integrating relationship among the variables in this model.

**Table 3: Unrestricted Cointegration Rank Test**

| Hypothesized No. of CE(s) | Trace | | Maximum eigenvalue | |
|---|---|---|---|---|
| | Trace Statistic | 0.05 Critical Value | Max-Eigen Statistic | 0.05 Critical Value |
| None | 28.80020 | 29.79707 | 16.87878 | 21.13162 |
| At most 1 | 11.92142 | 15.49471 | 11.42133 | 14.26460 |
| At most 2 | 0.500090 | 3.841466 | 0.500090 | 3.841466 |

### 3.4.    Estimation of VAR model

The result in table 4 shows that both import and export has a positive effect on economic growth but not statistically significant.

**Table 4: VAR short run**

| | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| lnGDP(-1) | 0.547428 | 0.141239 | 3.875891 | 0.0004 |
| lnM(-1) | 0.148012 | 0.117106 | 1.263915 | 0.2140 |
| lnX(-1) | 0.148340 | 0.101606 | 1.459955 | 0.1525 |
| Constant | 3.922386 | 1.405545 | 2.790652 | 0.0082 |

### 3.4.1.    Residual diagnostic test

The analysis of residuals has been conducted by using three tests such as: serial correlation LM, heterodasticity, and normality. The probability value of these three tests is above 0.05 percent level of significance respectively from this model. We can conclude that residuals are not serially

correlated (table 5), residuals are homoscedastic (table 6) and residuals are normally distributed (figure 1).

**Table 5: Breusch-Godfrey Serial Correlation LM Test**

| F-statistic | 2.959965 | Prob. F(2,36) | 0.0645 |
|---|---|---|---|
| Obs*R-squared | 5.931238 | Prob. Chi-Square(2) | 0.0515 |

**Table 6: Heteroskedasticity Test: Breusch-Pagan-Godfrey**

| F-statistic | 0.152988 | Prob. F(3,38) | 0.9271 |
|---|---|---|---|
| Obs*R-squared | 0.501223 | Prob. Chi-Square(3) | 0.9186 |
| Scaled explained SS | 0.298179 | Prob. Chi-Square(3) | 0.9604 |



Series: Residuals
Sample 1976 2017
Observations 42

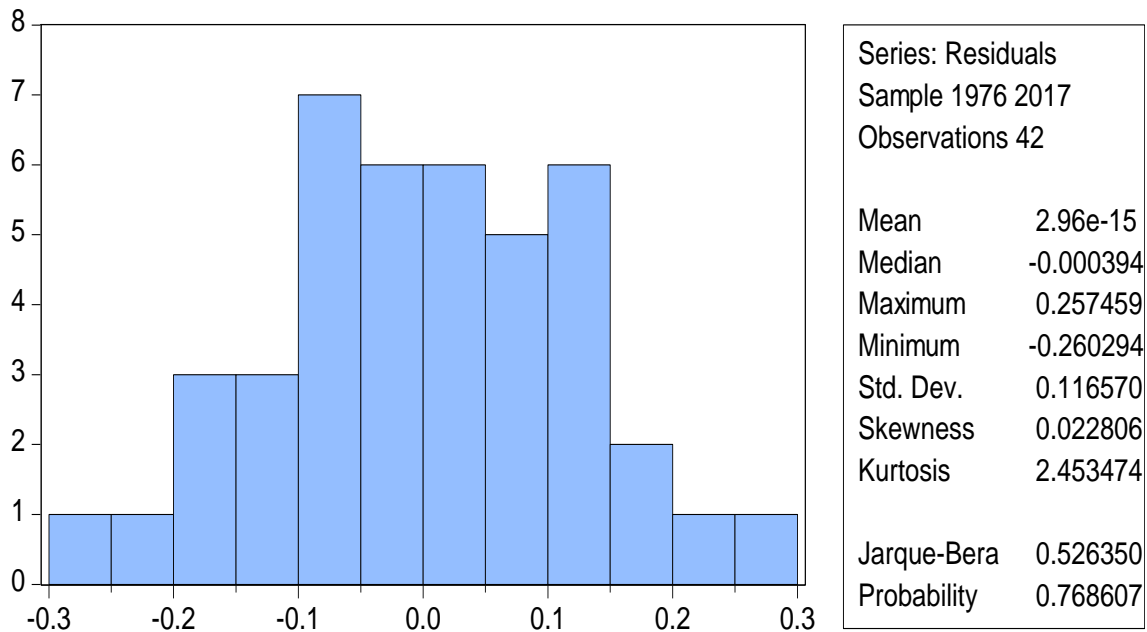| | |
|---|---|
| Mean | 2.96e-15 |
| Median | -0.000394 |
| Maximum | 0.257459 |
| Minimum | -0.260294 |
| Std. Dev. | 0.116570 |
| Skewness | 0.022806 |
| Kurtosis | 2.453474 |
| Jarque-Bera | 0.526350 |
| Probability | 0.768607 |

**Fig. 1- Histogram of normality test**

### 3.4.2.  Stability diagnostic test

From the figure below, the model is dynamically stable at 5% significance level using cumulative sum (CUSUM test) and cumulative sum of squares (CUSUMSQ test) because trend line lies within the boundaries.
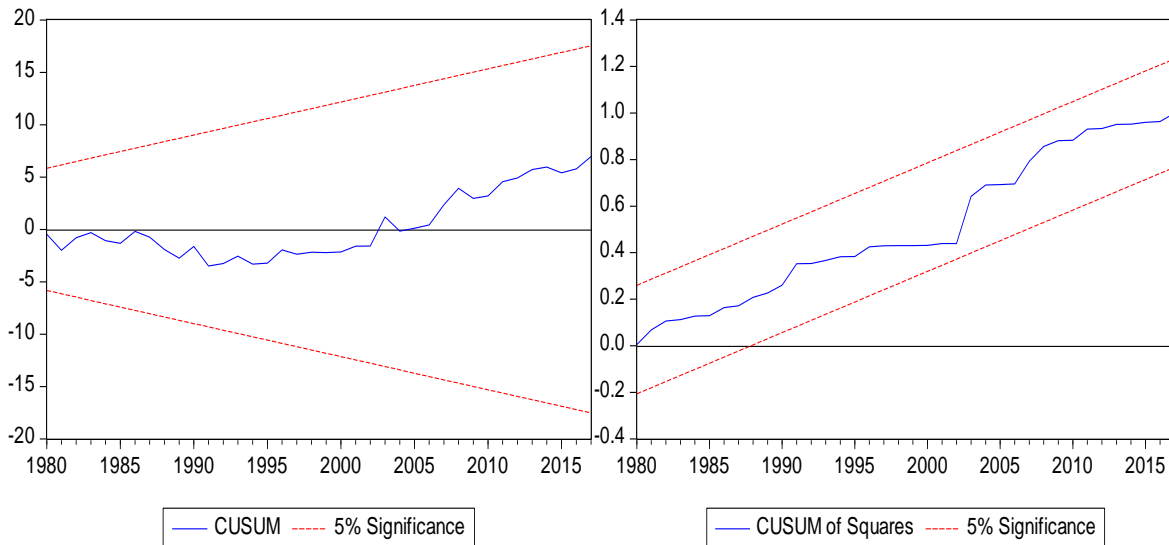
**Fig. 2- Plot of cusum and cusumsq**

### 3.4.3.  Granger causality test

The causality test indicates that import does granger cause GDP because the p-value is lower than 0.05 percent. In addition, export does granger cause GDP because the p-value is also lower than 0.05 percent. This indicates that there is unidirectional causal effect running from import to GDP and export to GDP at the 5 percent level of probability.  There is no evidence of direction causality towards GDP to import and export as well.

**Table 7: Pairwise granger causality**

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| LNM does not Granger Cause LNGDP | 41 | 5.31900 | 0.0095 |
| LNGDP does not Granger Cause LNM | | 0.08922 | 0.9148 |
| LNX does not Granger Cause LNGDP | 41 | 7.47188 | 0.0019 |
| LNGDP does not Granger Cause LNX | | 0.33818 | 0.7153 |

### 4.    CONCLUSION

The purpose of this study was empirically investigating the impact of import and export on economic growth in Madagascar. for the period of 1975 to 2017 time series data using Augmented Dickey fuller test, Phillips Peron test,   lag   section   criterion,   Johansen   co-

integration test, vector auto-regression model (VAR) and Granger causality. The findings result that there is no long run causality between import, export and economic growth. However, in the short run, import-export has a positive causal relationship towards GDP in Madagascar but not vice versa.

Our findings support import led growth and export led growth hypothesis. Consequently, the economy of Madagascar is mostly dependent on import and export. These results would help the policy makers, internal and external investors of Madagascar in their decision making. Finally, this study suggests that the government should review the planning of trade policies and promote export due to negative trade balance of the country.

**CONFLICTS OF INTEREST AND PLAGIARISM:** The authors declare no conflict of interest and plagiarism.

## REFERENCES

1.  Akter M. and Bulbul Md. N., (2017). Comparative analysis between export-led growth and import-led growth: a study on Developing Eight (D-8). *International Journal of Economics, Finance and Management Sciences*,vol.5,no.4,pp.204-212.doi: 10.11648/j.ijefm.20170504.11

2.  Ali A. A., Ali A. Y. S. and Dalmar M. S. (2018). The impact of imports and exports performance on the economic growth of Somalia. *International Journal of Economics and Finance*, vol. 10, no. 1; pp. 100-119.

3.  Dickey D. and Fuller W. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, vol. 74, no. 3, pp. 427-431, 1979.

4.  El Alaoui A., (2015). Causality and cointegration between export, import and economic growth: evidence from Morocco. *Journal of World Economic Research*. vol. 4, no. 3, pp. 83-91. doi: 10.11648/j.jwer.20150403.14

5.  Fannoun Z. and Hassouneh I. (2019). The causal relationship between exports, imports and economic growth in Palestine. *Journal of Reviews on Global Economics*, vol. 8, pp. 258-268.

6.  Guntukula R. (2018).   Exports, imports and economic growth in India:  evidence from cointegration and causality analysis. *Theoretical and Applied Economics*, vol. 25, no. 2, pp. 221-230.

7.  Johansen S. and Juselius K. (1990). Maximum likelihood estimation and inference on co-integration with application to the demand for money, *Oxford Bulletin of economic &statistics*, vol. 52, pp. 169-210.

8.  Miyan, Md.S. and Biplob, Md.N.K. (2019). Revisiting exports, imports and economic growth nexus: empirical evidence from Bangladesh (1981- 2017). *Modern Economy*, vol. 10, pp. 523-536.

9.  Mogoe S. and Mongale I. P. (2014). The impact of international trade on economic growth in South Africa: an econometrics analysis. *Mediterranean Journal of Social Sciences*, vol. 5, no. 14, pp. 60-66.

10. Phillips P. C. B. and Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, vol. 75, no. 2, pp. 335-46.

11. Seraphin T. and Yinguo D. (2015). Impact of export on economic growth in Madagascar. *International Journal of Economics, Commerce and Management United Kingdom*, vol. 3, no. 7, pp. 136-156.

12. Ucan O., Akyildiz A., and Maimaitimansuer M. (2016). The Relationship between export and economic growth in Turkey. *European Scientific Journal*, pp. 61-70.

13. Vardari L. (2015). Relationship between import-exports and economic growth: the kosova case study. *REFORMA*; vol. 2, pp. 262-269.