

Government budget control under the period of inflation: Evidence from Madagascar

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Abstract: Madagascar is rich in resource undermine, maritime and natural but have been experiencing Inflation now for more than four decades. Many studies and papers talk about the relationship between Inflation and Budget Deficit. This paper seeks to test the hypothesis that budget control explicated by the budget deficit cause inflation in Madagascar with some variable economically affect the inflation such as Gross Domestic Product, exchange rate, Money supply, budget deficits and political crises that is during a thirty-three years period: from 1981 to 2014. The methodology employed for estimating long-run relationship is Augmented Ducky Fuller test for a stationary data then cointegration analysis, with undertaking Granger causality tests. The findings of the study are Malagasy Budget control is not inflationary and the inflation didn't explain the budget control. But the variable that cause the inflation in Madagascar are the Political Crises and Money Supply

Key words: Budget Control, Budget deficit, Government Budget, Gross Domestic Product, Inflation, Madagascar

I. Introduction

Inflation remains one of the major parameters that disrupt the economy of a country. Indeed, inflation today is the source of the high cost of living characterized in particular by the general increase in market prices and declining purchasing power.

Inflation in an open economy can be influenced by both internal and external factors. Internal factors include, among others, the government budget Control, monetary policy and structural regime changes (revolution, political regime changes, etc.). External factors include terms of trade and foreign interest rate, as well as, the attitude of the rest of the world (sanctions, risk generating activities, wars, etc.) toward the country.

Talking about government budget, as we know, its major components are the revenues and expenditures. Then, the difference between the government revenues and expenditures called the government budget balance. A positive balance is a government budget surplus and the negative one is the government budget deficit. Government budget deficit is also due to a weak of government control in the sense that government control is to manage the spending activities. The relationship between budget deficit and macroeconomic variables such as inflation rate represents one of the most widely debated topics among economists and policy makers in developed, developing underdeveloped countries such as Madagascar. For this due, I have chosen to focus my study on the "Budget Deficit" whence my topic "Government budget control under the period of inflation--Evidence from Madagascar".

Review on the existing literature related on our study will be developed on the second part and will be divided in two subtitles by countries' development. The third section is about methodologies using and used. Empirical finding is in the fourth section and at the last is the conclusion with some recommendations.

II. Background research

As my study concern the budget government control under inflation; unfortunately we can't find some literature review about it so my background will focus on budget deficit and inflation.

Some theoretical literature concerning the budget deficits and inflation is assigned to the familiar classical quantitative theory of money. As budget deficits tend to be financed through money creation by financing from the central bank, it is estimated that over the money supply creates an excess demand and results in increase in the price level. As a conclusion of the monetarist framework, the proposal that budget deficits are inflationary was tested time and again. But, the empirical evidence on the relationship between budgetary deficits and inflation is not consistent.

Generally, there is substantial literature on this topic for the developed countries, especially for the United States. However, the evidence is quite limited for developing and underdeveloped countries, in particular, the African countries.

Then we will divided this part in two; first the background about developed countries and the second one will be the developing and underdeveloped countries

1.1 Developed countries:

Talking about the developed countries;

- i. As for the United States, Niskanen (1978); Hamburger and Zwick (1981); Dhakal et al. (1994) present evidence supportive of the effects of budget deficits on inflation. Whereas Dwyer (1982), Karras (1994), Abizadeh and Yousefi (1998) find no connection between budget deficits and inflation.
- ii. Hondroyiannis and Papapetrou (1994) suggest that there is a long-run relationship between government budget and price level and support the hypothesis of a bi-directional causality between the two variables. The analysis is employed in analyzing the government budget-inflation relationship in Greece. On one hand, Protopapadakis and Siegel (1987) found no evidence between the government debt
- iii. Rahman et al. (1996) present an empirical evidence by giving conclusion to long run and short run unidirectional Granger causality from budget deficits to real exchange rates, and from real exchange rates to inflation rates
- iv. Dwyer (1982), Brown and Yousefi (1996), Abizadeh and Yousefi (1998) concluded that there is no connection between budget deficits and inflation
- v. By studying Greece's data for a thirty-three years period (1960-1992), Hondroyiannis and Papapetrou (1994) provide the results that there was a long run relationship between government budget and price level and supported the hypothesis of a bi-directional causality between the two variables.
- vi. Analyzing the case of Turkey, Metin (1995) found that fiscal expansion was a determining factor for Turkey's inflation.

1.2 Developing and Underdeveloped countries:

Concerning the developing and underdeveloped countries;

- a. Aghevli and Khan (1978) found a positive relationship between inflation and budget deficit. Chang (1994) concludes that fiscal deficits caused slight inflation due to the issue of public bonds in Taiwan. In Turkey, Metin (1998) shows that budget deficit significantly affects inflation.
- b. Haan and Zelhorst (1990) analyzed the relationship between government budget deficit and money growth in the developing countries. The overall conclusion of this study did not provide much support for the hypothesis that government budget deficit influences monetary expansion and, therefore, create inflation
- c. S. O. Oladipo and T. O. Akinbobola (2011) there was no causal relationship from inflation to budget deficit, while the causal relationship from budget deficit to inflation was significant. This implies that a uni-directional causality from budget deficit to inflation exist in Nigeria. Furthermore, the result showed that budget deficit affects inflation directly and indirectly through fluctuations in exchange rate in the Nigerian economy.
- d. T.K. Jayaraman and Hong Chen (2013) found that budget deficits, nominal exchange rate and poor governance have indeed been responsible for inflation in the Pacific island countries
- e. Rely on the of independence of central banks' concept, Brown and Yousefi, 1996 conclude that budget deficit Granger cause inflation in developing countries as central banks are not independent in most of the developing countries. They started with a monetarist's hypothesis that excessive introduction of money into the source of income, wherein said the growth rate of the money supply exceeds the growth rate of production of the economy is inflation over the long term. The lack of central banks' independence political, especially in developing countries, assumes that monetary policy and price stability is compromised. The empirical results by Cukierman et al. 1992 support the view that a high level of independence of the central bank helps to mitigate the inflationary bias of politics, they highlighted the importance of the relationship between inflation and the autonomy of the central bank.

Chang (1994), Metin (1995, 1998) and Darrat (2000) provide the empirical results that show the significant impact of budget deficits on inflation. In addition, Hondroyiannis and Papapetrou (1994) provide bi-directional causality between the two variables. Furthermore, Rahman et al. (1996) present indirect empirical evidence by giving conclusion to long run and short run unidirectional Granger causality from the budget deficits to the real exchange rates, and from the real exchange rates to the inflation rates. However, Dwyer (1982), Brown and Yousefi (1996), Hondroyiannis and Papapetrou (1997),

Spite of the evidence presented by different studies and authors through different countries of the strong positive relationship between the budget deficit and inflation during periods of high inflation such we see above some case studies also show the opposite as Bruno 1993, Abizadeh and Yousefi (1998) provide the results that there is no empirical relationship between budget deficits and inflation. Dwyer (1982) tests three general.

III. Data, Modeling and Methodology

Any work wanting to be scientific needs to be developed according to a certain methodological approach. Within the framework of this work, it is a question of finding a general model of budget deficit and inflation can be estimated, it is also question of measuring the contribution of each variable in the model said the involvement of budget deficit inflation in Madagascar.

Study area: Malagasy Economics

3. 1 Data

3.1.1 Data Sources

The analysis of budget control and inflation in Madagascar is based on a thirty three years data series (1981–2012) compiled from data in various issues of the Central Bank of Madagascar (CBM), African Bank for Development, World Bank, International Monetary Fund, International Financial Statistics, Ministry of Finance and Budget, Malagasy National Institution of Statistic and some private database.

The choice of 1981 as the starting point of my analysis stems from the fact that from this year have an available data for the all variable. Unavailability of data did not permit the extension of the time profile beyond 2014.

Quantifiable and chronological Variables will be treated and analyzed by econometrics' Methodology.

These data were processed by the software Eviews and Stata used in econometrics. Eviews and Stata are a software version capable of processing time series data on the computer. We insert the data collected, treated them the software and develop an estimate of the equation of our model; this has helped to generate successively tested progressive approximations and also this equation to a most expressive model of the significance of variables.

To present the model, we started with the ADF test (Augmented Dickey-Fuller), then estimating long-run relationship with cointegration analysis, with undertaking Granger causality tests within the error correction model. This is to test the hypotheses from observation of reality and quantified to measure the relationship that may exist between the different variables

3.1.2 Variable

Quantifiable and chronological Variables will be treated and analyzed by econometrics' Methodology.

We selected variables that explain the evolution of the Malagasy economy in terms of growth. Since our interest is focused more on the impact or effect of budget deficit on inflation in Madagascar, we are among the variables that characterize Malagasy inflation.

By some literature review, studies Inflation in Developing and Underdeveloped country, inflation is explained by different variables. The surges in inflation that have been alluded to above are strongly correlated with major changes in the nominal and the real exchange rates. The latter is a key variable in the structural adjustment process, as it is the main determinant of competitiveness and current account performance. This close relationship between inflation and competitiveness shows that the monetary and exchange rate policies have a determinant impact on the performances of the real economy in Madagascar (Jean-Paul Azam 2000). That's why I have chosen the below variables to explain my model:

Inflation: 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 that may be fixed or changed at specified intervals, such as yearly.

Budget deficits: as a budget control Proxy. Budget deficits cause from the implementation of the Government Budget in Madagascar, Malagasy Public Finances never knew about budget benefits. It is explained in a billion of Malagasy Currency (Ariary or MGA)

Money supply: It is a monetary aggregate that it is usually assimilated to M2 is to -say to all "debt constituted by the money supply (M1) and quasi money (M2-M1). However, the concept is very compelling for specialists who then consider the money supply as all claims likely to be controlled by the central bank.

GDP: will be a GDP at purchaser's prices in Ariary billions. It is the sum of the value added of all resident producers in the economy and product taxes minus subsidies not included in the value of the products. It is calculated without depreciation deductions of fabricated assets or for depletion and degradation of natural resources

Exchange rate: the real effective exchange rate (REER), which measures the development of the country's currency real value against the basket of its trading partner. REER is a frequently used variable in both theoretical and applied economic research and policy analysis. That's why I will use it explain my variable

And the Political crisis: Madagascar had a lot of political crises which sometimes causes an economic crises of the country, that it is the raison that we have chosen this variable. As it is a non-quantitative variable, we are going to compute it as a Dummy Variable.

3.2 Model

A model is a presentation of a theory that takes the form of a set of assumptions about the relationship that binds the variables selected built and assumed causal links between them.

This is a formal presentation of a phenomenon in the form of equations whose variables are economic magnitudes. Therefore any model is inevitably a commitment to the reality in which we try to understand the basic features of the system

In general, a model is derived from a theory which assumes a causal link. One of the goals it pursues is also simplified the theory to check its consistency. It is therefore necessary to test the validity of a theory by comparing the facts.

In econometric language, the set of equations of a model as derived from the theoretical literature is called structural form of the model. To be explicit, this form must be specified. Our model is a multiple regression of the form:

$$\text{Log INF} = \beta_0 + \beta_1 \log \text{DEF} + \beta_2 \log \text{MONYSUP} + \beta_3 \log \text{ER} + \beta_4 \text{PC} + \beta_5 \log \text{GDP} + \epsilon$$

Where:

- Dependent Variable:

INF: Inflation rate

- Independent Variable

DEF: The Malagasy budget deficit

MONYSUP: Malagasy money supply

ER: The exchange rate

GDP: GDP

- Dummy Variable

PC: Political Crises in Madagascar

3.2.1 Statistical significance

ϵ : The error term (The error term observations are independent of each other)

It is possible that there are other variables that may explain the inflation that we seem to ignore. Taking into account this assumption of ignorance of the other variables can be found in the model by introducing the term ϵ error.

This model relates the inflation rate and the determinants of inflation as the budget deficit, GDP, exchange rate, political crises and money supply. Inflation is regarded as the independent variable and explained while the other variables are dependent or explanatory. This relationship can be fixed on the impact of budget deficit on inflation in Madagascar

a) Hypotheses

The implementation of a series of questions necessarily leads to assumptions. These arise from the questions at the problem. In response to the questions raised above, we made the following assumptions:

1. Inflation in Madagascar be explained by the budget deficit,
2. Increased volatility of the Malagasy economy, inflation in Madagascar would be explained by other variables such as GDP, money supply, political crises and exchange rates.

To state clearly the hypothesis to be tested, we need to test both in words and in a null and alternative hypothesis format

Null Hypotheses: Budget deficit doesn't affect Madagascar's inflation

Alternative Hypotheses : Budget deficit cause the inflation in Madagascar

In symbols:

H₀: $\beta_1 = 0$

H_A: $\beta_1 \neq 0$

b) Methodology:

As we pronounced in the abstract, the main method on this paper is Causality test. But the way to attend this are as follow:

First of all, we have to test the existence of the Unit Root by the ADF test because the model have to be stationary.

Then the cointegration test, it is to test the number of lag to use and the number of the cointegration equation in the model.

And finally the causality test, here we used the pairwise Granger Causality.

IV. Empirical Finding

As we pronounced above we are going to test the presence of the unite roots by using the Augmented Ducky Fuller.

To test the unit roots our hypotheses is:

H0: Null hypothesis: variable is not stationary it means that the particular variable got UR

H1: Alternative hypothesis: variable is stationary meaning that the particular variable don't have Unit Root

After computing the data into Eviews, the estimates of the Augmented Dickey Fuller (ADF) test is resumed bellow.

So the results show that:

- At level we constat that ADF test statistic < the value of t-statistic of the critical value 5% so We accept Null Hypotheses, reject Alternative Hypotheses then variable is not stationary but it have Unit Roots
- At the First Difference, ADF test statistic > the value of t-statistic of the critical value 5%, We reject Null

Hypotheses and accept Alternative Hypotheses meaning that the variable is stationary no Unit Roots From the result also we can conclude that we have a Long Run causality running all the variable have the same direction.

Table 4.1: ADF Statistics for Testing Unit Roots in the Variables

Variable	Series	At Level		At First differences	
		T stat	Critical Value 5%	T stat	Critical Value 5%
Inflation Rate	INF	-2.95402	-3.51449	-6.06012	-2.95711
Gross Domestic Product	GDP	-2.15717	-3.552973	-6.1571	-3.65373
Exchange Rate	EXR	-3.03498	-3.552973	-5.99599	-2.95711
Money Supply	logM2	-0.8421	-2.954021	-5.82253	-2.95711
Balance Budget	BB	-2.66342	-3.557759	-4.31899	-1.951687
Political crises	PC	-2.41903	-2.954021	-6.81909	-1.951687

Sources: Authors Survey

Here the stationary of the residuals is powerful evidence that there are long-term of convergence between the variables. Then, to be capable of determine if there is cointegration between our survey outcome it is important to determine the optimal lag length variables to use. The JOHANSEN COINTEGRITY TEST will help us to determine the lag of cointegration.

Table 4.2 Lag length test:

VAR Lag Order Selection Criteria

Endogenous variables: INF GDP EXR LOGM2 BB PC

Exogenous variables: C

Sample: 1981 2014

Included observations: 32

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-822.4012	NA	1.23e+15	51.77507	52.04990	51.86617
1	-660.8815	252.3745	5.04e+11	43.93009	45.85387*	44.56777
2	-612.7996	57.09724*	3.06e+11*	43.17497*	46.74770	44.35923*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Authors Survey

All the createria is efficiente, all the createria is significantly good

According to :

- The LR crieteria we should use in maximum 2 lags
- The FPE criteria we should 2 lags
- The AIC crieteria we should use 2 lags
- The SC crieteria we should use one lag
- The HQ crieteria we should use 2 lags

Out of five criteria four ask to use two lags maximum in the system equation model.

Table 4.3: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Series: INF GDP EXR LOGM2 BB PC

Lags interval (in first differences): 1 to 2

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.821590	53.43389	40.07757	0.0009
At most 1 *	0.692869	36.59495	33.87687	0.0231
At most 2	0.524062	23.01653	27.58434	0.1728
At most 3 *	0.509628	22.09030	21.13162	0.0366
At most 4	0.366673	14.15984	14.26460	0.0519
At most 5	0.000315	0.009753	3.841466	0.9210

Source: Author Survey

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

The above result we can confirm that there is at list two cointegration relationship between our survey variables in the model.

From the result of cointegration test, GDP, exchange rate and money supply have a long run cointegration they move in same direction.

To complete with the cointegration test, it should be noted that even whether there is a cointegration in the model, it doesn't mean that there is a causality between the variable.

So now we are going to test the causality between the pair variable.

Tableau 4.4: Granger Causality Test

Pairwise Granger Causality Tests

Sample: 1981 2014

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause INF	32	2.70853	0.0847
INF does not Granger Cause GDP		0.01592	0.9842
EXR does not Granger Cause INF	32	1.98974	0.1563
INF does not Granger Cause EXR		0.38218	0.6860

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LOGM2 does not Granger Cause INF	32	5.37747	0.0108
INF does not Granger Cause LOGM2		0.34301	0.7127
BB does not Granger Cause INF	32	1.42462	0.2581
INF does not Granger Cause BB		0.52185	0.5993
PC does not Granger Cause INF	32	7.96970	0.0019
INF does not Granger Cause PC		1.51557	0.2378
EXR does not Granger Cause GDP	32	7.18380	0.0032
GDP does not Granger Cause EXR		1.65581	0.2097
LOGM2 does not Granger Cause GDP	32	1.60518	0.2194
GDP does not Granger Cause LOGM2		0.94789	0.4001
BB does not Granger Cause GDP	32	1.85712	0.1755
GDP does not Granger Cause BB		5.87723	0.0076
PC does not Granger Cause GDP	32	1.44481	0.2534
GDP does not Granger Cause PC		4.17595	0.0263
LOGM2 does not Granger Cause EXR	32	5.28484	0.0116
EXR does not Granger Cause LOGM2		1.34701	0.2769
BB does not Granger Cause EXR	32	0.55811	0.5788
EXR does not Granger Cause BB		7.58633	0.0024
PC does not Granger Cause EXR	32	3.43991	0.0467
EXR does not Granger Cause PC		1.28226	0.2938
BB does not Granger Cause LOGM2	32	0.41292	0.6658
LOGM2 does not Granger Cause BB		3.10615	0.0611
PC does not Granger Cause LOGM2	32	1.98839	0.1565
LOGM2 does not Granger Cause PC		0.85882	0.4349
PC does not Granger Cause BB	32	1.29277	0.2910
BB does not Granger Cause PC		1.51309	0.2383

Source: Authors Survey

Deducted from the table 4.4, Malagasy Budget control is not inflationary and the inflation don't explain the budget control. There isn't any causality between this pair two variables. It means that we will rejected our Null hypothesis and accepted the Alternative hypothesis.

Contrariwise, Money Supply and Political crises have a causal effect on Malagasy inflation.

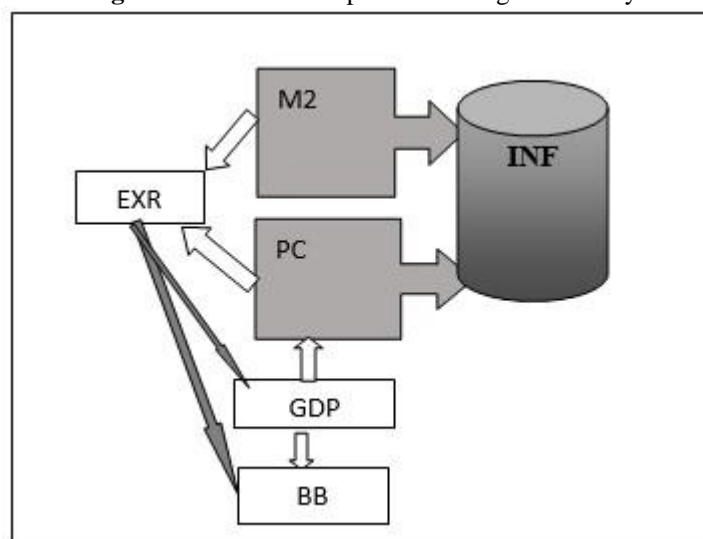
The relation between Money supply and Inflation is an economic phenomenon, by the different economic theory, changes in money supply are often used to try and control inflationary conditions.

Political rises have a strong unidirectional causality with Inflation with the P value of the F statistic approximatively to the at 5 percent level of significant.

Political crises also have a unidirectional causality with the exchange rate, exchange rate and GDP with the budget control, Money supply to Exchange Rate, GDP for Politic crises and finally Exchange rate have a causality with GDP.

The result of the pairwise Granger Causality is presented as the follow figure.

Figure4.1: result of the pairwise Granger Causality



V. Conclusion and recommendation

From our background research, the developed country was the most interested on the relationship between budget deficit and inflation but recently developing country such as Madagascar are captivated by this topic.

Through the empirical study done, we concluded that budget control that is attributed to the budget deficit during the data's processing, didn't influence Malagasy inflation, this two variables have no causality to each other. A change of Money supply is inflationary and inflation could be caused by the Malagasy political situation.

Malagasy Government have to take an appropriate strategy:

- On monetary policy such as an alleviation of lending rates and increase the interest rates by primary banks and the central bank.
- Talking about Malagasy political situation; a trust in government and combating corruption is a key factor to reduce or even eliminate the political crisis in Madagascar for the success of economic reforms.

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