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The Determinants of Inflation in Cameroon

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The Determinants of Inflation in Cameroon

Moussa Elhadji Saidou [α], Charles Alain Bita [σ] & Valère Amassangka Haman Haman [ρ]

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Résumé- L'objectif de ce papier est de mettre en évidence les déterminants de l'inflation au Cameroun entre 1970 et 2015. Pour y parvenir nous avons eu recours à la méthode des moindres carrés ordinaires. Ainsi, l'utilisation du modèle à correction d'erreur montre qu'à long et court terme, la croissance économique et la masse monétaire influencent positivement l'inflation au Cameroun. Par ailleurs, les dépenses de consommation des ménages, les exportations de biens et services, la libéralisation financière et la dévaluation contribuent de manière positive à expliquer l'inflation au Cameroun. En revanche, les importations de biens et services ont plutôt une influence négative. À cet égard, ce papier soutient un contrôle des prix pratiqués par les entreprises afin d'éviter des marges bénéficiaires excessives d'une part et la limitation des importations afin d'éviter l'inflation importée d'autre part.

Motsclés: inflation, masse monétaire, croissance économique.

I. Introduction

Friedman (1969) affirmed in this quotation that "inflation is a dangerous disease that can be sometimes fatal." Meanwhile the stabilization of price is the primordial objective of major modern central banks. In Economic and Monetary Community of Central Africa (CEMAC), as well as in major economic and monetary zone, one criteria of macroeconomic convergence have been adopted and it stipulates that, the rate of inflation cannot go beyond 3 per cent. However, between 1980 and 1987, the rate of inflation in Cameroon was not less than 7 per cent (Touna Mama, 2008).

In 1995 the rate of inflation reached 35 per cent just after the devaluation on CFA Francs. During the first semester of 2015, the rate of consumption price reach 3.4 per cent compared to the first semester of 2014 where this rate was estimated at 2.5percent.According to National Institute of Statistics the increasing of price affected: the price of transportation (14.5 %), hotel and restaurant services (5.2%), alcohol and cigarette (4.1%). The increase in the price of goods and services year to year need to be study and find out the determinants of inflation in Cameroon.

In fact, the economics literature on the determinant of inflation is abundant and many theories on the causes were stipulated. However, theories and empirical approaches give different determinants of inflation as well as different its influences. In Cameroon, the determinants of inflation are not well known. Meanwhile, this paper aims to highlight the determinants of inflation in Cameroon, based on the hypothesis that economic growth and the increase of volume of money can positively influence inflation of the country.

The remainder of the paper structure is as follows: the literature review (2), the methodology of the study (3), the results and discussion (4), and the conclusion come at last (5).

II. Literature Review

Broadly, the causes of inflation can be classified between monetary factors and non-strict monetary factors.

The first known monetary theory is the quantitative theory of money. The dichotomy vision that sustain the foundation of this theory was developed by neoclassical economist such as Walras (1874), Arrow and Debreu (1954) that were not opposed to classic economist (Jean Baptiste Say). Let us noticed that before classic economist, some authors such as Bodin (1568), Petty (1662), Locke (1692), Hume (1752), and Cantillon (1757) have suggest the analysis of monetary phenomenon, that will later give birth to the current theories.

According to classic economists, money have the function of the intermediary of exchange at and the function of a reserve of value was refused to money. They also argued that the money cannot have a disability role. Money just modify the appearance of things; it is a voile that does not change reel equilibrium (Walras, 1874, Arrow and Debreu, 1954). However

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neoclassic economists (Jevons 1881, Menger 1892, Walras, 1988, and Pareto, 1906) argued that the non-proportional increase in the volume of money compared to the increase of wealth is the main cause of inflation due to the misappropriate anticipation of economic agents.

While monetarist approach (Friedman 1969, and Meltzer, 2003), argued that, inflation is a monetary phenomenon. Indeed, each variation of price is the result of the variation of the volume of money. So to fight inflation, the evolution of volume of moneymay be limited. However, this restrictive function of money was criticized by Keynesian approach (Gregory Mankiw, 2000; Joseph Stiglitz, 2014) and Neo Keynesian authors who received Nobel Price (Hicks 1972, Modigliani, 1985, Samuelson, 1970, Solow, 1987, etc.) as they argued that money can be used to stimulate production.

According to the authors of new classic macroeconomics (Lucas, R, 1995; Kydl and and Prescott, 1977), money does not influence the real economy sphere. Therefore, inflation does not have as solemn source, money, it can also have non strict monetary factors (inflation from demand, inflation by cost and inflation by structural factors). The post Keynesian or post Kelekian (Kalecki, 1937) analyses of inflation focuses on the conflict that rise during the share of income between four groups: labour, capital, government and foreign countries. The effort of each segment in the search of improving its income (salary, profits, taxes, and the price of importation) generally lead to the lost for others that react by increasing their prices.

Literature also present some empirical studies across the world that identified the cause of inflation in many countries. Maryam et al, (2014) analyses the cause of inflation in Malaysia from 1980 to 2012. Using multiple regression model, these authors found out that economic growth, public expenditures, importation of goods and services, real interest rate and volume of money have a significant influence on inflation. Furrukh et al., (2011), analyses the determinant of inflation in Pakistan from 1972 to 2010 using the model of error correction, the results revealed that on long run period, the price of consumption was positively influence by GDP.

Armesh et *al* (2010), studying the cause of inflation in Iran using the method of Ordinary Least Squares (OLS) found out that, on the long run period economic growth negatively influence inflation. World Bank (1996) studied inflation on 127 countries from 1960 to 1992 found out the negative correlation between inflation and economic growth. In the same line, Bocco and Ablefonlin (2009) studying inflation from 1972 to 2007 base on a model of error correction, stressed that economic growth negatively influence inflation while the price of importation positively influence inflation. Beridabaye (2007) studying inflation in Democratic Republic of Congo using linear logarithm based on the model of quantitative theory of money, found out that, economic growth, the price of petrol and devaluation have a significant influence on the inflation of the country. While Husain (2007), studying the relationship between inflation and the supply of national money in Koweit from 1972 to 2004 found out the existence of a positive relationship between inflation and volume of money on the long run period. And Jalali (1997) stressed the fluctuation of price and the rate of inflation before World War II in Iran. He concluded that the supply of money is the main factor that increase the level of price. In this sense Armesh et *al* (2010), studying the inflation from 1961 to 2005 in Iran using Ordinary Least Squares method, found out that the supply of money positively influence inflation on long run period.

III. Methodology of the Study

This section present econometric approach conducted, variables and the process of data collection and analysis. To identify the cause of inflation, major authors used econometric models (Maryam et al, 2014; Beridabaye, 2007; and Armesh et *al*, 2010). The common models including: generalized moment method and ordinary least squares. However, the choice of one of this model depend of some econometric test (unit root and co intégration test). So, in this paper ordinary least squares is used. The study adopted Myriam et al (2014) model and some modifications were added according to the specificities of Cameroon context. Furthermore, ordinary least squares model is easy to test and it is the most used model by economist when is come to identify the determinants of inflation.

a) The variables of studies

i. *Dependent variable (INF)*

Inflation is a dependent variable. In macroeconomic analysis two main indicators are usually used to measured inflation. The consumer price index (for most European countries) and the GDP deflator who is an instrument for correcting an economic size of the effects of inflation.

This paper used the consumer price index to measure inflation based on Blix (1995) model.

ii. *Independents Variables(X)*

- Economic Growth (GDP)

GDP per capita is used as proxy for ec onomic growth. GDP is the main measure of economic growth and it indicating the level of the wealth of a given country. However, the increase in GDP can lead to the increase in price of goods and services due to the increase of demand that is higher than the Supply of goods and services. The general consensus among economists is that inflation has a statistically significant

negative impact on growth. So, we expected a positive correlation between GDP per capita and inflation rate in Cameroon.

- The Volume of Money (M2)

In major empirical studies, different aggregates are used to measure the volume of money. In this paper, the aggregate M2 in the percentage of GDP is a measure of the volume of money. According to Fischer (1911) quantitative theory of money that stipulated that an increase in the volume of money when held other variables constant leads to the increase in prices. So this variable has a positive sign.

- Households Consumption Expenditures (HCE)

Households Consumption Expenditures have a positive influence on inflation. When households, and firms increase their expenditures, the global demand of goods and services increase and consequently prices increase too. This variable is measured in percentage in GDP, and expect to have a positive sign.

- Importations of Goods and Services (IMGS)

The increase of importations can reduce the rate of inflation caused by domestic demand. The increase of importations expenditures when held other variables constants reduce the consumption of domestic goods and consequently the national inflation (Muktadir-Al-Mukit & Shafiullah, 2014). So the influence of this variable is negative.

- Exportations of Goods and Services (EXGS)

The exportations of goods and services offered foreign currencies to resident economic agents. So the effect of exportation on inflation is different from the importation's effect on inflation. The increase of exportations leads to the reduction of domestic supply compared to domestic demand, and consequently to inflation.

iii. *Dummy variables*

In this study, devaluation of CFA francs and financial liberalization are dummy variables.

- Devaluation (DEV)

Devaluation aims to improve economic competitiveness through the establishment of equilibrium (mainly the correction of disequilibrium caused by commercial deficit). Two main effects are expected from devaluation. The decrease of the value of the local currency increase the price, and the value of importations in foreign currencies, this effect is called: "price effect". On long-run landscape devaluation generated "volume effect", the decrease in prices of exported product increase the quantities sell abroad at the same time the increase of prices of imported product reduce the demand of foreign goods except for some raw materials (such as uranium, etc.). These contradictories effects of devaluation can be summarised on "J curve": In the first place, devaluation causes a brief degradation of the commercial sheet (this is price effect represented on the left side of J curve) and later the improve of this commercial sheet (this is volume effect represented on the right side of J curve).

- Financial liberalization (LIB)

Financial liberalization emerged from the works of Mckinnon (1973) and Shaw (1973) in the earlier 70. These authors argued that: on the one hand the limitation of the interest rate at its lowest level reduces savings and the supply of credits and consequently leads to the reduction of investment and the decrease of economic growth. And on the other hand, financial repression leads to unfair allocation of credits. So financial liberalization eases the access of households to bank credits and consequently increase the volume of money and later the increase in prices. So the expected sign of devaluation is positive.

- Econometric model

In line with Maryam et *al.,* (2014), and also of some adjustments due to the specificities of Cameroon economic structure, the multiple regression model of this study stress that inflation is a function of economic growth, the volume of money, households' expenditures, importations and exportations of goods and services, devaluation and financial liberalization. So the general form of empirical model is as follow:

$$INF = f(GDP, M2, HCE, IMGS, EXGS, DEV, LIB\ )$$

The econometric form of the model in the long run landscape is:

$$INF = \beta_0 + \beta_1 GDP_t + \beta_2 M2_t + \beta_3 HCE_t + \beta_4 IGMS_t + \beta_5 EXGS_t + \beta_6 DEV_t + \beta_7 LIB_t + \varepsilon_t$$

The econometric form of the model in the short run landscape is:

$$INF = \beta_0 + \beta_1 D(GDP)_t + \beta_2 D(M2)_t + \beta_3 D(HCE)_t + \beta_4 D(IGMS)_t + \beta_5 D(EXGS)_t + \beta_6 D(DEV)_t + \beta_7 D(LIB)_t + RESID(-1)$$

Table 1 summarized the different sign of each variable of the model:

Table 1: The different sign of variables of the model

Variables	Proxy	Parameters and Expected sign.
Economic Growth (GDP growth)	Gross Domestic Product per capita in%	β_1 (+)
Volume of money (M2)	The ratio of Volume of Money on GDP per capita in %	β_2 (+)
Households Consumption Expenditures (HCE))	The total sum of households' consumption expenditures expressed in percentage of GDP	β_3 (+)
Importations of goods and services (IMGS)	The total sum of goods and services imported in %	β_4 (-)
Exportations of goods and services (EXGS)	The total sum of goods and services exported in %	β_5 (+)
Devaluation (DEV)	Expressed in 0 before 1994, and 1 from 1994	β_6 (+)
Financial liberalization (LIB)	Expressed in 0 before 1990, and 1 from 1990	β_7 (+)

Source: Authors own elaboration based on economic theories

b) Source of data

The data used for estimation were withdrawn from World Bank Data base mainly the world Development Indicators (WDI, 2016). The data are from 1970 to 2015, which is the time period of this study. The study, mainly focuses on this period due to the unavailability of data for some variables, and so this period corresponds to the rising of inflation in Cameroon.

IV. Results and Discussion of Econometric Estimation

a) Statistical analysis of the results

Table 2 summarize the results of different test on short and long runs

Table 2: Results of estimations

Dependent variable : inflation rate		
Independents variables	Relation of the long-run	Relation of the short-run
C	-61.183 (-2.059)	-0.621 (-1.420)
GDP	0.452 (2.351) **	0.157 (2.256) **
M2	1.155 (2.762)***	0.522 (1.726) *
IMGS	-1.479582 (-3.448) ***	-0.530 (-2.830) ***
EXGS	0.452 2.974) ***	0.259 (1.792) *
HCE	0.884(2.342) **	/
DEV	6.652 (1.908) **	37.289 (12.302) ***
LIB	-15.397 (-4.011) ***	-12.640 (-4.092) ***
RESID (-1)	/	-0.965664 (-9.754105) ***
R^2	0.506	0.890
R^2 ajusté	0.416	0.869
F-statistic (k, n-k)	5.581	42.954
Prob(F-statistic)	0.000178	0.000000
Durbin-Watson stat	1.996	2.167
Observation	46	46

Source: Authors own elaboration (generated from Eviews 8.0)

Notes: Numbers below coefficients are the corresponding T-student and (***), (**) and (*) denotes statistical significance at the 1%, 5% and 10% levels respectively.

b) Analysis and interpretation of results

For all estimation results, the variation of the rate of inflation is between 41 and 86 percent in Cameroon during the period of the study (1970 to 2015). The results revealed that the model was statistically valid (F-stat=0.000178). This means, explanatory variables such as economic growth and volume of money have the expected signs effect on inflation. However, in short-run these two variables have a negative sign but still statistically significant. This means in short-run, the disequilibrium between the rate of inflation and these two variables are established. Furthermore, the Durbin Watson statistic value (DW= 1.996) indicated the absence of autocorrelation of residues and the absence of heteroscedasticity (see results in Appendix 1).

i. *Explanatory variables*

- Economic Growth (Gross Domestic Product per capita growth)

According to the results of the estimations of two models, the GDP is positive and statistically significant. So, an increase in GDP leads to an increase in the rate of inflation at the level of 0.452 in long run and 0.157 in the short-run respectively. This result is in line with Thouraya and Younes (2007) and Nubukpo (2002) who also found out that economic growth has negative impact on inflation. The economic growth generated increase of demand compared to supply (due to the increase of wealth and the reduction of unemployment rate) and consequently the increase in prices.

- Volume of money (M2)

The coefficient of this variable are 1.155 in long run and 0.522 in the short-run, this means when the volume of money increase by one unit, the rate of inflation increase by 1.155 and 0.522 in the long-run and short-run, respectively. This result is in live with money quantitative theory of Fisher (1911), and monetarist economist that support that inflation are everywhere and always a monetary phenomenon.

ii. *Control variables*

- Importations of Goods and Services (IMGS)

The coefficient of importations of goods and services are - 1.479 in the long-run and - 0.53 in the short-run, this means when the importations of goods and services increase by one unit, the rate of inflation decrease by 1.479 and 0.53 in the long-run and short-run respectively. The increase of importations reduces the consumption of domestic goods and consequently inflation rate. This matches the result of previous studies of Muktadir-Al-Mukit & Shafiullah (2014) in Bangladadeshand Mariam et *al* (2014) where importations were found to have a significant negative impact on inflation.

- Exportations of Goods and Services (EXGS)

The coefficient of exportations of goods and services are – 0.983 in the long-run and 0. 259 in the short-run, so when the exportations of goods and services increase by one unit, the rate of inflation increase by 0.983 and 0.259 points in the long-run and short run respectively. The exportations of goods and services reduce the supply of domestic goods and services and leads to the increase of inflation rate.

- Households Consumption Expenditures (HCE)

The increase by one unit of households' consumption expenditures in the long-run leads an increase in the rate of inflation by 0.884 point. This result respect the law of supply and demand that stipulates that an increase in demand lead to an increase in price when holding other variables constant. However, in the short-run this variable is not statistically significant.

iii. *Dummy variables*

- Devaluation (DEV)

Let notices that, the devaluation of CFA francs has an important influence on inflation. The coefficient of this variables are 6.652 and 37.289 in the long run and short run respectively, and it have the expected signs for two models. Meanwhile, a devaluation of 50 % of CFA francs leads to the increase of 6.652 in the long-run and 37.289 in the short-run. Cameroon reach the highest rate of inflation, estimated at 35 percent after the devaluation occurred in 1994. This result is in line with Béridabaye (2007) that argued that devaluation lead to an increase in inflation rate.

- Financial liberalization (LIB)

The coefficient of this variable has an unexpected sign, hence the influence of financial liberalization is perceived on inflation in Cameroon. The financial liberalization eases the access to credits and consequently, improve investments and competitiveness which later leads to the decrease of prices thanks to the reduction of the interest rate of bank credits (Bita, 2008).

V. Conclusion

Broadly, major studies on inflation revealed that the determinants of inflation are various and differ from one country to another. Some variables are commons to countries with the same similarities, but still some differences can exist. So the main objective of this paper was to identified the determinants of inflation in Cameroon and evaluated the influence of each determinant. Base on ordinary least squares method and the model of error correction, the results from this paper show that economic growth and volume of money positively impact the level of inflation in short and long runs. Variables including exportations of goods and services, devaluation, financial liberalization and household consumption expenditures have a positive impact on inflation. While importations of goods and services have a negative impact on the inflation rate.

This result call upon government to review the budgetary policy in order to fight inflation. The increase of supply is also important mainly when it is accompanied by the control of the effect of production on employment and wages. Commercial bank need also to control the supply of credits to economic agents. So, to control the rate of inflation, a policy of inflation can be put in place.

Monetary policies can also help in fight against inflation in Cameroon and in the CEMAC zone in large. The increase of interest rate of the central bank (Bank of the States of Central Africa, BEAC*)* to reduce the volume of money can consequently, increase the cost of bank credits and lead to the decrease in demand of credits, the volume of money and inflation rate can also decrease. The increase of the rate of the stocks of money can reduce inflation. And the application of quotas to the volume of monthly credits offer by commercial banks can control credits distributed to individuals and enterprises.

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Appendices

Table A1: Heteroscedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.563239	Prob. F(7,38)	0.1762
Obs*R-squared	10.28475	Prob. Chi-Square(7)	0.1730
Scaled explained SS	46.16317	Prob. Chi-Square(7)	0.0000

Source: Eview.8.0

Table A2: Long run Estimation

Dependent Variable: INF
Method: Least Squares
Date: 04/05/17 Time: 20:20
Sample: 1970 2015
Included observations: 46

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-61.18260	29.71943	-2.058674	0.0464
LIB	-15.39792	3.838481	-4.011460	0.0003
PIB	0.452479	0.192434	2.351347	0.0240
MM	1.155677	0.418392	2.762188	0.0088
IMPBS	-1.479582	0.429076	-3.448301	0.0014
EXPBS	0.983559	0.330647	2.974650	0.0051
DEV	6.652686	3.486591	1.908078	0.0640
DEPMEN	0.884692	0.377601	2.342931	0.0245

R-squared	0.506938	Mean dependent var	6.285821
Adjusted R-squared	0.416110	S.D. dependent var	6.680942
S.E. of regression	5.105086	Akaike info criterion	6.255123
Sum squared resid	990.3524	Schwarz criterion	6.573147
Log likelihood	-135.8678	Hannan-Quinn criter.	6.374256
F-statistic	5.581337	Durbin-Watson stat	1.996547
Prob(F-statistic)	0.000178		

Source: Eview.8.0

Table A3: Short run Estimation

Dependent Variable: D(INF)
Method: Least Squares
Date: 04/05/17 Time: 20:46
Sample (adjusted): 1971 2015
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.621535	0.437501	-1.420650	0.1638
D(LIB)	-12.64059	3.088664	-4.092574	0.0002
D(PIB)	0.157947	0.069990	2.256712	0.0300
D(MM)	0.522146	0.302361	1.726895	0.0925

D(IMPBS)	-0.530839	0.187525	-2.830768	0.0075
D(EXPBS)	0.259990	0.145042	1.792523	0.0812
D(DEV)	37.28997	3.031194	12.30207	0.0000
RESIDUS(-1)	-0.965664	0.099001	-9.754105	0.0000

R-squared	0.890429	Mean dependent var	-0.070491
Adjusted R-squared	0.869700	S.D. dependent var	7.792993
S.E. of regression	2.813045	Akaike info criterion	5.066223
Sum squared resid	292.7893	Schwarz criterion	5.387408
Log likelihood	-105.9900	Hannan-Quinn criter.	5.185958
F-statistic	42.95455	Durbin-Watson stat	2.167669
Prob(F-statistic)	0.000000		

Source: Eview.8.0