

# Does the Petroleum Era in the Sudan a Discriminant Era "Investigating the Monetary Sector"

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**Abstract:** The study aims to test the monetary data of Sudan in order to detect whether the petroleum era is totally distinct from the none petroleum era or not . The study had used four discriminant variables which are money multiplier, velocity of money, monetary deepening and quasi money. The study seeks to know what is the more discriminant variable and can affect the monetary sector and consequently the economic activities. The study running a technique of discriminant analysis in order to answer the study's questions and test its hypothesis. The results revealed that the two periods are significantly discriminant from each other, moreover the money multiplier is the most discriminant variable in the study, while quasi money is least one. The study concluded that the petroleum era characterized by economic gains , while none-petroleum era characterized by economic losses i.e the former experienced J curve effect, while the later experienced leverage effect.

**Keywords:** Petroleum era, discriminant variables, money multiplier.

**JEL:** E41; E44; E51; E51; E58.

## INTRODUCTION

There are ongoing debates about the role of the monetary sector in the economy, whether this role is essential or subsidiary, which leads to the emergence of schools supporting the view that the role of the monetary sector is pivotal in the economic process, regardless of whether the economy is close to or far from full employment. Some economists also claim that the role of the monetary sector is limited according to the state of the economy.

This study looks at the role of the monetary sector on the overall economic life in Sudan, dealing with the main monetary indicators as a discrimination between two main periods that the Sudanese economy went through, namely the petroleum period from 2001 to 2011 and the period that followed (the separation period) from 2012 to 2021. This study raises a major question: Is the petroleum period structurally distinct from the period that followed? There are also a number of sub-questions, which are ; is it possible to make discrimination according to monetary factors and indicators? Are these indicators sufficient to make the discrimination, and finally, what are the most discriminant indicators for the two periods? The study aims to highlight the role of the monetary sector and its importance in developing countries, including Sudan, in addition to clarifying the feasibility of reforming the monetary sector in Sudan, in addition to explaining the lessons learned from the analysis of the two periods according to discriminant monetary factors and indicators. The study hypothesizes that the petroleum period and the period that followed are completely distinct from each other accord-

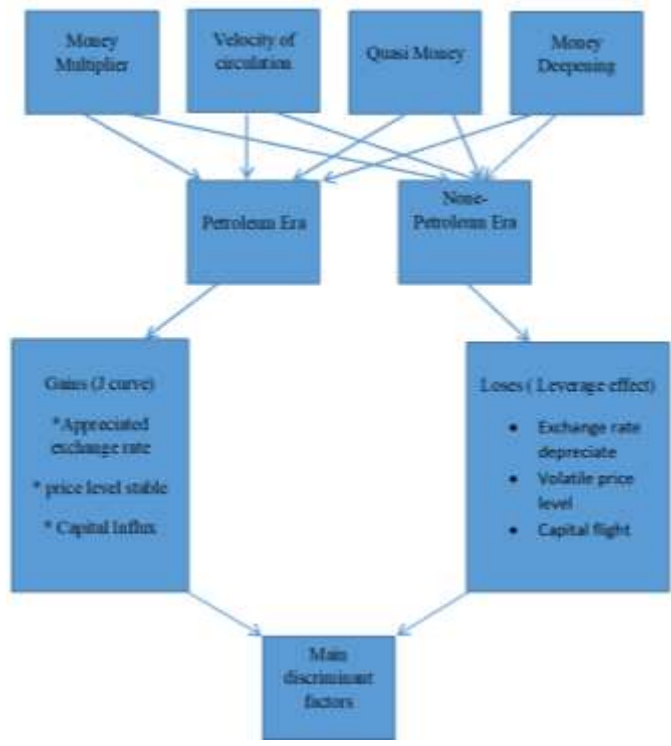
ing to monetary factors and indicators. The study also proposes an assumption that the monetary multiplier and monetary deepening are the most distinguishing factors for the two periods. The study also proposes the assumption that the monetary sector has a directing role for discriminant frameworks for economic periods, regardless of the state of the economy in terms of equilibrium, recession, or inflation. The study attempts to test the aforementioned hypotheses in order to crystallize the discussion of the results of the study and thus answer or justify the validity of the model that was formulated to build the study variables and their interaction with each other.

The study model is based on giving the monetary sector a decisive role in distinguishing the petroleum periods and the one that follows it during the period 2001 to 2021 with the projection of some shadows on the Sudanese economy through the emergence of petroleum, which led to a change in the equation of revenues and expenditures in the state. The importance of the study lies in highlighting the risks of relying on the rent economy and its potential consequences, such as the resource curse in the event of its sustainability, or the structural distortions that could occur in the event of the exit of the resource from the economy, as happened after the separation of South Sudan in 2011.

The study uses a statistical methodology to answer the study's questions and test the available hypotheses, in addition to highlighting and illuminating the objectives of the study. All this shows in the end the theoretical and practical importance of the study. The study proposes in the statistical approach used the tool or mechanism of discriminant analysis as a basic methodology in analyzing the data of the study, which extends from 2001 to 2021. Discriminant analysis of its various types is an effective tool for excellent classifica-

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**Study Model**



tion according to the factors used (the money multiplier, the money velocity, monetary deepening, and quasi-money) in discriminating to determine the dividing lines between two or more periods.

Based on the results that can be drawn from processing the data of the study using one of the statistical packages, the overall aims of the study can be discussed through questions and hypotheses. Also, based on the proposed model, it is possible to access the basic lessons learned on the grounds that the petroleum resource is an essential booster for the rent economy. Based on the foregoing, the importance of the study can be clarified and explained from both the theoretical and practical points of view, which helps highlight the gap that the study can cover in aspects of the monetary economy when it deals with the impact of the rent economy in developing countries. By clarifying the risks, including building precautionary strategies to confront them.

**THE THEORETICAL CONSTRUCTION OF THE MODEL**

The real demand for money is related to the monetary indicators used in the study in one way or another. This demand interacts with the nominal supply of money in generating the theoretical theory that determines the price level and its impact on income levels, and thus the macroeconomic indicators i.e unemployment and the balance of payments. If the interaction of money demand and supply led to the sustainability of the general equilibrium and the stability of economic indicators, in this case it can be said that the market mechanism operates with high efficiency and ultimately leads to the efficient distribution of resources, which entails the occurrence of the economic cycle in the narrowest period of time and the final result is economic prosperity. The afore-

mentioned case can be distinguished from market failure when the mechanism of interaction of demand and money supply leads to an inefficient distribution of resources, which leads to the moving of economic conditions away from the desired long-term equilibrium. The failure of the market to control the economic rhythm characterizes periods of structural imbalances in the economy that reflect a reality in which successive economic cycles are repeated.

The money velocity overlaps with the demand for money mainly, which affects the level of prices and income. Hence adjusting the value of the velocity and its stability are among the important factors and tools in the monetary and economic balance. The stability of the growth pattern of the velocity is consistent with economic development linked to the size of the targeted economic growth, which helps in monetary and financial stability. This situation is characterized by periods of instability in the velocity of money circulation and thus economic fragility in the real and financing sectors, as well as the instability of the external exchange sector.

The money multiplier and its various components of reserves to face current and time deposits, as well as the statutory reserve and the currency of the public. These components play a fundamental role in the size of the money supply,( expansion and contraction). Achieving the target money supply at a high rate confirms the flexibility of the economy and the ease of controlling monetary tools, as well as sizing the crowding out mechanism to the lowest possible level. Reducing the process of keeping cash via the demand for money by means of the quasi-money mechanism (letters of guarantee and credit) facilitates smooth financial performance through the money velocity and the money multiplier, as distinguished from the quasi-money stalemate.

Monetary deepening reflects the phenomenon of dealing and connection with financial and banking institutions, and this indicator is related to the effectiveness of monetary policy and the diversity of its tools to attract the public to deal through the banking system. This indicator is measured by dividing each of the money supply or demand deposits by the gross domestic product. Monetary deepening is affected by several factors, the most important of which are the level of per capita income, the return on investment deposits, and the degree of awareness and banking penetration. Monetary deepening affects the demand for money and the money supply, and subsequently the real and financing sectors. Therefore, it is considered a discriminant factor in the study, albeit to a lesser degree than the rest of the discriminant factors of the study.

The previous theoretical observations through the monetary sector can lead to two opposing cases in the economic reality. One of them is economic gains in the long term (what is known as the J-curve mechanism) and the stability of the equilibrium. This situation is likely to occur in the case of a steady growing money velocity and a monetary multiplier that reflects the desired economic growth. These levels of monetary indicators lead to achieving a stable equilibrium and an economic cycle in the shortest period of time. The other case is the so-called leverage effect in the economy, i.e. the dominance of uncertainty resulting from imbalances in the monetary sector, represented by an unstable money velocity and an abnormally growing monetary multiplier. These two cases are the ones that distinguish one economic period from another according to the monetary sector indicators and their effects on the real sector, as we will see in discussing the results of the study.

## LITERATURE REVIEW

Huidumac-Petrescu, C. E., & Popa, A. C. (2014) In their paper they assure that the Taylor rule is a central element in the decision making process of monetary policy rates set by most central banks, both in developed and emerging economies. Moreover they propose an analysis of the Taylor rule efficiency in terms of achieving the objectives of the monetary policy throughout the European Union, and to briefly outline some possible adjustments taking into account the unique specificity of these economies

Arintoko, A. (2009) explores the long-term monetary neutrality in Indonesia in this paper, primarily using annual time-series from 1970 to 2007. The research difficulties are analyzed using Fisher-Seater approach. The empirical findings demonstrate that both classical and neoclassical economics are incompatible with the long-run neutrality of money (both M1 and M2) with respect to real GDP. Government money injections in particular have a long-term favorable impact on actual output in the macro economy.

Tadesse, T., & Melaku, T. (2019) Using the Auto-Regressive Distributive Lag Model (ARDL) over the period of 1975 to 2017 in Ethiopia, they examine the relative efficacy of monetary and fiscal policies in influencing economic growth. According to the empirical findings, Ethiopia's economic growth is positively statistically significant and is influenced

by both monetary and fiscal policy. Long-term, fiscal policy has a greater influence on real GDP than monetary policy. However, in the short term, Ethiopia's output growth is more effectively influenced by fiscal policy than by the money supply, which serves as a monetary policy proxy.

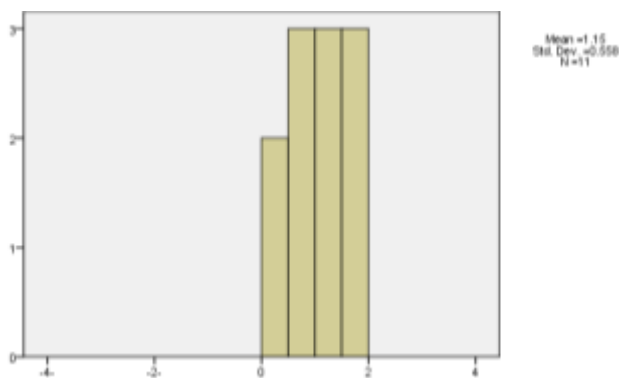
Mishchenko, S et al. (2019) In order to support the need for coordination between monetary and fiscal policies to promote economic growth, their study aims to evaluate the nature of monetary and fiscal policies in Ukraine from 2000 to 2017. The dynamics of the monetary aggregate M3, inflation, and the weighted average base interest rate are examined in this article in relation to the growth rates of the real GDP in Ukraine. The authors come to the conclusion that one of the causes of the excessive volatility of macroeconomic indicators is the inconsistency of monetary and fiscal policies.

## RESULTS & DISCUSSION

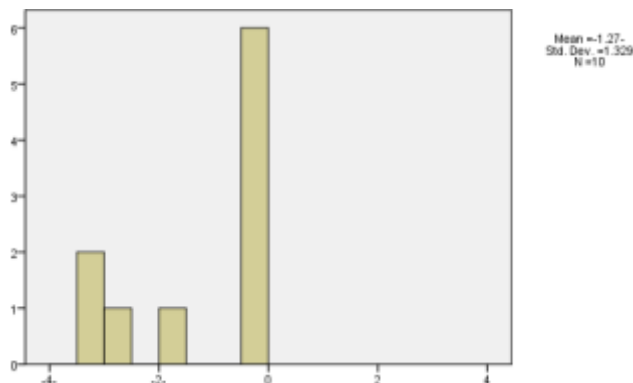
The study had managed time series data cover the period from 2001 to 2021, which divided into two eras. The first one is the petroleum era from 2001 to 2011, while the second one names the none- petroleum era (after separation of south Sudan) from 2012 to 2021. The methodology used in the analysis is the discriminant analysis, its function seeks to maximize the differences and minimize the error in the study variables. The type of the analysis is direct discriminant one, because all the variables have same weight and importance in the study. The study composes from four variables, which are the discriminant variables; are velocity of money, money multiplier, monetary deepening, and quasi money. These variables are classified by the type of the period either petroleum or none petroleum. The means of the variables are significantly different, moreover their distribution is approximately normal as shown by chi square test and normality test. So the variables are satisfied the per- conditions for applying the discriminant analysis. The table and figures below reflect the outputs of the analysis:-

Tests of Equality of Group Means			
Variable	Wilks' Lambda	F	Sig.
Money multiplier	.429	25.329	.000
Money velocity	.808	4.511	.047
Monetary deepening	.807	4.555	.046
Quasi money	.840	3.632	.072
Summary of Canonical Discriminant Functions			
Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1.613 <sup>a</sup>	100.0	100.0	.786
Wilks' Lambda			
Wilks' Lambda	Chi-square	Df	Sig.
.383	16.328	4	.003

Canonical discriminant function petroleum era



Canonical discriminant function none-petroleum era



From the above results we observe the following:-

The differences between the means of the variables given by the test of means group equality reveals that all the means of the variables are significantly different between the petroleum era and none petroleum one. The highest significance difference in the money multiplier variable, next the monetary deepening, next velocity of money, finally the quasi money variable. These results could reflect in the discriminant function. One canonical discriminant function was used in the analysis with eign value equals to 1.613, where the percentage of explaining the variance reached 100%, beside canonical correlation equals to 0.79, the square root of the correlation explains the variance between the petroleum era and none petroleum era in the discriminant function. The Wilkes lamda test given by the value of chi square with 4 degree of freedom is significantly reveals that the two periods are totally discriminant. Notably the means of the petroleum era are greater than the means of none petroleum ones except the monetary deepening variable. The classification of the probabilities for the groups reveals that they is 100% the observed data are identical to expected ones as shown by the figures .

From the results the petroleum era is totally discriminant from the none petroleum one as all the observed years are identical to expected ones. Such discrimination were attributed to all discriminant variables of the study, but mainly to the money multiplier variable, and partly to the rest of variables; money deepening, velocity of money, and quasi money respectively. Accordingly the discriminant function can be used to explain and interpret the main characteristics and properties of the two periods.

The four discriminant variables in the study are responsible the significant classification of the two periods, the most responsible variable is money multiplier because money supply is highly sensitive to this variable. Here the components of such multiplier play crucial role in the monetary sector and then money supply, and consequently the economic activities. The most effective components in money multiplier are the ratio of current deposit and the ratio of time deposit which have sensitive movement that affects money supply positively or negatively according to the monetary policy. The second variable responsible from the discrimination of the two periods is the money deepening, which affects the process of monetization positively and then the monetary sector, and consequently the economic activities. The technological revolution had made the process of money deepening so easily accordingly the dealing with the monetary institutions increased in the recent years, which contributes positively in reviving the economic life i.e reducing the currency in public as result money supply extends. The third factor contributes to the issue of discrimination is the velocity of money which depends on the proportion of income in the hand of public. Velocity of money affects national income via increasing money supply and hence price levels. Despite that the role of velocity of money in the discrimination of the two periods is less than money multiplier and money deepening but still has significant role in the study. The small effect percentage in the discrimination of the two periods had played by quasi money variable, which have lowest difference of mean between the two periods. This can be attributed to the fact that quasi money is one components of money supply, so its impact measures by direct summation in contrast to rest variables were their impacts counted through multiplier and hence it will be large in economic life compare to quasi money.

**CONCLUDING REMARKS**

- The results revealed that all means of the discriminant variables in the petroleum era are greater than the ones in the none petroleum era except the monetary deepening variable. The monetary deepening variable has minor role in the monetary sector compare to the rest variables, its role only concerns with the process of monetization through the institutional framework, so its effect in the economic life is to some extent minor. The high means of money multiplier, velocity of money, and quasi money in the petroleum era compare to none petroleum era resulted in relative stability in this era in term of price level, unemployment rate, as well as exchange rate. This stability had made gains as proved by J curve effect as examined by some studies. While none petroleum era experienced economic discrepancy and distortion or loses as proved by leverage effect (Elathir ,2016)
- The gains and losses in the petroleum and none petroleum eras as detected respectively are attributed mainly to the effect of rent economic which had shaped the petroleum era. The drawbacks of rent economy appeared in the next era after separation of south Sudan i.e collapse in the exchange rate, rising price levels and shouting unemployment rates.

The discriminant variables of the study (none petroleum era) experienced small means values compare to the petroleum era, as a result the monetary sector failed to derive economic activities positively.

- Finally the most discriminant variable in the study is the money multiplier, in this respect and according to the monetary sector in the Sudan is characterized by highly sensitivity to money multiplier and consequently income, as well, as other macro-economic indicators. So the deep examining to this multiplier as its components is a key point of reasonable treatment to Sudan economy problems as developing economy. Here the stress must be devoted to the monetary policies that deal with the issue of the currency in public, reserve proportion of current deposit and time deposit as those are the main components of the multiplier

## REFERENCES

- Arintoko, A. (2009). Is long-run monetary neutral? Evidence from Indonesia. *Economic Journal of Emerging Markets*, 197-214.
- Asfaw, H.A. (2014). Trade policy and economic growth in Sub-Saharan Africa: A panel data approach. *American Journal of Trade and Policy*, 94-101.
- Bokreta, K., & Benanaya, D. (2016). The fiscal-monetary policy and economic growth in Algeria: VECM approach. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, 10(9). <http://dx.doi.org/10.5281/zenodo.1126221>.
- Brueckner, M., & Lederman, D. (2015). Trade openness and economic growth: Panel data evidence from Sub-Saharan Africa. *Economica*, 82, 1302-1323.
- Eltahir, Y. (2016). ESTIMATING THE ERROR CORRECTION MODEL FOR SUDANESE EXCHANGE RA. *International Journal of Current Research*, 8(2), 357-362.
- Eltahir, Y. I. (2015). Estimating exchange rate volatility-comparative study (evidences from sudan). *International journal of research in business studies and management*, 2(11).
- Huidumac-Petrescu, C. E., & Popa, A. C. (2014). Implications of the financial crisis to the relevance of Taylor rule Case study: European Union. *Theoretical and Applied Economics*, 21(5 (594)), 113-126.
- Jayaraman, T.K., Cheeng, C.K., & August, L. (2012). A Study on Relative Effectiveness of Monetary and Fiscal policies in Vanuatu. Working series No. 2012/06.
- Keho, Y. (2017). The impact of trade openness on economic growth: The case of Cote d'Ivoire. *Cogent Economics & Finance*, 5(1), 1-14. <http://dx.doi.org/10.1080/23322039.2017.1332820>.
- Lawal, A.I., Nwanji, T.I., Asaleye, A., & Ahmed, V. (2016). Economic growth, financial development and trade openness in Nigeria: An application of the ARDL bound testing approach. *Cogent Economics and Finance*, 4, 1-15.
- Meltzer, A.H. (1983). *On Keynes and monetarism*. London: Carnegie Mellon University Research Showcas.
- Minyahil, A., Wndaferahu, M., & Yilkal, W. (2016). Monetary Policy and Inflation Dynamics in Ethiopia: An Empirical Analysis. *Global Journal of Human-Social Science: (E) Economics*, 16(4), 45-60.
- Mishchenko, S., Naumenkova, S., Mishchenko, V., Ivanov, V., & Lysenko, R. (2019). Growing discoordination between monetary and fiscal policies in Ukraine. *Banks and Bank Systems*, 14(2), 40.
- Okorie, D., Sylvester, M.A., & Simon-Peter, D-A.C. (2017). Relative Effectiveness of Fiscal and Monetary Policies in Nigeria. *Asian Journal of Social Science Studies*, 2(1), 117-129.
- Owoye, O., & Olugbenga, O.A. (1994). The Relative Importance of Monetary and Fiscal Policies in Selected African Countries. *Applied Economics*, 26, 1083-1091.
- Razzaque, M.A., Bidisha, S.H., & Khondker, B.H. (2017). Exchange Rate and Economic Growth: An Empirical Assessment for Bangladesh. *Journal of South Asian Development*, 12(1), 42-64.
- Tadesse, T., & Melaku, T. (2019). Analysis of the Relative Impact of Monetary and Fiscal Policies on Economic Growth in Ethiopia, Using ARDL Approach to Co-integration: Which Policy Is More Potent?. *Copernican Journal of Finance & Accounting*, 8(2), 87-115.
- Şen, H., & Kaya, A. (2015). The relative effectiveness of monetary and fiscal policies on growth: what does long-run SVAR model tell us? MPRA Paper, 65903.
- Waheed, M., T. Alam and S.P. Ghauri (2006), "Structural Breaks and Unit Root: Evience from Pakistani Macroeconomic Time Series," MPRA Paper No. 1797, University Library of Munich, Germany.Wallace,
- Zarra-Nezhad, M., Hosseinpour, F., & Arman, S.A. (2014). Trade-Growth Nexus in Developing and Developed Countries: An Application of Extreme Bounds Analysis. *Asian Economic and Financial Review*, 4(7,) 915-929.

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