

The Sudan economy "challenge and suggestions" Meta study

**Yassin Eltahir¹, Ahmed Abdelmotlab², ElSiddig Yousif Mohammed Mousa³,
Fuad Yousif⁴**

^{1,2,3,4} King Khalid University, Business College, KSA

¹ yeltahir@kku.edu.sa

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Abstract: The problem of this study is how to make a link between four studies, which reflect how they integrated to make one pound study, or how they are aligned together in order to explain and interpret the challenges facing the Sudan economy. So study is aggregation to four studies by using meta-analysis method which is suitable for integrating studies with the aim of elaborating main stream focusing in how the different studies under consideration reaching same results with different methods. Hence here the study seeks for increasing the power of testing the main question of the study which is the challenge that faced the Sudan economy particularly the structural distortion of economic variables. The study gathered the results of the four mentioned studies which are almost concerned with the exchange rate. The results confirmed the structural problem which faced the Sudan economy, while meta-analysis results assured and empowered the hypothesis of the study in terms of significant effect size. Moreover, the results consolidated the similarity of the studies in manipulating the problem of this study. In addition to that the heterogeneity stems from differences in the effect size of each study rather than differences in the sample sizes of the studies. Finally the study of exchange rate volatility has greater effect size, next to the study of estimating the error correction of exchange rate model while the studies of appropriate estimator of exchange rate and profitability of commercial banks have slight and insignificant effect size. Finally the different results assure the convenientability of meta analysis in reflecting the challenges that faced the Sudanese economy and their ramifications, then accordingly the suggested remedies which may help in tackling the matter.

Keywords: Meta-analysis; Challenge; Suggestions; Sudanese economy.

JEL Classification: A1; E0; E3; E6; F4; P5.

1. Introduction

The reason for writing this topic is the results of a number of research I had conducted between 2015 and 2019 related to topics in the Sudanese economy. These topics are studies in the exchange rate of the Sudanese pound by introducing several variables and the use of standard methodologies, in addition to research in the Sudanese commercial banks as the spearhead in credit.

The exchange rate study reflects the trends of the major variables in the economy as a window from which we can see the existing economic situation. The impact of the exchange rate extends beyond exports and imports to the core of macroeconomic problems such as inflation, growth, unemployment and income distribution and its implications for poverty levels. As well as its direct and indirect impact on the status of credit and thus investment and capital formation.

The aim of this topic is to draw the main conclusions in the papers referred to. Accordingly, it is possible to formulate the challenge facing the Sudanese economy and to develop suggestions that can contribute to the lighting of the various aspects of the subject that may help in developing proper solutions adapted to the specific situation of the Sudanese economy.

We will begin this study with an overview of research topics, objectives, methodologies, and the scope of study. Then we address the main findings of this research and formulate them in a way that reflects their interdependence as a fundamental unit that depicts the unity of the issues facing the Sudanese economy. After that, we introduce the challenge facing the Sudanese economy from the conclusion of the research results, which reflects the characteristics of the Sudanese economy and its difference from many economies. The next to the last paragraph presents suggestions that cover different aspects of the approach to the challenge facing the Sudanese economy. Finally, we will conclude by inviting further investigation to the challenge facing the Sudanese economy to give decision-makers more freedom to devise proper adaptive solutions. Deep examination using a

more subject-oriented approach allows us to know the impact of the factors that created the challenge and therefore suggest an appropriate approach that will contribute to mitigating the challenge if not overcoming it.

1.1. Meta-study

A meta-analysis is a measurable examination that joins the after effects of two or more studies. A key advantage of this method is the conglomeration of data prompting a higher factual power and more vigorous point gauge than is conceivable from the measure gotten from any individual investigation. Thoughtfully, a meta-investigation utilizes a factual way to deal with join outcomes from various studies with an end goal to build control (over individual analysis). Fundamentally, it creates a weighted normal of the included examination results and this method has a few points of interest:

- Results can be generalized to a larger population.
- The precision and accuracy of estimates can be improved as more data is used. This, in turn, may increase the statistical power to detect an effect.

1.2. Models

The fixed effect model gives a weighted normal of a progression of study. The backwards of the assessments' difference is ordinarily used as study weight, so bigger examinations will in general give more than littler investigations to the weighted. Random effect is a typical model used to integrate heterogeneous look into is the arbitrary impacts model of meta-investigation. This is essentially the weighted normal of the impact sizes of a gathering of studies. A meta-analysis of a few little studies doesn't generally foresee the consequences of a solitary huge ones. Some have contended that a shortcoming of the strategy is that wellsprings of inclination are not constrained by the technique: a great meta-examination can't right for poor structure or predisposition in the first studies. Another potential trap is the dependence on the accessible assortment of distributed thinks about, which may make overstated results because of production inclination, as concentrates which show negative outcomes or unimportant results are less inclined to be distributed. IVhet, irregular or quality impact models, however the analysis against the arbitrary impacts model is mounting a direct result of the recognition that the new arbitrary impacts (used in meta-examination) are formal gadgets to encourage smoothing or shrinkage and expectation might be incomprehensible or sick advised. The primary issue with the arbitrary impacts approach is that it uses the great measurable idea of producing a "bargain estimator" that makes the loads near the normally weighted estimator if heterogeneity crosswise over investigations is huge yet near the reverse difference weighted estimator if the between study heterogeneity is little. The most extreme issue in meta-analysis regularly happens when the individual or people doing the meta-analysis have a financial, social, or political motivation.

1.3. Publications Overview

The first study on the exchange rate volatility of the Sudanese exchange rate was published in 2015. This study aimed to examine the existence of volatility in the exchange rate of the Sudanese pound between 2000 and 2015 using official monthly data related to the exchange rate. This study was divided into two periods before separation and after separation. The method used is generalized auto-regressive conditional heteroscedasticity (GARCH). Symmetrical and asymmetrical model tests were conducted to arrive at the results of the study that would allow the study aim to be achieved.

The second study on what is the appropriate estimator of the Sudanese exchange rate model, this research was published in 2015, used data covering the period from 2000 to 2014. The model includes endogenous variables (exchange rate, budget position, current account position, capital account position (GDP) and exogenous variables (price level, interest rate, government spending, indirect taxes and money supply). A model of five equations was designed and the methodology used was the estimation of the two-stages least squares (2SLS), the three-stages least squares estimator (3SLS) and the estimate of the semi unrelated equations (SURE). The aim of the study was to arrive at the appropriate estimator of the model. After comparing the three estimators using the simulation model, the appropriate estimator was obtained.

The third study is related to estimating the error correction model of the Sudanese exchange rate, the research was published in 2016. This study aimed to discover the short-term and long-term relationships that link the exchange rate with some basic variables in the economy such as the GDP, the ratio of the money supply to the output, the percentage of government spending to the output. And interest rate. The study used annual data for the period from 1980 to 2014 by applying the error correction methodology after confirming the existence of long-term equilibrium relationships between the study variables. The results of the study helped to highlight the objective of the study through the short and long run exchange rate positions in response to the study variables.

The fourth study on the profitability of Sudanese commercial banks was published in 2016. It aimed to study the credit conditions in Sudan through the profitability index of commercial banks. The study used variables such as bank profitability, assets, liabilities and dummy variables such as capital ownership (domestic / foreign), capital size (small / large) and bank age (mature / immature). The data used are annual data for the period from 2008 to 2014. The sample banks were United capital Bank, Al-Baraka, Al-Jazira, Khartoum, Elshamal, Financial

Investment, Mashreq Blue Nile, and Faisal Bank. Data were processed as panel data using a fixed and random effect regression methodology.

The previous studies in the literature review were using quantitative results to same problem. Hence they were using similar subject matter, specifically the methods of gathering the results. This study was examining different past studies regarding Sudan's economy from different aspects. It aimed to design a method to the degree of alignment approaching the study problem by quantification the qualitative results, then, it used the meta-method which is the gap has been filled by the study.

2. Methodology

In order to benefit from meta-method in the analysis, the study had used objective standards and criteria to quantify the qualitative results of the studies which were used as data in this research. Four standards were used in the process of quantification of the results before meta-analysis implementation. Each criterion was given exact weight respect to its contribution in the study target alignment i.e. result aligned to the target problem (40%), Convenient technique used (25%), appropriate used variables in the study were (20%), and sample adequacy was (15%). Such weights reflected the importance and contribution of each standard in tackling the issue of transformation the qualitative results into quantitative ones, therefore it smoothes the task of meta-analysis in reaching reasonable outputs that combat and consolidate with the results using more sophisticated statistical methods in examining the data.

3. Results of Studies

- The presence of volatility in the exchange rate of the Sudanese exchange rate.
- The period before separation was more stable than the period after separation due to the impact of oil.
- The existence of the so-called leverage effect (Leverage Effect) This means that the decline in exchange rates lead to more volatility than volatility resulting from the increase of the exchange rate appreciation. This result indicates the high risk associated with investment and the economic situation is not encouraging for productive activity.
- It was concluded that SURE is the best estimator of the Sudanese exchange rate model. This indicates that the simultaneous equations random error bias can be said to be cross equations.
- The importance of GDP and the level of prices in the interpretation of the exchange rate where the first effect is positive and the second is negative while the improvement in the position of both the budget, current account and capital account improves the exchange rate situation.
- The use of monetary and fiscal policy proved in the short and long-term the absence of J Curve Effect. This indicates that the concept of short-term losses is followed by long-term gains is none exist in the Sudanese economy.
- Fiscal policy is more effective than monetary policy in influencing the exchange rate.
- With respect to the credit position of commercial banks, the Bank's assets and liabilities have a positive impact on profitability.
- Foreign ownership of the Bank's assets plus maturity of the Bank positively affects profitability and hence the credit standing of the Bank while the size of the Bank's capital adversely affects profitability.
- Long-term profitability of commercial banks is decreasing.
- Unobserved individual effects are not related to variables that affect the profitability of the Bank.

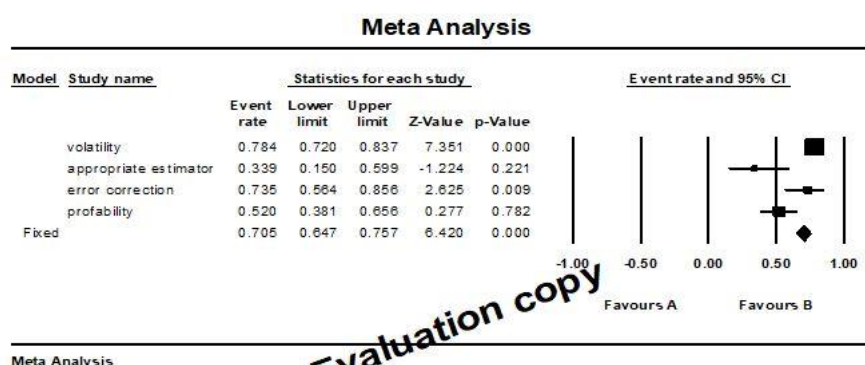
3.1. Empirical Meta-analysis

The methodology for calculating the impact of each study in the problem of the meta-study was based on four indicators: the adequacy of the sample with a weight of 15%, the selection of the appropriate variables for the study with a weight of 20%, the use of the appropriate methodology in the analysis with a weight of 25%, and the extent to which the results were aligned to the central issue of the meta-study with a weight of 40%. Each of the four indicators is divided into three levels: small 19, average 52, large 85, and full 100. A weighted average was measured for each study to measure its impact on the problem of the meta-study and the results were as shown in the good column. To the extent possible, scores were given in each indicator for each study in a way that took into account the objectivity aspect in a way that helps to give a quantitative assessment of the contribution of studies to the final effect according to the four suggested indicators.

Table (1): Empirical Meta-analysis

Study	Sample Adequacy (15%)			Appropriate used variables (20%)			Convenient technique (25%)			Result aligned to target problem (40%)			Ratio
	1-33	34-66	67-100	1-33	34-66	67-100	1-33	34-66	67-100	1-33	34-66	67-100	
	S (19)	M(52)	L(85)	S (19)	M(52)	L(85)	S (19)	M(52)	L(85)	S (19)	M(52)	L(85)	
Volatility			✓		✓				✓			✓	0.784
Appropriate Estimator	✓				✓			✓		✓			0.339
Error Correction		✓			✓				✓			✓	0.735
Bank Profitability		✓			✓			✓			✓		0.52

3.2. Meta-analysis results

**Figure (1): Meta-analysis results**

	Relative weight Fixed effect	Relative weight random effect	Z-value	p-value
Volatility	59.68	28.96	7.351	0.000
Appropriate Estimator	6.17	20.17	-1.224	0.221
Error Correction	12.16	24.21	2.625	0.009
Bank Profitability	21.99	26.66	0.227	0.782
Fixed effect			6.420	0.000
Random effect			1.203	0.229
	Q-value 21.296	Heterogeneity df [Q] 3	p-value 0.000	I-squared 85.906
	Tau Squared 0.582	Tau-squared Standard error 0.624	Variance 0.389	Tau 0.763

From the tables above we observe the following:

The study of the volatility has the largest weight exceeding 55% followed by the study of the profitability of banks and then the study of the correction of error and finally the study of the appropriate estimate. The testing of the effect size by the fixed effect method was significant compared to the random effect method. The volatility study has the largest contribution to the size of the impact, followed by the estimation of the error model, the appropriate estimator, and finally the profitability of banks. The last two studies have no significant effect. The heterogeneity test confirmed its presence (the rate of about 85%), ie there is a significant difference between study size of effect

From the above, our conclusion is that the appropriate approach to study the size of the impact is the approach of fixed effect, which means that there is a similarity between the studies on the central point that the meta-study which seeks to measure and observe. The hypothesis of a difference between studies of random effect test results was not supported. There is a consistent overall effect among all studies or the results of the studies contributed to its existence, namely the structural imbalance of the Sudanese economy. That is, studies have maximized this effect.

The two studies that have a significant contribution to the impact are the study of estimating the exchange rate volatility and estimating the error correction model. Or the other two studies, in which their contribution to the size of the effect was not significant which may call for thinking about the methodology used or variables or the structure of the sample.

Remarks:

- The studies which had used more advanced statistical methodology i.e exchange rate volatility & exchange rate error correction model were contributed significantly in aligning the problem of the study, which is Sudanese economy suffering structural complications.

- The studies of appropriate estimator of exchange rate and Sudanese commercial banks profitability have smaller contribution in aligning the study problem mainly due to that they were approaching indirectly, and partly due to the usage of less sophisticated techniques in the analysis
- The different weights which were given to the standards assigned to each study reflected in meta-analysis results the relative strengthens of each study in targeting the study problem alignment.

The challenge:

The results mentioned in the preceding paragraph point to one fact that the structural nature of the Sudanese economy does not allow using the market mechanism to correct distortions. Any deviation from equilibrium leads to further deviations (equilibrium is unstable). In other words, the situation of demand and supply in economics is not identical to their theoretical framework in the literature of economics. Therefore, the application of any policy based on the market mechanism suggests a tool to restructure economic variables by rebuilding the real sector (product sector) and the financial sector (monetary and credit) in a way that allows the positive impact of the market mechanism. So the challenge facing the Sudanese economy is how to restructure the economy so that demand and supply return to their proper framework and then make appropriate applications based on the mechanism of supply and demand in stimulating productive and consumer activity through fiscal and monetary policy.

Suggestions:

- Restructuring the real sector through expenditures and revenues. With regard to spending, it is suggested to balance consumer spending with investment spending in a way that reduces the size of the economic cycle. Here the effect of multiplier and accelerator principle must be examined. Here the trade-off between projects is suggested to take into account the combination of stimulating consumption and low volume of capital according to available resources. On the revenue side, it is suggested that the indirect tax sector must be structured by looking for the appropriate tax combination that maximizes revenue while minimizing the dead loss of tax due to its negative effects on output. This is done by examining the elasticity of demand and supply of indirect taxable commodities. Furthermore, it is suggested to review the VAT and its suitability to the nature of the goods involved in the economic activity, whether they are locally produced or imported.
- Restructuring the financial sector (monetary) by addressing the imbalances in the transactions demand for money, which has negative effects on the velocity of circulation and thus the stability of the financial sector and credit situation. It also suggested to address the imbalance in the composition of money supply between the components (M2) currency in the public on the one hand and quasi money (letters of guarantee and credit) on the other hand, which helps positively in the stability of the banking sector and thus the gradual return of confidence in the banking sector in addition to improving the credit situation of commercial banks.
- Due to the failure of the market mechanism to correct the distortions of the Sudanese economy (the optimal allocation of resources, the increase of income and the equitable distribution of wealth), it is suggested to pay attention to the alternatives such as direct support to the classes that deserve support, reforming insurance health system. It is also proposed to transform education services into what is known as the education industry through the establishment of an education bank. Deposits shall be the expenses paid by the State for education and the citizens' payment for education services (including direct and indirect expenses). The result of this help in creating credit in the field.
- Before gradually starting stopping government support, it is suggested to reform the social support institutions (Zakat, Social Welfare, Social Security) in a way that allows them to form a comprehensive, sufficient, accurate and up-to-date database so that the support reaches its actual beneficiaries. Therefore, it is suggested that huge support must be given to these institutions in the form of training of cadres and tools for collecting, improving and updating information.

4. Conclusion (further examination)

As mentioned above, the challenge facing the Sudanese economy is how to restructure economic variables in a way that allows the market mechanism to operate. The main problem is the instability of the variables equilibrium in all sectors. By borrowing the language of the medical field, if the above studies have examined the stethoscope in clearance the problem, it is suggested to perform endoscope examination to find out the size and directions of the problem as well as the complicated nature of this problem.

Based on the previous paragraph we go to the last suggestion which is to build a model of the economic cycle that examines the stability of the economy through a mathematical approach consisting of a square matrix of the basic variables dependent and independent. It is suggested to construct this matrix for the income model of the identity equation and its behavioral equations. The proposed matrix rank (7×7) includes the coefficients of dependent variables (income, consumption, investment, tax, demand for money, exports, imports) coefficients of independent variables (constant term, lag of income, government spending, fixed tax, money supply, price level, exchange rate). The matrix is studied by calculating characteristic roots, characteristic vectors, and characteristic

space. From these results, one can know the type of distortion or instability in addition to its size and extent, which independent variables are more influential and which dependent variables are more vulnerable. In the light of matrix examination, possible scientific and practical solutions can be formulated to address the problem. This entails rebuilding economic variables in such a way that the market mechanism can be used to achieve macroeconomic objectives such as growth, price stability, normal unemployment rates, stable balance of payments and equitable distribution of income.

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