UNIVERSITI PUTRA MALAYSIA

AN EMPIRICAL ANALYSIS OF MONEY, EXCHANGE RATE AND INFLATION DYNAMICS IN SUDAN

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FEP 2001 9

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By

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Thesis Submitted in fulfilment of the Requirement for the Degree of Doctor of Philosophy in the Faculty of Economics and Management Universiti Putra Malaysia

November 2001

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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Chairman: Professor Mohammed B. Yusoff, Ph.D.

Faculty: Economics and Management

The issue of the direction of dynamic causality among macroeconomic variables has been a divisive issue among the economists. It is argued that an exogenous expansion in money supply leads to a long-run cumulative causation among macroeconomic variables. Domestic monetary expansion causes domestic interest rates to fall, initiating an incipient capital outflows and a subsequent depreciation of domestic currency. This process, in turn, raises domestic prices via the prices of imported goods, which results in subsequent fall of domestic real money balances and wages. Maintaining such an accommodative monetary policy can doubtlessly give rise to exchange rate-inflation spiral that can generate and sustain a vicious dynamic process of rising prices and depreciating exchange rate which can plague the economy for a long time.

The main objective of this study is to examine and analyze the nature of the causality among money, exchange rate, nominal wages, domestic inflation and real output in the context of the Sudanese economy from 1970 to 1999. The study attempts to

determine the direction of causality among the variables and suggest appropriate policy actions that the concerned authorities might employ to break this vicious dynamic causality in order to stabilize the performance of the Sudanese economy. To achieve this, the study employs the cointegration techniques and vector error-correction model (VECM) to analyze this dynamic causal relationships using annual data on money supply, exchange rate, nominal wages, consumer price index, and real output. While the Johansen cointegration tests indicate two cointegrating equations (exchange rate and money), the Granger-causality tests indicate that inflation, nominal wages and inflation are weakly exogenous variables.

The empirical results indicate that, in the short run, a rise in consumer price index (inflation) and money supply cause the exchange rate to depreciate, while a rise in nominal wages and real output cause the exchange rate to appreciate. However, in the long run, while a rise in consumer price index and real output causes the exchange rate to appreciate, a rise in money supply results in exchange rate depreciation. In addition, a rise in exchange rates (depreciation) and consumer price index in the short run causes money supply to rise while a rise in nominal wages reduces it. However, in the long run, a rise in domestic prices, exchange rate (depreciation) and real output cause money supply to rise.

EMPIRIKAL ANALISIS WANG, KADAR PERTUKARAN DAN DINAMIK INFLASI DI SUDAN

Oleh

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November 2001

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Ahli ekonomi masih bertelingkah tentang isu dinamik arah penyebab antara pembolehubah makroekonomi. Mereka berhujah bahawa pertumbuhan penawaran wang secara eksogen mencetuskan hubungan jangka panjang antara pembolehubah makroekonomi. Pertumbuhan kewangan domestik menyebabkan kadar faedah menurun dan kemudiannya berlaku kemerosotan nilai matawang ekoran daripada pengaliran keluar modal. Proses ini akan meningkatkan harga domestik melalui peningkatan harga barang import dan seterusnya mengakibatkan kejatuhan stok wang domestik dan upah. Oleh itu, pengendalian dasar kewangan seperti ini bukan sahaja menyebabkan inflasi dan kemerosotan nilai matawang, bahkan juga akan memburukkan lagi keadaan ekonomi dalam jangka panjang.

Kajian ini bertujuan untuk menerangkan arah penyebab antara penawaran wang, kadar pertukaran, upah semasa, inflasi domestik dan keluaran benar dalam ekonomi

Sudan dari tahun 1970 hingga 1999. Kajian ini juga akan menentukan arah penyebab antara pembolehubah dan memberi cadangan dasar berkesan kepada pihak berkuasa untuk menstabilkan ekonomi Sudan. Untuk mencapai tujuan, kajian ini menggunakan kaedah kointegrasi dan model vektor pembetulan ralat (VECM) untuk menganalisis hubungan penyebab antara inflasi, upah, kadar pertukaran, permintaan wang dan keluaran benar dalam ekonomi Sudan. Ujian kointegrasi Johansen menunjukkan wujud dua persamaan kointegrasi (kadar pertukaran dan wang), manakala ujian penyebab Granger menunjukkan inflasi dan upah merupakan pembolehubah eksogen lemah di dalam sistem VECM.

Dalam jangka pendek, keputusan empirikal menyarankan bahawa kenaikan indeks harga pengguna (inflasi) dan penawaran wang menyebabkan kemerosotan nilai matawang, sedangkan peningkatan upah semasa dan keluaran benar menaikkan nilai matawang. Kenaikan indeks harga pengguna dan keluaran benar menyebabkan kenaikan nilai matawang manakala peningkatan penawaran wang pula akan merosotkan nilai matawang dalam jangka panjang. Kajian ini juga mendapati kemerosotan nilai matawang dan kenaikan indeks harga pengguna dalam jangka pendek akan meningkatkan penawaran wang, sedangkan kenaikan upah semasa mengurangkan penawaran wang. Selain itu, kenaikan harga domestik, kadar pertukaran (kemerosotan nilai matawang) dan keluaran benar mengakibatkan penawaran wang meningkat dalam jangka panjang.

ACKNOWLEDGEMENTS

I am highly indebted to a great number of people and institutions, more than I can mention here, for their help, both directly and indirectly, in the completion of this thesis.

First and foremost I wish to express my sincere appreciation and gratitude to my supervisory committee chairman Professor Dr. Mohammed Bin Yusoff for his constructive guidance and fruitful suggestions that have made the completion of this thesis a success. His productive efforts have made me cherish the importance of self-reliance and independence in academic research works. Coupled with this was the continuous encouragement and support from the other committee members: Professor Dr. Ahmad Zubaidi Baharumshah, Dr. Muzafar Shah Habibullah and Dr. Tan Hui Boon whose commitment has equally and remarkably improved the outcome of the work. My thanks are duly extended to the staff and the administrators of the Faculty of Economics and Management for their cooperation when a need arose.

My thanks and appreciation are extended to the administration of the University of Juba for its continuous support and encouragement for the training of its academic staff. In addition, my thanks are due to the staff of the Ministry of Finance, Department of Public Services in the Ministry of Manpower, National Bureau of Statistics and the Bank of Sudan for providing me with necessary data for this work.

At last, but not least, my profound gratitude is extended to my family for continuous and steadfast support and encouragement. These include my mother Yom and uncle Silas Kot Thong for their perseverance in waiting to see a successful conclusion of

my studies. My beloved and caring wife Victoria Samuel Aru, to mention the least, was instrumental in backing me to make the accomplishment of this work a reality. I owe her a great deal for her encouragement and support during my studies. In addition, my children Awou and Elizabeth deserve special appreciation for providing an entertaining family environment for my work in the house.

I certify that an Examination Committee met on 29th November 2001 to conduct the final examination of Marial Awou Yol on his Doctor of Philosophy thesis entitled "An Empirical Analysis of Exchange Rate, Money and Inflation Dynamics in Sudan" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of Examination Committee are as follows:

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

Name: Marial Awou Yol

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CHAPTER I

INTRODUCTION

Background

The increasing frequency of interacting sequences of money growth, exchange rate depreciation and inflation in many developing countries is a cause of concern about the role of exchange rates in causing domestic inflation. While supporters of flexible exchange rate regime argue that inflation rate is primarily determined by the monetary and fiscal policies with the exchange rate playing only a passive role in the adjustment process, its opponents stress that unmanaged exchange rate is an independent source of inflation.

These statements indicate that the dynamic relationship among money, exchange rate and inflation is based on the belief that flexible exchange systems have a tendency of causing a dynamic instability in which the exchange rate constitutes an independent source of inflation. However, Bilson (1979) objects to this type of analysis by arguing that the correct explanation should be that exchange rates simply respond more rapidly than prices to changes in underlying economic conditions. He contends that, although it appears that exchange rates cause subsequent movements in prices and wages, the ultimate and probable cause of both the exchange rate depreciation and the domestic inflation is an expansionary monetary policy. When asset prices, that is exchange rates and interest rates, are determined in auction markets, while wages and commodity prices are set on contractual bases, changes in the underlying economic conditions are first

reflected in asset market, creating an impression that asset prices cause changes in the contractual prices. Based on this, it is important to analyze the underlying economic conditions in order to provide a complete analysis of the sources of inflation and exchange rate depreciation.

This dynamic interaction between exchange rate depreciation and inflation has always been a source of bewildering dilemma to governments when choosing their priorities of whether to stabilize the domestic price level or foreign exchange rates. Although these goals could be attained simultaneously under closed economy, it is not possible to do so under open economy since countries are intertwined in a network of international trade. For this reason, it is inevitable that economic disturbances in one country will have unpredictable repercussions on the economies of their trading partners. If such a dilemma arises, then a country concerned will be obliged to make a choice of stabilizing only either the foreign exchange rates or the domestic price level. But as the fluctuations in foreign exchange rates are easily transmitted via import prices that, consequently, affect the domestic consumers and lead to speculative activities in foreign exchange markets, governments often choose to stabilize foreign exchange rather than domestic price. This is crucially important if a country is small in which trade policy plays a substantial role in its gross national product. With a majority of developing countries operating under semi-fixed or managed floating exchange rates, this choice of exchange rate stabilization as a policy option undermines the country's ability to run an independent monetary policy. Frequent central bank intervention in foreign exchange markets in order to stabilize the foreign exchange rates implies that the country's central

bank will no longer be in control of money supply since the money supply will be likely determined by the degree of volatility of the exchange rates.

This chapter presents the general economic conditions that prevailed in Sudan in the run up to and during the present economic crises. It is divided into six sections. Section one presents the background and effects of inflation phenomenon. Section two presents the major economic indicators. Section three is the problem statement while section four presents the objectives of the study. Section five discusses the importance of the study, while section six comprises the scope and organization of the study.

Views on Inflation Causes

The analysis of the causes of inflation has centered around two main views: namely, the "fiscal" view and the "balance of payments" view. The "fiscal" view advocates that inflation is purely a monetary phenomenon in the sense that there has never been serious inflation without an increase in the quantity of money. Indeed, according to this argument, other non-monetary factors such as government budget deficit, wage pressures by labor unions, and monopoly pricing may only operate via either an increase in the quantity of money or a decrease in output. This view was assertively expressed by Friedman (1963) that "inflation is always and everywhere a monetary phenomenon" The "fiscal" view proponents vehemently argue that continuous expansion of monetary base essentially arises from a fiscal disequilirium.

The "balance of payments" view advocates tend to link inflation to the role of exchange rate changes, which arise from the balance of payments crises. Laviatan

(1986) strongly stresses that exchange rate depreciation increases the underlying rate of inflation either through increases in inflationary expectations, which are then accommodated by monetary authorities, or through the wage indexation mechanism. Similarly, Dornbusch (1985) argues that the alternative theory is the balance of payments approach. This theory claims that adverse balance of payments developments force exchange depreciation, which then deteriorates inflation, and with that, budgetary performance. In a setting of passive money, exchange rate disturbances then cause inflation. Dornbusch argues that when the authorities are not pursuing money targets, either because of explicit policy of monetary accommodation or because of monetary financing of a real budget deficit that is endogenous with respect to the price level, nominal exchange rate shocks prompted by adverse external developments can give rise to inflationary episodes. Montiel (1989) observes that the distinction between the two was more analytical than being empirical. Furthermore, Montiel argues that, given the presence of a substantial degree of feedback from changes in the aggregate price level to both the fiscal deficit and the rate of depreciation of the nominal exchange rate (which accounts for the sustainability of inflation), these views differ with respect to the nature of the shocks that have empirically been observed to trigger episodes of sustained high inflation.

In this connection, governments try to prevent inflation episodes for a number of reasons. Mainly, inflation leads to a redistribution of real income in socially unjust and unacceptable manner. Inflation benefits those whose incomes rise faster than the rate of inflation at the expense of those whose incomes rise less than the rate of inflation. Mainly fixed-income earners such as pensioners, and professionals such as doctors,

lawyers, academics and producers of some primary products sold on international markets are the losers while strongly organized wage-earners and businessmen are the gainers. Secondly, inflation faces savers with tough dilemma of whether to invest on securities or deposit their money in fixed-interest bank deposits. The dilemma is that of not knowing what will be the value of a certain sum of money in the future sufficient to meet the needs for which saving is done. The third reason why governments fight inflation is that it affects the balance-of-payments position of a country. Inflation can weaken the balance of payments of a country by stimulating imports and discouraging exports. Inflation boosts imports because when the price of domestic products rises, domestic residents resort to purchasing the relatively cheaper foreign goods. Similarly, the growth of exports is checked by rising domestic costs and prices because, other things remaining equal, rising costs at home hurt the competitiveness of domestic producers in international markets. The fourthly, inflation distort the portfolio composition of wealth holding. During inflation, because the real money value declines continuously, wealth holders tend to tend keep a greatest part of their wealth in the form of other assets whose price rises faster than the rate of inflation rather than in money. This implies that both individuals and firms face real cost or real loss of welfare under inflation than they would have faced under stable prices. This real cost increases with increase in the rate of inflation and in extreme cases when the real cost becomes a major consideration, people try to pass on money as quickly it is received.

Major Economic Indicators

Inflation started to surface gradually in the Sudan economy in the 1970s when domestic price began to rise at about 3 percent annually whereas import price rose by about 8.6

percent annually during 1967-71 period. At the same time, money supply was growing at 22.1 percent per annum.

A comparison of inflation indicators of the Sudan with a selected number of high-inflation African countries is presented in Table 1.1. This table reveals that Sudan ranks second after Zaire in terms of annual percentage changes in consumer price indexes in which inflation rates were 51 percent and 528.4 percent for Sudan and Zaire respectively during the 1987-91 period. During the 1992-96, although the inflation rates fell by more than half from the previous figure to 260 percent in Zaire, this was still the highest figure on the continent followed only by Sudan with the inflation rate of 106 percent during the same period. This could be a reasonable indicator of inflationary trend since most of these countries, although had experienced high inflation rates in the period 1982-86, were able to reverse these upward trends as a result of successful implementation of IMF rescue packages in the 1990s. After 1991, all the countries except Nigeria, Sudan and Zaire had already managed to arrest the rising inflationary trends.

Ghana had experienced high inflation rates of 33.8 percent and 73.4 percent in the periods 1977-81 and 1982-86 respectively, but managed to reverse the trend in the period 1987-91 when it reduced the inflation rate to 3.5 percent, although it bounced back afterwards to 48.5 percent in 1992-96 period following the implementation of the IMF Structural Adjustment Programs. The high rates of inflation in the Sudan and Zaire could be attributed to political instability, civil wars as well as the dissipation of foreign assistance so that the governments had to resort to borrowing from the banking system

for financing their projects. In the Sudan, the 18-year civil war that erupted in 1983, which costs approximately US$1 million per day has imposed a constant drain on the meager resources of the country.

Table 1.1. Changes in Consumer Price Index During 1972-96 (%)

Country	Year				
	1972-76	1977-81	1982-86	1987-91	1992-96[a]
1. Sudan	15.2	23.6	33.3	67.6	107.1
2. Ghana	47.1	33.8	73.4	3.5	48.4
3. Nigeria	50.0	18.1	21.0	93.0	80.0
4. Uganda	NA	NA	48.6	-21.5	9.0
5. Zaire	88.6	2.8	22.5	528.4	260.0
6. Zambia	29.6	4.2	35.2	29.4	12.4[b]
7. Africa	35.0	4.3	-2.1	31.0	10.1
8. Developing Countries	32.9	7.6	2.6	22.4	3.1
9. Industrial Countries	9.3	5.7	-23.0	22.6	-8.6
10. World	11.9	12.6	-5.7	17.8	-5.6

Source: Derived from various Annual Reports of the Bank of Sudan and International Statistics Annual Yearbook

Notes: a. Average Percentage Change for three years.
b. Average Percentage change for four years.

Matters were compounded by half-hearted and noncommittal implementation of the IMF. When the country tried to implement the package faithfully in February 1992, the result was a staggering depreciation of the national currency by 540 percent and an inflation rate of 118.7 percent[1]. All these factors are believed to have contributed to this runaway inflation rates in these African countries.

Table 1.2 presents the growth rates of money supply, exchange rates and consumer price index of the Sudan during the period between 1972 and 1996. The table shows clearly that, as the growth rate of money supply (M1) was accelerating, there was a corresponding simultaneous depreciation of exchange rates and the rapid rise of the

consumer price index. The highest growth rates in these variables were recorded in 1992-96 period in which, on the average, exchange rate depreciated by about 58 percent while inflation and money supply grew at 107.1 and 269.9 percent respectively.

Table 1.2. Exchange Rates, Inflation and Money Supply in the Sudan during (1972-96)

Item	Year				
	1972-76	1977-81	1982-86	1987-91	1992-96
1. Exchange rate Depreciation LS/$ (% per annum)	0.0	8.6	24.5	29.1	57.9
2. Inflation Rates (% Growth of CPI per annum)	15.2	23.6	33.3	67.6	107.1
3. Money Supply (M1)growth Rate (% per annum)	23.2	34.4	31.5	50.5	269.9

Source: Derived from various Annual Reports of the Bank of Sudan and International Financial Statistics Yearbook.

In 1992 alone, following the conclusion of an agreement between Sudan Government and the IMF, while the national currency lost 97.4 percent of its value, inflation and money supply grew at 119.2 and 97.4 percent respectively. The agreement aimed at liberalizing the exchange rate and foreign exchange markets. This indicates that exchange rate and foreign exchange management became a subservient tool of government control. This practice, which has been largely blamed for most inflationary upsurges, has been vehemently opposed by the IMF as being in direct contravention to the laws and regulations governing the functioning of the international trade. In most cases, deterioration in each sector of the Sudanese economy in the later periods under study was squarely blamed on continuous reliance on bank borrowing which was seen as being responsible for an abrupt depreciation of the national currency, the pound. In

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[1] The Bank of Sudan Annual Report, Vol.32, (December 1992).

addition, the implementation of successive IMF structural adjustment programs could have consequently led to a rise in local currency cost of imports and debt servicing. Table 1.3 presents public finance indicators such as government current, budget deficits and government borrowing from the banking system all as percentage of GDP.

Table 1.3.   Public Finance Indicators for Sudan During 1972-96

Item	Year				
	1972-76	1977-81	1982-86	1987-91	1992-96
1. Overall Budget Deficit/ Surplus as % of GDP	-1.8	0.6	-4.7	-4.0[a]	-0.9
2 Foreign Deficit Financing (as % of GDP)	2.1	-5.7	-10.0	-9.2	-2.3
3. Government Borrowing from Banks (% of GDP)	1.0	4.0	4.6	5.9	1.3

Sources: Derived from various Annual Reports of the Bank of Sudan and the International Financial Statistics Yearbook.
Note: a indicates an average for three years. The figures are five-year period's averages.

It reveals that the government current budget was in continuous deficit ever since 1972-76 except in 1977-81 when it recorded a slightly moderate surplus of 0.6 percent. In the same period, the overall budget deficit, as a proportion of GDP, recorded 5.7 percent and deteriorated more in the subsequent two periods, registering negative rates of 10 percent and 9.2 percent in the following 1982-86 and 1987-91 periods respectively. In order to finance this worsening budget deficit, the government had increasingly resorted to borrowing from the domestic banking system which, accordingly, reached 4 percent, 4.6 percent and 5.9 percent as proportion of GDP in the periods 1977-81, 1982-86, and 1987-91 respectively. In addition to this, the monetary accommodation policy followed by the government in response to the persistent demand by civil servants for salary and wage increases could have worsened the situation. As such, government borrowing from the banking system for bailing itself out of these financing difficulties was growing fast.

Table 1.4 shows it clearly that the growth of money supply has been relatively and extremely rapid. Money supply growth accelerated rather faster in the second half of the period under this study, 1987-96, recording extremely high rates of increase of 67.8 percent and 79.9 percent during 1987-91 and 1992-96 periods respectively. One possible explanation that could be advanced for this explosive expansion of money supply in this period was the result of the adoption of the IMF liberalization program in which trade, exchange rate and foreign exchange markets were liberalized. Subsequent depreciation of the national currency might have triggered off an explosion of local currency cost of imports and debt servicing, possibly resulting in an overall rise in the domestic component of money supply. Following the implementation of that program, the Sudanese pound depreciated by about 1300 percent in 1992. Domestic credit also grew faster in the same period; possibly resulting from a decline in the foreign-reserve component of money supply as the central bank undertakes sterilization operations. In a fixed-exchange rate system as in the Sudan, when the balance of payments experiences a deficit, the central bank sells its foreign exchange reserves to the public and consequently sterilizes the effect of the deficit on the monetary base by increasing the domestic credit by exactly the same amount. In this period, the M2 component of money supply kept its acceleration especially in middle of the concerned period. While, on the average, M2 grew at 34.1 percent in the period 1982-86, it accelerated by 49.1 percent in the following (1987-91) and jumping by 95.7 percent in 1992-96 period. In this type of operation, although monetary base (and hence, money supply) remains the same, the domestic credit component of money supply has increased to the extent of the domestic credit created during this operation.