Impact of Macroeconomic Policies on Capture Fishery in Nigeria, (1970-2000)

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GJMBR-B Classification : *FOR Code : 140202, 140212, JEL Code : E63*

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Strictly as per the compliance and regulations of :

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I. Introduction

Prior to the political crisis of 1967 – 1970, agriculture's positive contributions to the economy were instrumental in sustaining economic growth and stability. The bulk of food demand was satisfied from domestic output, thereby obviating the need to utilize scarce foreign exchange resources on food importation (Olayide, 1972).

However, the crisis, which developed in Nigeria agricultural sector during the civil war, became more serious in the 1970's and incidentally coincided with the rising fortunes of the petroleum sector. From that period to 1985, agriculture's contribution to the economy in terms of output growth, employment, food supplies, investments capital and linkages with the rest of the economy became relatively insignificant. This development was reflected in rising food prices, inflation increased imports of food and agricultural raw materials for local industries and deteriorating living conditions of rural dwellers (Essen, 1982). The Nigerian economic development process has suffered from dearth of holistic. The production situation in the fishery sub -

sector of the Nigerian agriculture indicates that there was growth in the decade of the 1970's sharp decline in the mid-1980's, a slow recovery in the second half of the 1980 but a declining output since the 1990's (Federal Republic of Nigeria, 1997). The improvement in Nigeria's fishery sub-sector performance to a satisfactory and sustainable level and has been a challenge to policy makers in government and operators in the private sector. Hence, from the 1970 to 2000, government has adopted various policies to improve the fishery output in the country. The macroeconomic policies adopted include monetary, fiscal, exchange rate and price policies. In spite of such policy measures, significant and sustainable increase in fishery output in the country is yet to be achieved (Ukoha, 1999). For example, in the pre-structural adjustment period (1970 – 1985) total agricultural production, staple food crops and fish experienced negative growth. In the few cases where growth rate were positive, the rates were very low, ranging from 1.91 percent per annum for cash crops to 2.2 percent for livestock and -0.65 for fish. This is why Nigerian government over the years had embarked on various policies/programmes to boost the agricultural production, which include crops, livestock and fishery production. Monetary policy: Monetary policy is government guideline on money supply issued periodically to regulate the volume of money in the economy. Monetary policy can be used to stimulate agricultural output growth, increase employment, stabilize prices, moderate inflation, stabilize exchange rate, reduce pressure on external sector, and induce savings as well as agricultural investment (Ele, 1986). Government monetary policy has adverse consequences on the agricultural sector. It influences the availability of credit and the term structure of interest rates. If agricultural credit is readily available to the sector, farmers and other operators can obtain loans to expand output. On the other hand, monetary policy that encourages inflation will raise price of inputs such that cost of production increases. The consequence of this is that the size of operation will be drastically reduced for farmers and other operator that have limited financial resources (FAO, 1991). Fiscal Policy: Fiscal policy is the use of taxation government expenditure to control the level of economic activities. Such guidelines are useful in balancing resources available for public and private sectors such that inflation, unemployment and income

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inequality and pressure on balance of payment are minimized. Over the years, there have been many objectives of fiscal policy. For example, the objectives of fiscal policy in 1990 included the promotion of export of industrially manufactured goods, creating employment opportunities, providing effective protection for the local industries; enhance the use of locally sourced inputs and the reduction of tax burden on individuals and corporate bodies (Heady, 1946). The strategies of fiscal policy included: the introduction of 5% value added tax to replace sales tax; abolition of excise duties; regulation of custom and excise tariff; retention of tariff concession granted to the transport sector and imposition of custom duty and taxes on contracts or project loans.

Exchange Rage Policy: Government exchange rate policy regulates the rate at which the Naira exchanges with other currencies of the world. The objective of this policy is to realign the exchange rate of the Naira vis-à-vis the major world currencies; to create an equilibrium exchange rate for the Naira in a free market economy (Okigbo, 1986). The strategies of the exchange rate policy are: Pegging of Naira exchange rate to a dollar; introduction dual exchange rate between 1995 and 1999 and allowing the forces of demand and supply to determine the exchange rate. Fisheries development policies and programmes pre-dates Nigeria's independence in 1960. A search of the literature (Tobor and Ajayiu, 1992) reveals that, with the replacement of import from Europe owing to Second World War (1939-1945), the colonial government was promoted in 1942 to work out fisheries development policies/programmes for Nigeria. On attainment of independence in October 1960, the country commenced a number of fisheries development policies/programmes within the context of 5 – years National Development Plans in 1974, but with effect from 1975 – 1980 and (1981 -1986) from 1990, the 5 – year development plans were replaced with 3-year rolling plans i.e. 1990-1992, 1993-1995, 1996-1998 and 1999-2001 respectively (Tobor and Ajayiu, 1992).

The fisheries development policy/programmes in Nigeria have spanned the period of 30-years. Nevertheless, the main objective of this development programmes, which is to make Nigeria self sufficient in fish production and supply is still an illusion. Available records show that 40 years of political independence (October 1960-2000), the government of Nigeria changes hands twelve times, some regimes lasting for less than one year. The instability in the political structure or leadership in the country also resulted in frequent changes in the trust of agricultural policy (Jaeger, 1990). Some policies were introduced without any genuine political or economic reasons, but merely because they sounded different from previous ones. Before the commencement of National Development Plans in 1975, there have been a number of programmes during the Gowon regime (1966-1975).

This era witnessed the introduction of Marine Fishery Development Project (MFDP) (197), Agricultural Development Project (ADP) (1970), National Accelerated Fish Production Project (NAFPP) (1972) and Nigerian Agricultural, Cooperative & Rural Development Bank Ltd. (1973).

The Marine Fishery Development Project was designed to provide the basic infrastructural facilities to fishing settlements, the National Accelerated Fish Production Project focused on bringing the benefits of modern technology to replace the traditional method of fishing, Nigerian Agricultural, Cooperative and Rural Development Bank Ltd. was designed as a specialized credit and rural development institution while Agricultural Development Projects (ADPs) were extension oriented, saddled with the provision of improved fingerlings and introduction of new techniques of fishing. Records also show that during the period, the country was virtually self-sufficient in food. Ogbe (1984) reported that is was hoped that adequate food would continue to be provided through private initiative with little government intervention. The Commencement of National Development Plan (1975-1980): This period cut across three successive governments – Murtala Mohammed (1975-1976), Olusegun Obasanjo (1976-1979) and Shehu Shagari (1979-1983). This administration introduced quite a number of policies and programmes among which are Operation Feed the Nation (OFN) (1976), River Basin Development Authority (RBDA) and Inshore Fishery Project (IFP), all established in 1977. Operation Feed the Nation (OFN) was to mobilize the public to take active part in fish production. The River Basin Development Authority (RBDA) was saddled with the responsibility of developing the country's land and water resources. Inshore Fishery Project was to up-grade the indigenous fisheries to a modern trawling and the provision of modern size multipurpose fishing boats (Moses, 1989)

The civilian regime of Shehu Shagari (October 1979-December 1983) also witnessed quite a number of policies/programmes in fishery sector in particular and agricultural sector in general some of which were Green Revolution (GR) and Fish Seed Multiplication Project (FSMP). The Green Revolution, which was a mere rechristening of the Operation Feed the Nation (OFN) of the military administration of Obasanjo. It only further articulated the agricultural development project extending to cover the entire country. The programmes involved the provision of improved fingerlings and credit facilities to farmers, appropriate mechanization, and improved marketing system. The target was to make the country self-sufficient in basic food production within five years and to rehabilitate and restore the production of export for seven years. Sea Fisheries and Inland Fisheries Decrees established in 1992 was to include wide provision for regulation of catch species, sizes and fishing zones. Regulations set minimum net size for both

finfish and shrimp in order to preserve the fish stock from over fishing. The second National Development Plans (1981-1985) did not have a smooth ending due to military intervention in 1983, with Mohammadu Buhari as the Head. The regime did not produce any reasonable agriculture policy/programmes; rather effort was on River Basin Development Authority. The number of River Basin Development Authority (RBDA) was increased from eleven to eighteen in 1984. From August 1985 to August 1993 Nigeria passed through another military regime headed by Ibrahim Bahangida. This period marked the introduction of 3-year rolling plans, which did not do well in the fishery sub-sector.

Another change occurred (1993-1998) with Sani Abacha as the Head of the regime, this period witnessed two successive rolling plans of (1993-1995) and (1996-1998). Between the Third rolling plans and Fourth rolling plans was the introduction of Sea Fishery and Inland Fishery Decree saddled with the responsibility of regulating species size and fishing zone. 2000 there was establishment of Fish Farm Training Centre to carter for the training of school leavers and fishermen on the new method of fishing to replace traditional methods.

a) Objectives of The Study

The general objective of the study is to assess the performance of artisanal fishery in Nigeria from 1970 to 2000.

II. METHODOLOGY

a) Data and Data Sources

The empirical analysis for this study covers the period 1970 to 2000. Only secondary data were used for analysis. Data were collected on such variables as the quantity and value of fish captured and fish import within the period; government expenditure, credit and the exchange rate in the country for the same period. The choice of time period (1970 – 2000) is based entirely on the availability of data and the need to make allowance for loss of observation.

Data were extracted from the following books of records: Annual Report and Statement of Accounts and Economic and Financial Review of the Central Bank of Nigeria (CBN) from 1970 – 2000; Annual Abstract of Statistics and Nigeria Trade Summary of the Federal Office of Statistics (FOS) and FAO Trade Yearbook (various issues).

b) Method of Data Analysis

The study uses trend analysis in presenting variations in quantity and value of fishery output for the period under study. Such statistic as average annual quantity and value of import over the years, difference in means between pre-SAP and SAP period and co-efficient of variation were used to present the analysis. For the empirical analysis, the study employed Error Correction Model (ECM) to analysis fish output in Nigeria. The need to avoid the incidence of spurious regression, which may render the empirical analysis of regression results invalid, necessitated the adoption of recent development in econometric techniques used this study (Engle and Granger, 1987).

Further more, it has been noted that the estimation techniques such as OLS can be applied to estimate a regression model with time series data only when all the data are stationary. In a situation where non-stationary variable (data) are to be included in a regression, first difference forms should be used. This therefore implies that for appropriate modeling of the relationship between economic variables and in order to be able to make valid inference from findings, as well as to investigate the time series characteristics of the variables in the model as to know whether they are stationary or not.

Empirical Model

$Qf_t = f(Er_t, Qf_{t-1}, Fimp_t, CR_t, Ge_t + Ui)$

Where:

Qf_t = Quantity of fish capture in presence year – Ft

Er_t = Exchange rate

Qf_{t-1} = Quantity of fish captured previous year

$Fimp_t$ = fish import

CR_t = Credit facilities

Ge_t = Government Expenditure

$_{t-1}$ = indicates the lagged variables

c) Estimation Technique

The equations were estimated using Ordinary Least Square (OLS). The model of the study is a single equation Model made up of a dependent variable and five (5) independent (explanatory) variables. The method of multiple regression analysis will, therefore, be used to evaluate the relationship between the dependent variable and the explanatory variables. Two methods of estimating the coefficients of economic relationship exist namely:

Single-equation techniques, and Simultaneous-equation techniques

Single-equation techniques are applied to one equation at a time whereas the simultaneous-equation techniques are applied to all equations of a system at the same time. This implies that single-equation techniques like Classical Least Square (ILS), Two-Stage Least Square and other mixed estimation methods are used for single-equation models. Simultaneous-equation techniques such as Three-Stage Least Square and Full Information Maximum Likelihood techniques (FIML) are used for system equations.

Ordinary Least Square (OLS) estimation technique become imperative in this study because of the single-equation model since it involved simple phenomenon, which can be satisfactorily approximated with a single-equation model (Koutsoyiannis, 1985). Secondly, the purpose of the study is mainly for analysis

and policy making which makes the degree of bias of the estimates very crucial and the Ordinary Least Square techniques satisfies the Guass-Makov Least Square theorem of providing the Best Linear Unbiased Estimate (BLUE) Wanacott & Wanacott, 1972).

Ordinary Least Square (OLS) also has the advantages of simplicity of computation procedure, data requirements are not excessive and hence, it is less expensive and less time consuming. The mechanics of Ordinary Least Square are quite simple to understand and it is component of most other econometric techniques. In fact, with the exception of Full Information Maximum Likelihood technique, all other involver the application of Ordinary Least Square. This technique has produced fairly satisfactory results when used in a wide range of economic relationships and it is most commonly used in estimating relationships in economic models (Koutsoyiannis, 1985).

d) Stationary Test

In this study, the Augmented Dickey –Fuller (ADF) unit root test was used to test for the stationarity of the data (Dickey and Fuller, 1979). The ADF test involves running a regression of the first difference of the series against the series. Using Augmented Dickey Fuller (ADF) test, we run a regression as:

$$\Delta X_t = \beta_1 + \beta_1 t + \delta X_{t-1} + \alpha \sum \Delta_{t-1} + \varepsilon_t$$
$$i-1$$

and then carry out the t-test to know whether the coefficient is statistically significant or not. Then ADF t-statistics were use to compare the critical values at between 1 and 10 percent in order to determine whether the variable X_{t-1} has a unit root.

e) Co-Integration Test

Co-integration has assumed increased importance in analyses that purport to describe long run or equilibrium relationships. An equilibrium relationship exists when variables in the model are co-integrated. A necessary condition for integration, however, is that the data series for each variable involved exhibit similar statistical properties, that is, be integrated to the same order with evidence of some linear combinations of the integrated series. A variable is integrated of order I(0) when it is stationary in level form. A stationary series X_t for example has a mean, variance and autocorrelation that is constant over time (Tambi, 1998). However, most economic series tend to exhibit non-stationary stochastic processes of their form.

Co-integration test was carried out to avoid spurious regression. For this purpose ADF test was applied to test residuals (u) of the static co-integrating regression as follows:

$$\Delta \mu_t = \beta_o \mu_{t-1} + \beta_1 \Delta \mu_{t-1} + c \quad \ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where the t-test of the β_o (parameter of H_{t-1}) is compared to the ADF statistics at the various levels. Co-

integration implies that the long-run movements in the variables are related to one another in a long-run equilibrium relationship. The Johansen (1991, 1995) efficient maximum likelihood test is used to examine the existence of a long-term relationship between macro-economic policies on one hand and the capture fishery on the other, at the 5 and 1 percent levels of significance respectively. Studies by Barret and Arcese (1995), among others, provide ample evidence supporting the use of the Johansen approach over alternative tests. From Engle and Granger (1987), it is obvious that an Error Correction situation will arise showing the degree of adjustment towards long-run equilibrium. In other words, the model tells what proportion of the disequilibrium in one variable in one period is corrected in the next period. The Error Correction Model for 2 variables X and Y is generally stated as:

$$\Delta Y_t = \beta_o + \beta_1 \Delta x_1 + \beta_2 :_{t-1} + \gamma_t \ldots \ldots\ldots\ldots\ldots\ldots..(2)$$

The value of β_1 (coefficient of $:_{t-1}$) shows this degree of adjustment. Given the establishment of stationarity and/or co-integration in the variables, the bivariate Granger causality regressions as shown below are estimated where:

$$\Delta X_t = \alpha_o + \alpha_1 \Delta Y_t + \alpha_2 ECM_{-1} + \sum_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots.(3)$$

Here Y_t and X_t are stationary time series. The causality test shows whether past changes in one stationary variable X_t helps to predict changes in another stationary variable Y_t, apart from the impact of past changes in X_t itself. If so, then X does "Granger cause Y" otherwise, X does not "Granger cause Y". The hypothesis that X does not Granger because Y is rejected if the u_t's are jointly significantly.

f) Error Correction Model

The next procedure is Error Correction Model (ECM) this analysis is used to investigate further whether there is long-run relationship among the variables. This is necessary because economic variables may not be stationary individually, a mechanism could still exists that prevents some of the variables from diverging significantly from each other. This was done using the Johansen (1980) framework for finding whether co-integrating relationship exist among the variables by comparing likelihood ratios against their corresponding critical values at 5 percent. If the various tests performed support the fact that co-integrating relationship exist between dependent and any (or a combination) of its explanatory variable then we need to setup a parsimonious Error Correlation Model (ECM). The ECM is then used to analyze the response of fish import to a stimulus in the explanatory variables in a dynamic setting. The ECM is accepted when the residuals from the linear combination of non-stationary 1(1) series are themselves stationary. The acceptance of ECM implies that the model is best specified in the first difference of

its variables. Thus the application of co-integration paradigm will guard against the loss of information from long-term relationships in the first differences. The Error Correction Model (ECM), which is a method of dynamic modeling employing co-integrate economic theory useful in characterizing a long-term equilibrium with an observed disequilibrium by building a model that explicitly incorporates behaviour that would restore the equilibrium. A prerequisite of the ECM estimation is the determination of the time series properties of variables in the model so as to ascertain whether they are stationary or non-stationary. The use of the ECM is facilitated when variables are first differenced and co-integrated. Since the estimation method such as "Least Square" can be applied to time series data only when all the data series are stationary, then the first difference forms should be used if non-stationary variables are to be included in a regression exercise. For example, for a random walk or non-stationary variable X_t

$$X_t = X_{t-1} + e_t \quad e_t N(O,S^2) \quad \dots\dots\dots\dots\dots\dots(4)$$

The first difference of X_t can be written as : $X_t = e_t$, which is by definition a stationary process is a method of classification for non-explosive processes is that variables that are stationary processes are denoted by I(0), those that become stationary processes by taking first, second differences are designated as I(1), I(2), etc. so the expression I(d) means "integration of order d". The statistical tests to determine whether each of the economic variables is I(0) are 1: the Dickey – Fuller (DF), and 2: the Augmented Dickey – Fuller (ADF) test.

The DF test (Fuller, 1976, Dickey and Fuller, 1979) is carried out by applying a regression such as

$$X_t = ax_{t-1} + C_t + d + U_t \quad \dots\dots\dots\dots\dots(5)$$

The variable and comparing the t – value with Fuller (1976) distribution table. If the t-values is significantly negative the variable is regarded as 1(0) instead of I(1) in the ADF test, regression such as:

$$\Delta X_t = \beta_1 + \beta_2 t + \delta X_{t-1} + \alpha\sum\Delta_{t-1} + \varepsilon_t \quad \dots\dots\dots(6)$$
$$i\text{-}1$$

A popular past method of attempting to overcome the problem of spurious correlation has been to estimate the relationships between the rates of change of variables rather than between the absolute levels. The effect of looking at the rate of change in a variable is typically to remove any trend element. (Noise or disturbance) that is, many non-stationary economic time series become stationary when they are first-differenced. For instance, while output and prices in most post-war economies have trended steadily upwards, this is not generally true of rate of growth in output or of inflation rates. Unfortunately, when attention is concentrated on relationships between rates of

change, there is real danger that valuable information on the long-run relationships between the levels of variables will be lost. For example

$$Y_t = \beta_o + \beta_1 x_1 + \beta_2 X_{2t} + \gamma_t \quad \dots\dots\dots\dots\dots\dots(7)$$

Where γ_t is a disturbance, then

$$Y_t - Y_{t-1} = \beta1 (X_t - 1_{t-1}) + \beta_2 X_{2t} - X_{2t-1} + :_t \quad \dots\dots (8)$$

Where $:_t = \gamma_t - \gamma_t - 1$

If estimating equation 2, instead of equation 1, then would not obtain information about β_o. equation focuses purely on the short run – relationship between Y and X and, hence, is likely to provide poor forecasts for even a few periods ahead if a long-run relationship exists but is ignored. There is a further problem with first differenced equation 7. If a relationship such as 6 really exists and its disturbance γ_t is non-autocorrelated, then disturbance U_t in eauation 7 is of simple moving average form and hence will be auto correlated. First differencing then is an unsatisfactory method of dealing with spurious correlation problem. A major advantage of Error Correction Models (ECM) is that their result in equations with first-differenced and hence stationary dependent variables but avoids the problem discussed above. When economic time series are co-integrated, their relationship is most efficiently estimated by an Error Correction Model which incorporate short-run impacts as well as feedback effects to indicate the speed of adjustment to long-run equilibrium (Engle and Granger, 1987).

III. Results and Discussions

This chapter examines the performance of capture fishery sector under various macroeconomic policies/programmes in Nigeria.

The major thrust of government policy is the achievement of sustained increase in the quantum of fish output but regrettably the fishery potentials of Nigeria are high, but they are yet to be fully exploited, the current situations indicate that the performance of capture fishery is below the expectation with the consequence that Nigeria now has to import fish in order to feed its population. The capture fishery production in Nigeria fell short in demand of 1.5 million tones by 66%. This in effect means that in order to meet the present demand exclusively from the country resources, domestic production will have to increase to meet the targeted population.

Table 1 : Performance of Capture Fishery Under Different Policy Regimes.

Policy regime		Average output	Change in Output
Period	Acronym		
1970 – 1985	Pre-SAP	125.4	-
1986 – 1993	SAP	77.5	-38.2
1994 – 2000	Post-SAP	94.4	21.81

a) The Pre-SAP Period 1970-1985

Within this period, the average output or quantity of fish capture (in tons) stood at 125.5 tons, judging the performance from the average output, one is convinced to state that the performance was impressing. These impressive performance were probably due to direct monetary control techniques employed until June 1986. The monetary policy in this period featured concessionary interest rates. For example agriculture lending rate was fixed at 0.5 percent points above the minimum rediscount rate and about 2-3 percent point below the prime leading (Balagun and Out, 1991). This policy was aimed at providing incentive to farmers. To execute this policy, banks and other financial intermediates were made to support agricultural sector or sub-sectors activities through credit quotas.

The fiscal policy during this era featured increased Federal Government expenditure on agriculture sector. For example, the average annual real Federal capital expenditure on agriculture was ₦ 210.41 million in the period 1970 – 1974 or 5.91 percent of total Federal Government real capital expenditure on all sectors. But in the period 1980 – 1985, the average annual real Federal capital expenditure to agriculture rose to ₦ 734.92 million or 6.93 percent of total real Federal capital expenditure to all sectors. Part of the allocation to agricultural sector was in form of inputs, subsides. Concessionary tax measures such as tax holidays, removal of export taxes on agricultural commodities and income tax relief for new agricultural ventures were adopted (Ukoha, 2000).

Prior to SAP, exchange rate was usually fixed by the monetary authorities (Central Bank of Nigeria) against major international currencies. Foreign exchange was rationed in order to maintain the exchange rate, the exchange rate policy amounted to over-valuation of the exchange rate and resulted in inflow of cheap import of fish and fish products, which discouraged fishery production. The over-valuation of Naira exchange rate also put agricultural exports at a disadvantage.

b) The SAP Period: 1986-1993

As in the Pre-SAP period, this period also featured the use of monetary, fiscal and exchange rate. During this period, the average quantity or output of fishery sub-sector started to decline from 125.4 tons to 77.5 tons and -38.2 percent (change in output). The decrease in average quantity of capture fish is contrary

to a prior expectation in the SAP era, it is believed that most beneficiaries of fishery sub-sector credits might not been actual farmers. This unimpressive performance could also be attributed to the fact that, in the 1986 economic reform, interest rates were deregulated and agricultural loans were granted with higher rates of interest than previously, while agricultural loan terms were liberalized. During this period agricultural output responded positively to agricultural credits, in order words, changes in agricultural output moved in the same direction with changes in agricultural credits in the SAP period.

In this period the Federal Government real capital expenditure on agriculture declined from N 734.92 million in the immediate Pre-SAP period (1980 – 1985) to 392.49 million in the first phase of SAP and finally to N189.80 million in the later phase of SAP (1991 – 1996). As a result, the share of agriculture in Federal Government capital expenditure declined in real terms to 6.49 percent in the first phase SAP and subsequently to 2.2 percent in the later phase. The fiscal policy was not quite favorable to the fishery sub-sector. For instance, from the immediate pre-SAP (1984 – 1985) to the early period of SAP (1986 – 1989), the prices of fishing input rose by 129.77 percent for outboard engine, 389.5 percent for buoy and 2919.05 percent for canoe/boat (Ukoha, 2000). Also, in the SAP period some essential feature of exchange rate was adoption of a flexible exchange rate, the first exchange practice introduced at the inception of SAP in 1986 is the Second – Tier Foreign Exchange Market (SFEM) this market was established by law for buying and selling of foreign exchange at market determined rate. Consequently, single foreign exchange market (FEM) emerged which replaced SFEM (Ndebbio, 1991). The rational for having one foreign exchange market (FEM) was, to encourage among other things the inflow of foreign capital investment into Nigeria. The exchange rate during SAP period also influence the fishery sub-sector positively.

c) The Post-SAP Period: 1994 - 2000

During this period the average quantity stood at 94.4 tons which, shows an increase of 21.81 percent over the preceding period. Monetary, fiscal and exchange rate adopted the post-SAP era also have a spilled over effect during the post-SAP period. This period recorded favourable performance in the fishery sub-sector. However, these policies were distorted by the fiscal operations of the government that involved budget deficits that caused rapid depreciation of the

Naira exchange rate. Foreign exchange practices such as the hoarding of foreign exchange for speculation purposes, etc. also accounted for the rapid increase in the price of imported fish, inputs and increase cost of production (Ukoha, 2000).

IV. Impact of Policy on Capture Fishery

Table 2 : Results of Stationarity Test Critical Value: 5% = 2.971;   1% = 3.685

Variable	t-ADF	% lag	t-lag	Probability
Qf_t	-1.3593	14.451	2	-0.68582
Qf_t	-1.6822	14.297	1	1.4067
Qf_t	-1.3491	14.564	0	
Er_t	-0.16894	1.5269	2	-0.38930
Er_t	-0.49892	1.5205	1	2.9853
Er_t	0.34196	1.7365	0	
$Fimp_t$	-1.6835	5063.9	2	-0.25628
$Fimp_t$	-1.9116	4968.3	1	-1.3091
$Fimp_t$	-2.8699	5036.1	0	
Ge_t	8.3297	41446	2	-3.9193
Ge_t	8.3297	52161	1	-9.263
Ge_t	0.074033	1.0647e	0	
Cr_t	-2.1302	1394.3	2	1.3047
Cr_t	-1.7713	1403.5	1	0.59413
Cr_t	-2.3098	1086.0	0	

Source : Computer printout

The stationarity test result presented in Table 2 shows that quantity of fish, exchange rate, fish import, government expenditure and credit facilities to fishermen are not stationary at levels because the ADF statistics are lower than the critical ADF. Except government expenditure, which shows stationarity at lagged 1 and 2, the ADF statistics is greater than critical ADF. Test of co-integration was also carried out on the data in order to establish the existence or otherwise of equilibrium relationship between the relevant variables.

V. Test of Co-Integration

Table 3 : Results of Co-integration Test (Difference and Lagged-two).

Variable	t-ADF	% lag	t-lag	Probability
ΔQf_t	-2.4073	14.735	2	-1.243
ΔQf_t	-4.0195**	14.901	1	1.2001
ΔQf_t	-4.1809**	15.032	0	
ΔEr_t	-1.8635	1.4923	2	-1.4376
ΔEr_t	-2.9970*	1.5251	1	1.0187
ΔEr_t	-2.8683	1.5263	0	
$\Delta Fimp_t$	-2.9467	5286.9	2	-0.72514
$\Delta Fimp_t$	-5.0099**	5234.4	1	0.81784
$\Delta Fimp_t$	-8.1576**	5199.7	0	
ΔGe_t	2.4884	69084	2	-3.6562
ΔGe_t	0.19030	85042	1	-3.3602
ΔGe_t	-6.5770**	1.0104e	0	
ΔCr_t	-3.2472*	1500.5	2	1.1333
ΔCr_t	-3.1212*	1509.3	1	1.57216
ΔCr_t	-5.3155**	1488.9	0	

Source : Computer Printout

Differencing variables in different lagged length reveals that some of the variables that were not sationary at the zero (0) lagged length became stationary at first differencing. For instance, quantity of fish, exchange rate, fish import and credit facilities. This help to eliminate the problem of spurious regression normally obtained from the regression of two or more non-stationary series.

VI. Results of One-Period Lagged with Difference.

Table 4 : One-Period Lagged With Difference.

Variable	t-ADF	% lag	t-lag	Probability
ΔQf_t	-4.118**	14.410	1	1.1843
ΔQf_t	-4.3068**	14.517	0	
ΔEr_t	-2.6464	1.5247	1	0.71041
ΔEr_t	-2.6308*	1.5106	0	
$\Delta Fimp_t$	-5.0057**	5183.4	1	0.79455
$\Delta Fimp_t$	-8.1720**	5147.9	0	
ΔGe_t	0.71749	83132	1	-4.0684
ΔGe_t	-6.0981	1.0436e	0	
ΔCr_t	-3.2420	1453.9	1	-06441
ΔCr_t	-5.5301	1438.1	0	

Source : Extract from computer output.

Using one – period lagged with difference, the exercise reveals that at 5 percent critical value ΔQf_t and $\Delta Fimp_t$ were statistically significant at one-period lagged. Whereas ΔQf_t, $\Delta Fimp_t$, and ΔGe_t were all significant at 5 percent at 0 – period lagged, while ΔEr_t was significant at 1 percent at 0 period lagged. Further test of the variables at different lagged length shows that all variables were significant.

VII. Results of OLS Static Model Estimation

Table 5 : Results of OLS Static Model Estimation.

Variable	Constant	$Fimp_t$	Cr_t
Coefficient	00.1	+ 0.001605	0.006993
STD. Error	8.397	0.0005474	0.002187
t-ratio	11.920	2.932	-3.197
R^2	0.348		
F-Statistic	7.494		
D W Statistic	0.829		

Source : Computer printout

Table 5 shows that the explanatory variables explained 35 percent of the movement i.e there is autocorrelation. Table 5 shows that the explanatory variables explained about 35 percent of the movement. Test for t-statistic shows that fist import ($FIMP_t$) and credit facilities (Cr_t) were the only variables that were significant at 1 percent level. However government expenditure (Ge_t) and exchange rate (Er_t) were not significant. The value of Dubin Watson (DW) statistic also show that there is positive autocorrelation, R^2 shows that only 35 percent of the variations in capture fishery output are explained by the included variables.

VIII. Normalized Co-Integrating Coefficient Equation

Table 6 : Results of Normalized Equation.

Qf_t	$FIMP_t$	CR_t	Constant
100.1	0.001605	-0.006993	
			100
(9.726)	(0.0007467)	(0.00241)	

Source : Computer printout

Therefore since the results reveal that existence of co-integration among the variables of the model, there is a need to set up a parsimonious Error correction Model (ECM) that will make the model to be dynamic.

IX. Results of Ecm Estimation

Table 7 : Results of Error correction Model.

N/S	Independent variable	Coefficient	t-ratio
1	ΔQf_t	2.8221	26.350
2	$\Delta FIMP_t$	0.059582	0.0736
3	ΔCR_t	0.25244	0.4063
4	ΔEr_t	0.20787	0.3183
5	ΔGe_t	0.71276	1.7486**
6	Constant	0.0065481	0.00699
7	ECM	2.4888	19.307*
8	R^2	0.188923	
9	F-statistics	0.85407	
10	DW-Statistics	2.02	

Source : Computer printout

Using OLS modeling ΔQf_t, ΔGe_t and ECM were statistically significant at 5 percent using two-tailed test. Considering the determinants it is only two (2) variables that are significant.

X. Johansen Co-Integration Test

The result of the Johansen Co-integration test is present in Table 8 comprising the likelihood ratio against the critical the null hypothesis that there is no co-integrating, the researcher then adhered to the alternative hypothesis that co-integration exists.

Table 8 : Results of the Johansen Co-Integration Test.

	Eigen value	Likelihood ratio	5% critical value	Hypothesized nos. of co-integrating equation	Series in the equation
(a)	0.770236	104.4029	94.15	None**	LQTY/LPRC
(b)	0.666182	64.69397	68.52	At most 1	LOTPR LGDP
(c)	0.461938	35.07067	47.21	At most 2	EXR LOTPO
(d)	0.407166	18.33657	29.68	At most 3	
(e)	0.138936	4.219860	15.41	At most 4	
(f)	0.006682	0.181023	3.76	At most 5	

*Note: ** denotes rejection of the null hypothesis at 1% significant level.*

L.R. Test indicates one co-integrating equation at 5% significant level. The rank of this equation is 1 (i.e. r=1). The result of the Johansen Co-integration test is presented in Table 8 comparing the likelihood ratio against the critical value at 5 percent in (a) we reject the null hypothesis that there is no co-integrating vector, but accept the alternative hypothesis that one co-integrating vector exits. The long-run test indicates that one co-integrating equation exist (at 5% significant level) in the set of normalized co-integrating equation which shows the long-run relationship between the variables.

a) Major Findings

This study investigated the impact of macroeconomic policies on capture fishery in Nigeria (1970 – 2000). Secondary data were used in this research work and were collected from the Central Bank of Nigeria Statistical Bulletin (various issues) and Federal Office of statistics. The data obtained were analyzed using the Error Correction Model (ECM). The result of the ECM confirmed the existence of long run equilibrium between the dependent and independent variables. Available information reveals policy instability and duplication of programmes under different policy. Analysis also shows fluctuation of capture fishery output over the years. The policy variables included in the model found to explain 34.8% of the variability in fish output.

b) Policy Recommendations

In view of the findings of this study, the following recommendations are made. First, the government should increase the credit facilities to the fishermen, since output moved in the same direction with changes in credits.

Second, piecemeal policy measures should be avoided because they might be in conflict with one another.

Third, to cushion the fishermen from the impact of high costs of fishery inputs, the study suggest the provision of subsides on fishery inputs.

Fourth, to improve the real wage of fishermen, the study recommend measures, which will raise their productivity. One of such measures is encouragement of the fishermen to use modern fishing technologies

Finally, to increase fishermen access to credit, banks and agricultural credit extension officers should encourage the formation of formal self-help group (SHGs) and link them to financial institutions.

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