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Cocoa output, productivity and government expenditure in Nigeria (1970-2004)

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Abstract

The study was carried out to determine the topic relational analysis of cocoa output, productivity and government expenditure (1970-2004). The specific objectives were to determine the trend of cocoa output over the years; make comparative analysis of the output in the pre Structural Adjustment Programme (SAP), during SAP, and post SAP; make useful recommendations for improvement in cocoa output; determine government expenditure in cocoa production. The data obtained are wholly secondary in nature and were gotten from the CBN statistical bulletin (2004). It is clear from the above analysis that in real terms, cocoa production has been suffering from deterioration over the years, due to several factors such as (Unfavorable macroeconomic policies, low rate of adoption of appropriate technology, environmental hazard e.t.c). The growth is not as anticipated especially when compared to the aggregate output growth rate. The result showed that international cocoa price (INTP), infrastructural development at time t-1 (INFRAS) were statistically significant at 5% level; and rainfall in cubic millimeters at time (t-1) was not statistically significant. Nigeria being a traditional economy should place more emphasis on agricultural production especially cocoa because of its viability in the international agricultural commodity market, especially in London and New York. Revenue from this venture would also complement the revenue and foreign exchange from the oil sector over the years.

Keywords: cocoa output, productivity, government expenditure, trend analysis and SAP

1. Introduction

The Nigerian cocoa economy has a rich history which is well documented in literature. The contributions of cocoa to the nation's economic development are vast and have been reported by many authors. In terms of foreign exchange earnings, no single agricultural export commodity has earned more than cocoa. With respect to employment, the cocoa sub-sector still offers quite a sizeable number of people employments, both directly and indirectly. In addition, it is an important source of raw materials, as well as source of revenue to governments of cocoa producing states. Because of its importance, the recent Federal Government's concern of diversifying the export base of the nation has placed cocoa in the centre-stage as the most important export tree crop. Evidence has however shown that the growth rate of cocoa production has been declining, which has given rise to a fall in the fortunes of the subsector among other reasons. Folayan, Daramola and Oguntade (2009), noted that cocoa production in Nigeria witnessed a downward trend after 1971 season, when its export declined to 216,000 metric tons in 1976, and 150,000 metric tons in 1986, therefore reducing the country's market share to about 6% and to fifth largest producer to date (Abidogun, 2003).

In fact, the recent cocoa stakeholders forum held in Calabar, Nigeria by the Presidential Initiative on cocoa was to deliberate on the state of the cocoa subsector and reach consensus on how investments in the cocoa sub-sector can be strengthened and increased among other issues that bother on the sub-sector, in view of the Government's renewed interest to boost cocoa production, domestic utilization and export. Prior to the Structural Adjustment Programme (SAP), cocoa marketing was carried out by the erstwhile highly regulated Commodity Marketing Boards, which were known to pay farmers far less than the export price of cocoa. This situation affected cocoa production and export in the past as it served as a disincentive to investment in cocoa production. Even after the abolition of the Marketing Boards structure, cocoa production has still not fared better as is evident in the declining

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production trend reported in previous studies. One of the possible reasons for this may be the nature of investment in cocoa production, as some worry has been expressed as to whether the returns from cocoa are not being threatened by such factors as rising costs of production, price instability, and differences in management systems and perhaps declining productivity due to ageing trees.

Generally, if investment in cocoa production were attractive, farmers/investors would allocate scarce resources to cocoa farming. However, the problem is that most individual investors and even governments have only a vague idea of the potential of the industry and as such are sometimes slow in committing investment funds into the sub-sector (Abidogun, 2003). Thus, relevant research institutions in Nigeria can be said to have made a significant impact on the Nigerian cocoa industry. This view was given credence and quantitative support by some empirical studies which found that cocoa research in Nigeria has generated an internal rate of return (IRR) as high as 42 percent (Mbido, 2008). Against this background of impressive payoff to investment in cocoa research, it may be pertinent to access the distributional impact of benefit generated in the process. In particular, an export oriented industry like the cocoa industry, the relative size of consumer surplus is of interest to policy makers on account of its implication for research financing, allocate efficiency and international equity. Nigeria is an important player in the cocoa sector and as such, the Nigeria output has effects on the international aggregate output and price level. Cocoa production in Nigeria is done in the South West of the country especially in Ondo state and some are seen in the South -South zone especially in Akwa-Ibom state. The importance inherent in cocoa in any economy is rather vast because it serves as food and raw material (beverages, butter) in local use, and export. Cocoa production can be the main source of a country's foreign exchange earnings as well as a significant part of the GDP. At least post independent (1960- early 1970s) Nigeria belonged to this category/cadre. At the said time, cocoa was sufficient to produce a bulk of the national need of foreign exchange while other agricultural produce complemented the efforts therein.

The decline in cocoa was also reflected in the other crops. In the past, crop production has been classified basically into two broad categories of food and cash crop. This classification recognizes the use of output for domestic consumption and for export. The evaluation of the performance of the agricultural sector in industrial crop production is given in three places: 1970-1985 which is regarded as the pre Structural Adjustment Programme (SAP) era, 1986 – 1993 SAP era and 1994-2001 post SAP or era of deregulation.

Overtime, there has been dwindling level of output in the agricultural sector in general and the cocoa sub sector specifically. As we know, at a point in the Nigeria economic history, agricultural production has a major priority of the Nigerian state. But as time went by, there has been a gradual and small fall in the output overtime. Factually speaking, Nigeria produces a little more than half of what she used to produce in the 1970s (CBN, 2004). Production of cocoa though can be increased but some factors will militate against attaining it most especially because productivity is not too great in the sector. Also several factors overtime have led to the decline in productivity starting from over-regulation of the sector, international market price,

marketing boards, illiteracy, etc. Data available from both the statistical bulletin has shown a large decline over time. At different times, there have been growth and other times, some slumps in the overall output (UNCTAD, 2004)

The main objective of the study is to undertake a relational analysis of cocoa output, productivity and government expenditure in Nigeria.

The specific objectives are as to:

1. Determine the trend of cocoa output over the years.
2. Make comparative analysis of the cocoa output in the pre SAP, during SAP, and post SAP period.
3. Determine government expenditure in cocoa production.
4. Make useful recommendations for improvement in cocoa output.

The study would identify the problems/challenges over time and also proffering solutions that would return to the nation but to its glory days which would be impactful on the GDP per capita as well as reduction in unemployment because many people would be employed in the sector as well as other sector as the agricultural sector plays a supportive role for the other sectors that use agricultural output especially cocoa for their input. The project goes further to show that level of output of the cocoa production has been declining and recommendations are made forthwith. The knowledge of this is relevant so that Nigeria would return back to its leading role which has been taken over by Ivory Coast.

The scope to the study is to cover relevant areas as regards the contribution of cocoa to overall improvement in a country's economic status. The study basically would highlight the challenges inherent in the cocoa production which is a very valuable part of the output of agriculture production from 1970 - 2004. A critical and analytical study would be done to comprehend happening before, during and after SAP. The overall impact to the contribution of cocoa to the non oil export would be analyzed in the study. Available data from 1970-2004 would be used to cover the data. In closing, some very relevant areas would be examined with a view to addressing some lingering issues and also for the purpose of contributing to knowledge.

2. Research Methodology

2.1 Area of Study

The study area of this work is Nigeria. It is one of the sub-Saharan African nations in the western part of Africa which spans an area of 924000 square kilometer, boarded with the Republic of Benin to the west, Chad and Cameroon to the East, Niger Republic to the north and its coast lies on the East, Niger Republic to the North and its coast lies on the gulf of Guinea (Wikipedia, 2009). Nigeria which is known as giant of Africa has a population of 170,123,740, with rich human and material resources endowments; it has the potential to become African's largest economy and a major player in the global economy.

2.2 Data Collection

The data obtained are wholly secondary in nature and were gotten from the CBN statistical bulletin (2004), articles, Newspapers publication and Internet materials. In some regards some data were derived from data provided by the statistical bulletin. An example is the value of output: which is derived by output as provided by CBN. To this extent, the validity of our findings is dependent mainly on the accuracy

of these data and on how real our various theoretical assumptions are.

2.3 Data analysis and model specification

This ordinary least square model (OLS) was used to express the cocoa production functions in Nigeria. The production function is the mathematical relationship between output of a firm and the economy and the inputs (factors of production) used to produce that output. This section specifies the model to be tested in order to determine cocoa output, production and government expenditure in the Nigeria economy. Cocoa output is a function of several factors. Cocoa output depends on

$$V_{out} = f(INTP, RAIN, INFRAS)$$

V_{out} = Value of cocoa output

INFRAS = Infrastructural Development at time t – 1

INTP = International Cocoa Price

RAIN = Rainfall in cubic millimeters at time t- 1

Specifying it in an econometric form, we have

$$VOUT = \beta_0 + \beta_1 INFRAS + \beta_2 INTP + \beta_3 RAIN + U/\text{£}$$

Where U = Error term or disturbance factor

$$B_1 > 0$$

$$B_2 > 0$$

$$B_3 > 0$$

In the above model, cocoa output is denoted as a regression function of government expenditure on cocoa at time t – 1 as a percentage of total capital expenditure, infrastructural development at time t – 1, output price of cocoa multiple by exchange rate, industrial output as percentage of total capital expenditure, International cocoa Price, rainfall in cubic meters at time t- 1.

On Apriori

$$\Delta Q / \Delta GKEC > 0$$

Cocoa production is expected to be a direct positive function of government expenditure indicates that the country has a

high potential to increase output as there is an increase of the government expenditure. Though, after a while, the government expenditure would reduce cocoa production in that there would be more money in circulation. Farmers would turn contractors overnight.

$$\Delta Q / \Delta INTP > 0$$

The above relationship shows a positive/ direct relationship of the dependent variable and explanatory variable. The implication of this is that as the International cocoa price, which is the explanatory variable increases, the value cocoa output (dependent variable) increases and vice versa. The higher the consumer price index, which means that price, would go up and as such the cocoa output would go down probably because of affordability.

$$\Delta Q / \Delta RAIN$$

The above relationship shows a positive or direct relationship between rainfall (explanatory variable) and cocoa output (dependent variable). This implies that an increase in the level of rainfall would lead to an increase in the output of cocoa especially when irrigation usage is involved.

3 Empirical Results

The Regression result as well as the output trend is here shown and further analyzed. It is to explain the probable apriori contradiction as well as apriori conformity which are crucial for decision making and also the validity of the work.

3.1 trend of cocoa output in agriculture

The trend of cocoa output in agriculture is presented in figure 1. The figure shows inconsistency in cocoa output in the agricultural sector. The figure shows an increase in output from 1983 to 1994 and another rise in output was witnessed from around 1997-1999 and a fall in 2000. The result reports that the year with the least output was 1971 and a boom in 2003.

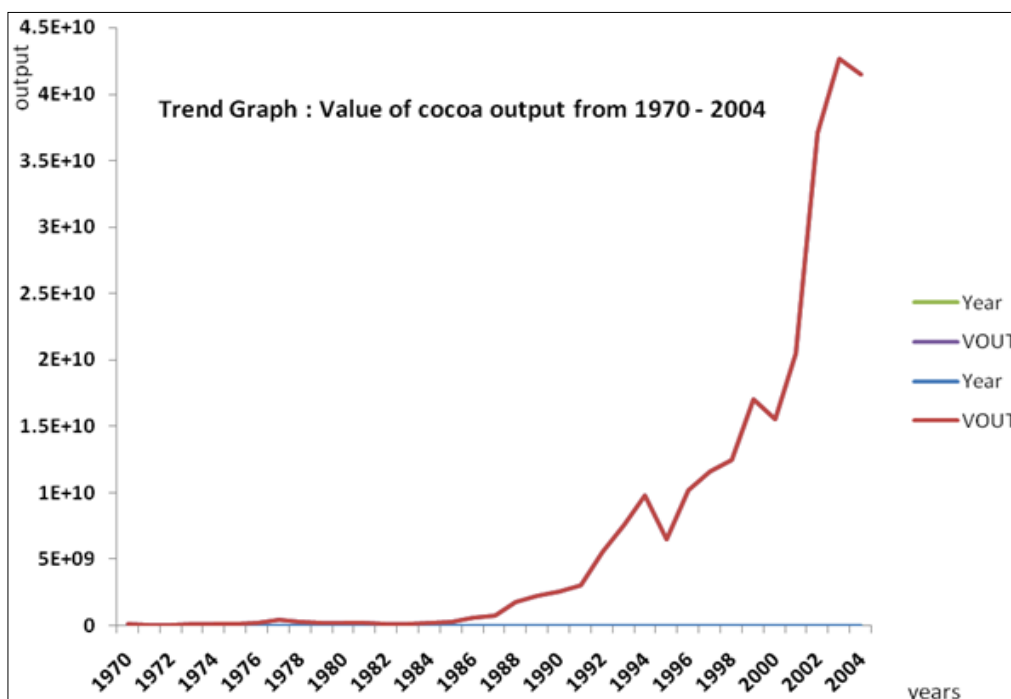


Fig 1: Trend of cocoa output in agriculture

1970-1986 (Pre SAP): From the table in Appendix 1 and in figure 1, there was little or no significant increase in the revenue got during this period. The revenue at this period was about the 1 billion naira mark, possibly because of the strength of the naira during that period. When a naira was exchanged for about 1.2 U.S dollar. Because of that, during that period much money would not be got from such trade. It is pertinent to note that despite the seemingly low revenue, it was more than sufficient for Nigeria.

1986 to 2000 (SAP): During this period, the Structural Adjustment Programme of the World Bank was implemented in Nigeria. The primary focus of the reform was to deregulate the economy in all ramifications, starting from interest rate, foreign exchange to the sale of public co-operations. The effect was seen in the revenue generated from cocoa sales as revenue went up to the realms of fifteen billion naira from a meager one Billion Naira in the 1970s. Though, the increase is not necessarily accounted for by increase in output because it is in monetary term.

2000 till Date: The Administration of General Olusegun Obasanjo which took over in 1999, continue the privatization and the deregulation of the sectors of the economy. This further accounted for the remarkable increase in the revenue from cocoa production as private individual engaged in the production of cocoa as well as soaring price level of the commodity.

Note that after SAP ended in 1993, the conditionality were still followed till date.

3.2 Predictors of value of cocoa output

The model specified above was estimated using the Ordinary Least Squares (OLS).

Table 1: Value of cocoa output model

Parameter	Coefficients	t-values	Sig.
INTP	182523.828	18.441	.000
INFRA	3.530	2.715	.011
Rain	-4.449E6	-2.323	.027

F=289.744 P-value = .000^a

R Square =.968 Adjusted R = Square.964

Following the equation, a typical linear production function for the production of cocoa in Nigeria over the period 1970 to 2004 was the case study. When the regression was run, it was from a period, 1970 to 2002. In addition, the parameter estimates of OLS are statistically biased. Thus, in this context, the estimates are not the best linear unbiased estimates (Blue).

Our regression result shows that the only explanatory variable government capital expenditure on infrastructure did not conform to apriori while rain and international cocoa price conform to apriori specification. As said in the preceding chapter, if the expenditure on infrastructure is continually on the rise, a time would come whereby people would go into other sectors where the money is more. On the other hand, the higher rainfall and international price of cocoa, the higher the output. The implication of conforming to apriori is that international cocoa price and rainfall carried the right signs.

On the basis of individual significance of the parameter estimates, if the level of significance is set at the appropriate level as given by the Probability value. However, the rain in

millimeters (RAIN) was not significant at the 5% level, while the international cocoa price (INTP) is significant at 5% and the capital expenditure on infrastructure (INFRA) is also significant at 5%. The implication of this is that changes in the function can be explained individually by the statistically significant variables which are capital expenditure on infrastructure (INFRA at .000) and international cocoa price (INTP at .010).

The F-statistics, F (3, 29) 289.744 [.000] which indicates the significance of all the explanatory variables taken together, was found to be highly significant at the 1% level of significance.

The adjusted R² (bar R²) value of 0.964 shows that over 96% systematic variation in the dependent variable is explained by the independent variables. This is surely a good fit. Note that there is a problem with using just R². This is because it generally overestimates the goodness of fit. So, we interpret the adjusted coefficient of determination. Thus the remaining 14% changes in the dependent variables, we attribute to the error term which is also known as the U term.

4 Summary, Conclusion And Recommendations

4.1 Summary of Findings

It is clear from the above analysis that in real terms, cocoa production has been suffering from deterioration as the years go by, due to several factors. The growth is not as anticipated especially when compared to the aggregate output growth rate. It was shown that cocoa output had fallen to a little more than half as expected.

With respect to the regression ran, the following findings were arrived at

1. Capital expenditure on infrastructure has a positive impact on the value of cocoa output over time. As there is a continuous increase on expenditure on infrastructure, there would be an increase in output.
2. The international price of cocoa has a very important impact on the value of cocoa output, the importance as to do with the conformity to apriori as well as its statistical significance. It implies that this is the most significant variable in determining the cocoa production.
3. Rainfall has negative impact on the value of cocoa output, and it is not statistically significant. This implies that an increase in rainfall would lead to a decline in output.

The results are summarized as follows

- There is significant statistical relationship between cocoa and infrastructural development at a lagged time.
- There is significant statistical relationship between cocoa and international cocoa price.
- There is no significant statistical relationship between cocoa and rainfall in cubic millimeters.
- Variations in rainfall have negative impact on the value of cocoa output.
- Variations in the international price of cocoa have positive impact on the value of cocoa output.
- Variations in the capital expenditure on infrastructure have positive impact on the value of cocoa output.
- Applying the OLS regression technique, we found out that rain was not statistically significant to the value of output.

4.2 Recommendations

In order to rekindle dwindling fortune of cocoa which could lead to economic growth and economic development on the long run, the authorities need to formulate and implement sound macroeconomic policies that promote growth in the sector through sound money, prudent fiscal policies and also the reiteration of the purpose of the land use decree/act.

The authorities should pursue policies with conscious efforts checking out for excessive spending. There must also be a framework to safeguard against externally generated shocks as regards world prices of certain goods and also highly demanded goods such as the world oil prices which can inhibit focus on agriculture production

Some of the specific areas where the policy makers would have to dwell on include:

1. Reforms in input supply.
2. There is the need for improved, and maintenance of existing and provision required infrastructure.
3. Banks should be encouraged to lend to cocoa producers
4. Enabling environment for the private sector effectively engaged cocoa production.
5. Adoption of modern farming / husbandry practice,
6. Sectoral policy analysis and implementation should be strengthened.
7. The rural / agricultural environment should be appropriately protected through appropriate management of land, water and forestry resources and reduction of pollution.

4.3 Conclusion

In this research work, we have empirically verified and discussed the impact of the level of cocoa output in Nigeria over time and we know that in a traditional society like Nigeria, increment in agricultural outputs like cocoa can be the kinetic force behind economic growth. The exploitation of the resources existent in the agriculture sector can help to move the Nigerian economy to a greater height because it would be assumed that there would be extra income for the government and the economy at large which could lead to an investment boom.

As earlier highlighted, Nigeria, being a traditional economy should place more emphasis on agriculture production especially cocoa because of its viability in the international agricultural commodity market especially in London and New York. Revenue got from this venture would also complement the revenue and foreign exchange that the oil sector has solely been contributing to the foreign exchange market, especially taking it into cognizance that the oil sector produces over 96% of the foreign exchange pool in Nigeria.

4.4 Limitation

The inferences of this study are drawn mainly from the results of the econometric analysis of annual observations of

the relevant variables. Though should be from 1970 to 2004, but it was 1970 to 2002 because of incomplete data. The data obtained are wholly secondary in nature and were gotten from the CBN, ICCO; FOS may not be very accurate. To this end, the validity of our findings is dependent mainly on the accuracy of these data.

Apart from these, we also have limitations such as time before the submission of the research work, availability of funds to carry out a full and comprehensive research work, availability of data that was used in analyzing the dependent variables etc. were all constrained.

Appendix 1

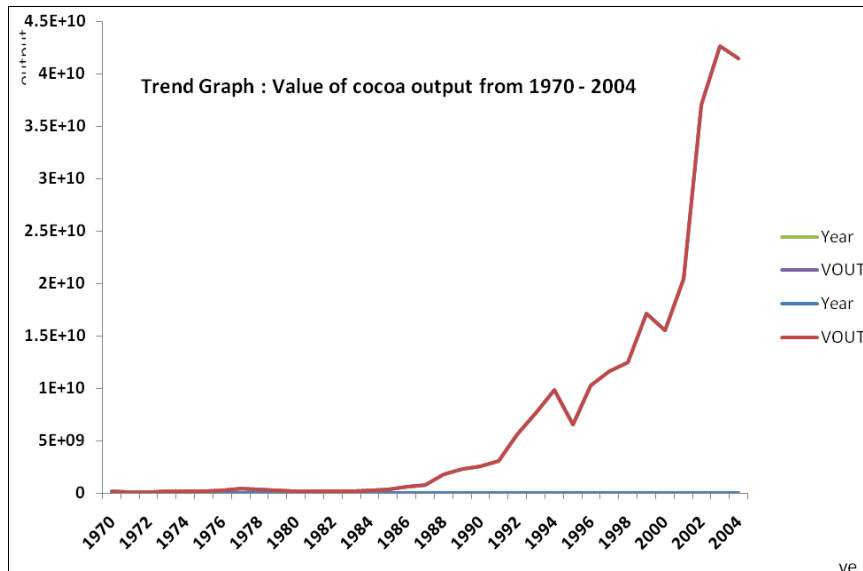
Table 1: Trend of cocoa output

Year	VOUT	C	Rain	INTP	INFRA
1970	146840000	1	338	481.44	1400000
1971	96020000	1	462	373.62	13200000
1972	101900000	1	445	422.83	42000000
1973	161210000	1	478	749.81	4040000
1974	210920000	1	430	985.6	35810000
1975	170160000	1	483	787.8	92740000
1976	229960000	1	516	1270.5	89970000
1977	471130000	1	435	2441.1	82490000
1978	317310000	1	492	2021	86600000
1979	291400000	1	357	1929.8	61300000
1980	220840000	1	324	1443.4	245670000
1981	216300000	1	320	1243.4	129900000
1982	179090000	1	410	1148	96830000
1983	208960000	1	379	1492.6	102650000
1984	259870000	1	436	1856.2	23760000
1985	318370000	1	484	1989.2	115400000
1986	614450000	1	459	4151.7	65540000
1987	798880000	1	359	7988.8	61910000
1988	1818100000	1	531	7186.1	172600000
1989	2271300000	1	462	8872.1	184480000
1990	2587400000	1	506	10604	209600000
1991	3056500000	1	535	11405	149170000
1992	5568400000	1	416	19070	213260000
1993	7613900000	1	359	24882	357530000
1994	9820500000	1	257	30404	49940000
1995	6560800000	1	350	32379	921560000
1996	10230000000	1	325	31671	865620000
1997	11645000000	1	314	35830	690200000
1998	12488000000	1	369	36081	233656000
1999	17087000000	1	494	103560	172535000
2000	15529000000	1	431	91347	279652000
2001	20464000000	1	1279	119670	533360000
2002	37047000000	1	1282.2	215390	324673000
2003	42637000000	1	N/A	229850	557360000
2004	41480000000	1	N/A	204740	300326000

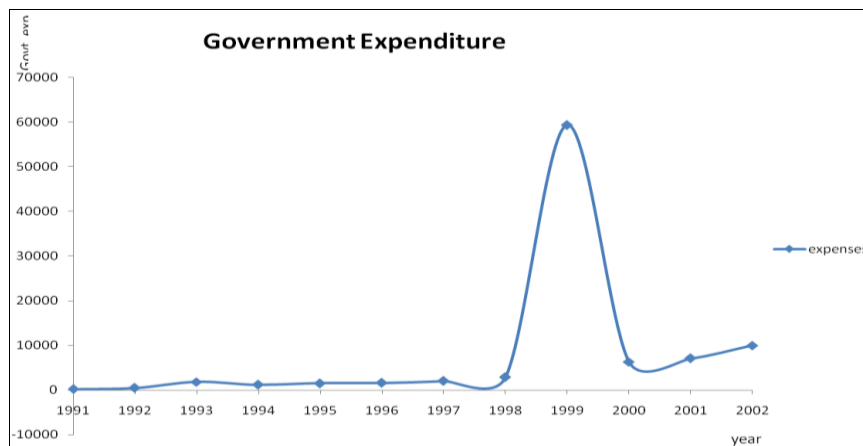
Sources: CBN Statistical Bulletin, 2004.

ICCO: International Cocoa Organization Quarterly bulletin of cocoa statistics.

Appendix 2



Appendix 3



Appendix 4: Regression result
Regression

Variables Entered / Removed ^b			
Model	Variables Entered	Variables Removed	Method
1	Rain, INFRA, INTP ^a	.	Enter
a. All requested variables entered.			
b. Dependent Variable: VOUT			

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.984 ^a	.968	.964	1.533E9
a. Predictors: (Constant), Rain, INFRA, INTP				

ANOVA ^b						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.044E21	3	6.813E20	289.744	.000 ^a
	Residual	6.819E19	29	2.351E18		
	Total	2.112E21	32			
a. Predictors: (Constant), Rain, INFRA, INTP						
b. Dependent Variable: VOUT						

Coefficients ^a						
Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			

1	(Constant)	2.003E9	8.618E8		2.324	.027
	INTP	182523.828	9897.645	1.027	18.441	.000
	INFRA	3.530	1.300	.101	2.715	.011
	Rain	-4.449E6	1.915E6	-.121	-2.323	.027
a. Dependent Variable: VOUT						

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