CREDIT CONSTRAINT AND AGRICULTURAL OUTPUT IN NIGERIA

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ABSTRACT

The paper empirically examines the impact of agricultural loans on agricultural output in Nigeria. The Cobb Douglas function was used with four independent variables including agricultural loans. The result showed that agricultural loan had a positive sign but on significant effect on agricultural output, while other factors were both positively signed and significant. Amongst others, the study recommends that adequate budgetary provision and releases should be made to fund policy initiatives in the agricultural sector in Nigeria.
Keywords: *Credit constraint, Agricultural credit, Agricultural output, Finance*

INTRODUCTION

Agriculture was the mainstay of the Nigeria economy until it was overtaken by black Gold (Crude Oil) in the late seventies. Since then, the contribution of agriculture to GDP gradually started declining on a yearly basis. This could be traced to inadequate investment in the sector, because government and other key investors channeled their funds to the oil sector which was more lucrative. In the pre-independence era, the contribution of the agricultural sector to the Gross Domestic Product surpassed every other sector in the economy (Sekumade, 2009).

Nigeria is not only blessed with mineral resources but also with arable land for agriculture. These lands are left fallow due to the craze for scarce white collar jobs and quick wealth from oil revenue. Agriculture is one of the oldest professions on earth and its output can either be consumed or serve as input for further production. According to Kassali, Ayanwale, and Williams (2009), the agricultural sector is the largest provider of employment in the rural area, producing the bulk of food for the country.

Agriculture is carried out either on a large or small scale. On a large scale it is capital intensive and majorly requires external finance to buy land, modern farm implements, and intermediate inputs like fertilizers. On the other, Small scale farmers remain small mainly because of poor access to loan facilities and as such cannot afford modern farm implements; making this type of farming burdensome, unattractive to the younger generation, and less productive. However, for agriculture to contribute immensely to the development of any nation it has to be largely done on a large scale.

Banks on the other hand exist to accept deposit from surplus units of the economy and provide credit for deficit units. The availability of credit from the money market can boost economic activities, most especially when such credit is channeled into productive activities. Since banks exist to make profit,

they channel credit only to those who can afford to repay both the loan and the interest on the loan. Lending to agricultural sector is a risk that commercial banks are more willing to avoid than to take. This is also not unrelated to the fact that agriculture is termed a more risky type of business compared to others as it is subject to climate, weather conditions and other natural disasters that are unpredictable and more or less beyond man's control.

Farmers are believed to be generally poor and uneducated therefore lacking managerial skills and the ability to pay back loans. Adeoti (2014) posited that relative to agriculture, other occupation reduce the probability of being poor in Nigeria. Lending to the agricultural sector at low interest rate is therefore a potent weapon for curing the vicious cycle of poverty associated with the sector.

The objective of this study is to evaluate the impact of agricultural lending on agricultural output in Nigeria. Several studies including Adeoti (2014) have revealed that in the midst of plenty, many Nigerians are still basking in poverty. This can be linked to the relative neglect of agriculture in the country, which serves not only as a source of food to the teaming populace, but provides employment to many, as well as being a source of local and 'foreign exchange' revenue for the government.

A number of studies; Uger (2013), Adetiloye (2012), Imoisi, Sogules and Ekpeyoung (2012), and Ubah (2014) have been carried out on the relationship between credit both from private and public institutions, and agricultural output. The findings of these studies are conflicting; hence this study seeks to fill this gap by empirically verifying the impact of agricultural lending on agricultural output.

EMPIRICAL REVIEW

Uger (2013) examines the impact of Federal Government's expenditure on the agricultural sector from 1991 to 2010. Data were sourced from the Central Bank of Nigeria Statistical bulletin and simple regression was used with a view to analyzing the data. The coefficient of determination (R^2) was 1% indicating a weak relationship between the variables. It was recommended that government should reinforce its budgetary allocations to the agricultural sector, ensure proper release of funds, monitor agricultural inputs distribution to farmers and create commodity markets.

Adetiloye's (2012) assessment of the agricultural credit guarantee scheme fund (ACGSF) for the period 1978 to 2006 using the T test, Paired T test and Granger Causality, found that though credit to the agricultural sector is significant it has not been growing in relation to the economy. The ACGSF settled claims were negatively significant and tardiness was observed in the claims process. The study further showed that Nigeria was food in-secured as the Chow test showed that food import was still on the rise. The study recommended further enlightenment campaigns to encourage more young people into agriculture, and that the ACGSF should be managed by professionals.

Imahe and Alabi (2005) examine some of the determinants of agricultural productivity in Nigeria. In their study, the measures of productivity were; agricultural gross domestic production, aggregate index of agricultural production, output of major agricultural commodities (staples) and other output of major agricultural commodities excluding staples. The independent variables were arable land per capita, average rainfall, fertilizer distribution, value of food imports, agriculture capital expenditure and the loans by commercial banks to agricultural sector. The results of the regression analysis showed that the six selected independent variables

contributed significantly to the systematic variation in agricultural productivity and output of major agricultural commodities in the four models specified.

Anyanwu (2013) evaluates the determinants of aggregate agricultural productivity in High External Input Technology (HEIT) farmers in an environment where policy on subsidy of fertilizer is inconsistent. The result showed that farm size, capital input, number of crops planted in a mixture in the farm, labour input, expenditure on planting materials, non farm income, distance to the nearest market, level of education and farming experience were the statistically significant determinants of aggregate agricultural productivity among HEIT users in a harsh macroeconomic environment.

Imoisi et.al. **(**2012) examine credit facilities and agricultural output and productivity in Nigeria from 1970-2010. Data were collected from the Central Bank of Nigeria's Statistical Bulletin and were analyzed using the Ordinary Least Squares Method. The results of the study showed that there was a significant relationship between loans and advances of Deposit Money Banks, and agricultural output.

Ubah (2014) in his study specifies a model based on the Cobb-Douglas Production function with six explanatory variables. Using the ECM method, the significance of agricultural credit on agricultural output in Nigeria was put to test. The result revealed that agricultural credit has an insignificant positive effect on agricultural output in Nigeria. The result also revealed that there is a long-run relationship between agricultural credit and agricultural output. From the results, the unit root test revealed that the variables are integrated of order one.

Akwaa-Sekyi (2013) found significantly large effect of microcredit intervention on the labour employed, working capital, output and income of farmers. The result indicates that, there are significant differences in the labour force employed, capital, output and income of farmers. The results indicated that there were significant differences as a result of the introduction of the credit intervention.

THEORETICAL FRAMEWORK

Traditionally, agricultural production function represents a connection between physical quantities of output and the inputs like land, labor, capital and quantities of other inputs (water, seeds, fertilizer, pesticides etc.). However, as agriculture is a multi-product industry therefore, Agricultural Gross Domestic Product (AGR) was used as the dependent variable and agricultural production was assumed to be the function of credit disbursed by different financial institutions for irrigation purpose, seeds, fertilizers, pesticides, and other purposes as used by Sohail et. al. (1991) who stated that expenditure on seeds, fertilizers, etc. may be explained by the amount of institutional credit obtained.

Agricultural credit was also used directly as one of the explanatory variables based on the arguments of Carter (1989). Carter argued that credit affects the performance of agriculture in three ways: (i) it encourages efficient resource allocation by overcoming constraints to purchase inputs (ii) if the agricultural credit is used to buy modern farm technology it shifts the entire input-output surface in this regard it embodies technological change and a tendency to increase technical efficiency of the farmers; and (iii) credit can also increase the use intensity of fixed inputs like land, family labor, and management, persuaded by the nutrition-productivity link of credit'—that raises family consumption and productivity. Carter's reasoning implies that agricultural credit not only increases management efficiency but also affects the resource allocation and profitability.

Capital Input (CAP) which is a measure of flow of services available from stock of capital goods such as equipment, structures, inventories and land, was used as an independent variable to capture these inputs in the model (teachmefinance.com). Lastly Per-Capital Income (PCI) which is the mean income of an economic unit was also used as an independent variable in the model. Putting into consideration the percentage of the total population of Nigerians involved in farming, PCI becomes a relevant input into the model. Farmers who do not opt for external sources of finance will reinvest into their agricultural business for sustenance irrespective of the size of their income. Furthermore considering the fact that a number of farmers operate on the subsistence level and may not obtain external finance, plowing back of profit becomes inevitable.

METHODOLOGY

This section contains the econometric model specified for the study, the estimation procedure and type of data and method of data analysis.

Model Specification

The model of this study is specified from the theoretical framework. Hence the Linear Regression Model of the Cobb-Douglas type was expressed as follows:

$$AGR = f(AGL, LAB, CAP, PCI)$$

Where

AGR = Agricultural Output

AGL = Agricultural Loans

LAB = Labour Input

CAP = Capital Input

PCI = Per Capita Income

The econometric form of the model is:

$$AGR = \beta_0 + \beta_1 AGL + \beta_2 LAB + \beta_3 CAP + \beta_4 PCL + u$$

Where u is the stochastic error term

Estimation Procedure

Based on *apriori* grounds, there should be a positive relationship between agricultural output and agricultural loans, labour input, capital input and per capital income. The researchers based their judgment on the result of the regression; whether the signs and sizes of each parameter estimate conform to theory.

Data and Method of Data Analysis

Time series data was sourced from the Central Bank of Nigeria (CBN), Statistical Bulletin (various years), Federal government of Nigeria National Accounts and Federal Office of Statistics, Annual Abstract of Statistics, and Digest of Statistics.

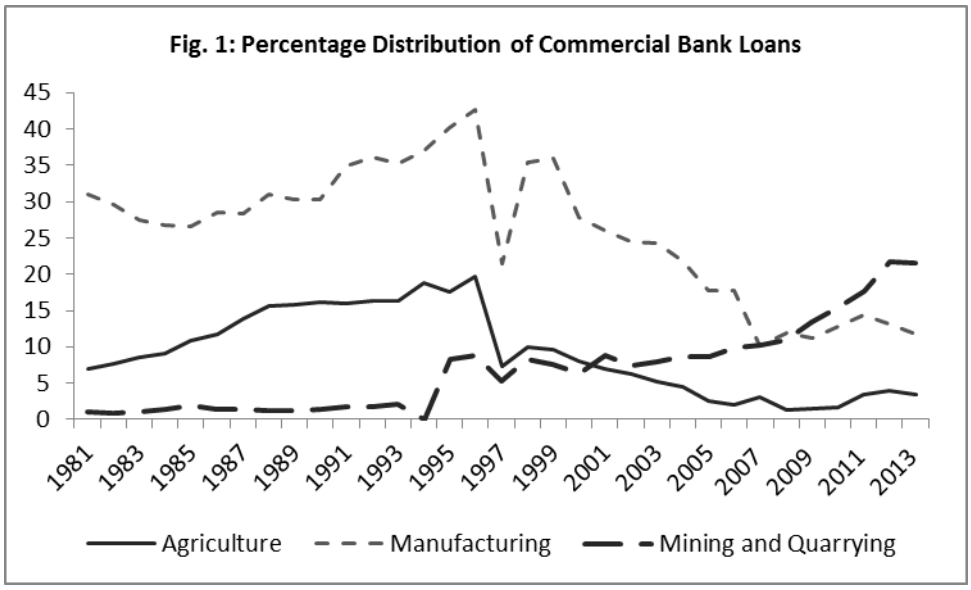
The main aim of this study is to empirically examine the effects of agricultural loans on the growth of the agricultural sector in Nigeria. The analysis involves both statistical and econometric analysis. In the statistical analysis, descriptive statistics of the data was presented in order to obtain background characterization of the data used. The Ordinary Least Squares technique is used in the empirical analysis to analyze the specified model.

DATA ANALYSIS

Statistical Analysis

The statistical analysis involves the presentation and analysis of summary statistics for the data used in the study. The pattern of distribution of bank loans to selected sectors in the Nigerian economy over the period is shown in Figure 1. The chart indicates that loans to manufacturing dominated the loan applications of the banks in the country for a very long time, although, its share has reduced drastically and is now below that of mining and quarrying since 2009. The share of the sectorial loans to total loan application dropped for each of the sectors in 1997 which could have been as a

result of the reforms in the financial sector (especially in terms of exchange rate) that drastically changed the nature and structure of formal activities in Nigeria. Loan to mining and quarrying activities which had a very low share for a long period has gradually risen over the time and as at 2013, it had the highest share in commercial banks loan application.



Source: Author

From figure 1 above, the share of loans to Agriculture rose steadily in the 1980s towards the mid-1990s. However, after the general fall in loan applications in 1997, agricultural loans in proportion to total bank loans has continued to fall, and was less than 5 percent of total loans disbursed to choice sectors by commercial banks in 2013. In comparison to mining and quarrying (with about 25 percent of total bank loans application), it can be seen that the agricultural sector has received poor attention by the banking sector in terms of loan supply.

The descriptive statistics for each of the variables are presented in table 4.1 below. The table shows that the average output of agricultural production for the period under study is about ₦213.7 billion which indicates a relatively high output level. The standard deviation and the skewness for the period indicate that the output level over the years has not varied significantly. Moreover, the J-B value of 2.07 fails the significance test at the 5 percent level, indicating that the data is uniformly distributed over time.

Table 4.1: Descriptive Statistics

	Mean	Med.	Max.	Min.	Std. Dev.	Skewness	J-B	Prob.
AGR	213689.1	190369.1	348490.8	132699.2	70164.91	0.59	2.07	0.36
AGL	2249.23	1007.2	9704.91	29.5	2533.88	1.33	7.87	0.02
LAB	29.16	29.83	39.61	22.57	5.50	0.20	1.81	0.41
CAP	147254.9	57302.05	482914.5	7846.75	150004.3	1.00	3.66	0.16
PCI	64468.14	55400.28	109417.4	53158.23	14904.47	1.63	13.35	0.00

In contrast to the output levels over time, the bank loans to the agricultural sector seem to have been highly variable across time (perhaps due to the sharp structural break that occurred in the amount in 2005). The standard deviation of the loans level is quite higher than the mean value while the skewness shows a high amount of loans for some periods to be higher than the mean value. The J-B statistic value also shows that the series over the period is not normally distributed, suggesting a structural break at some point over the entire period. Both the labour and capital data series are less variable over the period although income levels seem to be uneven across the period in the study.

Empirical Analysis

The analysis of the estimated model is done in this section. The result of the model is presented in table 4.2 below. In the result, the goodness of fit statistics isquite impressive, with R^2 value at 0.997. This indicates that over 99 percent of the systematic variations in agricultural output over the period are determined by the explanatory variables in the model. The overall significance of the model, as reflected in the high F statistic value of 706.9 in the result, suggests that the model possesses a strong overall significance. Thus, we cannot reject the hypothesis of a high significant relationship between agricultural output and all the independent variables involved.

Table 4.2: Bank Loans and Agricultural Output.

Variable	Dependent Variable of Agricultural Output	
	Coefficient	T-ratio
Constant	6.898	10.26
Bank Loan	0.007	1.169
Labour	0.194	2.231
Capital	0.218	10.06
Income	0.195	2.818
	R^2 = 0.997	F = 706.9

With respect to the individual coefficients of the model, the result shows that each of them possess the expected positive *a priori* sign, indicating that each of the variables may be exerting positive effects on agricultural output over the period. However, the result also indicates that only the coefficient of bank loans fails the significance test at the 5 percent level, while all the other coefficients pass the significance test. Apparently, labour and capital input as well as income level tends to stimulate agricultural output when each is increased. Loans advanced to the agricultural sector by the commercial banks do not have significant impact on agricultural output. Given that agricultural output proxies the informal sector, it appears that bank loans have a rather pervasive impact on the informal sector in Nigeria.

Considering the results shown in figure 4.1 above, we perform a Chow breakpoint test to determine whether a structural break exists based on the financial sector reforms that drastically affected the banking industry in Nigeria.

Table 4.3: Chow Break-Point Test Result

F-statistic	10.23	Prob. F(5,11)	0.0008
Log likelihood ratio	36.36	Prob. Chi-Square(5)	0.0000
Wald Statistic	51.14	Prob. Chi-Square(5)	0.0000

The result of the breakpoint test is reported in table 4.3 above. In the result, each of the test statistics passed the significance test at the 1 percent level and they show that a break point actually exists for the 2005 period. The result of the chow test indicated by the F-statistic, log likelihood ratio and Wald statistic, whose values are 10.23, 36.36 and 51.14 respectively. Given that these values are significant at the 1 % level. We reject the null hypothesis of no structural breakpoint during the study period. Specifically, the results indicate invariably that a structural break existed on the financial sector reform period in Nigeria.

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

Summary of Findings

In this study, we sought to investigate the impact of bank loans on agricultural sector output in Nigeria. On this ground, this study set out to investigate this relationship, using secondary data covering the period 1992 to 2012. Moreover, both statistical and econometric methods were employed for the empirical analysis. Based on the results of the empirical analysis, the following findings were made:

- Bank credit has a rather weak effect on informal sector growth in Nigeria over the period. The results from the empirical analysis showed an insignificant coefficient of the bank loans variable for the entire period of the study in the agricultural output equation. As the loan amount provided by the banks increase, the output of this sector tends to be unaffected.
- The effect of bank credit on the informal sector changed drastically after the financial sector reforms in the country in 2005. While the effect

of the loans from the banks was positive and significant before the reforms, the effect became weak after the reforms.

- Bank loans to agricultural sector have actually suffered since financial sector reforms started in the country.

Recommendations

Based on the foregoing, the following recommendations are suggested:

1. Training and capacity building for staff of the institutions involved in the implementation of policies – CBN, banks, ministry of agriculture, etc., to strengthen institutional capacity, as well as training and capacity building for loan beneficiaries on their operations and fund management. Formation of farmers' cooperatives as a good instrument for imparting functional education which inculcates thrift, responsibility and accountability as well as efficient management skills in the farmers.
2. The transaction costs of financial institutions partaking in financing programs should be reduced by the operators to encourage more borrowers; cooperatives and community based self-help organizations should be included in the credit delivery channel.
3. Simplification of operational procedures in credit administration to reduce cost and bureaucracy as well as modification of the terms of financing under most policy initiatives, such as interest rates, eligibility criteria, legal rights, etc, to enhance access.
4. Granting loans to group of farmers (inform of self-help groups or cooperatives), and integrating credit with input supply and output marketing to reduce default problems.
5. Financial institutions should monitor and supervise all facilities disbursed and the Central Bank of Nigeria should effectively and diligently carry out their regulatory function on all banks to check none compliance, insider abuse and defaults.
6. Most of Nigeria's farmers reside in the rural areas and gain their livelihood from the farm and other rural based economic activities. If the agricultural financing policies of the government are to achieve set targets of rural development, the need an adequate level of strategically targeted investment in agriculture to upgrade rural infrastructure, boost productivity, and increase competitiveness of the farm output will be imperative.

Conclusion

Though this study identified the fact that one of the most important functions of commercial banks and other financial institutions is to make credit available to investors at affordable rate with preference to the agricultural sector, it however finds that bank credit is not quite relevant in agricultural output in Nigeria. This is because low credit or high lending rate will amount to low level of investment which translates to low agricultural output.

The government through its relevant authorities should design favourable monetary policies that will enable commercial banks to make credit more available to the agricultural sector to spur growth. This is because, the fiscal posture for the reform period, and monetary policy outcomes will depend largely on the government's fiscal stance. The disparity between monetary targets and outcomes is wide largely because of the statutory financing of budget deficits and the inability of the apex bank to sterilize the liquidity effects of government expenditure. Thus monetary policy intervention has basically been reactionary and short /medium term, leading to missed targets and ineffectiveness in performance towards increasing agricultural output in Nigeria.

Except urgent measures are taken, the present economic objectives in Nigeria may not be achieved in the nearest future.

The federal government has formulated good policies on agricultural financing meant to encourage food production over the years, but such policies have been found inefficient and ineffective since the intended results were not realized. To this end, adequate budgetary provision and releases should be made to fund policy initiatives in the agricultural sector in Nigeria in order to achieve set objectives.

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APPENDIX

Dependent Variable: LAGR
Method: Least Squares
Date: 09/15/13 Time: 04:52
Sample (adjusted): 1996 2012
Included observations: 17 after adjustments
Convergence achieved after 6 iterations

Variable	Coefficiet	Std. Error	t-Statistic	Prob.
C	6.897721	0.672527	10.25642	0.0000
LAGL	0.007366	0.006297	1.169787	0.2668
LLAB	0.194320	0.087108	2.230789	0.0475
LCAP	0.217647	0.021628	10.06333	0.0000
LPCI	0.194573	0.069036	2.818432	0.0167
AR(4)	-0.522500	0.107168	-4.875499	0.0005

R-squared	0.996897	Mean dependent var	12.31513
Adjusted R-squared	0.995487	S.D. dependent var	0.281773
S.E. of regression	0.018929	Akaike info criterion	-4.825679
Sum squared resid	0.003941	Schwarz criterion	-4.531603
Log likelihood	47.01827	Hannan-Quinn criter.	-4.796447
F-statistic	706.8749	Durbin-Watson stat	1.922797
Prob(F-statistic)	0.000000		

Inverted AR Roots	.60+.60i	.60+.60i	-.60-.60i	-.60-.60i

Chow Forecast Test

Equation: UNTITLED
Specification: LAGR C LAGL LLAB LCAP LPCI
Test predictions for observations from 2005 to 2012

	Value	df	Probability
F-statistic	4.799421	(8, 8)	0.0199
Likelihood ratio	36.91292	8	0.0000

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.037850	8	0.004731
Restricted SSR	0.045737	16	0.002859
Unrestricted SSR	0.007886	8	0.000986
Unrestricted SSR	0.007886	8	0.000986

LR test summary:

	Value	df

Restricted LogL	34.56077	16
Unrestricted LogL	53.01723	8

Unrestricted log likelihood adjusts test equation results to account for observations in forecast sample

Unrestricted Test Equation:
Dependent Variable: LAGR
Method: Least Squares
Date: 09/15/13 Time: 04:53
Sample: 1992 2004
Included observations: 13

Variable	Coefficiet	Std. Error	t-Statistic	Prob.
C	14.84239	4.038063	3.675620	0.0063
LAGL	0.044100	0.014031	3.143054	0.0137
LLAB	0.630480	0.155545	4.053363	0.0037
LCAP	0.053025	0.023492	2.257143	0.0540
LPCI	-0.522951	0.407265	-1.284058	0.2351

R-squared	0.973808	Mean dependent var	12.00757
Adjusted R-squared	0.960713	S.D. dependent var	0.158405
S.E. of regression	0.031397	Akaike info criterion	-3.800457
Sum squared resid	0.007886	Schwarz criterion	-3.583168
Log likelihood	29.70297	Hannan-Quinn criter.	-3.845119
F-statistic	74.36039	Durbin-Watson stat	1.438951
Prob(F-statistic)	0.000002		

	AGR	AGL	LAB	CAP	PCI
Mean	213689.1	2249.23	29.16	147254.9	64468.14
Median	190369.1	1007.2	29.83	57302.05	55400.28
Maximum	348490.8	9704.91	39.61	482914.5	109417.4
Minimum	132699.2	29.5	22.57	7846.75	53158.23
Std. Dev.	70164.91	2533.88	5.50	150004.3	14904.47
Skewness	0.59	1.33	0.20	1.00	1.63
Jarque-Bera	2.07	7.87	1.81	3.66	13.35
Probability	0.36	0.02	0.41	0.16	0.00

YEAR	AGR	AGL	LAB	CAP	PCI
1992	132,699.20	29.50	24.82	7846.75	54502.31
1993	135,185.18	123.20	23.06	11551.18	54381.02
1994	138,753.57	155.40	22.57	15624.66	53158.23
1995	143,706.30	98.60	22.59	42499.72	53218.27
1996	149,512.02	229.40	23.11	46092.51	54223.4
1997	155,934.80	367.40	23.73	47301.10	54406.99
1998	162,248.76	962.70	23.82	47517.33	54154.17
1999	170,813.88	1,007.20	23.86	46955.80	53480.39
2000	175,876.60	1,248.35	24.86	46646.32	55044.84
2001	182,660.00	447.37	27.35	46655.41	55400.28
2002	190,369.10	1,467.71	29.83	57302.05	54903.09
2003	203,012.61	3,389.27	32.53	85277.22	59086.04
2004	216,208.46	3,865.58	35.12	102332.66	63752.63
2005	231,463.61	9,704.91	35.07	133032.46	65549.84
2006	248,598.96	505.23	33.68	212851.94	67906.55
2007	266,477.18	701.80	30.48	246185.23	70509.37
2008	283,175.43	3,354.30	32.94	283113.01	72897.42
2009	299,823.86	4,736.90	32.96	323598.17	76070.36
2010	317,281.65	5,102.90	34.16	375373.88	80004.03
2011	335,180.07	4,679.20	36.27	431679.96	91764.38
2012	348,490.80	5,056.80	39.61	482914.52	109417.4

Dependent Variable: LTCL
Method: Least Squares
Date: 09/15/13 Time: 05:14
Sample: 1992 2012
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-25.06686	6.448856	-3.887024	0.0013
LAGL	0.510499	0.084378	6.050165	0.0000
LLAB	-0.808169	0.852811	-0.947653	0.3574
LCAP	0.756385	0.143325	5.277420	0.0001
LPCI	2.142230	0.769539	2.783782	0.0133

R-squared	0.979269	Mean dependent var	7.955894
Adjusted R-squared	0.974086	S.D. dependent var	1.879144

S.E. of regression	0.302501	Akaike info criterion	0.650794
Sum squared resid	1.464112	Schwarz criterion	0.899490
Log likelihood	-1.833335	Hannan-Quinn criter.	0.704767
F-statistic	188.9460	Durbin-Watson stat	1.274417
Prob(F-statistic)	0.000000		