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Inventory Management and the Financial Performance of Quoted Manufacturing Firms in Nigeria

Ndukwe O. Dibia

Department of Accountancy, Abia State University, Uturu, Nigeria.

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ABSTRACT

This study investigated the relationship between inventory management and the financial performance of quoted manufacturing firms in Nigeria. The study employed longitudinal research design. Longitudinal design involves repeated observations of the same variables over long periods of time which helps the researcher to be able to detect changes in the variables of interest. The population of the study covers all quoted manufacturing companies listed on the Nigerian Stock Exchange from 2011- 2015. However, a sample of 23 manufacturing companies was drawn from the companies listed in the Stock Exchange for the period 2011-2015. The study utilizes the Pooled Ordinary Least squares (OLS) and the Generalized Least squares (GLS) regression estimation. The use of the Pooled OLS is based on the fact that it is a simple way to examine the sensitivity of the results to alternative specifications and allows for greater flexibility in modelling differences in sample specific behaviour. Findings revealed that finished goods inventory, inventory turnover, inventory conversion period and raw material inventory all have a positive effect and also statistically significant at 5% level while work-in- progress cost is not significant. The Inventory turnover is positive (0.6634) and statistically significant at 5% level ($p=0.0014$) which implies that the higher the inventory turnover, the higher the level of profitability. Specifically, a 1% increase in inventory turnover results in about 66.3% increase in profitability and vice-versa. While the inventory conversion period (ICP) is negative (-0.3962) and statistically significant at 5% level ($p=0.0014$) implying that delays in inventory conversion affects profitability negatively. Specifically, a 1% delay in inventory conversion will result in 39% decrease in profitability. The study therefore, recommends that; manufacturing companies should improve their inventory turnover ratio as this has been observed to have a positive impact on profitability. Companies can do this by using sales discounts, marketing campaigns and total product improvements. There is also the need to improve the rate of inventory conversion by eliminating delays in the conversion process as delays have been found to adversely affect profitability.

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1.0 Introduction

Efficient inventory cost management is vital to the successful functioning of manufacturing organizations. The inventory cost management of any organization represents an important decision making function at all stages of the product manufacturing, distribution and sales chain. Inventory Management has attracted a great deal of attention from people both in academia and industries. A lot of resources have been devoted to research on the inventory management practices of organizations. Inventory represents one of the most important assets that most businesses possess as the turnover of inventory represents one of the primary sources of revenue generation and subsequent earnings for the company. Thus, it should be managed in order to avail the inventories at right time and in right quantity. Inventories are the stocks of raw materials, work in progress, finished goods and supplies held by a business organization to facilitate operations in the production process (Pandey, 2005). Inventories can either be assets as well as items held in the ordinary course of business or they can be goods that will be

consumed or used in the production of goods to be sold. Inventory management specifies the size and placement of stocked goods. This is required at different locations within a facility or within multiple locations of a supply network to protect the regular and planned course of production against the random disturbance of running out of materials or goods. Inventory management also centres on the line of best fit between the replenishment lead time, carrying costs of inventory and inventory forecasting

Organizations have generally ignored the savings from proper inventory management, treating inventory as a necessary evil and not as an asset requiring management. As a result, many inventory systems are based on arbitrary rules (Temeng, Eshun & Essey, 2010). It is therefore not unusual for some organizations to have more funds invested in inventory than necessary and still not be able to meet customer demand because of poor distribution of inventory items. The efficient and effective management of inventories help in achieving better operational results and reducing investment in working capital. It has a significant influence

Tele:

Email address: nodibia2006@yahoo.com

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on the profitability of a concern thus inventory management should be a part of the overall strategic business plan in every organization (Gupta & Gupta, 2012).

2.0 Review of Relevant Literatures

2.1 Concept of Inventory Management

Inventories are the stocks of raw materials, work in progress, finished goods and supplies held by a business organization to facilitate operations in the production process (Pandey, 2005).

Chase, Jacobs & Aquilano (2004), defined inventory as the stock of any item or resource used in an organisation. An inventory system is the set of policies and controls that monitor levels of inventory and determine what levels should be maintained, when stock should be replenished, and how large orders should be. Inventories can either be assets as well as items held in the ordinary course of business or they can be goods that will be consumed or used in the production of goods to be sold.

Inventory management is about specifying the size and placement of stocked goods. Inventory management is required at different locations within a facility or within multiple locations of a supply network to protect the regular and planned course of production against the random disturbance of running out of materials or goods. The scope of inventory management also focuses on the fine lines between replenishment lead time, carrying costs of inventory, asset management, inventory forecasting, inventory valuation, inventory visibility, future inventory price forecasting, physical inventory, available physical space for inventory, quality management, replenishment, returns and defective goods and demand forecasting. Balancing these competing requirements leads to optimal inventory levels, which is an on-going process as the business needs shift and react to the wider environment.

According to Wild (2002), inventory control is the activity which organises the availability of items to the customers. It coordinates the purchasing, manufacturing and distribution functions to meet marketing needs. This role includes the supply of current sales items, new products, consumables, spare parts, obsolete items and all other supplies. Inventory enables a company to support customer service, logistic or manufacturing activities in situations where purchasing or manufacturing of the items is not able to satisfy the demand. Lack of satisfaction could arise due to the speed of purchasing, protracted manufacturing and because quantities cannot be provided without stocks.

2.2 Concept of financial performance

Firm financial performance is generally defined as a measure of the extent to which a firm uses its assets to run the business activities to earn revenues. It examines the overall financial health of a business over a given period of time and can be used to contrast the performance of identical firms in similar industries or between industries in general (Ajirrole, 2009). The main source of data for determining firm financial performance is the financial statements, the product of accounting, which consist of the statement of financial position which shows the assets, liabilities and equities of a business; the income statement records the revenues, expenses and profits in a particular period; the cash flow statement which exhibits the sources and uses of cash in a period; and the statement of changes in the owners' equity which represents the changes in owner's wealth.

2.3 Theoretical Framework: Lean Investment Theory

Lean Investment theory was pioneered by Wormack, Jones & Roos (1990).

This theory is linked with reduced inventories. The argument is that as inventory is reduced there will be profit improvement due to interest savings as well as a reduction in storage fees, handling and waste. These savings have been estimated to be in the range of 20-30%. Lean management theory is getting more and more attention in today's highly competitive environment. The proponents of the lean inventory theory argue that excess inventory will adversely affect the net cash flows of a firm.

2.4 Empirical framework

Capkun, Hameri, & Weiss (2009) studied the relationship between inventory and financial performance in manufacturing companies. The researchers studied 52,254 businesses for a period of 25 years between 1980 and 2005; they used multiple regressions to determine the correlation between financial performance and various inventory levels. They measured financial performance using gross profits and operating profit results and inventory levels in regard to raw materials, partially manufactured products, and finished products. The results revealed a positive correlation between a company's inventory management and its financial performance. They also noted that degrees of correlation vary depending on the type of inventory and the financial performance reference.

Eneje, Nweze, & Udeh (2012) investigated the effects of raw materials inventory management on the profitability of breweries in Nigeria using a cross sectional data from 1989 to 2008 which were gathered from the annual reports of the sampled firms. Measures of profitability were examined and related to proxies for raw materials inventory management by brewers. The multiple regression models were applied in the analysis. The study revealed that the local variable raw materials inventory management designed to capture the effect of efficient management of raw material inventory by a company on its profitability is significantly strong and positive and influences the profitability of the firms in Nigeria. They concluded that efficient management of raw material inventory is a major factor to be contented with by Nigerian brewers in enhancing or boosting their profitability.

Another study suggesting a positive relationship between inventory management and performance was Eroglu & Hofer (2011), which used the Empirical Leanness Indicator (ELI) as a measurement for inventory management. They argued that inventory leanness is the best inventory management tool. Lean production considers inventory as a form of waste that should be minimized and has become synonymous with good inventory management. Their study on USA manufacturing firms covering the period 2003-2008 found that leanness affects profit margins.

Mohamad, Suraidi, Rahman & Suhaimi (2016) in a case study of a textile chain store in Malaysia, examined the relation between inventory management and company performance and found that their inventory days was significantly related to return on assets (used proxy for company performance). The study identified that the textile chain store company had unorganized inventory arrangement, large amount of inventory days and lacked accurate stores balances due to unskilled workers.

Prempeh (2015) studied the impact of efficient inventory management on the profitability of manufacturing firms in Ghana, using raw material inventory management and profit as variables. Cross sectional data from the annual reports of four manufacturing firms listed on the Ghana Stock Exchange were analysed using Ordinary Least Squares (OLS) and multiple regression techniques.

The study found a significantly strong and positive relationship between raw material inventory management and profitability.

Lwiki, Ojera, Mugenda & Wachira (2013) examined the impact of inventory management on the financial performance of sugar manufacturing firms in Kenya. Both primary and secondary data were analysed using descriptive statistics and correlation analysis, and they found that inventory management had positive correlation with financial performance.

Ogbo, Onekanma & Ukpere (2014) examined the relationship between effective inventory management and organization's performance in Nigeria. This case study of a bottling company using descriptive statistics and Chi-Square non-parametric test found that inventory management enhanced return on investment. Augustine & Agu (2013) studied the effect of inventory management on organizational effectiveness and profitability of manufacturing companies in Nigeria. Using Pearson product moment correlation coefficient and linear regression techniques, the study found positive correlation between inventory management and profitability.

Abdulraheem, Yahaya, Isiaka & Aliu (2011) studied the impact of inventory management on the performance of small businesses in Nigeria. Using multiple regression technique the study found that inventory management had a strong positive impact on profitability among small businesses in Nigeria. Olufemi & Olubanjo (2009) used a sample of 50 Nigerian quoted non-financial firms for the period of 1996-2005. Their study utilized panel data econometrics in a pooled regression where time series and cross sectional observation were combined and estimated. They found a significant negative relationship between operating profit and the inventory turnover in days for a sample of 50 Nigerian firms listed in the Nigerian Stock Exchange.

Raheman & Nasr (2007) studied the effects of inventory turnover in days and current ratio of the net operating profit of Pakistani firms. They selected a sample of 94 Pakistani firms listed on the Karachi Stock Exchange for a period of six years from 1999-2004 and found a strong negative relationship between inventory conversion period and profitability of the firms.

Sekeroglu & Altan (2014) investigated the effect of inventory management on the profitability of firms in the weaving, food, wholesale and retail industries in Turkey from 2003 to 2012. The study employed regression and correlation techniques using the computer software SPSS 20 version to analyse data collected from the income statements of the selected firms. The results showed positive relationship between inventory management and profitability in the food industry, but no relationship in the weaving, wholesale and retail industries.

Panigrahi (2013) examined the relationship between inventory conversion period and the profitability of cement companies in India for the period 2001 to 2010. The study adopted gross operating profit as the dependent variable and proxy for profitability and inventory conversion period as the independent variable. In addition, current ratio, size of the firm and financial debt ratio were used as control variables. The study found significant negative linear relationship between inventory management and profitability. Deloof (2003) studied the relationship between inventory conversion period and corporate profitability, using a sample of 1,009 large Belgian non-financial firms for a period of 1992-1996.

The study employed correlation and regression analysis and found a significant negative relationship between gross operating income and inventory turnover days for the firms.

Lyndon & Paymaster (2016) examined the effect of inventory cost management on the profitability of listed breweries in Nigeria. Inventory cost management proxied by raw materials cost, work in progress cost and finished goods cost was regressed against profitability proxied by gross profit margin. Secondary time series data were collected from the annual reports and accounts of selected breweries from the Nigeria Stock Exchange for the period 2005 to 2014. A multiple regression technique was used to analyse the data obtained from NSE. The study revealed that efficient inventory cost management has positive influence on the profitability of breweries in Nigeria. Based on the findings, the study recommended that breweries should adopt effective and efficient inventory cost management practices; deploy appropriate modern technology for effective inventory cost management; and employ capable and qualified staff who should be trained regularly on proper and efficient inventory cost management.

2.5 Development of Research Hypotheses

Given the mixed results in the above empirical review, we develop the following hypotheses stated in their null forms.

H₀₁: Inventory turnover has no significant positive effect on profitability of manufacturing firms in Nigeria.

H₀₂: Inventory conversion period has no significant positive effect on profitability of manufacturing firms in Nigeria.

H₀₃: Raw materials inventory has no significant positive effect on profitability of manufacturing firms in Nigeria.

H₀₄: Finished goods inventory has no significant positive effect on profitability of manufacturing firms in Nigeria.

3.0 Methodology

Our study employed longitudinal research design. Longitudinal design involves repeated observations of the same variables over long periods of time which helps the researcher to be able to detect changes in the variables of interest. The population of the study covers all quoted manufacturing companies listed on the Nigerian Stock Exchange from 2011- 2015. However, a sample of 23 manufacturing companies was drawn from companies listed in the Nigeria stock Exchange for the period 2011-2015. The study utilizes the Pooled Ordinary Least squares (OLS) and the Generalized Least squares (GLS) regression estimation. The use of the Pooled OLS is based on the fact that it is a simple way to examine the sensitivity of the results to alternative specifications (Beaver, 1998) and allows for greater flexibility in modelling differences in sample specific behaviour. The reason for the GLS regression is that it has the additional advantage of taken care of the omitted variable bias and it allows for the examination for variations among cross-sectional units simultaneously with variations within individual units over time. Thus, omitting relevant unobservable factors would mis-specify the model from the econometric standpoint and would inevitably produce biased (or inconsistent) result. There are two basic approaches used to account for relationships within or between each cross-section (Baltagi, 2001). First, is the fixed effect approach which assumes that the individual constant is a group specific constant term in the regression model. Second is the random effect approach which assumes that the individual constant is a group specific disturbance similar to the error term, except for each group.

3.1 Model Specification

The model for the study examines the relationship between inventory management and firm profitability in manufacturing firms in Nigeria. The model for the study builds on that of Lyndon and Paymaster (2014). Specifically, the study utilizes, inventory turnover (INVTO) inventory conversion period (INVCP), Raw materials cost (RAMCO) and finished goods cost (FIGCO) as core elements of inventory costs management the econometric presentation of the model is presented below:

$$PAT_{it} = \beta_0 + INVTO_{it} \beta_1 + INVCP_{it} \beta_2 + RMC_{it} \beta_3 + FGC_{it} \beta_4 + \mu_{it} \quad (1)$$

Where;

PAT= Profit after tax used to measure firm profitability

INVTO= Inventory turn over

INVCP= Inventory Conversion period

RMC= Raw Material cost

FGC= Finished goods cost

β_0 - β_4 = Slope coefficients

i= ith firm

t= time period

u= error term

4.0 Presentation of Data

Table 4.1 shows the data description for the variables. As shown in the table (4.1) FP has a mean value of 33755051 with maximum and minimum values of 5.202008 and 296.0000 respectively. The standard deviation stood at 42700813 which is large and indicates the extent to which the FP for each sample company deviates from the distribution average. The Jarque-Bera statistics and p-values suggest the unlikely presence of outliers in the data series. The mean RM is 12247902 with maximum and minimum values of 6.541108 and 565.0000 respectively. The standard deviation stood at 78690524 is also very large and indicates the extent to which the RM for each sample company deviates from the distribution average suggesting that firms in the distribution are very uniquely different in the raw material inventory.

The Jarque-Bera statistics and p-values suggest the unlikely presence of outliers in the data series.

Profit after tax has a mean value of 51740474 with maximum of 4.202109 and minimum of 1.336690 with a standard deviation of about 3.382108 which indicates the extent to which firm specific profitability values deviates from the distribution average. The Jarque-Bera statistics and p-values for all variables suggest the unlikely presence of outliers in the data series. As seen ICP has a mean value of 122 days which suggest that the average inventory conversion period for companies in the distribution is about 122 days with maximum and minimum values of 1217 days and 2 days respectively. The standard deviation stood at 127.415 indicates the extent to which the ICP for each sample company deviates from the distribution average. Jarque-Bera statistics and p-values for all variables suggest the unlikely presence of outliers in the data series.

From table 4.2 above, the correlation coefficients of the variables are examined. However of particular interest to the study is the correlation between profit after tax and all other explanatory variables. As observed, the following correlation exists between FP & PAT ($r=-0.011$), RM & PAT ($r = 0.041$), ICP & PAT ($r=-0.092$) and IVTO & PAT ($r=0.128$). The positive coefficient suggest that increases in these variables could be related with increases in firm performance and vice-versa while the negative coefficient suggest that increases in these variables could be related with decreases in firm performance and vice- versa. However correlation analysis is limited for inferential purposes because it does not suggest causality or functional dependence in a strict sense, regression analysis is better suited for this purpose.

4.1 Hypotheses Testing

The Hypothesis is restated and verified as follows:

H₀₁: Inventory turnover has no significant positive effect on profitability of manufacturing firms in Nigeria.

The result shows that Inventory turnover is positive (0.6634) and statistically significant at 5% level ($p=0.0014$) which implies that the higher the inventory turnover, the higher the level of profitability. Specifically, a 1% increase in inventory turnover results in about 66.3% increase in profitability and vice-versa.

Table. 4.1. Summary statistics of Variables.

	FG	RM	PAT	ICP	IVTO
Mean	33755051	12247902	51740474	122.7663	7.549098
Median	238307.5	416486.5	358463.5	112.7268	5.587184
Maximum	5.202008	6.541108	4.202109	1217.437	179.3289
Minimum	296.0000	565.0000	1.336690	2.085530	0.135318
Std. Dev.	42700813	78690524	3.382108	127.4147	14.62346
Skewness	8.854740	8.614825	11.95829	5.610587	6.846892
Kurtosis	80.36328	76.58557	147.6245	48.29078	81.75200
Jarque-Bera	41466.46	37602.01	141464.4	14333.03	56280.89
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	8.131108	1.784109	4.591309	20977.08	1303.358
Sum Sq. Dev.	2.465417	6.515417	1.794519	2588982.	38322.55
Observations	115	115	115	115	115

Source: Researcher's Compilation (2016)

Table 4.2. Pearson Correlation Result.

	FP	RM	PAT	ICP	IVTO
FP	1				
RM	0.993743	1			
PAT	-0.01149	0.04162	1		
ICP	0.047255	0.031096	-0.09208	1	
IVTO	-0.02903	-0.00595	0.127623	-0.16562	1

Source: Researcher's compilation (2016)

H₀₂: Inventory conversion period has no significant positive effect on profitability of manufacturing firms in Nigeria.

The result shows that ICP is negative (-0.3962) and statistically significant at 5% level ($p=0.0014$) which implies that delays in inventory conversion affects profitability negatively. Specifically, a 1% delay in inventory conversion will result in 39% decrease in profitability. Hence the null hypothesis of no significant positive effect of inventory conversion period on profitability of manufacturing companies is rejected while the alternate hypothesis of a significant positive effect of inventory conversion period on profitability of manufacturing companies is accepted.

H₀₃: Raw materials inventory has no significant positive effect on profitability of manufacturing firms in Nigeria.

The result shows that Raw material (RM) inventory is positive (0.2127) and statistically significant at 5% level ($p=0.0167$) which is line with theoretical expectations and implies a 1% increase in raw material inventory will result in 21.27% increase in profitability. Hence the null hypothesis of no significant positive effect of raw materials on profitability of manufacturing companies is rejected while the alternate hypothesis of a significant positive effect of raw materials on profitability of manufacturing companies is accepted.

H₀₄: Finished goods inventory has no significant positive effect on profitability of manufacturing firms in Nigeria.

As revealed, the finished goods (FP) inventory is positive (0.369) and also statistically significant at 5% level ($p=0.00$) which is in line with theoretical expectations and implies a 1% increase in finished goods inventory will result in 36.9%

increase in profitability. hence the null hypothesis of no significant positive effect of finished goods inventory on profitability of manufacturing companies is rejected while the alternate hypothesis of a significant positive effect of finished goods inventory on profitability of manufacturing companies is accepted.

4.2 Discussion of Findings

The regression is conducted using the generalized least squares estimation result which shows a coefficient of determination (R^2) value of 0.663 this suggest that the model explains about 66.3% of the systematic variations in financial performance with an adjusted value of 0.645. The F-stat is 39.158 (p -value = 0.00) is significant at 5% and suggest that the hypothesis of a significant linear relationship between the dependent and independent variables cannot be rejected. It is also indicative of the joint statistical significance of the model. The D. W statistics of 1.78 indicates the absence of stochastic dependence in the model. Focusing on the performance of the coefficients, the log form of the variables were employed in the estimation and hence the elasticities are presented as percentage changes rather than unit changes. As observe that finished goods (FP) inventory is positive (0.369) and also statistically significant at 5% level ($p=0.00$) which is line with theoretical expectations and implies a 1% increase in finished goods inventory will result in 36.9% increase in profitability. more finished goods in inventory companies are better able to respond to demands of customers without delay. The result also shows that raw material (RM) inventory is positive (0.2127) and statistically significant at 5% level ($p=0.0167$) which is line with theoretical expectations and

Table 4.3. Regression Result.

Variable	Apriori sign	Regression estimates
C		1.2137 (0.676) {0.076}
FP	+	0.36933 (0.072) {0.0000}
RM	+	0.2127* (0.0871) {0.0167}
ICP	-	-0.3962 (0.1202) {0.0014}
IVTO	+	0.6634 (0.1626) {0.0001}
Model Parameters		
R^2		0.663
Adjusted R^2		0.645
D.W		1.78
Mean of Dep.Var		20.694
S.E of Regression		1.894
F-stat		39.158 (0.000)
Model Diagnostics		
Breusch-Pagan-Godfrey		0.165
Breusch-Godfrey		0.177
Ramsey Reset Test		0.902

Source: Researcher's Compilation (2016) () are standard errors, { } are p-values

implies a 1% increase in raw material inventory will result in 21.27% increase in profitability. Raw materials inventories in excess of those required to support production can result from speculative purchases made because management expects either a future price increase (Stock and Lambert, 2001).

The result also shows that inventory conversion period (ICP) is negative (-0.3962) and statistically significant at 5% level ($p=0.0014$) which implies that delays in inventory conversion affects profitability negatively. Specifically, a 1% delay in inventory conversion will result in 39% decrease in profitability.

5.0 Conclusion and Recommendations

Efficient inventory cost management is vital for the successful functioning of manufacturing organizations. Thus the inventory cost management of any organization represents an important decision making function at all stages of the product manufacturing, distribution and sales chain. It represents one of the most important assets that most businesses possess as the, turnover of inventory represents one of the primary sources of revenue generation and subsequent earnings for the company. Thus, it should be managed in order to provide the inventories at the right time and in right quantity. Inventories are the stocks of raw materials, work in progress, finished goods and supplies held by a business organization to facilitate operations in the production process.

Testing the relationship between inventory management components (finished goods inventory, Raw materials inventory, Work in progress inventory, Inventory conversion period, Inventory turnover) and firm profitability using the generalized least square technique, the study findings reveals that finished goods inventory, inventory turnover, inventory conversion period and raw material inventory all have a positive effect and also statistically significant at 5% level while work in progress cost is not significant. We therefore, recommend that; manufacturing companies should improve their inventory turnover ratio as this has been observed to have a positive impact on profitability. Companies can do this by using sales discounts, marketing campaigns and total product improvements. There is also the need to improve the rate of inventory conversion by eliminating delays in the conversion process as delays have been found to adversely affect profitability.

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Appendix

Dependent Variable: LOG(PAT)				
Method: Panel EGLS (Cross-section weights)				
Date: 01/04/17 Time: 11:58				
Sample: 2011 2015				
Periods included: 5				
Cross-sections included: 23				
Total panel (unbalanced) observations: 115				
Linear estimation after one-step weighting matrix				
White cross-section standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.213754	0.675977	1.795556	0.0760
LOG(FP)	0.369331	0.072057	5.125581	0.0000
LOG(RM)	0.212726	0.087167	2.440440	0.0167
LOG(WIP)	0.141944	0.092831	1.529055	0.1299
LOG(ICP)	0.396282	0.120232	3.295982	0.0014
LOG(IVTO)	0.663438	0.162618	4.079722	0.0001
Weighted Statistics				
R-squared	0.662354	Mean dependent var	20.69393	
Adjusted R-squared	0.644673	S.D. dependent var	9.879445	
S.E. of regression	1.893579	Sum squared resid	311.9508	
F-statistic	39.15847	Durbin-Watson stat	0.686898	
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.316165	Mean dependent var	13.31464	
Sum squared resid	354.7967	Durbin-Watson stat	0.446584	