IMPACT OF STOCK CONTROL ON PROFIT MAXIMIZATION OF MANUFACTURING COMPANY

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ABSTRACT

This study examined the impact of stock control on profit maximization of manufacturing company with the main of determining the impact of stock control on profitability of manufacturing company. The data collected was spanned from 2005 to 2015.

The study employed the use of panel data regression for the purpose of analysis using profit after tax (PAT) as endogenous variable while stock value (STV), firm size (SIZE) and current ratio (CRR) were regressed as exogenous variables.

The result of the analysis explored that stock value (STV) and firm size (SIZE) were significantly related to profit after tax while current ratio was negatively related to profit after tax of manufacturing companies.

The study essentially concluded that stock control significantly impact profit maximization of selected manufacturing companies in Nigeria. Based on the conclusion the study recommended that the sales and marketing department of the company should pay closer attention to the growth pattern of inventory usage and incorporate it in sales forecasting technique

Keywords: Stock, Profit Maximization, Manufacturing Company, Nigeria.

INTRODUCTION

Stocks or inventory is one of the largest and most valuable current assets of any trading or manufacturing concern. These are items of value held for use or sale by an enterprise and include goods awaiting sale, sometimes called finished good stocks; goods in the course of production, also called work in progress or process and goods to be consumed in the course of production, called raw material stocks. Conversely, it excludes long term assets subject to depreciation, called fixed assets and those subject to amortisation, called intangible or fictitious assets. Nonetheless, inventory of manufacturing concerns constitutes the second largest item after fixed assets in the balance sheet in terms of monetary value; hence it is paramount to attach importance to the control of the stock and its usage by the management (Siyanbola, 2012).

The survival and growth of any organization greatly depends on its efficiency and effectiveness of inventory management this implies that organization that does not keep inventory is prone to loss customers and technically sales decline is inevitable. When management is prudent enough to handle inventory it minimizes depreciation pilferage and wastages while ensuring availability of the material as at when required (Ogbadu, 2009). Proper inventory management result in enhancing competitive ability and market share of small manufacturing units (Chalotra, 2013) well managed inventories can give companies a competitive advantages and result in superior financial performance (Isaksson and Seifert, 2014).

Inventory control determines the extent to which stock holding of materials equally makes it possible for materials manager to carry out accurate and efficient operation of the company through decoupling of individual segment of the total operation and it entails the process of assessing of stock into the store house largest cost of the company especially for the trading firm wholesalers and retailers. It is a pile of money on the shelf in normal circumstance it consists of 20% - 30% of the company total investment. Most organizations, especially manufacturing industry, now operate at lower measure which makes it extremely difficult for such organizations to control stock. Quite often management is faced with stock problems such as inadequate raw materials; obsolute materials; high storage cost etc. Stocks are influence by both internal and external factor and are balanced by the creation of the purchase order request to keep supplies at a reasonable or prescribed level. Stock control is use to show how much stock a firm has at any time, and how you keep track of it, it applies to every item you use to produce a product or services from raw materials to finished goods. This covers stock at every stage of the production, purchase and delivery to using and reordering the stock. Efficient stock control allow the firm to have amount of stock in the right place and at the right time in ensuring that capital is not tied up unnecessarily, and protect production if problem arise with the supply chain. However researches showed that many organizations do not maintain efficient stock management process which creates a gap for the current research on the impact of stock control on profit maximization of manufacturing company.

In line with the identified problems the following research questions are guided for the study

i. Will stock control have significant impact on profitability of a manufacturing company?
ii. What are the principles and method for effective stock control?
iii. Can stock control have significant impact on firms profit and efficiency?

METHODOLOGY

The model of the study is specified with reference to the work of Ashok (2013) with modification replacing operating profit with Profit after tax, and including stock values to the set of explanatory variables. Hence the model of the study proxies profitability using profit after tax (PAT), along explanatory variables such as stock value (STKV), Firm size (SIZE), and Current Ratio (CRR)

$$PAT = f(STKV, SIZE, CRR, U)$$

The model can as well be specified in linear form as:

$$PAT_{it} = \alpha_0 + \alpha_1 STKV_{it} + \alpha_2 SIZE_{it} + \alpha_3 CRR_{it} + \mu_i + \varepsilon_{it}$$

Where:

PAT=Profit After Tax

STKV=Stock Value

SIZE=Firm Size

CRR=Current Ratio

U=Stochastic error term

i = cross-sectional variable from 1,2, 3,…………………………… 4

t = time series variable form 1, 2, 3, ……………………………… 10

$\alpha_0, \alpha_1, \alpha_2, \alpha_3$ are parameter estimates corresponding to the explanatory variable and the constant term, μ_i is the cross sectional unit effect, while ε_{it} is the idiosyncratic error term

Method of Data Analysis

The study employed both descriptive and inferential statistical analyses. The Descriptive analysis shows the measure of central location and measure of dispersion, normality status, skewness, kurtosis of all the variables included in the model of the study. However panel estimations including fixed and random effect estimations were conducted in the study for inferential purpose.

Estimation Techniques

The study shall adopt the panel data regression analysis to analyze the impact of merger and acquisition on the performance of some selected banking firms in Nigeria.

The Fixed Effect Model

The term "fixed effect" is due to the fact that although the intercept may differ among firms, each firm's does not vary overtime, that is time-variant. This is the major assumption under this model i.e. while the intercept are cross-sectional variant, they are time variant.

Within-Group Fixed Effects

In this version, the mean values of the variables in the observations on a given firm are calculated and subtracted from the data for the individual, that is;

$$\mathrm{Y}_{\mathrm{it}} - \hat{\mathrm{Y}}_{\mathrm{i}} = \sum_{i=2}^{k} \beta_i (X_{ijt} - X_{ij}) + \text{ð}(\mathrm{t} - \bar{\mathrm{t}}) + \mathrm{E}_{\mathrm{it}} - \bar{\mathrm{E}}_{\mathrm{i}} \quad \text{----------------}(3.1)$$

And the unobserved effect disappears. This is known as the within groups regression model.

First Difference Fixed Effect

In the first difference fixed effect approach, the first difference regression model, the unobserved effect is eliminated by subtracting the observation for the previous time period from the observation for the current time period, for all time periods. For individual *i* in time period *t* the model may be written:

$$\mathrm{Y}_{\mathrm{it}} = \beta_i + \sum_{j=2}^{k} \beta_j X_{ijt} + \text{ð}\mathrm{t} + \infty_i + \mathrm{E}_{\mathrm{it}} \quad ----------------(3.2)$$

For the previous time period, the relationship is

$$\mathrm{Y}_{\mathrm{it\text{-}1}} = \beta_i + \sum_{j=2}^{k} \beta_j X_{ijt} - 1 + \text{ð}(\mathrm{t} - 1) + \infty_i + \mathrm{E}_{\mathrm{it\text{-}1}} \quad ----------------(3.3)$$

Subtracting (3.3) from (3.2) one obtains.

$$\Delta \mathrm{Y}_{\mathrm{it}} = \sum_{j=2}^{k} \beta_j \Delta X_{ijt} + \text{ð} + \mathrm{E}_{\mathrm{it}} - \mathrm{E}_{\mathrm{it\text{-}1}} \quad ----------------------(3.4)$$

and again unobserved heterogeneity has disappeared.

Least Square Dummy Variable Fixed Effect

In this third approach known as the least squares dummy variable (LSDV) regression model, the unobserved effect is brought explicitly into the model. If we define a set of dummy variables A_i, where A_i is equal to *1* in the case of an observation relating to firm *i* and *0* otherwise, the model can be written

$$\mathrm{Y}_{\mathrm{it}} = \sum_{j=2}^{k} \beta_j X_{ijt} + \eth\mathrm{t} + \sum_{t=1}^{n} \infty_i A_i + \mathrm{E}_{\mathrm{it}} \qquad ---------------(3.5)$$

Formally, the unobserved effect is now being treated as the co-efficient of the individual specific dummy variable.

Random Effect Model

Another alternative approach known as the random effects regression model subject to two conditions provide a solution to a problem in which a fixed effects regression is not an effective tool when the variables of interest are constant for each firm and such variables cannot be included.

The first condition is that it is possible to treat each of the first unobserved Z_p variables as being drawn randomly from a given distribution. This may well be the case if the individual observations constitute a random sample from a given population.

If $$\mathrm{Y}_{\mathrm{it}} = \beta_j + \sum_{j=2}^{k} \beta_j X_{ijt} + \eth_{\mathrm{t}} + \infty_i + \mathrm{E}_{\mathrm{it}} \quad = \quad \beta_i + \sum_{j=2}^{k} \beta_j X_{ijt} + \eth_{\mathrm{t}} + \mu_{\mathrm{it}} \qquad ----(3.6)$$

where: $\mu_{it} = \infty_{\mathrm{i}} + \mathrm{E}_{\mathrm{it}}$

The unobserved effect has been dealt with by subsuming it into the disturbance term.

The second condition is that the Z_p variables are distributed independently of all the X_j variables. If this is not the case, ∞, and here μ, will not be uncorrelated with X_j variables and the random effects estimation will be biased and inconsistent.

In order to provide a complete analysis of the impact of stock control on profit maximization of a manufacturing company, the study shall be developing Panel Data using the following methods: Pooled Ordinary Least Square (OLS) regression model, the Fixed Effect or Least Square Dummy Variable (LSDV) Model and the Random Effect Model.

However, it would be recalled that there are three (3) manufacturing companies (cross sections) and there are four (4) variables such as Profit After Tax (PAT), Stock value (STV), Firm size (SIZE) and Current ratio (CRR). Hence, this study shall be analyzing the relationship between

Profit After Tax (PAT) and the three (3) explanatory variables such as Stock value (STV), Firm size (SIZE) and Current ratio (CRR).

The data for this study spanned from 2005 – 2015. So, the observations would be 33 (i.e. 2005-2015 of 3 manufacturing industries).

ANALYSES AND RESULTS

Pooled OLS Regression Model

In the pooled OLS regression model, we pull all the 33 observations and run the regression model, neglecting the cross section and time series nature of data. The result of the pooled OLS regression model is presented in Table 4.1 below:

Extract from the Pooled OLS Regression Model Result

Dependent Variable: PAT

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-1.880980	0.476309	-3.949076	0.0005
STV	0.509990	0.099786	5.110824	0.0000
SIZE	0.721835	0.124280	5.808140	0.0000
CRR	0.136920	0.170985	0.800771	0.4300
R-squared	0.941597			
Adjusted R-squared	0.935339	Durbin-Watson stat	1.879560	
F-statistic	150.4757	Prob(F-statistic)	0.000000	

Source: *Author's Computation from EViews 7*

Estimated Pooled OLS Regression Model

$$PAT = -1.880980 + 0.509990*STV + 0.721835*SIZE + 0.136920*CRR \quad \text{-----} \quad (4.1)$$

The result of the pooled OLS regression model is shown above. It is evident from the estimated pooled regression model that only the dependent variable (*PAT*) is negative however it is statistically significant to explaining the behavior of the stock control in manufacturing company. Furthermore, *STV* and *SIZE* variables were positive and statistically significant at 5% level of significance with the exception of *CRR* which is positive but insignificant. Since *CRR* is insignificant, hence it cannot explain the behavior of the dependent variable - *PAT*. The result thereby implies that one percent change in *STV* and *SIZE* will significantly increase *PAT* by 51% and 72%. However, the major problem with this model is that it does not distinguish between the various manufacturing industries that the study has. Conversely, by combining the three (3) manufacturing companies by pooling, the study deny heterogeneity or individuality that may exist among the three manufacturing companies selected for analysis in this study, therefore, it is imperative to carry out the remaining two regression models. The R^2 coefficient is very impressive (94.16%) connoting the degree of variation of the dependent variable as explained by the explanatory variable. However, the model is statistically significant in its overall looking at the significance of the F-statistics from it probability value. Furthermore, since the study assumed that all the three (3) manufacturing companies are the same, which normally does not happen, hence, the study cannot accept this model because all the manufacturing companies are not the same.

Fixed Effect or LSDV Model

The fixed effect or LSDV model allows for heterogeneity or individuality among the three manufacturing companies by allowing having its own intercept value. The term fixed effect is due to the fact that although the intercept may differ across manufacturing industries, but intercept does not vary over time, that is, it is time invariant.

The result of the fixed effect model is presented in Table 4.2.

Table 4.2: Extract from the Fixed Effect or LSDV Regression Model Result

Dependent Variable: PAT

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-2.813252	0.957336	-2.938624	0.0096
STV	0.709726	0.270647	2.622331	0.0185
SIZE	0.662315	0.193820	3.417167	0.0035
CRR	-0.190111	0.215354	-0.882785	0.3904
Cross-section fixed (dummy variables)				
R-squared	0.977327			
Adjusted R-squared	0.956071	Durbin-Watson stat		2.078620
F-statistic	45.97852	Prob(F-statistic)		0.000000

Source: *Author's Computation from EViews 7.*

$$PAT = -2.813252 + 0.709726 * STV + 0.662315 * SIZE - 0.190111 * CRR \qquad \text{-----(4.2)}$$

Presented in Table 4.2 is the fixed effect regression model. It can be seen in the estimated model that explanatory variables such as stock value and firm size depict positive relationship with the dependent variable while currency ratio depicts negative relationship with profit after tax. However, only the *CRR* variable is negative and statistically insignificant with the dependent variable – *PAT*. This is because the probability value of the estimated coefficient of *CRR* variable is greater than 5%. This implies that one percent change in the *STK* and *SIZE* variables will further increase significantly the value of *PAT* by 71% and 66% respectively. The third model (random effect model) will hence be analysed below as earlier specified. The R^2 value shows that 97.73% of the variation in *PAT* is explained by the explanatory variables while the remaining 2.27% is accounted for by the error term. In its overall, the model is statistically significant owing to the statistical significance of its F-statistics.

Random Effect Model

In the case of the random effect model, the three (3) manufacturing industries used for the purpose of analysis in this study are assumed to have a common mean value for the intercept. The result of the random effect model is presented in Table 4.3.

Extract from the Random Effect Regression Model Result

Dependent Variable: PAT

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-1.853767	0.442621	-4.188157	0.0003
STV	0.515374	0.091071	5.659064	0.0000
SIZE	0.713155	0.114461	6.230521	0.0000
CRR	0.123341	0.160190	0.769970	0.4478
Effects Specification				
	S.D.		Rho	
Cross-section random	0.032122		0.0501	
Idiosyncratic random	0.139874		0.9499	
Weighted Statistics				
R-squared	0.941722			
Adjusted R-squared	0.935478	Durbin-Watson stat	1.865855	
F-statistic	150.8199	Prob(F-statistic)	0.000000	
Unweighted Statistics				
R-squared	0.941574	Mean dependent var	7.100665	
Sum squared resid	0.667238	Durbin-Watson stat	1.868752	

Source: *Author's Computation from EViews 7.*

$$PAT = -1.853767 + 0.515374*STV + 0.713155*SIZE + 0.123341*CRR \quad ----(4.3)$$

The estimated random effect model is presented in equation 4.3. The result showed that, only the *STV and SIZE* variables are statistically significant to explaining the dependent variable's behavior – *PAT;* this is evident from the probability value of the variables as it is less than 5% as shown in Table 4.3. However, *CRR* became positive but statistically insignificant with *PAT*.

Hence, one percent change in the value of *STV* and *SIZE* will bring about a statistically significant increase in the value of *PAT* by 51.53% and 71.32% respectively. The weighted R^2 value of 94.17% implies the variable of the dependent variable as accounted for by the explanatory variables while the remaining percentage is ascribed to the stochastic error term. The random effect model is statistically significant in its overall owing to the significance of the model's F-statistic value. To ascertaining the appropriateness of either of these estimated models, the study shall employ the Hausman Test.

Hausman Test

Haven estimated the three models above; the study shall have to decide which model is good to accept. To check it, the study shall use the Hausman Test to check which model is suitable to accept.

Hausman Test Hypothesis:

H_0: Random effect model is appropriate

H_1: Fixed effect model is appropriate

NB: If the probability value is statistically significant, the study shall use fixed effect mode, otherwise, random effect model.

Table 4.4: Extract from the Hasuman Test Result

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	3	0.0583

Source: *Author's Computation from EViews 7.*

Looking at the Chi-square value of the cross-section random in Table 4.4, the probability value of the chi-square statistic is 0.0583% which is more than 5%, this implies that, the study cannot reject the null hypothesis; rather, we accept the null hypothesis. This implies that, the random effect model is the appropriate model to accept.

Nonetheless, looking at the estimated random effect model Table 4.3, it is evident that stock value and firm size (*STV* and *SIZE)* variables are statistically significant to explain the behavior of the dependent variable – Profit After Tax *(PAT)*; this result is theoretically expected. Conversely, the result further showed that the coefficient of the current ratio variable in the model (i.e. *CRR)* depicts positive and theoretically expected relationship with the dependent variable; however, this relationship is statistically insignificant to explaining the behavior of the dependent variable.

Analysis of t-Statistics (t-test)

The t – test; the ratio of estimated parameter to its standard error is used to test for the individual significance of the parameters estimated in the model. Given values of the t-statistic from the random effect model result shown in Table 4.3 above are t-calculated. For t-tabulated at 5% level of significance with observation 2005 – 2015, t – tabulated at 5% is 1.692 using the two tail test. The decision rule states that; if t-calculated is greater than t-tabulated (t-cal>t-tab), the parameter estimate is statistically significant, vice versa. The insignificance of the parameters estimated presupposes that the variable with such parameter do not have any significant effect on Profit After Tax (PAT).

The t-test hypothesis are as follows:

$H_0: \alpha_1 = \alpha_2 = \alpha_3 = 0$

$H_1: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq 0$

Table 4.5 Summary of t-test (Extract from Estimated Random Effect Model)

Variable	T-tabulated at 5% level	T-calculated	Decision
STV	1.692	5.659064	Reject H_0
SIZE	1.692	6.230521	Reject H_0
CRR	1.692	0.769970	Do Not Reject H_0

Source: Author's Computation

The summary of t-test above further affirmed the statistical significance of the *STV* and *SIZE* variables in the model since it fulfilled the t-test criteria. This implies that, the behaviour of Profit After Tax *(PAT)* is mostly influenced by stock value and firm size *(STV* and *SIZE)*.

4.3.2 Test for the Overall Significance (f-test)

The f-test is used to test for the overall significance of the model and to test the hypothesis that the estimated parameters are simultaneously equal to zero.

F – calculated = 150.8199

F – tabulated = 2.64

Since *F–cal* > *F–tab*, hence, this implies that, the estimated random effect model is statistically significant in its overall.

Implication of Findings

Owing to the fact that an empirical analysis makes no meaning if it is not interpreted for policy purpose, this section therefore presents the policy implications of all the findings earlier discussed in this section. From the accepted pooled OLS regression result (random effect model) shown in Table 4.3, it was showed that all the independent variables in the model depict positive relationship with the dependent variable. However, only the stock value and firm size variables were statistically significant enough to explain the behavior of profit maximization of manufacturing companies as measured by profit after tax. This implies that, the most credible asset and tool to enhancing the performance of manufacturing companies in the Nigerian economy is the degree of stock value available at a time and how the firm has been able to expand in its size.

CONCLUSION

This study examined the impact of stock control on profit maximization of manufacturing company with the main of determining the impact of stock control on profitability of manufacturing company. The data collected spanned 3 manufacturing companies from 2005 to 2015. The study employed the use of panel data regression for the purpose of analysis using profit after tax as endogenous variable while stock value firm size and current ratio were regressed as exogenous variables. The result of the analysis explored that stock value and firm size were significantly related to profit after tax while current ratio was insignificantly related to profit after tax of manufacturing companies.

The study therefore concluded that stock control significantly impact profit maximization of selected manufacturing companies in Nigeria under the study review. This is in consistence and in relationship with the work of Mwangi and Nyambura (2015), Muhayimana (2015) and Siyanbola (2012) in their work on stock control and profitability of manufacturing companies and found that manufacturing companies significantly improved their profit maximization.

RECOMMENDATIONS

Haven examined the impact of stock control on profit maximization of manufacturing companies; these empirical findings have significant implications for manufacturing industries and its stakeholders. Hence, the study therefore suggests the following recommendations:

i. Economic order quantity model because has been placed to be in the best interest of manufacturing companies to maintain an optimal level of materials in store such that it minimizes total cost of investment in inventory. To achieve this successfully, different costs which are associated with inventory should be differentiated and accumulated in such a way that EOQ can be easily determined.

ii. In the analysis we mentioned that there is a positive relationship between the stock value and productivity of a company. This does not imply that inventory automatically determines production cost or sales. However, it does shows that inventory levels can be a useful indication of what level of sales to expect. It is thus recommended that the sales and marketing department of the company should pay closer attention to the growth pattern of inventory usage and incorporate it in sales forecasting technique.

Materials management unit should also pay attention to sales growth made over the years and thus be taking into consideration as against the expected sales in current time.

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APPENDIX I

DATA PRESENTATION

DANGOTE CEMENT PLC

Year	PAT	STOCK VALUE	FIRM SIZE	CURRENT RATIO
2005	4,429,884	6,523,543	9,291,704	1.59
2006	3,377,481	8,793,788	7,977,776	1.76
2007	10,607,128	11,105,588	27,762,350	1.01
2008	35,941,068	45,941,611	34,995,470	1.30
2009	61,392,230	69,136,138	60,660,949	2.94
2010	106,605,409	84,916,717	1 17,648,981	1.04
2011	121,415,513	97,707,942	143,698,035	0.82
2012	152,925,098	106,326,020	179,309,258	1.03
2013	210,262,754	115,892,838	243,614,298	1.01
2014	185,814,123	128,583,576	242,950,541	1.00
2015	227,819,619	153,610,772	381,927,780	1.25

Source: Annual Statement of Account various issue

LAFARGE CEMENT PLC

Year	PAT	STOCK VALUE	FIRM SIZE	CURRENT RATIO
2005	4,321,830	5,423,743	7,211,704	2.68
2006	5,387,400	5,105,000	6,017,720	1.76
2007	10,607,108	11,105,588	27,762,350	1.02
2008	35,941,068	45,941,611	34,995,470	1.03

2009	61,392,230	69,136,138	60,660,949	1.63
2010	106,605,409	84,916,717	1 17,648,981	0.30
2011	121,415,513	97,707,942	143,698,035	1.30
2012	152,925,098	106,326,020	179,309,258	1.30
2013	210,262,754	115,892,838	243,614,298	1.07
2014	185,814,123	128,583,576	242,950,541	1.44
2015	227,819,619	153,610,772	381,927,780	1.52

Source: Annual Statement of Account various issue

GLAXOSMITHKLINE NIG PLC

Year	PAT	STOCK VALUE	FIRM SIZE	CURRENT RATIO
2005	4,816,000	2,177,000	16,896,000	1.39
2006	5,498,000	2,437,000	18,215,000	1.51
2007	5,310,000	3,062,000	17,399,000	1.32
2008	4,712,000	3,010,000	17,937,000	1.40
2009	5,669,000	4,064,000	20,988,000	1.45
2010	1,853,000	3,837,000	20,800,000	1.25
2011	5,458,000	3,873,000	20,055,000	1.07
2012	4,744,000	3,969,000	18,537,000	0.99
2013	5,628,000	3,900,000	17,920,000	1.11
2014	2,831,000	4,231,000	15,683,000	1.10
2015	8,372,000	4,716,000	15,070,000	1.25

Source: Annual Statement of Account various issue

APPENDIX II

RESULTS

POOLED LEAST SQUARE RESULT

Dependent Variable: PAT
Method: Panel Least Squares
Date: 12/11/16 Time: 04:54
Sample: 2005 2015
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.880980	0.476309	-3.949076	0.0005
STV	0.509990	0.099786	5.110824	0.0000
SIZE	0.721835	0.124280	5.808140	0.0000
CRR	0.136920	0.170985	0.800771	0.4300

R-squared	0.941597	Mean dependent var	7.100665
Adjusted R-squared	0.935339	S.D. dependent var	0.606954
S.E. of regression	0.154339	Akaike info criterion	-0.782865
Sum squared resid	0.666973	Schwarz criterion	-0.599648
Log likelihood	16.52584	Hannan-Quinn criter.	-0.722134
F-statistic	150.4757	Durbin-Watson stat	1.879560
Prob(F-statistic)	0.000000		

FIXED EFFECT OR LSDV MODEL

Dependent Variable: PAT
Method: Panel Least Squares
Date: 12/11/16 Time: 05:00
Sample: 2005 2015
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.813252	0.957336	-2.938624	0.0096
STK	0.709726	0.270647	2.622331	0.0185
FRM	0.662315	0.193820	3.417167	0.0035
CRR	-0.190111	0.215354	-0.882785	0.3904

Effects Specification			
Cross-section fixed (dummy variables)			
Period fixed (dummy variables)			
R-squared	0.977327	Mean dependent var	7.100665
Adjusted R-squared	0.956071	S.D. dependent var	0.606954
S.E. of regression	0.127213	Akaike info criterion	-0.979048
Sum squared resid	0.258932	Schwarz criterion	-0.246180
Log likelihood	31.66476	Hannan-Quinn criter.	-0.736123
F-statistic	45.97852	Durbin-Watson stat	2.078620
Prob(F-statistic)	0.000000		

RANDOM EFFECT MODEL RESULT

Dependent Variable: PAT
Method: Panel EGLS (Period random effects)
Date: 12/11/16 Time: 05:01
Sample: 2005 2015
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 33
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.853767	0.442621	-4.188157	0.0003
STK	0.515374	0.091071	5.659064	0.0000
FRM	0.713155	0.114461	6.230521	0.0000
CRR	0.123341	0.160190	0.769970	0.4478

Effects Specification		
	S.D.	Rho
Period random	0.032122	0.0501
Idiosyncratic random	0.139874	0.9499

Weighted Statistics			
R-squared	0.941722	Mean dependent var	6.606742
Adjusted R-squared	0.935478	S.D. dependent var	0.584616
S.E. of regression	0.150741	Sum squared resid	0.636241
F-statistic	150.8199	Durbin-Watson stat	1.865855
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.941574	Mean dependent var	7.100665
Sum squared resid	0.667238	Durbin-Watson stat	1.868752

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HAUSMAN TEST RESULT

Correlated Random Effects - Hausman Test
Equation: Untitled
Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	7.473179	3	0.0583

Period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
STK	0.543698	0.515374	0.001088	0.3905
FRM	0.644916	0.713155	0.004582	0.3134
CRR	-0.192257	0.123341	0.029430	0.0658

Period random effects test equation:
Dependent Variable: PAT
Method: Panel Least Squares
Date: 12/11/16 Time: 05:03
Sample: 2005 2015
Periods included: 11
Cross-sections included: 3
Total panel (unbalanced) observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.513775	0.548493	-2.759880	0.0129
STK	0.543698	0.096859	5.613294	0.0000
FRM	0.644916	0.132980	4.849703	0.0001
CRR	-0.192257	0.234714	-0.819111	0.4234

Effects Specification

Period fixed (dummy variables)

R-squared	0.969163	Mean dependent var	7.100665
Adjusted R-squared	0.946891	S.D. dependent var	0.606954
S.E. of regression	0.139874	Akaike info criterion	-0.796510
Sum squared resid	0.352167	Schwarz criterion	-0.155250
Log likelihood	26.74416	Hannan-Quinn criter.	-0.583950
F-statistic	43.51614	Durbin-Watson stat	1.569160
Prob(F-statistic)	0.000000		