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CONTENTS

IS WORKING CAPITAL MANAGEMENT IMPORTANT? EMPIRICAL EVIDENCE FROM MANUFACTURING COMPANIES IN GHANA

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ABSTRACT

The objective of the study is to empirically examine the effect of working capital management on performance of manufacturing firms in Ghana. The study used six listed manufacturing companies on the Ghana Stock Exchange for the period 2008-2014. Correlation and regression analyses were used to analyze the effect of working capital management on manufacturing firms' performance. The study examines the effect of different components of working capital management on firm's performance. The study finds that the current ratio, average collection period and the accounts payable period have positive effect on profitability. However, only the current ratio has statistical significance. Also, while inventory conversion period as well as the cash conversion cycle have negative effect on performance, they are all statistically insignificant. It is recommended that finance managers should implement efficient and effective ways of managing working capital management. Emphasis should be placed on average payment period, improving sales growth and maintaining higher current ratio.

Keywords:
Working Capital Management, Return on Assets, Firm Performance, Manufacturing Companies, Ghana Stock Exchange

1. BACKGROUND OF THE STUDY

In the immediate post-independence era, Ghana embarked on an import-substitution industrialization policy with the active involvement of the State. Currently, manufacturing constitutes about 6% of Ghana's GDP (ISSER 2013) and provides employment for over 250,000 people (as at 2013). The manufacturing sub-sector grew at a rate of 2.2% in 2012 but drastically falling to a growth rate of 0.6% in 2013. The development of the manufacturing sector was thus spearheaded by the State (in early post-independence) with support from multi-national companies. However, it was felt that the sustained growth of industries in Ghana would depend on one hand on working capital management. Several reforms have been made to this effort. This notwithstanding, the effort was marred with problems including lack of working capital, electricity, water and other related issues (Tuffour 2012; Tuffour, Barnor and Akuffo 2015). This influences the profit maximization of the manufacturing companies listed on the Ghana Stock Exchange.

Organizations, profit oriented or not, irrespective of size, type or nature of business, should have a certain quantity of working capital for day to day operations. Working capital is one of the most critical factors for sustaining liquidity, solvency, survival and profitability of most businesses (Mukhopadhyay 2004). The goal of working capital is to guarantee that companies have adequate cash flow to run regular operations and to reduce the possibility of not being able to meet short-term liabilities. According to Ranjith (2008), there is a tradeoff between risk and return in achieving the best level of working capital. This is because, though disproportionate investment in working capital makes a firm highly liquid, it also has the effect of reducing a firm's profitability. This optimal level is not simple to arrive at and it requires an efficient working capital management.

In manufacturing companies, holding excessive amounts of the various components of working capital will result in a firm losing out on the return on investment. Also, holding low amounts of working capital may result in certain shortages and failure of the organization to satisfy immediate obligations to the detriment of the overall performance of the organization (VanHorne and Wachowicz 2000). Working capital management aims at maintaining a best mix of the components of working capital. The management of working capital is embedded into the firm's strategy. This is to create value for shareholders (Raheman and Nasr 2007).

The general objective of any firm is to maximize profit. However, this cannot be achieved with insufficient liquidity for day-to-day operations, making the issue of liquidity very crucial to the organization. As a result there should be an equitable trade-off between two objectives. Without profit a firm may not be able to run for a long period, however without liquidity, insolvency and bankruptcy may bring the organization to a grinding halt (Raheman and Nasr 2007). Evidently, there are both internal and external issues which influence a firm's decision on how much current

assets and current liabilities to keep. Kishore (2008) indicates that the level of working capital that various firms require differ in terms of the level of activity, company policy, market conditions, supply conditions, seasonality of operations, nature of business and so on.

Liquidity, which is determined by current assets and current liabilities, is importance in determining the financial strategies to be employed for efficient working capital management. Over time, cash conversion cycle is used to measure working capital management (Richardes and Laughlin 1980). The concept is that there is likely to be a strong link between the cash conversion cycle and profitability. Three different components of cash conversion cycle are identified: accounts payables, accounts receivables and inventory. For firms, these can be combined in different proportions to maximize profit (Choiu and Cheng 2006).

Also Moss and Stine (1993) proposed two dimensions: static and dynamic view to examine working capital. The static view as the name implies makes use of the traditional liquidity ratios such as current ratio to measure firm's liquidity at a particular point in time. The dynamic view considers cash conversion cycle. This is used to measure firm's liquidity.

This study uses the dynamic view of working capital management. The purpose of this study is to determine the effect of working capital on the profitability of selected manufacturing companies listed on the Ghana Stock Exchange (GSE). The study covers a sample of 6 selected manufacturing companies[1] for the period covering 2008-2014. The choice of the six companies was done on two levels. The first involved clustering of the listed manufacturing companies. The second was based on the simple random selection of the companies from the clusters. The manufacturing firms listed on the Ghana Stock Exchange can be categorized into those related to a) households groceries and toiletries, b) metals, c) food and agriculture products, d) pharmaceuticals, e) paper products, f) breweries and g) information and communication technology. Thus, to capture a broad based representation, six of the categories were chosen. The study companies were then randomly selected from the chosen categories. In undertaking these, consideration was given to origin of the companies (i.e., whether they were initially Ghanaian or foreign owned), and the age of the companies in terms of period of enlistment. The focus on manufacturing companies stem from the basis that the firms have working capital in the form of cash, outstanding expenses, inventories, accounts receivables and payables. Unlike the financial institutions (banks and non-bank) which have bulk of their working capital in the form of cash, and will not be appropriate to provide better understanding on the topic under consideration.

The significance of the study is that Ghanaian businesses will be able to survive in the short-run and will be able to exist for longer periods if there is better under-

1 African Champion Industries Limited, Aluworks Ghana Limited, Cocoa Processing Company Limited, Pioneer Kitchenware Limited, PZ Cussons Ghana Limited and Unilever Ghana Limited.

standing of the effect of working capital on profitability. Thus, businesses will become more profitable to all stakeholders especially the shareholders. The rest of the paper is structured as follows. The second section contains literature review which examines relevant theories on the issues and gives some insights on empirical works in the area of study. Section three is on the methodology used for the study. Section four contains the results and discussion of key findings while section five has conclusions and policy recommendations.

2. LITERATURE REVIEW

2.1 Concept of Working Capital Management

Working capital management is that area of finance that is concerned with ensuring adequate levels of current assets to meet current liabilities (Hampton 2007). The management of assets and liabilities concerns management of working capital (Khan and Jain 2007). Also, working capital management is an organization's ability to efficiently control current assets and current liabilities with a view of maximizing returns on its assets while minimizing the payment of its liabilities (Adelman and Marks 2007).

Furthermore, working capital management is concerned with a firm's decisions which determine the firm's composition of working capital. It refers to utilization of current assets namely: cash, account receivables, and inventory, and current liabilities: outstanding expenses, account payable, etc (VanHorne and Wachowicz 2008). This involves all those activities which concern the firm's receipts and payment of cash (Ross, Westerfield, Jaffe and Jordan 2008). Hofmann and Kotzap (2010) concluded that working capital management includes all aspects of the administration of current assets and liabilities.

The composition of working capital is always changing with respect to the phases of operations. Breadey, Myers and Marcus (2011) propose that net working capital is a better indicator of current assets and liabilities while cash conversion cycle is considered as effective and adequate indicator of working capital management. The introduction of cash conversion cycle approach by Hager (1976) as a dynamic method of measuring liquidity as against the traditional static liquidity ratios has received recommendation by Largay and Stickney (1980).

Brealey, Myers and Marcus (2011) viewed cash conversion cycle as "the longer the production process, the more cash the firm must keep tied up in inventories. Similarly, the longer it takes customers to pay their bills, the higher the value of accounts receivable. On the other hand, if a firm can delay payment for its own materials, it may reduce the amount of cash it needs. In other words, accounts payable reduce net working capital" (p. 181). Richards and Laughlin (1980) indicate that cash conversion cycle is the interval between the time of actual cash expenditure for pro-

duction resources and the time cash is received from the sale of the product. This implies that if the time difference grows longer, then larger investments will have to be made into working capital (Deloof 2003). This reduces the firm's flexibility of cash for other activities (Khan and Jain 2007).

2.2 Empirical Literature Review

A study by Raheman and Nasr (2007) investigated the effect of different components of working capital management including average collection period, average payment period, cash conversion cycle, inventory turnover and current ratio on the net operating profit of firms in Pakistan. The findings indicated a negative relationship between the various components of working capital and profit.

Deloof (2003) researched the relationship between working capital management and profitability of non-financial firms over a five year period between 1992 and 1996. Using cash conversion cycle, inventory policy and trade credit policy as measures of working capital management, the conclusion was that if managers are able to reduce the number of days of accounts receipts and inventory conversion period, it would increase profit, proving there is a negative relationship between profitability and working capital management.

Also, Samiloglu and Demirgunes (2008) conducted a research on manufacturing firms in Turkey. They showed that account receivable period and inventory conversion period have significant negative effects on profitability. However, the research revealed cash conversion cycle has no significant effects on firm's profit. In addition, research works of Padachi (2006), Reheman and Nasr (2007), and Garcia-Teruel and Martinez-Solano (2007) have all proven that in terms of cash conversion cycle it has significant negative relationship with firm's profitability.

Mohamad and Saad (2010) analyzed the effect of working capital management on the profitability of 172 firms over a five-year period (2003-2007) listed on Bursa Malaysia. They found negative relationship between working capital management components (cash conversion cycle, current liabilities to total asset ratio, current assets to current liability ratio and profitability captured by return on equity (ROE) and return on total asset (ROA). On the other hand, they also concluded that there is a significant positive relationship between the current assets to total assets ratio and firms' profit.

Gill, Biger and Mathur (2010) concluded that no significant relationship exists between inventory conversion period and firms profit. They were of the view that collection period of accounts receivables is most influencing factor among components of cash conversion. Thus, managers can generate value for shareholders by shortening the average collection period. As with Gill et al. (2010) study on manufacturing firms, Nobanee, Abdulatif and Al Hajjar (2011) examined the impact of cash conversion cycle on non-financial Japanese firms listed on the Tokyo Stock Exchange from

1990 to 2004. The results showed that except for consumer goods and service sector, there is a negative relationship between the cash conversion cycle and the return on equity. Similar empirical findings have been obtained by Ebben and Johnson (2011).

Generally, the literature indicates that efficient working capital management leads to higher profitability. This research provides the empirical evidence of the relationship between working capital management and firm's profitability from selected manufacturing firms listed on the Ghana Stock Exchange.

3. METHODOLOGY

The study is based on the effect of working capital management on the profitability of listed manufacturing firms in Ghana. To achieve this objective, data was obtained from the annual financial reports and financial statements of the study companies from 2008 to 2014 as well as Ghana Stock Exchange. The study variables are based on literature. Table 1 contains the explanation of the variables.

Table 1.: Description of Variables

SYMBOL	VARIABLE	DESCRIPTION
Dependent variables		
ROA	Return on Assets	Net Income/Total Asset
Independent variables		
ACP	Average Collection Period	(Account receivable/sales)x365
ICP	Inventory Conversion Period	(Inventory/cost of goods sold) x365
APP	Average Payment Period	(Accounts payables/cost of goods sold)x365
CCC	Cash Conversion Cycle	ACP + ICP - APP
Control variables		
CR	Current Ratio	Current assets/current liabilities
FL	Financial Leverage	Total debt/total assets
SIZE	Firm Size	Natural log of total assets
GROWTH	Growth in sales	(Salest-Salest-1)/Salest-1
FATA	Financial Asset to Total Asset	Financial Assets/ Total Assets

Source: Authors' determination based on literature review

Given the determinants of ROA, then ROA = f(WC, CV), where WC is working capital and CV is control variables. In a compact form, it implies these factors combine to determine the level of profitability.

The general form of the model is specified as:

$ROA_{it} = \beta_o + \beta WC_{it} + \gamma CV_{it} + \varepsilon_{it}$

where

ROA_{it} is the Return on Asset of firm *i* at time *t*

B_o: the intercept of the equation
β: Coefficients of the working capital variables
γ: Coefficients of the control variables
WC_{it} : the different variables for working capital management of firm *i* at time *t*.
CV_{it} : the different control variables determining profit of firm *i* at time *t*.
t: time = 1, 2, …,7 years.
i: Manufacturing firms = 1, 2, …, 6 firms.
ε: error term.

This general model was converted to a specific form used by Usman, Saleem and Aziz (2012) which is presented as:

$$ROA_{it} = \beta_o + \beta_1(WC_{it}) + \beta_2(SIZE_{it}) + \beta_3(FATA_{it}) + \beta_4(FL_{it}) + \beta_5(GROWTH_{it}) + \beta_6(CR_{it}) + \varepsilon_{it}$$

In the above model, WC_{it} is measured by the following variables:

i. ACP (Average Collection Period)
ii. ICP (Inventory Collection Period)
iii. APP (Average Payment Period)
iv. CCC (Cash Conversion Cycle)

This model is re-specified using the four variables of working capital as follows:

Model 1: $ROA_{it} = \beta_o + \beta_1(ACP_{it}) + \beta_2(SIZE_{it}) + \beta_3(FATA_{it}) + \beta_4(FL_{it}) + \beta_5(GROWTH_{it}) + \beta_6(CR_{it}) + \varepsilon_{it}$
Model 2: $ROA_{it} = \beta_o + \beta_1(CCC_{it}) + \beta_2(SIZE_{it}) + \beta_3(FATA_{it}) + \beta_4(FL_{it}) + \beta_5(GROWTH_{it}) + \beta_6(CR_{it}) + \varepsilon i_t$
Model 3: $ROA_{it} = \beta_o + \beta_1(APP_{it}) + \beta_2(SIZE_{it}) + \beta_3(FATA_{it}) + \beta_4(FL_{it}) + \beta_5(GROWTH_{it}) + \beta_6(CR_{it}) + \varepsilon_{it}$
Model 4: $ROA_{it} = \beta_o + \beta_1(ICP_{it}) + \beta_2(SIZE_{it}) + \beta_3(FATA_{it}) + \beta_4(FL_{it}) + \beta_5(GROWTH_{it}) + \beta_6(CR_{it}) + \varepsilon_{it}$

The ACP, CCC, APP and ICP are the measures of working capital while the FATA, SIZE, FL, CR and GROWTH are control variables. The study presented three types of analyses: descriptive, correlation and pooled regression analyses. The models are to identify which working capital indicator has a relatively stronger influence in predicting the profit of a manufacturing company. To capture profitability, return on asset (ROA) is used according to literature.

4. RESULTS AND DISCUSSION

Three different components of the analyses are presented. These are descriptive, correlation and pooled regression analyses. Table 2 below contains the summary statistics of the data.

Table 2.: Summary Statistics

Variable	Minimum	Maximum	Mean
ROA	-0.369	0.1717	0.0393
CCC	-178.83	164.633	-1.9217
ACP	0.7179	185.9701	68.523

Variable	Minimum	Maximum	Mean
ICP	22.311	206.366	102.566
SIZE	10.725	19.125	14.923
FATA	0.014	0.442	0.1787
FL	0	0.6617	0.1371
GROWTH	-0.342	0.975	0.1495
APP	24.93	373.742	173.011
CR	0.183	2.184	1.0517

Source: Authors' calculation based on data from study organizations

Table 2 provides a summary of the descriptive statistics of the dependent and independent variables. It shows the average indicators of variables computed from the financial statements. The profitability rate, measured by the Return on Assets reveals an average of 3.93%. The CCC has an average of -1.9217. The value indicates that it takes the companies approximately 2 days to make expenditure for the purchases of raw materials and the collection of sales from finished goods. That is, the companies are taking less time to generate cash as compared to time required to make payments. The Inventory Conversion Period has an average of 102.57. This implies that the companies take approximately 102 days to sell their inventories within a year. The ACP also has average of 68.52. This indicates that it takes manufacturing companies approximately 68.5 days to collect their receivables in a year. On the other hand, it takes companies an average of 173 days to make payment for raw materials. These results have implications for ROA.

Linear regression model is based on the assumption that there is a linear relationship between the dependent variable and the independent variables. Thus, the existence of significant regression model is largely based on the existence of linear relationship between the dependent variable and each of the independent variables. A condition that can be problematic is multicollinearity, which can lead to misleading and inaccurate results. Multicollinearity occurs when there are high inter-correlations among some of the predictors or independent variables. The existence of collinearity means that two or more predictors contain much of the same information. In assessing the collinearity of the data, a Pearson correlation matrix of all the variables is computed. The correlation matrix of the data is presented in table 3 below.

Table 3.: Correlation Matrix

	ROA	ACP	ICP	APP	CCC	CR	SIZE	FATA	FL	GROWTH
ROA	1.00									
ACP	0.093									
ICP	0.163	0.072								
APP	-0.157	0.578	0.099							
CCC	0.315	0.046	0.592	-0.595						

	ROA	ACP	ICP	APP	CCC	CR	SIZE	FATA	FL	GROWTH
CR	0.586	0.0905	0.487	-0.323	0.590					
SIZE	-0.007	0.511	0.533	0.511	0.163	0.215				
FATA	0.575	0.220	0.014	-0.06	0.195	0.575	-0.093			
FL	-0.120	0.445	0.289	0.046	0.396	0.122	0.376	-0.149		
GROWTH	0.323	0.083	0.206	0.036	0.145	0.263	0.218	0.170	0.257	1.00

Source: Authors' calculation based on data from study organizations

It can be observed from the correlation matrix (Table 3 and p-values indicated in appendix A) that CR, FATA, CCC and GROWTH each tends to have significant positive linear relationship with ROA, as indicated by their Pearson correlation coefficients (0.586, 0.575, 0.315, 0.323) and low probability values (0.000, 0.000, 0.045, 0.041) respectively which are all less than 5%. These variables tend to have higher predictive influence on ROA than the rest of the independent variables. Observably, ACP and ICP have positive while APP has negative association with ROA.

Having established the extent of association between each independent variable and the ROA, pooled regression analysis is performed to examine the effect of the components of working capital on ROA.

The multiple correlation coefficient (R) measures the relationship between the observed and predicted values of the dependent variable. Larger values of R indicate stronger relationships and vice versa. Model 1 produced an R figure of 0.881 (see table 4), indicating that the regression model between the dependent variable and the set of independent variables is appropriate. The adjusted R-square figure of 0.716 indicates that reliance on this model will account for 71.6% of the variations in the dependent variable. The second model produced an R figure of 0.892, indicating the extent of correlation between the dependent variable and the set of independent variables. It also produced an adjusted R-square figure of 0.796.

Again, model 3 produced R figure and adjusted R-square figure of 0.897 and 0.729 respectively. It indicates that the model is appropriate and its reliance can account for approximately 72% of the variations in the dependent variable. Finally, model 4 has R figure and adjusted R-square figure of 0.881 and 0.717 respectively. These indicate that about 71.7% of the variation in the dependent variable is attributed to the set of explanatory variables.

The F-value, indicated by the ratio of regression mean square to the residual mean square shows the overall fit of the model. The analyses resulted in F-values of 13.296, 12.304, 10.774 and 13.270 for models 1, 2, 3 and 4 respectively with corresponding p-value of 0.000 for each. These confirm that the models are significantly reliable. That is, one can rely on the models to predict ROA with high accuracy. Having established that the models are appropriate and reliable, the next step is to estimate the pooled regression coefficients as indicated in table 4 below.

Table 4.: Regression Results

Variable	Model 1 β (p-values)	Model 2 β (p-values)	Model 3 β (p-values)	Model 4 β (p-values)
Constant	-0.156 (0.081)	-0.198 (0.013)	-0.070 (0.457)	-0.224 (0.017)
ACP	0.031 (0.424)			
CCC		-0.033 (0.166)		
APP			0.062 (0.058)	
ICP				-0.035 (0.437)
SIZE	-0.006 (0.335)	-0.005 (0.313)	-0.020 (0.049)	0.0007 (0.920)
FATA	0.322 (0.153)	0.292 (0.147)	0.092 (0.697)	0.368 (0.065)
FL	-0.142 (0.129)	-0.053 (0.053)	-0.079 (0.287)	-0.110 (0.170)
GROWTH	0.082 (0.087)	0.066 (0.145)	0.075 (0.087)	0.074 (0.112)
CR	0.1316 (0.002)	0.173 (0.002)	0.207 (0.000)	0.136 (0.003)
Adjusted R2	0.716	0.796	0.729	0.717
F	13.296	12.304	10.774	13.270
R	0.881	0.892	0.897	0.881
Sig (F)	0.000	0.000	0.000	0.000

The values in parenthesis are p-values
Predictors: ACP, CCC, APP, ICP, SIZE, FATA, FL, GROWTH and CR
Dependent Variable: ROA

Source: Authors' calculation based on data from study organizations

The table contains regression coefficients with their corresponding p-values to test the significance of each of the estimated regression coefficients. A significant coefficient indicates that the attached independent variable largely contributes to the significance of the overall regression model in explaining the variations in ROA. From the regression result (model 1), it is apparent that the Average Collection Period (ACP) has a co-efficient of 0.031 meaning a positive effect on profitability. However, its p-value of 0.424 implies that ACP has no statistical significance. This means the number of days a firm takes to collect its receivables has no effect on the profit of the firm. This result contradicts the findings of Samiloglu and Demirgunes (2008), and Deloof (2003) who found a negative relationship between ACP and profitability. However, Ramachandran and Janakiraman (2009) found a positive linkage.

From Model 2, Cash Conversion Cycle (with a co-efficient of -0.033) has negative effect on profitability. This inverse relationship makes economic sense, yet its p-value of 0.166 implies CCC has no statistical significance in explaining ROA. This indicates that the time lag between purchases of raw materials and the collection of sales from finished goods does not significantly influence the profitability of manufacturing companies. This conclusion is consistent with the findings of Zariyawati, Anuuar and Abdul (2009). However, it contradicts the findings of Lyroudi and Lazaridis (2000) who found a positive relationship between CCC and profitability.

It is observed that Average Payment Period in the regression results (model 3), has a co-efficient of 0.062 implying that lengthening the payment period increases profitability. It means that companies with higher accounts payable period tend to have improved firm performance. The implication is that the longer a firm takes to make its payments to creditors, the higher the amount of working capital available which can be used to improve profitability. Also, its p-value indicates that this variable is significant. This result is in conformity with the findings of Usman, Saleem and Aziz (2012).

Also, the regression results (model 4) indicate that Inventory Conversion Period (ICP) has a coefficient of -0.035 and p-value of 0.437. This means ICP has no statistical significance on ROA. The implication is that the length it takes the companies to sell their inventories has no significant influence on ROA. In a similar research conducted by Garcia-Teruel and Martinez-Solano (2007) and Deloof (2003), it was concluded that inventory period has negative relationship with profitability.

The results from the entire four models suggest that Financial Asset to Total Asset (FATA) has no statistical significance on profitability because the p-values are all greater than 0.05. That is, the ratio of Financial Asset to Total Asset has positive but insignificant effect on profitability except model 4 which is significant at 10%. This result is consistent with the findings of Samiloglu and Demirgunes (2008) who revealed that the financial asset to total asset ratio has no statistical significance on profitability. Also financial leverage (FL) is negative but insignificant in all the models except model 2 which is significant at 10%. This means changing the levels of leverage has no significant effect on firms' profit.

Surprisingly, firm size (SIZE) has an unusual behavior. It has no significant effect on profitability in all four models except model 3. Also, it is negatively related to ROA in all models except in model 4. This is an indication of the fact that larger companies are not necessarily more profitable than smaller companies. Change in sales (Growth), is statistically significant at 10% level in models 1 and 3. This may be due to very high selling expenses such as advertising and promotional activities which offset the increase in sales.

Current Ratio (CR) has statistical significance and direct effect on ROA in all models. The implication is that companies with higher current assets to current liabilities ratio are more likely to have higher profit. Thus, this result is consistent with the findings of Raheman and Nasr (2007).

5. CONCLUSION AND POLICY IMPLICATIONS

The research used four different measures of working capital to ascertain the extent to which working capital management influences profitability of selected manufacturing companies listed on the Ghana Stock Exchange over the 2008-2014 period. The empirical results indicate that firms' financial leverage, cash conversion cycle and inventory conversion period have negative effect on ROA, the profitability indicator. On the other hand, financial asset to total asset ratio, Average Collection Period, Average Payment Period, growth and current ratio have positive impact on profitability. Irrespective of the nature of the relationship, the various measures of working capital, that is ACP, CCC and ICP have no statistical significance on profitability except APP.

The above findings indicate clearly that three measures of working capital employed in this research have no significant effect on profitability. However, this conclusion does not dispute the fact that working capital management practices are important. The conclusion is rather an indication of the fact that regardless of the policies adopted by manufacturing companies in the management of working capital, it has not been significant in improving profitability. It is recommended that manufacturing companies in Ghana should adopt working capital management policies that will keep working capital at optimum level. Generally, over the study period, working capital management has not been effective for the manufacturing industry in Ghana in contributing to the growth in profit. Emphasis should be placed on average payment period, improving sales growth and maintaining higher current ratio.

Based on these results, the next steps in respect of further research directions would be to build stronger overall evidence by analyzing working capital issue from the perspective of different types of companies in Ghana as well as determining the appropriate optimal level of working capital to sustain firm operations. Although this research was carefully prepared and has reached its objectives, its limitation is the small number of companies used. A relatively larger number of firms would be better to generalize results. Also, the study was limited by the relatively short period. Effort to obtain data in forms other than annual series might give useful results.

REFERENCES

Adelman, P. J., and Marks, A. M. *Entrepreneurial finance*, 4th ed. New Jersey: Pearson, Prentice Hall, 2007.

Brealey, R., Myers, S, and Allen, F. *Fundamentals of corporate finance*, 3rd ed. Boston: McGraw-Hill Primis Custom Publishing, 2011.

Chiou, J., and Cheng, L. *"The Determinants of Working Capital Management." Journal of American Academy of Business, 10*(1), (2006): 149-155

Deloof, M. *"Does Working Capital Management Affect Profitability of Belgian Firms? Business Finance and Accounting Journal,* 30 (3 and 4), (2003): 573 - 587

Ebben, J. J., and Johnson, A. C. *"Cash Conversion Cycle Management in Small Firms: Relationships with Liquidity,* Invested Capital and Firm Performance." *Journal of Small Business and Entrepreneurship*, *24*(3), (2011): 381-416

Garcia-Teruel, P. J., and Martinez-Solano, P. *"Effects of Working Capital Management on SME Profitability." International Journal of Managerial Finance, 3*(2), (2007): 164-177

Gill, A., Biger, N., and Mathur, N. *"The relationship between working capital management and profitability: Evidence from the United States." Business and Economics Journal,* (2010): 10, 1-9

Hager, H. C. *" Cash management and the cash cycle." Management Accounting,* 57; (1976): 78-79

Hampton, J. J. *Financial decision making, concepts, problems and cases,* 4th ed. New Delhi: Prentice Hall of India Private Limited, 2007.

Hofman, E., and Kotzab, H. *"A supply chain-oriented approach of working capital management." Journal of Business Logistics, 31*(2), 2010.

Institute of Statistical, Social and Economic Research. *The state of Ghanaian economy.* Sundel Services, Accra, 2014.

Khan, M., and Jain, P. K. *Management accounting: Text, problems and causes*, 4th ed. New Delhi: Tata McGraw-Hill, 2007.

Kishore, R. M. *Taxmann's financial management.* 6th ed. New Delhi: Taxmann Allied Services, 2008.

Largay, J. A., and Stickney, C. P. *"Cash flows,* ratio analysis and the W. T. Grant Company Bankruptcy." *Financial Analysts Journal*, (1980):51-54

Lyroudi, K., and Lazaridis, Y. *"The cash conversion cycle and liquidity: Analysis of food industry in Greece." Research Journal of Business Management, 7*(4), (2000):1-57

Mohamad, N. E., and Saad, N. B. *"Working capital management: The effect of market valuation and profitability in Malaysia." International Journal of Business and Management, 5*(11), (2010):140-147

Moss, J., and Stine, B. *"Cash conversion cycle and firm size: A study of retail firms." International Journal of Business and Management, 19*(8), (1993): 25-35

Mukhopadhyay, D. *"Working capital management in heavy engineering firms - A case study." International Journal of Business and Management,* retrieved from myicwai.com/knowledgebank/fm48. (2004)

Nobanee, H., Abdullatif, M., and Hajjar, M. *"Cash conversion cycle and firm's performance of Japanese firms." Asian Review of Accounting, 19*(2), (2011): 147-156

Padachi, K. *"Trends in working capital management and its impact on firms' performance." International*

Review of Business Research Paper, 2(2), (2006):45-58

Raheman, A., and Nasr, M. *"Working capital management and profitability-Case of Pakistani firms." International Review of Business Research Paper, 3*(1), (2007): 279-300

Ranjith, A. B. A. *"The impact of firms' capital expenditure on working capital management: An empirical study across industries in Thailand." International Management Review, 4*(1), (2008):11-24

Richards, V. D., and Laughlin, E. J. *"A cash conversion cycle approach to liquidity analysis." Financial Management, 9*(1), (1980): 32-38

Ross, S. A., Westerfield, R. W., Jaffe, J., and Jordan, B. D. *Modern financial management.* 8th ed. McGraw-Hill International Edition, 2008.

Samiloglu, F., and Demirgunes, K. *"The effect of working capital management on firm profitability: Evidence from Turkey." The International Journal of Applied Economics and Finance,* 2(1), (2008): 44-55

Tuffour, J. K. *"Analysis of the effect of external debt on private investment crowding-out in Ghana." Journal of Business Research, 6*(1 and 2), (2012): 73-83

Tuffour, J. K., Barnor, C., and Akuffo, E. *"Do leadership styles matter in microfinance performance? Empirical evidence from Ghana." Journal of Business Research, 9,* (2015)

Usman, J. K., Saleem, F. A., and Aziz, H. A.*International Conference on Statistical Sciences Lahore.* Pakistan, July 5-6, (2012): 289-302

VanHorne, J. C., and Wachowicz, J. M. *Fundamentals of financial management.* 13th ed, London: Pearson Education Limited. 2008.

Zariyawati, M. A., Annuar, M. N., and Abdul-Rahim, A. S. *"Effect of working capital management on profitability of firms in Malaysia." Journal of Cash Management,* 17, (2009): 51-57

APPENDIX A

	ROA	ACP	ICP	APP	CCC	CR	SIZE	FATA	FL	GROWTH
ROA										
ACP	0.312									
ICP	0.195	0.353								
APP	0.203	0.000	0.302							
CCC	0.045	0.405	0.000	0.000						
CR	0.000	0.309	0.003	0.041	0.000					
SIZE	0.485	0.002	0.000	0.000	0.194	0.127				
FATA	0.000	0.121	0.470	0.376	0.151	0.000	0.313			
FL	0.264	0.007	0.061	0.405	0.015	0.260	0.020	0.216		
GROWTH	0.041	0.331	0.138	0.425	0.222	0.080	0.123	0.185	0.085	

DETERMINANTS OF FOREIGN DIRECT INVESTMENT IN NIGERIA: A MARKOV REGIME-SWITCHING APPROACH

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ABSTRACT

Several studies have analyzed the movement of foreign direct investment in Nigeria using linear approach. In contrast with all existing studies in Nigeria, this paper runs several non linear FDI equations where the main determinants of FDI are determined using Markov-Regime Switching Model (MSMs). The approach enables us to observe structural changes, where exist, in FDI equations through time. Asides, where FDI regression equation is truly nonlinear, MSMs fit data better than the linear models. The paper adopts maximum likelihood methodology of Markov-Regime Model (MSM) to identify possible structural changes in level and/or trends and possible changes in parameters of independent variables through the transition probabilities. The results show that FDI process in Nigeria is governed by two different regimes and a shift from one regime to another regime depends on transition probabilities. The results show that the main determinants of FDI are GDP growth, macro instability, financial development, exchange rate, inflation and discount rate. This implies liberalization that stems inflation and enhance the value of domestic currency will attract more FDI into the country.

Keywords:
FDI; Markov-Regime Switching Model; Nigeria

1. INTRODUCTION

Over the years, several studies have examined various related issues on foreign direct investment (FDI) in both developed and developing countries. The steady stream of theoretical and empirical research on FDI has to do with the impulses and responses it generates in an economy. FDI enhances growth through technology diffusion, human capital development, export promotion, employment generation and productivity growth (Li and Liu, 2005; Liu *et al*. 2009, Alfaro *et al*. 2010, Lee *et al*. 2012, de Mello Jr. 1999, Yao 2006, Ramirez, 2006). In view of the benefits of FDI, the dominant theme of research has been on factors influencing FDI. Early studies have focused on firms and industry specific variables in trying to explain FDI movement. However, in recent time, attention has shifted to spatial aspect of FDI and the subsequent consequences on the expansion of multinational enterprises into foreign markets. The shift of attention to the locational aspect of FDI can be attributed to the realization that countries compete with each other to attract a major share of FDI inflows thereby making changes in domestic policies key factors in attracting FDI. No doubt, location variables are major factors influencing FDI; however, their influence has continued to wane.

This explains the recent emphasis on the role of macroeconomic policies in the host country on FDI inflows (Dunning 2009; Vasconcellos and Kish 1998). It is not surprising therefore that several macroeconomic policy changes were made in most developing countries in the 1980s. These macroeconomic policy reforms were implemented in most developing countries not only to enhance domestic investment but also to foster increased foreign direct investment. Nigeria, in particular, introduced a comprehensive adjustment reforms in mid 1980s to promote increased foreign direct investment and economic growth. Moreover since early 1990s, many macroeconomic policies targeted at fostering increased foreign direct investment into the economy have been implemented. However in spite of all these measures, the share of aggregate FDI inflows in Nigeria relative to the GDP is still low when compared to some other African counties. Also, in aggregate terms, the amount FDI inflows to Nigeria compared to those of the Asian countries is relatively low[1]. Given the various macroeconomic reforms implemented in Nigeria and the aggregate FDI trends over time, it is quite instructive to understand the role of macroeconomic factors on FDI inflows into the country. Surprisingly, only few studies have focused on the effects of macroeconomic factors on inward FDI in Nigeria. Most existing works have focused on the effects of inward FDI on economic growth (Oyinlola 1995, Ekpo 1997, Akinlo 2004, Ekperware 2011, Omonkhanlem 2011 and Oyatoye *et al*. 2011). The few existing research works that examine the impact of macroeconomic vari-

1 As an illustration in 2002, the aggregate FDI inflows to Malaysia, Indonesia, India and Thailand were $23,823.0m, $11,641.0m, $20,326.0m and $308, 180.0m respectively. However, Nigeria received only $1005.0m. The pattern has not change significantly over the years.

ables on inward FDI in Nigeria are faced with some limitations. First, they all failed to consider potential shifts in constant, trend and parameters of FDI function as they applied either co-integration or error correction modeling approach or vector error correction methodology. Second, all the known studies in Nigeria on the determinants of FDI only modeled a linear function without any formal test of its appropriateness. Therefore, this paper fills these gaps.

The remainder of the paper is organized as follows. In section 2, some stylized facts on FDI inflows into Nigeria are provided. Section 3 gives a capsule summary of literature review. Section 4 describes the methodology and the data. Section 5 presents the results and section 6 contains the conclusion.

2. FOREIGN DIRECT INVESTMENT TO NIGERIA: SOME STYLIZED FACTS

This section provides some stylized facts about FDI that motivates my analysis. The supporting data are presented in Tables 1 and 2.

Over the years, Nigerian Government has adopted several policies to attract FDI. In particular, government implemented the structural adjustment programme in mid 1986s. The programme entailed liberalization of the various sectors of the economy, attraction of foreign investors to the manufacturing sector through tax incentives, privatization of several government owned enterprises, and liberalization of the interest and exchange rate. These programmes were implemented in order to provide enabling environment for increased FDI inflows into the economy.

Aggregate FDI inflows into the country increased from ₦1003.2m in 1970 to N9313.6m in 1986. Following the structural adjustment reforms introduced in mid 1986, aggregate FDI inflows increased to N10,436.1m and N119,391.6m in 1990 and 1995 respectively. However, as a result of the nullification of general election in 1993 and the attendant crisis, FDI inflows into the economy experienced downward trend from the year 1996 to 1999. However, the institution of democratic governance in late 1999 coupled with the introduction of various financial and economic reforms in the country, aggregate FDI inflows increased to N157,508.6m in year 2000 and further up to N324,129.3m in 2005 and N482,448.5m in 2006. The aggregate FDI inflows into the country maintained upward trend to attain the peak of N463, 329.3m in 2011. However, aggregate FDI inflows dropped slightly to N459,397.1m in 2012. Although, aggregate FDI inflows into the economy increased for most years between 1970 and 2012, it is important to note, that, the country has not fared well in attracting FDI when compared to other Asian countries as China, Malaysia, Indonesia, Thailand and India.

Table 1.: FDI inflows in Nigeria: Some selected Years

Year	FDI (Nm)
1970	1003.2
1975	2287.5
1980	3620.1
1985	6804.0
1990	10436.1
1995	119391.6
2000	157508.6
2005	324129.3
2006	482448.5
2007	552498.6
2008	399841.3
2009	441271.1
2010	440136.1
2011	463239.3
2012	459397.1

Source: CBN Statistical bulletin (various years)

In terms of sectoral distribution of FDI in Nigeria, some diversification particularly into the manufacturing sector has occurred over the years. As shown in table 2, unlike the traditional notion that FDI has concentrated more on the primary sector and particularly the extractive sub sector, the trend analysis of capital inflows into the country reveals that other sub sectors like manufacturing and service have benefitted from FDI inflows. Table 2 clearly shows that the mining and quarrying received the highest share of inward FDI in the 70s but the percentage share for the subsector declined in the 80s and early 90s. It however increased phenomenally in the late 1990s and early 2000s only to stabilize at 22 per cent from 2005 through 2012. The share of manufacturing FDI increased from average of 25.1 per cent between 1970-74 to average of 43.7 per cent between 1990 and 1994. The average share FDI to the manufacturing sub sector remained over 40 per cent between 2005-2009 and 2010-2012. The share of trading and business sub sector which was high in the early 70s declined to about 8.2 percentage average between 2005 and 2012.

Table 2.: Sectoral Composition of FDI in Nigeria: 1970—2012 Percentage

Year	Mining & Quarrying	Manufacturing	Agriculture	Transport & Communication	Building & Construction	Trading & Business	Miscellaneous
1970-1974	51.2	25.1	0.9	1.0	2.2	16.9	2.7
1975-1979	30.8	32.4	2.5	1.4	6.4	20.4	6.1
1980-1984	14.1	38.3	2.6	1.4	7.9	29.2	6.5
1985-1989	19.3	35.3	1.4	1.1	5.1	32.6	5.2
1990-1994	22.9	43.7	2.3	1.7	5.7	8.3	15.4
1995-1999	43.5	23.7	0.9	0.4	1.8	4.5	25.3
2000-2004	33.7	28.8	0.7	1.2	2.4	7.7	25.6
2005-2009	22.5	40.7	0.4	2.1	2.2	8.2	23.9
2010-2012	22.3	40.4	0.4	2.1	2.2	8.2	24.3
1970-2012	27.3	36.0	0.6	1.7	2.3	7.9	24.3

Source: CBN Statistical Bulletin (various years)

In general, the share of FDI inflows into the country is still low. The country needs more FDI inflows given her low income and low domestic savings. External capital is needed for investment and development. This explains why identifying various factors that drive FDI inflows into the country becomes imperative.

3. LITERATURE REVIEW

Several theories have been propounded to provide logical foundation on the determinants of FDI in the 1930s. These include the internationalization, monopolistic competition and market structure theories. However, realizing the inadequacies of each of the existing traditional theories in explaining FDI, Dunning (1977, 1981, 1993 and 1988) provided the eclectic paradigm. The eclectic paradigm synthesizes already existing theories on MNEs into what is popularly referred to OLI framework. The OLI framework argues that what determine a country decision to invest abroad are three sets of advantages namely; Ownership (O), Location (L), and Internationalization. The ownership advantages encompasses all the technological, managerial, and marketing assets that allow a firm to compete with others in the markets it serves irrespective of the disadvantages of being foreign. The locational advantages consist of tangible and intangible resources that make the chosen country attractive business environment. Internalization advantages are attributed to own production as against producing through a partnership arrangement such as licensing or a joint venture. They arise from exploiting imperfections in external markets. This includes reduction of uncertainty and transaction costs for more efficient knowledge generation and reduction of state generated imperfections including tariffs, control of foreign exchange and subsidies.

It is argued that the three advantages (ownership, locational and internalization) work together to influence the flow of FDI (Dunning, 2009). However, considering the fact that most firms that intend to invest abroad often possess ownership and internalization advantages; location factor therefore remains the critical consideration. This explains why emphasis, particularly in developing countries, is placed on country specific factors that tend to reduce business risk and enhance market potentials. As pointed by Kiymaz (2009) and Boateng *et al*. (2014), macroeconomic factors including GDP, exchange rate and inflation among several others, provide the means for assessing market potentials and market risk. Indeed, it is contended that internal influences are intricately linked to a firm's assets, competencies and competitive advantages (Hawawini and Schill, 1994). All the same, the role of external or environmental factors in determining decision to investment cannot be completely waved off. As such, FDI would move to a country where it could benefit from a new market that provides a favourable economic environment, reduces cost and risk and enhances firms' competitive advantage (Boateng *et al*. 2015).

Empirically, several studies in both developed and developing economies indicate that FDI depend largely on economic fundamentals such as the degree of macroeconomic and political stability and growth prospects. Most existing studies equally identify good infrastructure, skilled labour force, natural resources endowment, market size, financial development as major determinants of FDI. Few recent studies on the determinants of FDI include Ramirez (2006), Ang (2008), Jeon and Rhee (2008), Buckley et al (2007), Oladipo (2008), Mohamed and Sidiropolous (2010), Feils and Rahman (2008), Bukley et al. (2015) . However, empirical findings from existing studies are inconclusive. While some studies found positive relationship between FDI and some of its determinants; others reported negative. Moreover, most of the existing studies have adopted linear methods of analyzing the linkage between FDI and its determinants[2].

With specific reference to Nigeria, few studies have examined FDI and its determinants. These studies include Obadan (1982), Aremu (1997), Anyanwu (1998), Ajakaiye (1995, 1997), Chette (1998), Wafure and Nurudeen (2010), Thaddeus and Yadirichukwu (2013), Abubakar and Abdullahi (2013) and Akenbor and Tennyson (2014). Several of the studies identify market size, exchange rate and natural resources availability as major determinants of FDI in Nigeria (Obadan 1982, Wafure and Nurudeen 2010, Abubakar and Abdullahi 2013 and Akenbor and Tennyson 2014). Some other factors identified in Nigeria as determinants of FDI are trade policies (Obadan 1982 and Anyanwu1998), interest rate, domestic credit and legal system (Akenbor and Tennyson, 2014) and stock market development (Wafure and Nurudeen, 2010). Few other factors identified by some Nigerian empirical evidences

2 As argued in the literature, the ambiguity of the findings of these studies may be due to the use of different models, and the models may de sensitive to the samples selected and nonlinearity may be important. If the nonlinearities are not statistically controlled for, any relationship between FDI and its determinants might be questionable as the correlation between them might be wrongly specified, and thence erroneous inferences might be drawn.

with negative effects on FDI are corruption, political risk and trade openness (Akenbor and Tennyson 2014). Thaddeus and Yadirichukwu (2013) show that interest rate, exchange rate and inflation rate have negative effect on FDI while Wafure and Nurudeen (2010) show that openness, inflation and infrastructural development do not have significant effect on FDI inflows in Nigeria.

There are few observations from the studies on FDI determinants in Nigeria. First, controversies still surround the impact of many of the variables on FDI. For example, while some found positive relationship between exchange rate and FDI, few others obtained negative effect. The same applies to such factors as openness, interest rate, infrastructure amongst others. Second, none of the studies has looked at the role of oil reserves on FDI inflows. Finally, all the existing studies on FDI determinants follow constant parameter (linear) time series. None of them consider regime changes or regime shift. There is the need to fill these gaps in the literature. Hence, the main goal of the paper is to determine the statistically significant parameters on FDI in Nigeria taking cognizance of structural changes in parameters by employing Markov-Regime Switching Model (MSM).

4. METHODOLOGY

The study utilizes state space model (SSM) based on two main reasons. One, it allows unobserved variables within an observed model. Two in estimation procedure, SSM uses robust algorithm to reach strong optimization (convergence) through iterations in a dynamic system. As pointed out by Kim and Nelson (2000), in a SSM with Markov-Switching, the state variable is an unknown parameter evolving through stochastic difference equation. Following the seminal paper of Hamilton (1988) on regime switching, the shifts in regime or cycles in variables are estimated by MSM. Indeed, several advantages that are associated with SSMs have been noted in the literature. For one, MSM is capable of taking care of asymmetry and persistence in extreme observations in data. For another, it can attain solution in a nonlinear context (Anas *et al*. 2004)[3]. In short, Markov Switching-Regime model has become an alternative to linear models such as autoregressive (AR), moving average (MA) or (autoregressive integrated moving average (ARIMA) model, as it allows change in parameters in a stochastic process[4]. MSM are capable of handling non-

3 Several studies have used this methodology particularly in the developed economies. These include Hamilton (1989), Durland and McCurdy (1994), Ghysels (1994), Chauvet (1998), Smith and Summers (2005) and Lam (2004)

4 As noted by Kuan (2002, 2010), although linear models such as linear bivariate or multivariate classical regression models, autoregressive (AR), moving average (MA) or autoregressive integrated moving average (ARIMA) can apture the dynamics in data, they are unable to handle some nonlinear properties such as asymmetry, dependency weights and volatility. Generally, it is well established in the literature that Markov approach presents more sophisticated methods and original results compared to other structural breaks tests such as Chow test (Hamilton, 1989, 1990).

linear properties such asymmetry, dependency, weight and volatility. Specifically in relation to our study, this approach is appealing because it fits with the fact that FDI can perform differently in different sub-periods. Asides, MSM permits two or more process to exist with a series of shifts between the states occurring in a probabilistic manner, so that shifts occur exogenously rather been imposed. Another motivation to use the approach is the patterns of FDI into Nigeria, which historically have switched in response to many political and macroeconomic shocks. Finally, with the smoothed probabilities graph, MSM allows us to have a probabilistic approach of appurtenance of each regime, while explaining FDI by its determinants, conditionally with all information of the sample. Through stochastic process, switches in volatility from low level (contraction) to high level (expansion) are captured in a probabilistic procedure as shown by MSM equation 1[5].

$$P\left(y_t/Y_{t-1,}X_{t,\,s_t} = \begin{matrix} \left\{f\left\{y_t/Y_{t-1,}X_t;\theta_1\right\} \quad s_t = 1\right\} \\ \left\{f\left\{y_t/Y_{t-1,}X_t;\theta_m\right\} \quad s_t = M\right\} \end{matrix}\right) \tag{1}$$

where $Y_{t-i}\left\{y_{t-j}\right\}_{i}^{\infty}$ = 0 shows the history of y_t which depends on unobservable state variables $s_t \in \{1, 2, \ldots\ldots, M\}$, which represents the probability of being in a particular state of the data. X_t and θ_m with m = 1,2,3,…,M are exogenous variables and parameter vector, respectively (Bilgili *et al*. 2012 and Krolzig 2000)

For a two state Markov chain, the four transition probabilities are given as:

$$P\left\{s_t = 1/s_{t-1} = 1\right\} = \rho_{11}$$

$$P\left\{s_t = 0/s_{t-1} = 1\right\} = 1 - \rho_{11}$$

$$P\left\{s_t = 0/s_{t-1} = 0\right\} = \rho_{00} \tag{2}$$

$$P\left\{s_t = 1/s_{t-1} = 0\right\} = 1 - \rho_{00}$$

where s_t =0 or 1 represents the unobserved state of equation (Hamilton, 1989). The transition probability takes the range of $0 < \rho_{ij} < 1$ and the transition probabilities summed up to one.

As well, the transition probabilities measure persistence in the regime. Then, the expected duration of a typical recession is written as a reverse function of the probability to remain in recession.

$$\sum_{k=0}^{\infty} K_{\rho 00}{}^{k-1}\left(1 - \rho_{00}\right)^{-1} \tag{3}$$

and the expected duration of a typical expression is given as:

5 In general, the low level is otherwise referred to contraction phase or Regime 0 while the high level is otherwise called the expansion phase or Regime 1.

$$\sum_{k=0}^{\infty} K_{\rho 11}{}^{k-1}\left(1-p_{11}\right)=\left(1-\rho_{11}\right)^{-1} \tag{4}$$

Assuming Δy_t denotes growth rate of y_t while μ_t represents the mean growth of y_t. The general form of Makov-Switching model takes the form:

$$\Delta y_t-\mu(s_t)=A_1\left(\Delta y_{t-1}-\mu(s_{t-1})\right)+\ldots\ldots+A_p\left(\Delta y_{t-\rho}-\mu\left(s_{t-\rho}\right)\right)+u_t \tag{5}$$

where u_t is normally and independently distributed.

The low (repression) phase (s_t=0) and high (expansion) phase regimes are related with different conditional distributions of Δy_t. μ, however, depends on regimes (Bilgili et al 2012, Krolzig 2001). As severally noted in the literature, Markov Switching model given as equation 3 can be extended into a multivariate MSM[6], which is adopted in this paper to analyze the behaviour of FDI in Nigeria. This is formally stated as

$$FDI=\beta_0(s_t)+\beta_{1t}(s_t)+\sum_{i=2}^{n}B_iX_{1t}(s_t)+u_t \tag{6}$$

where FDI is foreign direct investment, s is the state (regime), t is trend, X_i is the explanatory variable i and is the residual time and t is time subscript. The state term in the equation (6) is a vector of states; state (regime 0) and state (regime 1) or equivalently corresponds to vector of regimes. Hence, the parameters of B_0, B_1, …, B_n denotes time varying parameters.

Maximum likelihood estimation of this model is performed with quarterly data 1986:1 - 20102:4. This is with a view to investigating the possible structural changes (regime shifts) in level, and/or trends as well as possible changes in parameters of vector **b** in FDI-MSM equations through the transition probabilities as explained in Hamilton (1989, 1990) by conducting analytical derivatives of Feasible Sequential Quadratic Programming explicitly detailed in the work of Lawrence and Tits (2001)[7].

Data

The quarterly data used in the work were obtained from the Central Bank of Nigeria, Statistical Bulletin 2013 edition; IMF, International Financial Statistics and OPEC, OPEC Statistical Bulletin, 2006-2012[8]. GDP is the real GDP. The real GDP

6 Examples of multivariate MSM can be found in the works of Simon (1996), Jeanne and Masson (2000), Raymond and Rich (1997), Frommel et al. (2005), Ribeiro and Pereira (2010), Liu and Mumtaz (2010).

7 The full description of the steps involved in the analytical derivatives of the Feasible Sequential Quadratic Programming can be found in the work of Lawrence and Tits (2001) titled "A computational efficient feasible quadratic programming algorithm, SIAM Journal on Optimisation, 11, 1092-118".

8 A natural starting point for any time series analysis is the stationary test of the data to be used. All the variables were tested for stationarity using Kwiatkowski-Phillips-Scmdmit-Shin (1992)-KPSS stationarity. All the variables were stationary at first difference. This actually explains the use of growth rates of the variables in our estimation.

is defined as nominal GDP deflated by the consumer price index (1990=100). Exchange rate is the real exchange rate defined as domestic currency per unit of U. S. dollar, discount rate is the Central Bank of Nigeria minimum rediscount rate and inflation rate is the consumer price index (1990=100). Export is the total real export, import is total real import, financial development is measured as the ratio of private credit to GDP, and macro instability refers to macroeconomic uncertainty related to output fluctuations. It is constructed based on a GARCH (1, 1) specification in a simple equation in which the logarithmic real GDP follows an AR(1) process. There is no quarterly series on foreign direct investment and crude oil reserves. However, the annual series of these variables were decomposed into quarterly values using linear quadratic method from E-views package. In estimation, the levels of index (CPI), rediscount and exchange rates and the percentage growth rates of FDI, GDP, export, import, and financial development are used throughout MSM predictions. The growth rates were obtained using equation:

$$Z_t = 100\{(Z_t - Z_{t-4})/Z_{t-4})\}$$

where Z_t and Z_{t-4} denote time series observation at time t (current quarter) and at time t-4 (four quarters earlier), respectively.

5. ESTIMATION RESULTS

The results of the four alternative Markov-Switching models 1-4 denoted MSM1, MSM2, MSM3 and MSM4 respectively are shown in table 3[9]. Column 1 of table 1shows constant and potential explanatory variables of FDI to be analyzed in alternative MSMs. Columns 2, 3, 4 and 5 of table 3 show the estimation results of Markov Regime-Switching Model 1 (MSM1), Markov Regime-Switching Model 2 (MSM2), Markov Regime-Switching Model 3 (MSM3) and Markov Regime-Switching Model 4 (MSM4) respectively. As shown in column 2 of table 3, MSM1 uses, in addition to constant and trend, the independent variables of GDP growth, macroeconomic uncertainty and financial development following nonlinear time series regression in which FDI growth serves as the dependent variable. The results show that constant, trend and macroeconomic uncertainty (at low regime, Regime 0) are significant determinants of FDI in Nigeria. GDP growth rate is positively correlated with high FDI growth rate (Regime 1) but negatively correlated with low FDI growth (Regime 0). However, the coefficient is not significant in both Regimes. As expected, Nigerian FDI growth rate is positively correlated with Nigerian financial development at both regimes though the coefficient is only significant at the high regime (Regime 1). This shows that as financial devel-

9 The study estimated four models because employing all the variables together in a model would generate problem of degree of freedom. Indeed, when the number of parameters to be estimated was increased in each MSM, the results showed either poorer goodness of fit measurements or no strong convergence.

opment increases, the FDI growth rate also increases at Regime 1 and Regime 0[10]. This indicates that financial development possibly acts as a mechanism in facilitating the adoption of new technologies in the domestic economy. Hence, the provision of efficient credit and financial services by the financial system may greatly facilitate technological transfer and induce spillover efficiency. Macroeconomic instability tends to encourage FDI in Regime 0 as against conventional wisdom[11]. This possibly suggests that foreign investors perceive a higher level of uncertainty as greater investment return[12]. As a matter fact, a substantial share of FDI to Nigeria is in the petroleum sub sector. Investment in the sector might be so profitable such that returns after adjusting for risk remains quite substantial. The major implication of this finding is FDI may not enhance growth as composition of FDI may have shifted towards more speculative type of investment.

Table 3.: Markov Regime Switching Models for FDI growth: 1986-2012

Variables/ Regimes	MSM1	MSM2	MSM3	MSM4
Constant	13843.09	15499.05	13355.73	4248.75
(Regime 0)	(0.000)	(0.000)	(0.000)	(0.013)
Constant	1635.18	12692.64	12633.65	15643.38
(Regime 1)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth	-0.000031	0.00427	-0.00038	0.00156
Regime 0	(0.656)	(0.107)	(0.000)	(0.000)
GDP growth	0.0000169	-0.00018	0.0012	-0.00019
Regime 1	(0.2024)	(0.052)	(0.438)	(0.000)
Trend	57.87	82.53	344.47	250.754
Regime 0	(0.000)	(0.0005)	(0.000)	(0.069)
Trend	236.26	319.92	78.93	133.38
Regime 1	(0.000)	(0.000)	(0.438)	(0.000)
Macro instability	2597.24	-32121.79	1850.08	-18763.23
Regime 0	(0.000)	(0.137)	(0.121)	(0.000)
Macro instability	-35.31	1723.78	485.89	329.28
Regime 1	(0.545)	(0.005)	(0.177)	(0.239)

10 This finding is consistent with the findings of Deichmann, Karidis and Sayek (2003) and Ang (2008) but contradict the findings of Anyanwu and Erhijakpor (2004), Anyanwu (2011) and Walsh and Yu (2010).

11 Some of the existing studies that found insignificant correlation between instability (measured as political risk) include Edwards (1990), Jaspersen et al. (2000), Hausmann and Fernandez-Arias (2000) and Asiedu (2002).

12 Indeed, the study by Wafure and Nurudeen (2010) on Nigeria found that political instability had significant positive effect on FDI inflows. His results showed that a 1 per cent increase in political instability leads to 1.6 per cent increase in FDI inflows. According to them, the positive effect of political instability on FDI reflect e the situation in the in the Nigeria's oil sector that has continued to attract more foreign investment regardless of political situation in the country.

Variables/ Regimes	MSM1	MSM2	MSM3	MSM4
Financial development	5734.60	52523.13	-8319.78	
Regime 0	(0.276)	(0.005)	(0.000)	
Financial development	917.38	-15504.55	62121.74	
Regime 1	(0.058)	(0.000)	(0.000)	
Oil reserves		0.5880		
Regime 0		(0.174)		
Oil reserves		0.2716		
Regime 1		(0.513)		
Import growth			-0.0063	
Regime 0			(0.879)	
Import growth			-0.0543	
Regime 1			(0.799)	
Export growth			0.0079	
Regime 0			(0.831)	
Export growth			-0.652	
Regime 1			(0.019)	
Exchange rate				66.474
Regime 0				(0.0016)
Exchange rate				113.604
Regime 1				(0.000)
Inflation rate				-132.37
Regime 0				(0.042)
Inflation rate				-19.073
Regime 1				(0.000)
Discount rate			136.09	-165.47
Regime 0			(0.0006)	(0.123)
Discount rate			115.91	43.87
Regime 1			(0.0001)	(0.094)

Source: Autor`s

Compared to MSM1, MSM2 incorporates oil reserves as an additional explanatory variable. The incorporation of oil reserves is based on the argument that availability of natural resources is a major determinant of FDI to host country. It is contended that FDI takes place when a country richly endowed with natural resources lacks the amount of capital or technical skill needed to extract or/and sale to the world. Hence, vertical FDI occurs in the host country by foreign firms in order to produce raw materials and inputs for production. Constant, trend, macroeconomic instability (Regime 1) and financial development all have significant coefficients as obtained in MSM1. Oil reserves has positive impact on FDI inflows into the country

as expected, but the coefficient is not significant. This result shows that availability of oil reserves is not a major determinant of FDI inflows into the country. What this possibly suggests is that the huge FDI inflows into the oil sector might be explained by the high level of return on investment in the sector arising from lax policy on capital and remittances and massive corruption in the sub sector[13]. Indeed, few studies including Al-Sadig (2009) and Kim, (2010) have reported positive effect of corruption on FDI inflows.

The third nonlinear evaluation of FDI with its determinants is given as MSM3. It employs besides, constant and trend, the independent variables, GDP growth rate, macro instability, financial development, import growth, export growth and discount rate. Constant term has significant positive sign at Regime 0 and Regime 1 at 1% level of significance. GDP is only positive and significant in Regime 0. Trend is positive in both regimes but significant only in Regime 0. Financial development is significant in both regimes but the coefficient is negative in Regime 0 but positive in Regime 1. Import growth has negative non significant effect in both regimes. This shows that Nigeria's import growth dampens FDI inflows into the country. Similar results have been obtained by Bilgili *et al*. (2012) for Turkey. The negative effect of export growth on FDI emerges in high FDI growth rate periods while non significant positive effect of export growth on FDI appears on low FDI growth rate periods. This means that when Nigeria's capability to export increases, FDI shrinks. Discount rate has positive effect on FDI in both Regimes and the coefficient significant at 1% significance level. This simply shows that as the discount rate increases, FDI grows. This should not come as a surprise because for most periods before mid 1986, the interest rate was administratively fixed by the Monetary Authority which led to high financial repression and inefficiency with adverse impact on investment and economic growth. Hence, the liberalization of the interest rate in early 1987 might have led to increased efficiency in resource allocation and thus increased domestic and foreign investment. This finding supports the argument of Yang *et al*. (2000) and Jeon and Rhee (2008) that higher interest rates in the host country make foreign investment more attractive as they lead to profitable investment. Our finding is consistent with the Boateng *et al*. (2015) result for Norway.

The final alternate nonlinear evaluation of FDI with its determinant is reported as MSM4 in table 3. MSM4 employs, besides, constant and trend, the independent variables GDP growth rate, macroeconomic uncertainty, exchange rate, inflation and discount rate. As in MSM1 and MSM2, constant and trend are both positive and significant at both 1% and 10% significance levels. GDP growth rate is positively related to FDI in Regime 0 but negative in Regime 1. When GDP growth rate increases, FDI grows and vice versa. MSM4 reveals that FDI growth is associated positively with ex-

13 Indeed, over the years, the oil sector has been characterized by massive level of corruption running into several billions of Dollars. The operation of the subsector has shrouded in secrecy without transparency and accountability. In 2012, the then Governor of Central Bank of Nigeria alleged that $20 billion was stolen from the oil revenue that accrued to Federal Government of Nigeria.

change rate at both regimes (Regime 0 and Regime 1). This suggests that an appreciation of the domestic currency (Naira) encourages FDI inflows into economy. This result seems to contradict the findings of some existing studies that depreciation of exchange rate leads to increase in FDI inflows (Froot and Stein 1991, Ang 2008, Azrak and Wynne 1995 and Ramirez 2006). The finding that appreciation leads to increase FDI inflows could possibly be explained by the fact that the nominal return that asset yields in foreign currency should be the main consideration as against the price of the asset in factor explaining FDI inflows. This is as discussed by McCulloch (1989). Our result actually supports the argument by Campa (1993) that positive relationship exists between exchange rate and FDI. Campa argues that an appreciation of the host country's currency will spur increase investment expectation of increased future profit. Empirical study by Boateng, et al. (2015) for Norway supports the postulation by Campa (1993). Inflation is negatively correlated with FDI growth and is significant at 5% and 1% significance levels for Regime 0 and Regime 1 respectively. This result shows that high inflation rates in the host country dampens FDI inflows. This finding can be explained by the fact that high inflation rate reduces the real value of earnings in local currency for inward investment firms as explained by Buckley *et al*. (2007). Our finding is consistent with general finding in the literature including Nnadozie and Osili (2004), Khair-Uz-Zaman and Awan (2006), Anyanwu, (2011), Wafure and Nurudeen (2010) and Boateng *et al*. (2015).

As shown in table 4, all the models seem to perform well. However, MSM1 model seems to fit the data best according to lowest AIC of 13.66908 and highest Log Likelihood of -709.4616 among others. The second best model in the work in terms of AIC and Log-likelihood is MSM3. Using the variance as a measure of goodness of fit, the variance of Regime 1 (102.80) and Regime 0 (5.09638e-006) choose MSM1 as best model among alternatives in this work.

Table 4.: Switching variances, transition probabilities and test statistics of Markov Regime-Switching Models: 1986:1-2012:4

	MSM1	**MSM2**	**MSM3**	**MSM4**
Sigma 0	5.09638e-006	6.819972e-006	6.529383e-006	6.616353e-006
Sigma 1	102.80	135.38	130.58	132.32
P[0/1]	0.020910	0.027468	0.033239	0.036729
P[1/1]	0.979090	0.972532	0.966764	0.963271
P[1/0]	1.000000	1.000000	1.000000	1.00000
P[0/0]	0.00000	0.000000	0.000000	0.000000
Log likelihood	-709.4614	-896.378	-863.3534	-887.1653
AIC	13.66908	17.02908	16.49259	16.91498
Linearity Test (χ_2)	2686.4873	2351.3589	2828.429	2383.764
	(0.0000)	(0.0000)	(0.0000)	0.0000

Note: Below the linearity test values are the p-values
Source: Autor`s

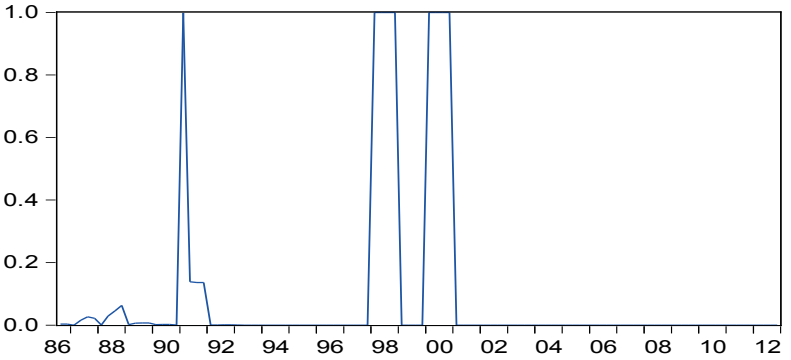
In general, the four models perform well considering the fact that they all attain strong convergence through SQPF analytical derivatives. Asides, the differences amongst the models in terms of signs and significance of the coefficients are, to a reasonable extent not sharp. Constant has similar signs and significances. The same applies to Trend except for MSM3 (Regime 1) and MSM4 Regime (0) where the coefficients are not significant at 5% level. Financial development has similar signs and significance. However, minor differences exist. The coefficient of financial development is negative in both MSM2 (Regime 0) and MSM3 (Regime 1). The other difference is that GDP growth rate is positive and significant at MSM4 (Regime 0), it is negative and significant at MSM4 (Regime 1) and MSM3 (Regime 0). The coefficients of GDP growth rates are not significant at both Regimes in MSM1 and MSM2.

As revealed in table 4, linearity test show that the null of linearity of four MSMs are rejected at 1%. This simply means that for the four MSMs, conducting nonlinear estimations are more desirable than their linear counterparts. The transition probabilities for the four MSMs are also shown in table 4. They all show that when the current state of FDI in Regime 1 at time t, the probability of jumping FDI from Regime 1 to Regime 0 at time t+1 is 0.0295865 on average. The probability is lowest in MSM1. As the current state is Regime 1 at time t, the probability of remaining at Regime 1 at time t+1 is 0.97041425 on average. From table 4, probability of FDI growth's switching from current Regime 0 to Regime 1 is 1.0000. It can be asserted that the cumulative effect of any shock in the system (in MSM FDI equation) to Nigerian FDI growth rate is persistent in Regime 1 while in Regime 0, the responses of FDI to shock(s) is temporary.

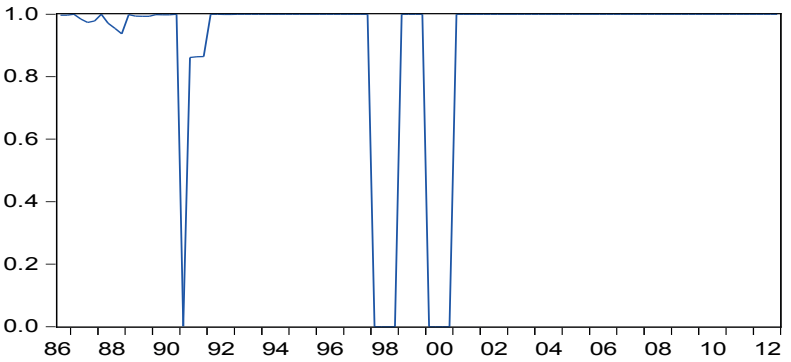
It is possible to observe the time duration (Regime Classification) of the smoothed probabilities. Figures 1a-b to Figures 4a-b provide the smoothed probabilities of Regime 0 and Regime 1 of MSM1 to MSM4 respectively. Regime 0 time points as revealed in Figure 1a are 1991:1; 1998:1-1998:4 and 2001:1-2004:4. Figure 1b: shows that Regime 1 covers periods 1986:3-1990:4, 1992:2-1997:4, 1991:1-1999:4 and 2001:1-2012:3.

Figure 1.: Probability of regime 0 smoothed from MSM1. b: Probability of regime 1 smoothed from MSM1

a



b

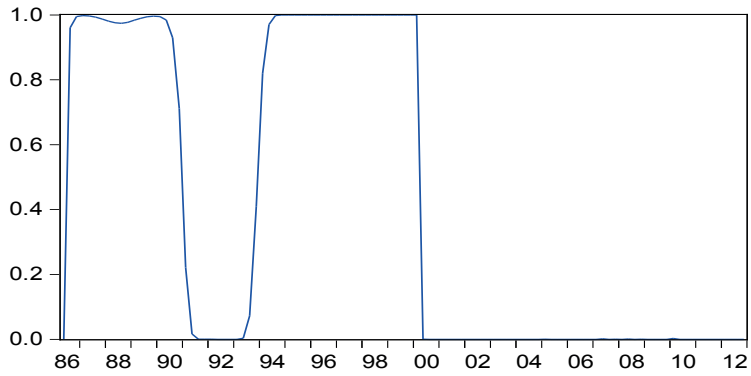


Source: Autor`s

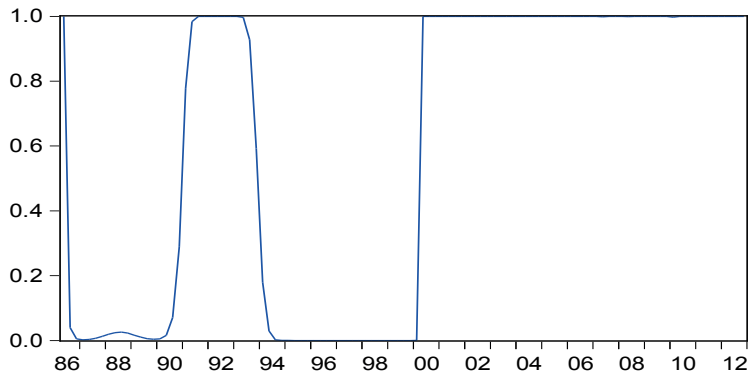
With respect to MSM2, Regime 0 time points are 1987:1-1990:1 and 1994:4-2000:1. However, from Figure 2b, Regime 1 periods include 1991:3-1993:2 and 2000:3-2012:3. From Figure 3 (a) the time points are 1991:2-1992:2; 2000:1-2006:4 and 2009:1-2012:3. Figure 3b reveals that Regime 1 covers periods 1986:2-1990:3 and 1993:3-1999:4.

Figure 2.: Probability of regime 0 smoothed from MSM2. b. Probability of regime 1 smoothed from MSM2

a



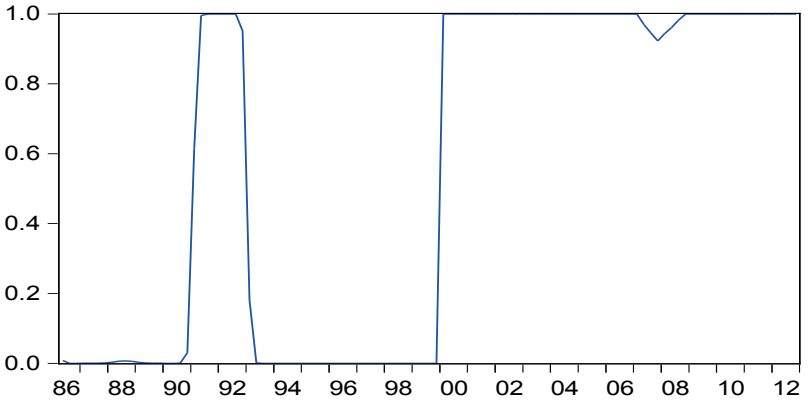
b



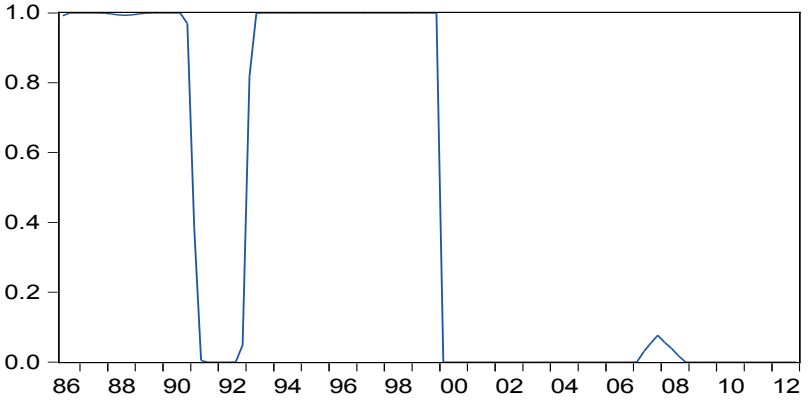
Source: Autor`s

Figure 3.: Probability of regime 0 smoothed from MSM3. b: Probability of regime 1 smoothed from MS

a



b

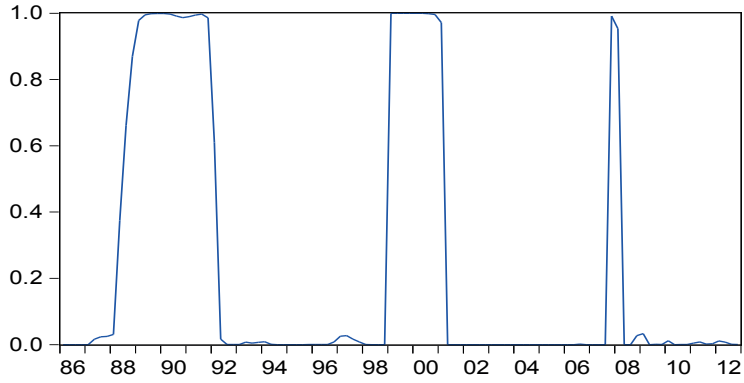


Source: Autor`s

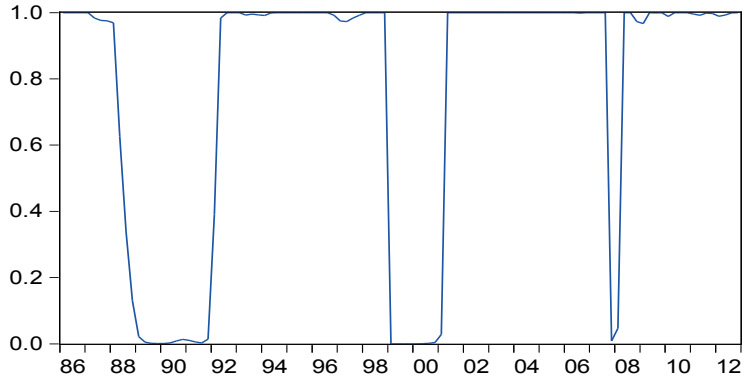
Finally, from Figure 4a, Regime 0 time points are 1988:1-1992:2, 1977:3-2001:2 and 2008:1. As revealed in Figure 4b, time points for Regime 1 are 1986:1-1987:2, 1992:4-1998:4, 2001:3-2007:3 and 2008:2-2012:3. Few observations from the time points of the various regimes include one, MSM4 regime include one more time point (2008:1) into Regime 0 classifications in comparison with MSM1 and MSM2. This simply means that the first quarter of 2008 is not considered high.

Figure 4.: Probability of regime 0 smoothed from MSM4. b: Probability of regime 1 smoothed from MSM4

a



b



Source: Autor`s

FDI point in MSM4. Two, MSM3 adds far more time periods (2000:1-2006:4) and (2009:1-2012:3) into regime 0 classification in comparison with MSM1 and MSM2. Thus, by implication, means that the various quarters 2001:1-2006:4 and 2009:1-2012:3 are not considered high FDI points in MSM3. Regime 0 classification based on smoothed probabilities from MSM1 covers 9 quarters (8.33 per centage of total) with average duration of 2 quarters. In respect of Regime 1 classification based on smoothed probabilities from MSM1, it is made up of 99 quarters (91.67 percentage of total) with average duration of 19.81 quarters. Regime 0 classification of MSM2 includes 35 quarters representing 32.41 percentage of the total. The percentage of Regime 1 point of MSM2, on the other hand, is 67.59. Regime 0 classifications of MSM3 and MSM4 include 43 and 24 quarters respectively. The percentages of Regime 1 points of MSM3 and MSM4, on the other hand, are 60.19 and 77.78 respectively.

At this juncture, it is pertinent to understand some realizations of the Nigerian economy corresponding, in particular, to Regime 0 classification. Considering MSM1 best among others, one may focus Regime 0 points of MSM1. The third quarter of 1986 pertains to the structural adjustment and liberalization programme in Nigeria (Akinlo, 1996). This programme entailed liberalization of the exchange rate, interest rate and massive export promotion. The first quarter of 1991 marked the beginning of a precipitous fall in oil price from $29.10 bbl in 1990 to $20.50 bbl. This sharp reduction in oil price had significant adverse effect on total revenue. The trade balance ratio which was 24 per cent in 1990 dropped sharply to 0.27 per cent in 1991. The first quarter of 1998 marked the height of the banking crises which started in 1994 in the country. A total of 36 banks were liquidated in 1998 due to fraud, mismanagement, and undercapitalization. This problem led to a sharp reduction in credit flows to the private sector with adverse effects on employment, output and economic growth. Moreover, this period marked the beginning of reversion to managed floating exchange rate for the purpose of fostering competitiveness of the economy, encourage export and discourage importation. Arising from the regime shift, the naira exchange rate to dollar increased to 92.6931 as against 90.00 in the last quarter of 1999. The first to fourth quarters of 2000 represent the data points of the bitter political battle with the National assembly - in essence, to delineate the boundaries of their respective authorities under the democracy. Moreover, the new constitution, which gives state and local governments full and automatic right to their shares of the oil revenues, severely constrained the management of the oil windfall gains. Thus in 2000, oil windfall, defined as oil revenue in excess of US$20 per Barrel (so-called excess proceeds), amounted to US $4 billion, or 10 per cent of the GDP. Government at the both National and State levels engaged in huge spending including award of huge wages to public servant in May 2000 which precipitated increased rate of inflation and massive exchange rate depreciation. The other Regime 0 time points from MSM4 namely 2007:4 and MSM3 (2007:3 -2012:3) may represent global financial crises that arose from the US house bubble and the attendant increased default rates on mortgage rate. The world economy was not spared of negative spillover effect of the global financial crises. In Nigeria, several policies were initiated to mitigate the spillover effects of the global financial crises on the domestic economy. These measures included consolidation of the banking sector, reduction in the monetary policy rate and liquidity ratio (from 40 to 30 per cent) as well as a reduction in cash reserve requirements.

In general, from the discussion above, it could be inferred from regime classifications of MSMs that the deviations of each FDI growth rate equation from its mean are not transient. Consequently, perturbations in parameters of constant, level and some of explanatory variables would be persistent. Moreover, the findings emphasize the fact that structural changes (i.e. shocks to each FDI equation) are, in most cases, permanent. This, by implication, means that the potential or probable

persistent shifts in parameter in time series model of FDI would generate bias and inconsistent estimators of FDI fluctuations. Hence, potential parameters shift must be taken into consideration in time series FDI modeling.

6. CONCLUSION

The paper examines the dynamics of FDI in Nigeria using the Markov Regime Switching approach. The study employs quarterly data for growth rates of FDI, GDP, export, import, macroeconomic uncertainty, inflation, discount rate, exchange rate, financial development and oil reserves for the period 1986:1 to 2012:4. The paper is distinct from all the previous studies in Nigeria in two ways. First, the adoption of Markov Regime-Switching models which enables us to examine FDI cycles in Nigeria taking cognizance of the potential shifts in parameters of the explanatory variables included in model including constant and trend. Second, the study runs nonlinear estimations of parameters in FDI equations after the tests for null hypothesis of linearity against alternative hypothesis of nonlinearity had been conducted.

The fundamental argument in this work is that FDI process is governed by two different states (otherwise called Regimes) and that a movement from one Regime to another is a function of the transition probabilities. Also, as found by Bilgili et al. (2012) for Turkey, a regime is determined endogenously through the inferences derived the probability of obtaining one regime (0 or 1) depending on previous regime prevailing.

The results show that the coefficient of GDP growth rate is negative and significant in at least one regime of the four MSMs except in MSM1 (Regime 1) and MSM4 (Regime 0) where it is positive. This might be that foreign investors perceive economic growth in Nigeria as non inclusive. As such, increased economic growth rate might not necessary spur foreign investment. Second, except in MSM2 and MSM3 (Regime 1 and Regime 0 respectively), financial development is positively correlated with FDI. Availability of natural resources (oil reserves) though positively correlated with FDI, is not a major determinant of FDI. FDI growth rate is positively correlated with exchange rate and discount rate in both Regimes but correlated negatively with inflation in regimes 0 and 1.

From policy perspectives, the following points are germane. First, government efforts at developing the financial sector will spur increase in FDI inflows into the economy. This therefore calls for more far reaching reforms in the financial subsector. The liberalization policy in the sector must be pursued to the logical conclusion as our results show that interest rate engenders increased FDI inflows. Second, there is the need to enhance the value of the domestic currency to boost higher FDI inflows. This could be done through increased domestic productivity. Third, government should ensure that the rate of inflation is maintained at low level in order not to deter FDI inflows into the country. Moreover, government efforts at reducing importation while increasing exports will serve to boost FDI inflows into the economy.

In conclusion, preponderance evidence from the estimations shows clearly that macroeconomic factors play significant role in FDI inflows. Hence, policy makers in host country must ensure that macroeconomic policies are designed to provide enabling environment for increased FDI inflows. Also, the shifts in parameters of Markov Regime-Switching model demonstrate the need to keep track of potential possible structural changes in parameters to obtain unbiased and efficient estimations.

REFERENCES

Abubakar, M., Abdullahi, F. A., An inquiry into the determinants of foreign direct investment in Nigeria. European Scientific Journal 9(25), (2013): 293-308

Ajakaiye, D. O., Foreign Direct Investment in Nigeria's Services Sector. In: Nnana, O. J., Okafor, C. M., Odoko, F. O., (eds.), Foreign direct investment in Nigeria, Proceedings of the 12th Annual Conference of the Regional Research Units of the Central Bank of Nigeria, September 1-5, (1995): 227-236

Ajakaiye, D. O., The structural adjustment programme and changes in the structure of production in Nigeria, 1986-1994. NCEMA monograph Series No. 9, 1997.

Akenbor, C. O., Tennyson O., Determinants of foreign direct investment in a democratic society: the Nigeria experience. Business and Management Review 4, (2014): 282-294

Akinlo, A. E., Adjustment programme and structural shift in the Nigerian industrial sector. Ife Journal of Economics and Finance 3(1&2), (1996): 16-42

Akinlo, A. E., Foreign direct investment and growth in Nigeria: an empirical investigation. Journal of Policy Modeling 26, (2004): 627-639

Alfaro, R., Chanda, A., Kalemli-Ozcan., Sayek, S., Does foreign direct investment promote growth? Exploring the role of financial markets on linkages. Journal of Development Economics 91, (2010): 242-256

Al-Sadig, A., The effects of corruption on FDI inflows. Cato Journal 29(2), (2009): 267-294

Anas, J,. Billio, M. L., Duca, M. L., Business cycle analysis with multivariate markov switching models. University of Venice Department of Economics Working Papers 04.

Ang, J. B., 2008. Determinants of foreign direct investment in Malaysia. Journal of Policy Modeling 30, (2004): 185-189

Anyanwu, J. C., An econometric investigation of the determinants of foreign direct investment in Nigeria, Annual Conference, Nigeria Economic Society. 1998.

Anyanwu, J. C., Determinants of foreign direct investment inflows to Africa, 1980-2007. African Development Bank Group, Working Paper No. 136, September 2011.

Anyanwu, J. C., Erhijakpor, A. E. O., Trends and determinants of foreign direct investment in Africa. West African Journal of Monetary and Economic Integration, second Half, (2004): 21-44

Aremu, J. A., Foreign private investment: issues, determinants and performance. Paper presented at a workshop on foreign investment policy and practice, Nigerian Institute of Advanced Legal Studies, Lagos, 1997.

Asiedu, E., On the Determinants of foreign direct investment to developing countries: is Africa different? World Development 30(1), (2002): 107-119

Asiedu, E., Foreign direct investment in Africa: the role of natural resources, market size, government policy, institutions and political instability. World Economy 29, (2006): 63-77

Azrak, P., Wynne, K., Protectionism and Japanese direct investment in the United States. Journal of Policy Modeling 17, (1995): 293-305

Bilgili, F., Tülüce, N. S. H., Doğan, I., The determinants of FDI in Turkey: a Markov regime-switching approach. Economic Modelling 29, (2012): 1161-1169

Boateng, A., Hua, X., Uddin, M., Du, M., Home country macroeconomic factors on outward cross-border mergers and acquisitions: evidence from the UK. Review of International Business and Finance 30, (2014): 202-216

Boating, A., Hua, X., Nisar, S., Wu, J., Examining the determinants of inward FDI: evidence from Norway. Economic Modelling 47, (2015): 118-127

Buckley, J. P., Clegg, L. J., Cross, A. R., Xin, L., Ping, Z., The determinants of Chinese outward foreign direct investment. Journal of International Business Studies 38, 499-518.

Campa, J. M., 1993. Entry by foreign firms in the United States under exchange rate uncertainty. Review of Economic Statistics 75, (2007): 614-622

Chauvet, M., An econometric characterization of business cycle dynamics with factor structure and regime switching. International Economic Review 39(4), (1998): 969-996

Chette, L. C., Determinants of FDI: an error correction specification. Nigerian Journal of Economic and Social Studies 40(1), (1998): 1-17

de Mello Jr, L. R., Foreign direct investment-led growth: evidence from time series and panel data. Oxford Economic Papers 51, (1999): 133-151

Deihmann, J., Karidis, S., Sayek, S., Foreign direct investment in Turkey: regional determinants. Applied Economics 35, (2003): 1767-1778

Dunning, J. H., Trade location of economic activity and the MNE: a search for an eclectic approach. In: Ohlin, B., Hesselborn, P. O. (Eds.), The International Allocation of Economic Activity, Macmillan, London, (1977): 395-418

Dunning, J. H., Explaining the international direct investment position of countries toward a dynamic or development approach. Weltwirtschaftliches Archiv 117, (1981): 30-64

Dunning, J. H., The eclectic paradigm of international production: a restatement and some possible extension. Journal of International Business Studies 19(1), (1988): 1-31

Dunning, J. H., Multinational Enterprises and the Global Economy. Addison-Wesley, Workingham, 1993

Dunning, J, H., Location and the multinational enterprise: a neglected factor?". Journal of International Business Studies 40, (2009): 5-19

Durland, J. M., McCurdy, T. H., Duration dependent transitions in a Markov model of US GNP growth. Journal of Economic and Business Statistics 12, (1994): 279-288

Edwards, S., Capital flows, foreign direct investment, and dept-equity swaps in developing countries. National Bureau of Economic Research (Cambridge, M.A) Working Paper No. 3497, 1990

Ekperware, C. M., Oil and nonoil FDI and economic growth in Nigeria. Journal of Emerging Trends in Economics and Management Sciences 2, (2011): 333-343

Ekpo, A. H., 1997. Determinants of foreign direct investment in Nigeria: evidence from time series data. CBN Economic and Financial Review 35(1), (2011): 59-78

Feils, D.J., Rahman, M., Regional economic integration and determinants of foreign direct investment: The case of NAFTA, Management International Review 48(2), (2008): 147-163

Frommel, M., MacDonald, R., Menkhoff, L., Markovswitching regimes in a monetary exchange rate model. Economic Modelling 22, (2005): 485-502

Froot, K., Stein, J. C., Exchange rates and foreign direct investment: an imperfect capital markets approach. Ouaterly Journal of Economics 106, (1991): 1191-1217

Ghysels, E., On the Economics and Econometrics of Seasonality. Invited paper, 1990 World Congress of the Econometric Society, August 1990. In: Sims, C. A. (Ed.), Advances in Econometrics 1. Cambridge University Press, (1994): 257-316

Hawawini, G. V., Schill, M., The Japanese presence in the European financial sector: historical perspective and future prospects. In: Maso, M., Encarnation, D. (Eds.). Does Owner ship Matter: Japanese Multinationals in Europe. Oxford University Press. Oxford, 1994.

Hamilton, J. D., Rational-expectations econometric analysis of changes in regime: an investigation of the term structure of interest rate. Journal of Economic Dynamics and Control 12, (1988): 385-423

Hamilton, J.D., A new approach to the economic analysis of non-stationary time series and the business cycle. Econometrica 57 (2), (1989): 357-384

Hamilton, J. D. Analysis of time series subject to changes in regimes. Journal of Econometrics 45, (1990): 39-70

Hausmann, R., Fernandez-Arias, E., The new wave of capital inflows: Sea change or just another title? Inter-American Development Bank Working Paper No. 417, 2000.

Jaspersen, F., Aylward, A.H., Knox, A.D., The Effect of Risks on Private Investment: Africa compare with other Developing Countries. In Collier, P., Pattillo, C., (Eds.), Investment and risk in Africa. St Martin's Press, New York, (2000): 71-95

Jeanne, O., Masson, P., Currency crises, sunspots and Markov-Switching Regimes. Journal of International Economics 50, (2000): 327-350

Joen, B. N., Rhee, S. S., The determinants of Korea's foreign direct investment from the United States, 1980-2001: an empirical investigation of firm level data. Contemporary Economic Policy 26, (2008): 118-131

Khair-UZ-Zaman, H. S., Awan, Z, Economic determinant of foreign direct investment in Pakistan, Gomal University Journal of Research 22, (2006): 49-57

Khan, R, E. A., Nowaz, R. E. A., Economic determinants of foreign direct investment in Pakistan. Journal of Economics 1, (2010): 99-104

Kim, H., Political stability and foreign direct investment. International Journal of Economics and Finance 2(3), (2010): 59-71

Kim, C. J., Nelson, C. R., State-space Models with Regime Switching. MIT Press, Cambridge, Massachusetts London, England, 2000

Kiymaz, H., The impact of country risk rating on US firms in large cross-border acquisitions. Global Financial Journal 20, (2009): 235-247

Krolzig, H. M., Predicting Markov-switching vector autoregressive process. Nuffield College Economic Working Papers W31, 2000.

Krolzig, H. M., Markov-switching procedures for dating the Euro Zone business cycle. Vierteljarshefte zur Wirtschaftsforschung 70 (3), (2001): 339-351

Kuan, C. M., Lecture on the Markov Switching. Institute of Economics Academia Sinica. 2002. http: idv. sinica.edu.tw/ckuan/pdf/lecmarkn.pdf, last accessed on January 5, 2015.

Kuan, C. M., Lecture on Markov Switching. Department of Finance & CRETA, National Taiwan University. 2010. http://homepage.ntu.edu.tw/-ckuan/pdfLec-Markov_slide_Spring2010.pdf, last accessed on January 5, 2015.

Kwiatkowski, D., Phillips, P. C., Schmidt, P., Shin, Y. Testing the null hypothesis of stationary against the alternative of a unit root. Journal of Econometrics 54, (1992): 159-178

Lam, P., A Markov switching model of GNP growth with duration dependence. International Economic Review 45(11), (2004): 175-204

Lawrence, C., Tits, A., A computational efficient feasible sequential quadratic programming algorithm. SIAM Journal on Optimisation 11, (2001): 175-204

Lee, S. H., Levendis, J., Guitierrez, L., Telecommunication and economic growth: empirical analysis of sub-Saharan Africa. Applied Economics 44, (2012): 461-469

Li, X., Liu, X., Foreign direct investment and economic growth: an increasingly endogenous relationship. World Development 33, (2005): 393-407

Liu, P., Mumtaz, H., Evolving macroeconomic dynamics in a small open economy: an estimated markov-switching DSGE model for the United Kingdom. Bank of England, Working Paper No. 397, 2010

Liu, X. M., Shu, C., Sinclair, P., Trade, foreign direct investment and economic growth in Asian economies. Applied Economics 41, (2009): 1603-1612

McCulloch, R., Japanese investment in the United States. In: Audretsch, David B., Michael, P. Claudon (Eds.), The Internalisation of U.S. Markets. New York University Press, (1989): 171-179

Mohamed, S. F., Sidiropoulos, M. G., Another look at the determinants of foreign direct investment in MENA countries: an empirical investigation. Journal of Economic Development 35, (2010): 75-95

Nnadozie, E., Osili, U. O., Foreign direct investment in Africa and its determinants. UNECA Workshop of Financial Systems and Mobilisation in Africa, Nov 2nd 2004 .

Obadan, M.I., Direct investment in Nigeria: An empirical analysis. African Studies Review 25, (1982): 67-81

Oladipo, O. S., Foreign direct investment flow: determinants and growth effects in a small open economy, Proceedings of the Northeast Business & Economics Association, Northeast Business & Economics Association 35th Annual Conference, Long Island, New York, November 6th - 8th, 2008.

Omonkhanlem, A. E., Foreign direct investment and its effect on the Nigerian economy. Business Intelligence Journal 4, (2011): 253-261

Oyatoye, E. O., Arogundade, K. K., Adebisi, S. O., Oluwakayode, E. F., Foreign direct investment, export and economic growth in Nigeria. European Journal of Economic and Social Studies 2, (2011): 67-86

Oyinlola, O. External capital and economic development in Nigeria (1970-1991). Nigerian Journal of Economic and Social Studies, 37, (1995): 205-222

Ramirez, M. D., Economic and institutional determinants of foreign direct investment in Chile: A time-series analysis, 1960-2001. Contemporary economic policy, 24: 459-471.

Raymond, J. E., Rich, R. W., 1997. Oil and the macroeconomy: a Markov-Switching approach. Journal of Money, Credit, and Banking 29(2), (2006): 193-213

Ribeiro, P. F., Pereira, P. V., Economic cycles and term structure application to Brazil. Escola De Economia De Sao Paulo Da Fundacao Getulio Vargas FGV-EESP, 2010. http://econspapers.repec.org/PePEc:fgv:eesptd:259, last accessed on April 23, 2014.

Simon, J., A markov-switching model of inflation in Australia. Economic Group Reserve Bank of Australia, Research Discussion Paper 9611, 1996.

Smith, P. A., Summers, P. M., How well do Markov switching models describe actual business cycles? The case of synchronization. Journal of Applied Econometrics 20(2), (2005): 253-274

Thaddeus, E. O., Yadirichukwu, E., Determinants of foreign direct investment inflow: a focus on Nigeria. European Journal of Business and Management 5, (2013): 41-52

Wafure, O. G., Nurudeen, A. Determinants of foreign direct investment in Nigeria: an empirical analysis. Global Journal of Human Social Science 10(1), (2010): 26-34

Walsh, J. P., Yu J., Determinants of foreign direct investment: A sectoral and institutional approach, IMF Working Paper WP/10/187, 2010.

Vasconcellos, G. M., Kish, R. J., Cross-border mergers and acquisitions: the European-US experience. Journal of Multinational Financial Management 8(4), (1998): 431-450

Yang, J. Y. Y., Groeneworld, N., Tcha, M., The determinants of foreign direct investments in Australia. Economic Records 76, (2000): 45-54

Yao, S., On economic growth, FDI and exports in China. Applied Economics 38, (2006): 339-351

IMPACT OF OIL PRICE VOLATILITY AND MACROECONOMIC VARIABLES ON ECONOMIC GROWTH OF PAKISTAN

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ABSTRACT

This research analyses the effect of oil price volatility and macroeconomic variables (Trade balance, private sector investment and public sector investment) on economic growth of Pakistan. Linear regression describes the Public sector investment and Trade Balance has significant and oil price volatility and private sector investment has insignificant effect on gross domestic production of Pakistan. Johenson co integration test described the long run relation among the variables. Vector Autoregression, impulse response function and variance decomposition conclude that effect of variables was stable within 10 years and the major part on the variable is due to itself rather than other variables.

Keywords:
Oil Price Volatility; Macroeconomic variables; Economic Growth; Pakistan.

1. INTRODUCTION

Crude oil is an important source of energy and used in domestic as well as transport and industrial sector widely. This is the reason it is considered as the crucial and important factor of economical development of the country. Oil demand and supply and price fluctuation also affects stock market throughout the world. Middle East the largest supplier of the crude oil in the world and Asia is considered as the largest consumption of the world.

Oil price changes not only affect economic activities but they also predict the future stability and the effects of price changes on stability. Oil value changes likewise influence the monetary development both decidedly and adversely. The oil price fluctuation in process and high unpredictability not only influence the economy but also different other factors such as gross domestic product (GDP) of the country, import bills and inflation.

Crude oil prices are highly unstable and it has a great impact on economic growth and it arouses many controversies among the policy makers and researchers. Some economic researchers like Akpan (2009), Aliyu (2009) and Olomola (2006) argue that it will promote economic growth while some others like Darby (1982) and Cerralo (2005) argue that it will inhibit economic growth. It was observed in oil exporting countries that increase in oil prices will increase national income of exporting countries.

The oil exporting countries benefited greatly when the oil price increases and they earn huge profits. Governments earn profits and they use those profits for the betterment of their own country. New investment projects are being launched and all the other expenditures are financed through those findings (Hausmann & Rigobon, 2003).

So that was the case of oil price increase. When oil price decreases, public sector faces disastrous losses because it is difficult for it to reduce the spending immediately. The country will face fiscal imbalances with oil price decrease because country's economy was highly dependent on oil revenues. And due to a decrease in oil revenues, fiscal imbalance occurred. There are large price fluctuations in oil prices consists of sudden increase and sudden decrease. Thus the current pattern is full of price volatilities and it has created large uncertainties in oil market (Sauter and Awerbuch, 2003).

2. LITERATURE REVIEW

Most of the research was conducted on developed countries because the developed economies and their economic growth are mainly affected by oil price fluctuations. The observational confirmation demonstrates that oil price shocks have a huge effect on monetary development through some immediate and indirect channels.

The experimental studies have likewise demonstrated an uneven relationship between oil price shocks and financial subsidence on the planet. Research explains this as an increase in oil price results in the decline in GDP and economic activity and investment is not encouraged due to the decrease in oil price. The sudden increase in oil demand results in increase in oil prices and study shows that it leads to the economic growth of the countries involved in crude oil exports mainly OPEC (Organization of Petroleum Exporting Countries) countries.

If price will increase, it will have adverse affects on output production because overall price increase will also increase the price of input and as a result the earnings will drop. The stock market, if efficient, will experience an immediate decline in stock prices after sudden increase in oil price. Then again securities exchange, if not proficient, will achieve a slacked decrease in the share trading system with an increment in oil cost in oil market.

Numerous financial literary works have exhibited that oil costs unpredictability has negative effect on the total economies. Oil value unpredictability happens because of the unfavorable oil supply stun, i.e. an improve in oil costs moves the total oil supply expanding, results in the increment in value rise and an abatement in efficiency and business (Dornbusch, Fisher and Startz, 2001).

As the developed countries are the biggest consumers of the oil and they are focusing on the reconstruction and that is the reason of their increased demand and also the demand of oil is increasing in the world.

Hamilton (2003) clarified the impact of oil price shocks on financial advancement furthermore clarified the nonlinear oil price shock techniques. He likewise indicates contradiction for the general approach that both deviated and moral presentation of oil price shocks has an effect on money related improvement. They used various macroeconomics variables from 1983 to 2008 and explained the oil price instability.

There is also observed a decline in reserve of oil base which is the reason of oil price volatility. Other factors include Middle East crisis, political unrest in many oil producing and exporting countries, demand supply forces and the quota system of OPEC affect the oil prices greatly and influence the investors to make decisions (Pirog, 2004).

Just like the other raw materials, increase in oil price forced many countries to search for oil and produce their oil and this also caused the downfall of demand worldwide. As many economists promoted energy efficiency and energy conservation to decrease the demand so finally decrease in oil will help a great deal in reducing the oil price.

Due to drop in oil price, demand will once again tend to increase and once again there is a chance of oil price increase in future. The distinctive purpose of perspectives about the oil showcase perceptibly is an indication of unique prospect about the future movement of oil costs (Stevens, 2005).

Oil is considered a major input for many industries. Many studies conducted on oil market are focused on macroeconomics variables and the effect of these variables on oil prices and stock prices. Many researchers like Rebeca and Sanchez (2004, 2009) Nung et al. (2005), Sandrine and Mignon (2008), Jacobs et al. (2009) and Yazid Dissou (2010) argue that oil price fluctuations and oil price volatility are greatly influenced by macroeconomic variables.

The demand and supply forces determine the oil prices. When there is high demand, price will increase and when there is large supply as compared to demand, the price will decrease. As the countries are becoming modernized and advanced, the demand for oil is increasing and there is large consumption of oil to run domestic as well as industrial sector (Eryigit, 2009).

Kiani (2011) argued there is a continuous increase in the oil prices in Pakistan by OGRA and the reason for this increase is the high demand of energy at all sectors of the economy.

Jamali et al (2011) explained the Pakistan economy and the effects of oil price on economy. They concluded that due to increased oil prices all other variables like inflation rate, interest rate, exchange rate movements, unemployment, low investment, low economic activities, low GDP and low economic growth are adversely affected.

Zamanet et al (2011) described the usage of oil in different sectors of the economy and argued that industrial sector is the largest consumer of oil followed by transport sector and then household sector. All these demand patterns by different sectors ultimately affect the economic growth.

Eksi et al. (2012) again documented that oil is a major input of industrial sector and it is the main and major constitute of economic growth and economic crisis. When there will be increase in oil prices, it will lead to inflation because material and production cost will increase. Thus it will lead to unemployment ultimately.

Salim and Rafiq (2013) used the vector autoregressive (VAR) and Granger causality test and generalized variance decompositions for empirical studies. This study discovers the effect of oil price instability on six noteworthy rising economies of Asia including Indonesia, China, Thailand, India, Philippines and Malaysia.

It is presently very much archived in both exact and hypothetical writing, that oil price shocks apply negative impacts on distinctive macroeconomic pointers through raising creation and operational expenses. This may influence the economy unfavorably on the grounds that they postpone business venture by inducing so as to raise vulnerability or excessive asset reallocation (Salim and Rafiq, 2013).

Muhammad (2013) argued that oil price shocks also has an impact on the economic development while they affect the oil exporting countries and oil importing countries in a different way. On the basis of the results the GDP and economic growth will affect.

Ahmad (2013) examined the situation of Pakistan and also finds out that it depends on the oil in every sector. So when oil price increases it increase the production

cost, which decrease the investment rate and as a result unemployment decreases.

Siddiqui (2014) explained that investment in oil affect significantly the economic development, economic growth and GDP growth. He also suggested that oil price increase will affect all these variables and also the stock and exchange market.

Katircioglu et al. (2015) examined the association the changes in oil prices and macroeconomic variables (GDP, CPI and unemployment) among 26 OECD economies from 1980 to 2011. The researchers concluded by econometrics test (Durbin-H panel co-integration) that changes in oil price has a inverse effect on macroeconomic variables.

After brief review of literature review across different countries, developing and developed economies and from different region of the world, it is observed that the effect of oil price volatility and the macroeconomic variables are not previously viewed, anticipate and define its magnitude in the context of Pakistan.

As Pakistan is a developing economy and has a major role in context of Asia, it is so much important for the policy maker and government of Pakistan to know about the impact of key variables like oil price volatility and macroeconomic variables (Trade Balance, Public sector investment, Private sector investment, Gross Domestic Production) for achieving the improving growth rate.

This research define the magnitude and direction (positive and negative) of oil price volatility and macroeconomic variables (Trade Balance, Public sector investment, Private sector investment, Gross Domestic Production) on economic growth of Pakistan.

3. DATA AND METHODOLOGY

3.1. Theoretical Framework

The standard growth theories focus on primary inputs such as; capital, labour & land, while failing to recognize the role of primary energy inputs such as; oil price. However, efforts have been made at evolving some theories which capture the role of oil price volatility on economic growth, thus incorporating the linkage between energy resources; its availability and volatility and economic growth. Just as Moradi, Salehi and Keivanfar (2010), the theories reviewed are primarily reduced-form models, rather than a single theory. The study reviews the following theories: theory of economic growth, linear/symmetric relationship theory of growth, asymmetry-in-effects theory of economic growth.

Mainstream theory of economic growth postulates that production is the most important determinant of growth of any economy, and production which is the transformation of matter in some way, requires energy. This theory categorizes capital, labour and land as primary factors of production; these exist at the beginning of the production period and are not directly used up in production (though they can be

degraded or added to). While energy resources (such as; oil and gas, fuels, coal) are categorized as intermediate inputs, these are created during the production period and are entirely used up during the production process. In determining the marginal product of oil as an energy resource useful in determining economic growth, this theory considers in one part its capacity to do work, cleanliness, amenability to storage, flexibility of use, safety, cost of conversion and so on, it also considers other attributes such as; what form of capital, labour or materials it is used in conjunction with. The theory estimates the ideal price to be paid for crude oil as one that should be proportional to its marginal product.

Linear/Symmetric relationship theory of growth which has as its proponents, Hamilton (1983), Gisser (1985), Goodwin (1985), Hooker (1986) and Laser (1987) postulated that volatility in GNP growth is driven by oil price volatility. They hinged their theory on the happenings in the oil market between 1948 and 1972 and its impact on the economies of oil-exporting and importing countries respectively. Hooker (2002), after rigorous empirical studies demonstrated that between 1948 and 1972 oil price level and its changes exerted influence on GDP growth significantly. Laser (1987), who was a late entrant into the symmetric school of thought, confirms the symmetric relationship between oil price volatility and economic growth. After an empirical study of her own, she submitted that an increase in oil prices necessitates a decrease in GDP, while the effect of an oil price decrease on GDP is ambiguous, because its effects varied in different countries.

Asymmetry-in-effects theory of economic growth posits that the correlation between crude oil price decreases and economic activities in an economy is significantly different and perhaps zero. Mark *et al.* (1994), members of this school in a study of some African countries, confirmed the asymmetry in effect of oil price volatility on economic growth. Ferderer (1996) another member of this school explained the asymmetric mechanism between the influence of oil price volatility and economic growth by focusing on three possible ways: Counter-inflationary monetary policy, sectoral shocks and uncertainty. He finds a significant relationship between oil price increases and counter-inflationary policy responses. Balke (1996) supports Federer's position/submission. He posited that monetary policy alone cannot sufficiently explain real effects of oil price volatility on real GDP.

My study topic is also related to oil price volatility, exchange rate, fiscal policy effect and economic growth of Pakistan and all above theories supports my research topic.

3.2. Research Problem

This research analyses the impact of oil price volatility and macroeconomic variables (Trade balance, private sector investment and public sector investment) on economic growth of Pakistan. Moreover, oil price volatility and macroeconomic

variable have a significant role in economic growth which is not previously analysis in the context of Pakistan.

3.3. Data collection procedure

Secondary data are collected from Institute of Economic Affair (IEA), International Financial Statistics (IFS) , World Bank (WB), Ministry of Petroleum & Natural Resources of Pakistan and Pakistan Bureau of Statistics from 1973 to 2014 for estimation of coefficient. The data contain on yearly basis.

Correlation Coefficient Test

The correlation coefficient is used to measure the linear relationship between two variables. The correlation coefficient values are always lying between negative one (-1) to positive one (+1). A value of +1 of correlation coefficient defined that two variables are perfectly associated in a positive linear sense and -1 define that two variables are perfectly associated in a negative linear sense. Meanwhile, it the value of correlation coefficient is 0 that indicates there is no linear relationship between the two variables.

Table 1.: Correlation Coefficient Test Results

	Gross Domestic Production	Oil Price Volatility	Private Sector Investment	Public Sector Investment	Trade Balance
Gross Domestic Production	1				
Oil Price Volatility	-0.1774	1			
Private Sector Investment	0.9183	-0.2010	1		
Public Sector Investment	0.8067	-0.2194	0.9206	1	
Trade Balance	0.6299	-0.1901	0.5445	0.3882	1

Source: Autors`

Table 1 describes the correlation coefficient among the five variables Oil Price Volatility, Trade Balance, Private Sector Investment, Public Sector Investment and Gross Domestic Production (GDP) of Pakistan.

It is described in the above table that Gross Domestic Production has strong positive relation with Private Sector Investment (correlation coefficient value of 0.9183), Public Sector Investment (correlation coefficient value of 0.8067) and Trade Balance (correlation coefficient value of 0.6299). It is viewed that Gross Domestic Production has a negative weak relation exist with Oil Price Volatility (correlation coefficient value of -0.1774). It is defined in the above table that Oil Price Volatility has moderate negative relation with Private Sector Investment (correlation

coefficient value of -0.2010) and Public Sector Investment (correlation coefficient value of -0.2194). Meanwhile, it is viewed that Oil Price Volatility has a weak negative relationship exist with Trade Balance (correlation coefficient value of -0.1901).

It is observed in the above table that Private Sector Investment has strong positive relation with Public Sector Investment (correlation coefficient value of 0.9206). Meanwhile, it is viewed that Private Sector Investment has moderate positive relationship with Trade Balance (correlation coefficient value of 0.5445). It is described in the above table that Public Sector Investment has moderate positive relationship with Trade Balance (correlation coefficient value of 0.3882).

3.4. Linear Regression

Linear regression model with OLS techniques is used for analysis.

Gross Domestic Production = $\beta_0 + \beta_1 OPV + \beta_2 PRS + \beta_3 PS + \beta_4 TB + \varepsilon$

The linear Regression analysis is run on the dependent variable Gross Domestic Production and the independent variables Trade Balance, Public sector investment, Private sector investment and the Oil price volatility (defined through standard deviation) to find out the impact of oil price volatility and other macro economic variables on the economic growth of Pakistan. The results are described by the following equation

GDP = 9.999 + 0.017 OPV – 0.123 PRS + 0.944 PS -0.167 TB

Table 2.: Linear Regression Model Result

Predictor	Coefficient	Standard Deviation	T	P
Constant	9.999	0.968	10.325	0.000
OPV	0.017	0.250	0.283	0.779
PRS	-0.123	0.136	-0.751	0.458
PS	0.944	0.079	5.296	0.000
TB	-0.167	0.064	-2.199	0.034

R-Sq = 93.3% R-Sq(adj) = 87.0%

Source: Autors`

The equation illustrates the constant value of 9.999 units which mean without any change in other independent variables, the constant independently change the GDP by 9.999 units. After that the oil price volatility have the coefficient value of 0.017 which is positively impacted and also depict that one positive change in oil price volatility have positively change GDP of Pakistan by 0.017 unit. The regression equation also denominate that private sector investment (which is represented through PRS) has also a negative impact on GDP of Pakistan and one unit change in private sector investment would change GDP of Pakistan by 0.123 units. Conse-

quently, the analysis about public sector investment, it has positive impact on GDP of Pakistan and one unit change in public sector investment may change the GDP of Pakistan by 0.944 units. In contrast with other independent variable Trade balance have a negative impact on GDP of Pakistan and if one unit change in Trade Balance would change GDP of Pakistan by negatively 0.167 units. The regression table describes that oil price volatility value and private sector investment value is not even significant at 10 % level of significance but at the same time public sector investment value is significance at 1 % level of significant. The table illustrates that trade balance value is significant at 5 % level of significance.

The R square value in the Linear Regression equation described that the independent variables Trade Balance, private sector investment, public sector investment and oil price volatility describe the dependent variable Gross Domestic Production of Pakistan by almost 87 %. The remaining portion of GDP of Pakistan is impact through other macro-economic variables which is only 13 %.

3.5. Johenson co integration test

The Johenson co integration test is used to find out the short run and long run relation among the variables. The following results described by using the Johenson co integration test on oil price volatility, trade balance, private sector investment, public sector investment and gross domestic production:-

Table 3.: Johenson co integration test Result

Hypothesized No of CE(s)	Eigen value	Trace Statistic	0.05 Critical value	Probability
None*	0.652978	128.5686	69.81889	0.0000
At most 1*	0.594215	87.29219	47.85613	0.0000
At most 2*	0.471945	52.11686	29.79707	0.0000
At most 3*	0.391162	27.21321	15.49471	0.0006
At most 4*	0.182554	7.861257	3.841466	0.0051

Source: Autors`

Johenson co integration test define that there is 5 co integration equations at level 0.05. So it is concluded that oil price volatility, trade balance, private sector investment, public sector investment and gross domestic production have a long run relationship.

4. VAR MODEL

We estimated our results through stationary data although according to (Phillip Fanchon and Jeanne Wendel, 2006) VAR models can be predictable with raw data in the levels if the non-stationary data is also co-integrated because current theoretical work demonstrate that estimation with such data will yield consistent parameter estimates but at the same time all economist and econometrics professional is agreed that for VAR model we used stationary data for effective and accurate parameters.

Table4.: VAR Result Table

	OPV	GDP	PRS	PS	TB
OPV(-1)	-0.113916	-0.080780	-0.192589	0.270975	-0.539859
	(0.18738)	(0.13167)	(0.08245)	(0.12414)	(0.61692)
	[-0.60793]	[-0.61349]	[-2.33571]	[2.18280]	[-0.87508]
OPV(-2)	0.190564	-0.136090	0.272156	0.107838	-0.426049
	(0.17875)	(0.12561)	(0.07866)	(0.18442)	(0.58851)
	[1.06608]	[-1.08344]	[3.46005]	[0.91062]	[-0.71477]
GDP(-1)	-0.074239	0.222397	-0.055420	0.108009	0.186063
	(0.25602)	(0.17990)	(0.11266)	(0.16961)	(0.84289)
	[-0.28998]	[1.23621]	[-0.49195]	[0.63681]	[0.22075]
GDP (-2)	0.059763	-0.197262	-0.036637	0.480729	-0.144857
	(0.25369)	(0.17827)	(0.11163)	(0.16807)	(0.83524)
	[0.23557]	[-1.05768]	[-0.32819]	[2.86025]	[-0.17343]
PRS(-1)	-0.216679	-0.236448	0.078424	0.087925	0.789868
	(0.34018)	(0.23904)	(0.14969)	(0.22537)	(1.11999)
	[-0.63695]	[-0.98914]	[0.52391]	[-0.39013]	[0.70525]
PRS(-2)	-0.127917	-0.221449	-0.137281	-0.083655	0.307370
	(0.31772)	(0.22336)	(0.13981)	(0.21049)	(1.04604)
	[-0.40261]	[-0.99187]	[-0.98192]	[-0.39743]	[0.29384]
PS(-1)	-0.316807	0.096940	0.141545	-0.087893	0.472799
	(0.25041)	(0.17596)	(0.11019)	(0.16590)	(0.82444)
	[-1.26513]	[0.55091]	[1.28456]	[-0.52980]	[0.57348]
PS(-2)	-0.023139	-0.229831	-0.246838	0.341179	-1.194313
	(0.21266)	(0.14943)	(0.09358)	(0.14088)	(0.70013)
	[-0.10881]	[-1.53803]	[-2.63786]	[2.42169]	[-1.70585]
TB(-1)	-0.020457	-0.004693	-0.001275	0.081844	-0.240151
	(0.06175)	(0.04339)	(0.02717)	(0.04091)	(0.20330)
	[-0.33130]	[-0.10816]	[-0.04694]	[2.00066]	[-1.18129]
TB(-2)	0.073846	-0.004928	-0.047826	0.049897	-0.111292
	(0.06160)	(0.04329)	(0.02711)	(0.04081)	(0.20281)
	[1.19878]	[-0.11385]	[-1.76435]	[1.22263]	[-0.54875]
C	0.203750	0.206123	0.179732	-0.026435	0.136343
	(0.11244)	(0.07901)	(0.04948)	(0.07449)	(0.37020)
	[1.81203]	[2.60872]	[3.63254]	[-0.35486]	[0.36830]

Source: Autors`

The analysis described that Oil price volatility Auto Regress by itself, gross domestic production, private sector investment, public sector investment, trade balance, its coefficient value is -0.113916, --0.080780, -0.192589, 0.270975 and -0.539859 respectively and its t value is -0.60793, -0.61349, -2.33571, 2.18280 and -0.87508 accordingly at lag (1). Meanwhile, its coefficient value is 0.190564, -0.136090, 0.272156, 0.107838 and -0.426049 respectively and its t-value is 1.06608, -1.08344, 3.46005, 0.91062 and -0.71477 accordingly at lag (2)

Consequently, GDP of Pakistan Auto Regress by oil price volatility, itself, private sector investment, public sector investment and trade balance, its coefficient value is -0.074239, 0.222397, -0.055420, 0.108009 and 0.186063 respectively and its t value is -0.28998, 1.23621, -0.49195, 0.63681 and 0.22075 accordingly at lag (1). Meanwhile, its coefficient value is 0.059763, -0.197262, -0.036637, 0.480729 and -0.144857 respectively and its t value is 0.23557, -1.05768, -0.32819, 2.86025 and -0.17343 accordingly at lag (2).

Meanwhile, private sector investment Auto Regress by oil price volatility, GDP of Pakistan, itself, public sector investment and trade balance, its coefficient value is -0.216679, -0.236448, 0.078424, 0.087925 and 0.789868 respectively and its t-value is -0.63695, -0.98914, 0.52391, -0.39013 and 0.70525 accordingly at lag (1). Meanwhile, its coefficient value is -0.127917, -0.221449, -0.137281, -0.083655 and 0.307370 respectively and its t value is -0.40261, -0.99187, -0.98192, -0.39743 and 0.29384 accordingly at lag (2).

In the same time, public sector investment Auto Regress by oil price volatility, GDP of Pakistan, private sector investment, itself and trade balance, its coefficient value is -0.316807, 0.096940, 0.141545, -0.087893 and 0.472799 respectively and its t value is -1.26513, 0.55091, 1.28456, -0.52980 and 0.57348 accordingly at lag (1). Meanwhile, its coefficient value is -0.023139, -0.229831, -0.246838, 0.341179 and -1.194313 respectively and its t value is -0.10881, -1.53803, -2.63786, 2.42169 and -1.70585 accordingly at lag (2).

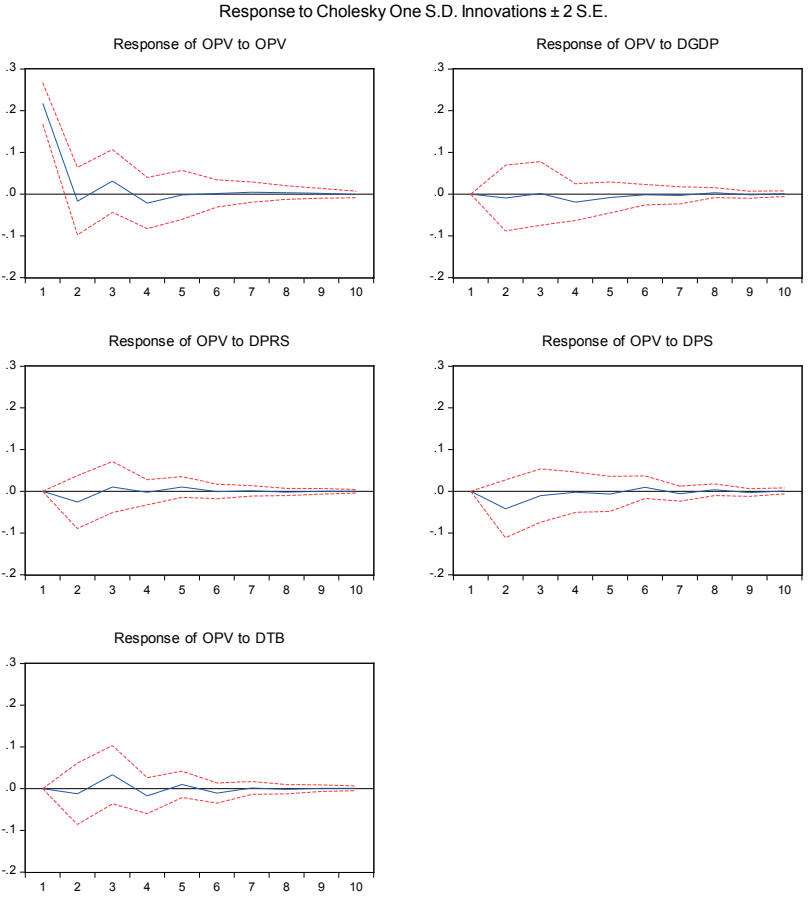
Meantime, trade balance Auto Regress by oil price volatility, GDP of Pakistan, private sector investment, public sector investment and itself, its coefficient value is -0.020457, -0.004693, -0.001275, 0.081844 and -0.240151 respectively and its t value is -0.33130, -0.10816, -0.04694, 2.00066 and -1.18129 accordingly at lag (1). Meanwhile, its coefficient value is 0.073846, -0.004928, -0.047826, 0.049897 and -0.111292 respectively and its t value is 1.19878, -0.11385, -1.76435, 1.22263 and -0.54875 accordingly at lag (2).

In the VAR Model the constant coefficient values of oil price volatility, GDP of Pakistan, private sector investment, public sector investment, trade balance are 0.203750, 0.206123, 0.179732, -0.026435 and 0.136343 respectively and its t value is 1.81203, 2.60872, 3.63254, -0.35486 and 0.36830 accordingly at lag (1).

5. IMPULSE RESPONSE FUNCTION

Impulse Response function is used to analyze the shocks and innovation. Impulse response function (IRF) refers to the effect of any external change.

Figure 1.: Impulse response function of OPV



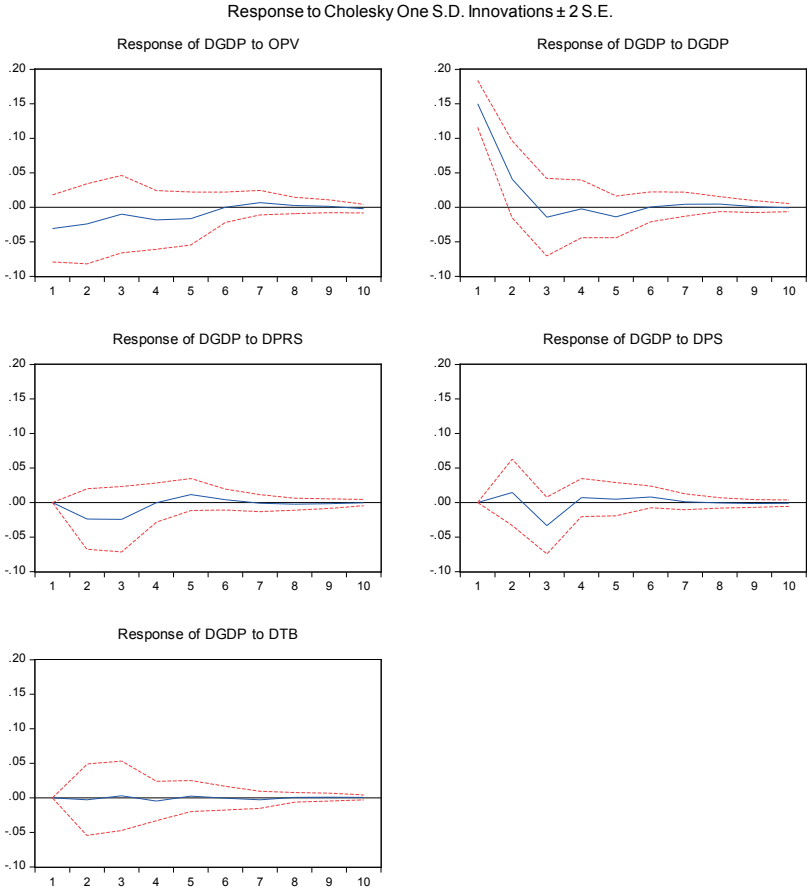
Source: Autors`

After VAR Model, Impulse Response function is used to analyze the shocks and innovation. It is observed through Impulse Response Function that oil price volatility shock start its effect on oil price volatility and sharply decreases and goes in negative side. After that it was slightly increase and decrease and found in negative and positive side of the zero level. Oil price volatility shock was stable after 7 year and its stabilizing trend continued till the further instability policy effect again. Mean while,

oil price volatility shock effect the GDP and it dramatically start from the negative side of the zero line go downward and then upward but remain in the negative side and finished after 5 year and that stabilize condition continued at last. Oil price volatility shock also affecting the private sector investment and it's also start from negative side from the zero line but move upward in positive side till 5 year. The shock was stabilizing after 5 year and this stabilizing effect continued.

Furthermore, oil price volatility shock also effects the public sector investment and its start below from zero line. Afterward the shock slowly increasing and go on positive side after 5 year. The oil price volatility shock stabilizes after 8 year and stabilizing effect go on till end. Consequently, oil price volatility shock also effect trade balance and as before it's also start from negative side but afterward dramatic increasing and decreasing trend start. The shock was stabilized after 7 year and after that no further destabilization is found in it.

Figure 2.: Impulse response function of GDP



Source: Autors`

The second impulse response function related to gross domestic production of Pakistan. It is observed through impulse response function gross domestic production shock effect the oil price volatility and its start from negative side of the zero line and slowly increasing till 6 year and afterward go on the positive side. The shock was stabilized after 8 year and no further instability was found.

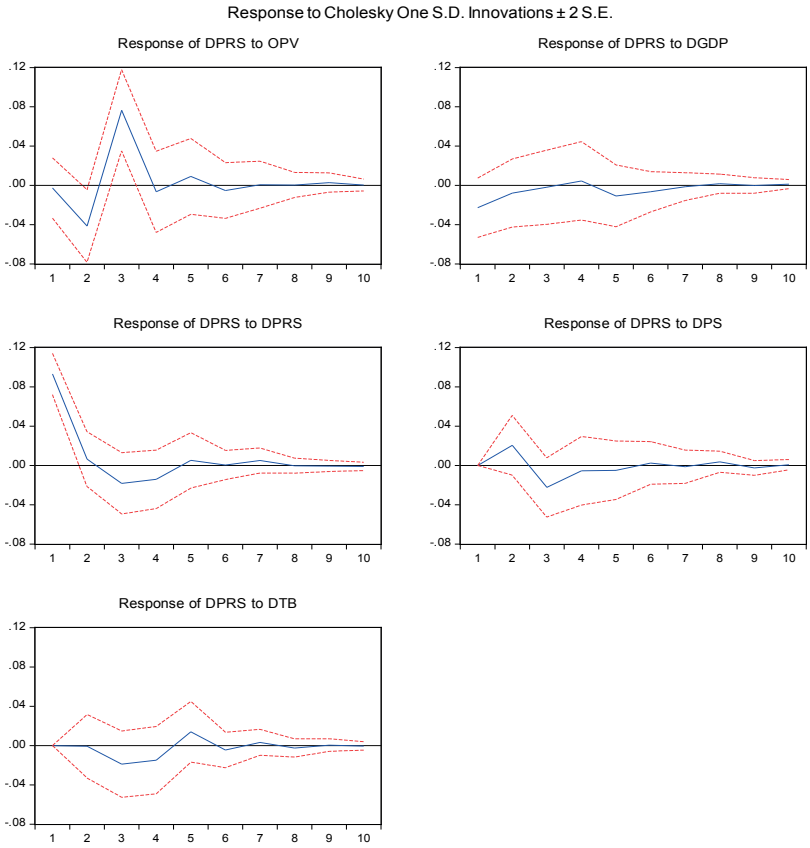
Moreover, gross domestic production shock also effect gross domestic production. Its start from positive side and steeply decreased and go in negative side with respect to zero line and that instability was found till 9 year. Afterward stable response was found in gross domestic production.

In addition, gross domestic production shock effect private sector investment and its start from the negative side and after 3 year the shock response goes in positive side with respect to zero line. The shock stabilized after 9 year and further goes on.

Accordingly, gross domestic production shock also effect public sector investment. The shock start from positive side with the reference of zero line but later on it's steeply goes to the negative side. Then the shock slowly moves upward and goes in positive size and stabilized after 7 year and further no instable effect was found.

At last, gross domestic production shock also effect the trade balance but the shock effect is so much minor but the instability goes its effect on negative and positive side continuously. The shock stabilized after 8 year.

Figure 3.: Impulse response function of PRS



Source: Autors`

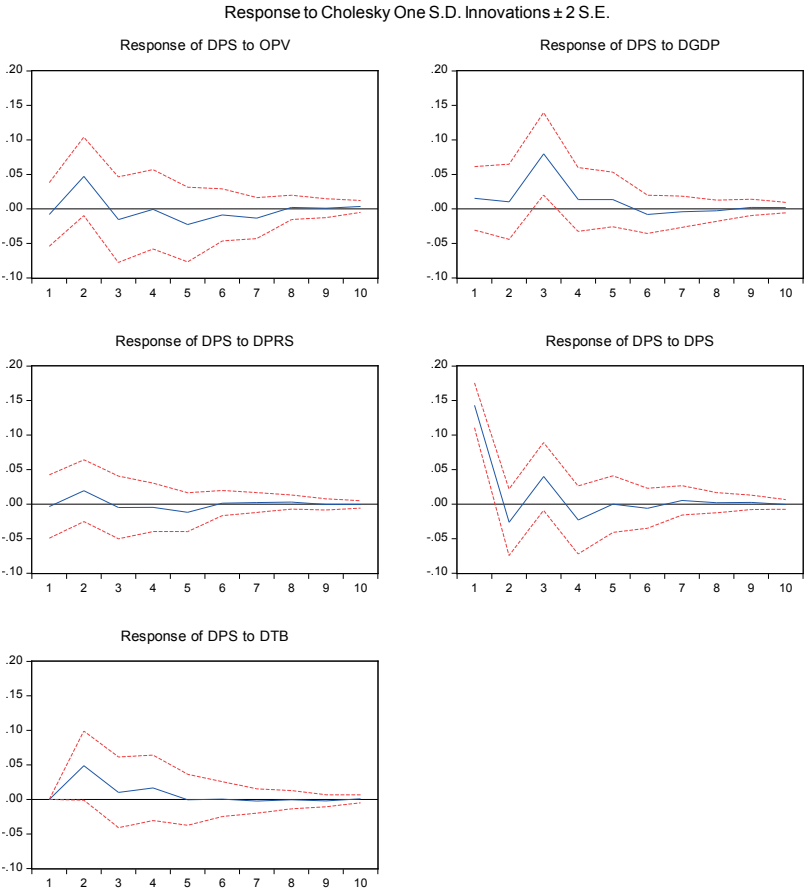
The third impulse response function is related to private sector investment on different macroeconomic variables. It is viewed that private sector investment shock effect the oil price volatility dramatically. Its start from negative side with respect to zero line but afterward it goes on positive side sharply. Then the shock effect goes down in negative side afterward low instability was found till 9 year and stability was found.

Furthermore, private sector investment shocks effect on gross domestic production and its start from the negative side and increasing slowly toward the positive side. After a low volume in positive side with respect to zero line, the shock again goes in negative side and stabilized after 8 year and further no instability was found.

Moreover, private sector investment shock also effect private sector investment. Its start from positive side and steeply decreased and go in negative side with respect to zero line and that instability was found till 8 year. Afterward stable response was found in private sector investment.

In addition, private sector investment shock also effect public sector investment and its start from positive side and goes upward. Afterward the shock decreases and goes in negative side with respect to zero line. Then slow positive trend was found and the shock was stabilized after 9 year till end. Consequently, private sector investment shock also effect trade balance. The shock start from the negative side and increasing trend in negative side was found. Afterward the decreasing trend was found in the shock and goes in positive side with reference to zero line. The instability was found till 8 year and further no volatility was found.

Figure 4.: Impulse response function of PS



Source: Autors`

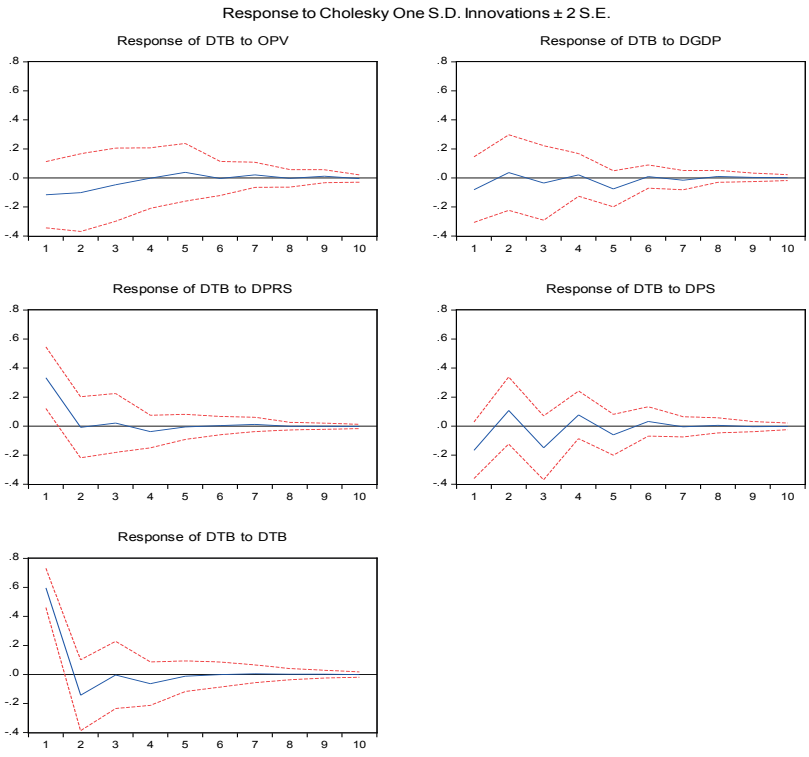
The forth impulse response function is associated to public sector investment. It is observed via impulse response function that public sector investment shock effect the oil price volatility. Its start from the negative side but instantly goes on positive side with respect to zero line. Afterward dramatically change was found till 8 year

and the public sector investment stabilized and no further instability was observed. Consequently, Public sector investment shock effect the gross domestic production of Pakistan. At start the shock was found in positive side but after that a sharp increase and decrease was observed. The shock was stabilized after 8 year and further stable response was found.

Meanwhile, Public sector investment shock also effect the private sector investment and it is viewed that the shock was start from the negative side with respect to zero line and increasing and decreasing trend was found. The shock was stabled after 6 year and goes on.

Furthermore, public sector investment shock also effect public sector investment. Its start from positive side and steeply decreased and go in negative side with respect to zero line and that instability was found till 7 year. Afterward stable response was found in public sector investment. Additionally, public sector investment shock effect trade balance and it is viewed that the shock was start from the positive side with reference to zero line and increased. Afterward the shock was decreasing and found stable after 5 year and further no instability was observed.

Figure 5.: Impulse response function of TB



Source: Autors`

The fifth and the last impulse response function is related to trade balance. It is observed with respect to impulse response function that the trade balance shock effect the oil price volatility. The shock initiate from the negative side with reference to zero line and increasing slowly. Afterward the shock was found in positive side and stabled after 9 year. No further instability was found with respect to the effect of trade balance shock.

Meanwhile, trade balance shock also effect gross domestic production of Pakistan. The shock start from the negative side and continuous increasing and decreasing trend was found. The shock was stabled after 8 year and further goes on.

Consequently, trade balance shock effects the private sector investment. Its start from the positive side with respect to zero line but steeply decreasing. Afterward, the shock was observed in positive and negative side in different time spam and stabilized after 7 year. The stabilized effect was observed till end.

Furthermore, trade balance shock also effects the public sector investment. The shock initiate from the negative side but sharp movement which make the shock trend in positive side and negative side in different time spam was observed. The stability effect of the shock was observed after 7 year and remains stabled afterward.

At last, trade balance shock also effect trade balance and it is viewed that shock start from positive side with respect to zero line. Afterward, the shock decreased steeply and goes on the negative side and remains there till end. The increasing and decreasing trend was observed there but the shock never cross the zero line and lye in the positive side. The shock was stabilized after 5 year and that effect remain constant till end.

6. VARIANCE DECOMPOSITION

Variance decomposition is used to help out in the explanation of a vector autoregression (VAR) model after its implementation. The variance decomposition defined the value attribute to each variable to the other variables in autoregression.

The under mentioned table 8 described the variance decomposition of oil price volatility (OPV) by statistical analysis. It is viewed in the table that at first year all variation on OPV is due to itself 100 % and other macroeconomic variables trade balance (TB), private sector investment (PRS), public sector investment (PS), and gross domestic production (GDP) have no contribution on OPV variation. Consequently, it is observed that increasing variation contribution by public sector investment is viewed on OPV by 4.02% and OPV itself variation is decreased by 94.7% and TB, PRS and GDP jointly contributed 1.2% of variation. After 6 year the variation is viewed as constant and stabilized trend up to 10 year and the variation on OPV due to itself, TB, PRS, PS and GDP is 90.33%, 3.54%, 1.13%, 4.06% and 0.94% respectively.

Table 5.: Variance Decomposition of GDP

Variance Decomposition of OPV						
Period	**S.E.**	**OPV**	**TB**	**PRS**	**PS**	**GDP**
1	0.217792	100.00	0.000000	0.000000	0.000000	0.000000
2	0.224481	94.70573	0.263740	0.778046	4.022915	0.229571
3	0.229563	92.44012	2.585186	0.881500	3.847384	0.245814
4	0.232018	91.35141	2.840396	1.032605	3.909416	0.866174
5	0.232696	90.82761	3.275761	1.069609	3.916949	0.910071
6	0.233150	90.47748	3.500935	1.132319	3.972974	0.916290
7	0.233295	90.40677	3.507708	1.320319	4.020954	0.923644
8	0.233387	90.35715	3.536413	1.131926	4.039932	0.934582
9	0.233425	90.33411	3.540039	1.132371	4.055994	0.937483
10	0.233431	90.33089	3.539863	1.132701	4.057948	0.938601

Source: Autors`

The following Table 6. explained the variance decomposition of trade balance (TB). It is observed in the table that at first year maximum variation on trade balance is due to itself 97.39 % but meanwhile trade balance also has a little variation due to oil price volatility (OPV) by 2.61% and other macroeconomic variables private sector investment (PRS), public sector investment (PS), and gross domestic production (GDP) have no contribution on trade balances (TB) variation. There is no dramatic contribution in variation upon trade balance is viewed due to other macroeconomic variables. After 10 year the variation is viewed on trade balances (TB) due to OPV, itself, PRS, PS and GDP is 4.59%, 87.85%, 0.77%, 5.81% and 0.97% correspondingly.

Table 6.: Variance Decomposition of TB

Variance Decomposition of TB						
Period	**S.E.**	**OPV**	**TB**	**PRS**	**PS**	**GDP**
1	0.717039	2.609978	97.39002	0.000000	0.000000	0.000000
2	0.746938	4.247174	93.99863	0.787689	0.836267	0.130245
3	0.764266	4.433250	90.15105	0.762580	4.492214	0.160910
4	0.772044	4.344853	89.76848	0.749265	4.974979	0.162427
5	0.779142	4.512049	88.15567	0.747728	5.659253	0.925301
6	0.779863	4.506595	88.00240	0.750868	5.809707	0.930428
7	0.780414	4.570671	87.90225	0.768242	5.805514	0.953326
8	0.780509	4.571366	87.88123	0.769521	5.810820	0.967065
9	0.780613	4.592273	87.85803	0.770416	5.810491	0.968789
10	0.780639	4.595855	87.85276	0.771710	5.810787	0.968886

Source: Autors`

The subsequent Table 5. clarified the variance decomposition of private sector investment (PRS). It is viewed, first year main variation on PRS is due to itself 76.48% but meanwhile PRS also have a moderate variation due to trade balance (TB) by 23.44%. Furthermore, PRS has a minute vibration due to oil price volatility (OPV) by 0.08% and other macroeconomic variables public sector investment (PS), and gross domestic production (GDP) have no contribution on PRS variation. There is an impressive contribution in variation upon PRS is viewed due to OPV, TB and PS in second year by 15.09%, 18.87% and 3.09% respectively. The variation is viewed on PRS after 10 year due to OPV, TB, itself, PS and GDP is 39.42%, 16.29%, 37.14%, 6.09% and 1.05% in the same way.

Table 7.: Variance Decomposition of PRS

Variance Decomposition of PRS						
Period	**S.E.**	**OPV**	**TB**	**PRS**	**PS**	**GDP**
1	0.095835	0.078304	23.44557	76.47613	0.000000	0.000000
2	0.106882	15.09474	18.87076	62.37352	3.096647	0.564335
3	0.135894	40.98689	13.65487	39.04133	5.902567	0.414347
4	0.137785	40.09384	15.08047	38.21735	6.185459	0.422880
5	0.139398	39.59578	16.15763	37.34027	6.062886	0.843436
6	0.139749	39.54084	16.13904	37.24063	6.033680	1.045815
7	0.139889	39.46420	16.26272	37.20660	6.022715	1.043778
8	0.139970	39.41882	16.30079	37.16894	6.061134	1.050316
9	0.140025	39.42791	16.29058	37.14534	6.086645	1.049530
10	0.140037	39.42148	16.29545	37.14224	6.087288	1.053537

Source: Autors`

The under state Table 7. explained the variance decomposition of public sector investment (PS). It is observed that at first year major variation on PS is due to itself 92.35% but meanwhile PS also has a considerable variation due to trade balance (TB) by 6.59%. Oil price volatility (OPV) and private sector investment (PRS) have a minor contribution in variation by 0.30% and 0.75% respectively and gross domestic production (GDP) have no contribution on PS variation. There is an impressive contribution in variation upon PS is viewed due to trade balance (TB) in second year by 16.63%. The variation observed later than 10 year on PS due to OPV, TB, PRS, itself and GDP is 8.91%, 13.15%, 3.27%, 59.20% and 15.46% respectively which mean variation in public investment (PS) is mainly contributed by trade balance and gross domestic production.

Table 8.: Variance Decomposition of PS

Variance Decomposition of PS						
Period	**S.E.**	**OPV**	**TB**	**PRS**	**PS**	**GDP**
1	0.144287	0.307945	6.587663	0.752030	92.35236	0.000000
2	0.163070	8.604530	16.63330	1.116644	72.72469	0.920836
3	0.186907	7.243687	13.08868	2.032893	62.19740	15.43734
4	0.189590	7.041135	13.40942	2.837995	61.18433	15.52713
5	0.191787	8.282709	13.26040	3.201569	59.79256	15.46276
6	0.192257	8.453396	13.22707	3.195503	59.61067	15.51337
7	0.192871	8.880721	13.15060	3.232471	59.27941	15.45680
8	0.192939	8.887588	13.14305	3.266760	59.24462	15.45798
9	0.192979	8..886068	13.15767	3.265914	59.23107	15.45928
10	0.193021	8.913884	13.15233	3.269166	59.20511	15.45951

Source: Autors`

The next Table 8. gives details about the variance decomposition of gross domestic production (GDP). It is viewed that at first year most important variation on GDP is due to itself 89.62% but meanwhile private sector investment (PRS) also have a minor variation by 4.18%. Oil price volatility (OPV) and trade balance (TB), public sector investment (PS) have also contributed in GDP variation by 4.02%, 1.25%% and 0.93% respectively. After 10 year the variation on GDP due to OPV, TB, PRS, PS and itself is 7.67%, 2.94%, 8.01%, 5.74% and 75.64% accordingly.

Table 9.: Variance Decomposition of GDP

Variance Decomposition of GDP						
Period	**S.E.**	**OPV**	**TB**	**PRS**	**PS**	**GDP**
1	0.153042	4.023553	1.249362	4.179429	0.930888	89.61677
2	0.162605	a5.746131	2.885640	6.173488	1.882644	83.31210
3	0.168680	5.681864	2.682725	7.655217	5.608871	78.37132
4	0.169903	6.765538	2.746981	7.585831	5.628327	77.27332
5	0.171736	7.529868	2.910607	7.927013	5.567321	76.06519
6	0.171980	7.508517	2.903029	7.981543	5.755228	75.85168
7	0.172199	7.642630	2.940686	7.961434	5.742077	75.71317
8	0.172299	7.656586	2.940312	7.991941	5.735415	75.67575
9	0.172324	7.660485	2.939737	8.006580	5.737843	75.65536
10	0.172340	7.672687	2.940867	8.005676	5.738659	75.64211

Source: Autors`

7. CONCLUSION

The results and outcomes based on the time series data of oil price volatility, trade balance, private sector investment, public sector investment and gross domestic production of Pakistan from 1973 to 2014.

Correlation coefficient test is used to measure the linear relationship between the variables. Gross Domestic Production has strong positive relation with Private Sector Investment, Public Sector Investment and Trade Balance and negative weak relation exist with Oil Price Volatility. Oil Price Volatility has moderate negative relation with Private Sector Investment and Public Sector Investment, weak negative relationship exist with Trade Balance.

Private Sector Investment has strong positive relation with Public Sector Investment and moderate positive relationship with Trade Balance. Public Sector Investment has moderate positive relationship with Trade Balance.

The linear regression model is used to find out the effect of oil price volatility and the other macro economic variables on the GDP. Public sector investment and Trade Balance has significant effect on Gross domestic production at 1% and 5% level of significance accordingly. Meanwhile, the oil price volatility and private sector investment have insignificant effect on the Gross domestic production. The Linear Regression Model describe that these independent variable define 87% about the dependent variable. The remaining portion of GDP of Pakistan is impact through other macro-economic variables which is only 13 %.

Afterward, Johenson co integration test is used to find out the short run and long run relation among the variables (oil price volatility, trade balance, private sector investment, public sector investment and gross domestic production). It is observed that 5 co integration equations are found at 5% level of significance. So it is concluded that oil price volatility, trade balance, private sector investment, public sector investment and gross domestic production have a long run relationship.

After implementing the vector autoregression (VAR), we utilized impulse response function to define the effect of different shocks. Impulse Response Function described that oil price volatility (OPV) sock effect itself, gross domestic production (GDP), private sector investment (PRS), public sector investment (PS) and trade balance (TB) and stabilized after 7 year, 5 year, 5 year, 8 year and 7 year respectively. Furthermore, gross domestic production (GDP) shock effect oil price volatility (OPV), itself, private sector investment (PRS), public sector investment (PS) and trade balance (TB) and stabilized after 8 year, 9 year, 9 year, 7 year and 8 year accordingly. Moreover, private sector investment (PRS) shock effect oil price volatility (OPV), gross domestic production (GDP), itself, public sector investment (PS) and trade balance (TB) and stabilized after 9 year, 8 year, 8 year, 9 year and 8 year correspondingly. In addition, public sector investment (PS) shock effect oil price volatility (OPV), gross domestic production (GDP), private sector investment (PRS), itself and

trade balance (TB) and stabilized after 8 year, 8 year, 6 year, 7 year and 5 year respectively. At last, trade balance (TB) shock effect oil price volatility (OPV), gross domestic production (GDP), private sector investment (PRS), public sector investment (PS) and itself and stabilized after 9 year, 8 year, 7 year, 7 year and 5 year accordingly.

Variance decomposition described that variation of oil price volatility, trade balance, private sector investment, public sector investment and gross domestic production is 100%, 97.39%, 76.48%, 92.35%, and 89.62% accordingly due to itself at first year but it is decreasing after time to time and reached at 90.33%, 87.85%, 37.14%, 59.20% and 75.64% respectively.

REFERENCE

Ahmed, F., The effect of oil prices on unemployment: evidence from Pakistan. *Business and economics journal*, 4(1), (2013): 43-57

Akpan, E., Oil price shocks and Nigeria's macro economy. *Journal of Economics*, 4(2), (2009): 12-19

Aliyu, S., Impact of Oil Price Shock and Exchange Rate Volatility on Economic Growth in Nigeria: An Empirical Investigation. *Journal of international studies*, 11(1), (2009): 4-15

Aliyu, S.R.U., Impact of Oil Price Shock and Exchange Rate Volatility on Economic Growth in Nigeria: An Empirical Investigation. *Research Journal of International Studies*, 11(1), (2011)

Anderton, R. and Skudelny F., Exchange Rate Volatility and Euro Area Imports. (2001), *European Central Bank (ECB)*, Working Paper, No. 64.

Awerbuch , S., & Sauter, R., Oil price volatility and economic activity: a survey and literature review. (2003), *IEA Research Paper*.

Cerralo, J., Do oil price shocks matter? Evidence from some European countries. *Energy Economics*, 25(2), (2005): 137-154

Chen S, Hsu K., Reverse Globalization: Does High Oil Price Volatility Discourage International Trade?. (2012), *Munich Personal RePEc Archive*, MPRA Paper No. 36182.

Darby, M.R., The price of Oil and World Inflation and Recessions. *American Economic Review*, 72(4), (1982): 738-751

Dissou, Y., Oil price shocks: Sectoral and dynamic adjustments in a small-open developed and Oil-exporting economy. *Energy policy*, 38(1), (2010): 562-572

Dornbusch, R., Fisher, S. and Startz, R., *Macroeconomics*, McGraw-Hill, Ltd. 2001.

Edelstein, P. and Kilian, L., How Sensitive Are Consumer Expenditures to Retail Energy Prices?. *Journal of Monetary Economics*, 56(1), (2009): 766-779

Eksi, I.H., Senturk, M., and Yoldirm, H.S., Sensitivity of stock market indices to Oil prices: Evidence from manufacturing sub-sectors in Turkey. *Panoeconomicus*, 4(1), (2012): 463-474

Eryigit, M., Effects of oil price changes on the sector indices of Istanbul stock exchange. *International Research Journal of Finance and Economics*, 25(2), (2009): 209-216

Hamilton, J.D., What is an Oil Shock?. *Journal of Econometrics*, 113(1), (2003): 363-398

Jacobs, J., Kuper, G.H. and van Soest, D.P., On the effect of high energy prices on investment. *Applied Economics*, 41(27), (2009): 3483-3490

Jamali, B., Shah, M.A., Soomro, J., Hassan, Shafiq. and Shaikh, M.F., Oil price Shocks: A Comparative study on the Impacts in Purchasing Power in Pakistan. *Modern applied Sciences*, 5(2), (2011): 192-203

Jawad, M., Oil Price Volatility and its Impact on Economic Growth of Pakistan. *Journal of Finance and Economics*, 1(4), (2013): 62-68

Katircioglu, S. T., Sertoglu, K., Candemir, M. and Mercan, M., Oil Price Movements and Macroeconomic Performance: Evidence from Twenty-Six oecd Countries. *Renewable and Sustainable Energy Re-views,* 44, (2015): 257-270

Kiani, A., Impact of High Oil Prices on Pakistan's Economic Growth. *International Journal of Business and Social Sciences*, 2(17), (2011): 209-216

Olomola, P., Oil price shocks and aggregate economic activity in Nigeria. *African Economic and Business Review*, 4(2), (2006): 40-45

Pirog, R., Natural gas prices and market fundamentals. *CRS Report for Congress Congressional Research service*. 2004.

Rafiq, S., Salim, R., and Bloch, H., Impact of crude oil price volatility on economic activities: An empirical investigation in the Thai economy. *Resources Policy*, 34(1), (2008): 121-132

Rebeca, R.J., and Sanchez, M., Oil price shocks and real GDP growth: Empirical evidence for some OECD countries. (2004), *European Central Bank*, Working Paper No 362.

Rebeca, R.J., and Sanchez, M., Oil shocks and the macro-economy: A comparison across high Oil price periods. *Applied Economics Letters*, 16 (16), (2009): 1633-1638

Ricardo, H. and Roberto, R., An Alternative Interpretation of the Resource Curse: Theory and Policy Implications. (2003), *NBER Working Paper No. 9424*.

Salim, R. and Rafiq, S., The Impact Of Crude Oil Price Volatility On Selected Asian Emerging Economies, (2013): 1-33. (http://www.wbiconpro.com/220-Salim.pdf.)

Sandrine, L. and Mignon, V., Oil prices and economic activity: An asymmetric cointegration approach. *Energy Economics*, 30(3), (2008): 847-855

Sardorsky, P., Oil Price Shocks and stock market activity. *Energy Economics*, 21(5), (1999): 449-469

Siddiqui, M. M., Oil Price fluctuation and Stock Market Performance The case of Pakistan. *Journal of International business and economics*, 2(1), (2014): 47-53

Stevens, P., Oil markets. *Oxford Review of Economic Policy*, 21(1), (2005): 19-42

Zaman, U., Farooq, M. and Ullah, S., Sectoral oil Consumption and economic growth in Pakistan and ECM approach. *American journal of scientific and industrial research*, 2(2), (2011): 149-156

A STUDY ON THE RISK-ADJUSTED PERFORMANCE OF MUTUAL FUNDS INDUSTRY IN INDIA

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ABSTRACT

Investing through mutual funds has gained interest in recent years as it offers optimal risk adjusted returns to investors. The Indian market is no exception and has witnessed a multifold growth in mutual funds over the years. As of 2016, the Indian market is crowded with over two thousand mutual fund schemes, each promising higher returns compared to their peers. This comes as a challenge for an ordinary investor to select the best portfolio to invest making it critical to analyse the performance of these funds. While understanding and analysing the historical performance of mutual funds do not guarantee future performance, however, this may give an idea of how the fund is likely to perform in different market conditions. In this research we address multiple research issues. These include measuring the performance of selected mutual schemes on the basis of risk and return and compare the performance of these selected schemes with benchmark index to see whether the scheme is outperforming or underperforming the benchmark. We also rank funds on the basis of performance and suggest strategies to invest in a mutual fund and therefore, our findings have significant relevance for investing public.

Keywords:
Mutual Funds, Risk Adjusted Returns, Value at Risk.

1. INTRODUCTION

Investment is very vital to park the surplus fund by an individual for the purpose of earning additional revenue or capital appreciation or both. An investor has to take into consideration various factors while crafting an investment decision. These are: risk associated with the investment, tax benefits, liquidity, and marketability etc. Mutual funds are investment option available to investors through which they can invest in an asset class of their choice such as equity, debt, gold or real estate etc. Investors who may not want to invest directly in financial markets may instead get exposure to the same securities through a mutual fund. Also, mutual funds provide flexibility to liquidate investment position at any point in time.

The concept of mutual fund is that of a portfolio. The money pooled in by a huge number of investors is what makes up a Mutual Fund. This money is then managed by a specialized Fund Manager, who uses his investing management skills to invest it in numerous financial instruments. The investors in turn will own units, which essentially represent the share of the fund based on the invested quantity. The rise in value of the investments along with other profits earned from it is thenceforth passed on to the unit holders in proportion to the number of units owned after charging for applicable expenses, load and taxes. Like other investment alternatives, mutual funds come with a risk as well and the value of mutual funds will change if the value of the investments change, thus making the mutual funds exposed to volatility but to a limited extent. The Mutual Fund industry in India is fairly mature and has witnessed growth as well as structural changes since its inception. By the initiative undertaken by the Government of India(GoI) and the Reserve Bank of India(RBI), the first mutual fund was rolled out by Unit Trust of India(UTI) in 1963. Later, UTI was joined by State Bank of India (SBI) in 1987 to enter the MF industry. Subsequently, the year 1993 proclaimed another time in the MF industry. This was set apart by the setting up of privately owned businesses in the sector. After the Securities and Exchange Board of India (SEBI) Act was passed in 1992, the SEBI Mutual Fund Regulations appeared in 1996. From that point forward, the Mutual store organizations have kept on growing exponentially with the foreign companies entering India, through joint endeavors and acquisitions.

As the business extended, a non-benefit association, the Association of Mutual Funds in India (AMFI), was built up on 1995. Its goal is to advance sound and moral marketing practices in the Indian MF Industry. SEBI has made AMFI affirmation obligatory for each one of those occupied with offering or advertising mutual fund product. The average assets under management (AUM) of Indian mutual funds in 2016 had risen to INR 14.41 trillion[1] for the first time due to light inflows in equity and short-term debt funds. Gilt and long-term debt funds saw certain retrenchment. Equity funds stood at INR 4.74 trillion and contributed mark-to-market (MTM)

1 Approximate exchange rate is 1 USD = 65.4 INR

profits of above 7% in 2016. In the same period, short-term debt funds reached to a high of INR 1.60 trillion while Ultra short-term fund assets rose to INR 1.47 trillion. Liquid fund assets remained at INR 3.42 trillion while Income fund assets contracted to INR 35.81 billion. Finally, Gilt fund assets soared to INR 152.07 billion[2].

Given this exponential growth in the mutual fund industry, the Indian market is crowded with over two thousand mutual fund schemes, each promising higher returns compared to their peers. This comes as a challenge for an ordinary investor to select the best portfolio to invest making it critical to analyse the performance of these funds. While understanding and analysing the historical performance of mutual funds do not guarantee future performance, however, this may give an idea of how the fund is likely to perform in different market conditions. Furthermore, as funds are diversified, their performance should not be solely based on absolute returns but instead must take into account risk adjusted returns. Therefore, a study on mutual fund industry will have plausible policy implications for the participants. In this research we aim to address multiple research issues. These include measuring the performance of selected mutual schemes on the basis of risk and return and compare the performance of these selected schemes with benchmark index to see whether the scheme is outperforming or underperforming the benchmark. We also aim to rank funds on the basis of performance and suggest strategies to invest in a mutual fund depending upon the objectives of the investors, risk appetite, duration of investment, etc. The rest of the paper is organized as follows. Section II provides a review of literature on mutual funds, Section III discusses data and methodology, Section IV is dedicated for results and Section V will conclude.

2. LITERATURE REVIEW

Performance measurement plays an important role for investors when deciding to invest in mutual funds. Since Markowitz (1952), several indicators have been developed to assess fund performance. Traditional indicators are also accompanied by the measures that evaluate conditions such as asset allocation and performance persistence. The rising number of indicators might lead to a more confused performance evaluation as the use of the innumerable indicators can lead to wavering results and varying fund rankings.

Razafitombo (2010) noted that there is ample academic literature on performance measurement, few studies made contrasts between the various measures. The results found in the literature are controversial. If certain studies found no convergence amid funds' rankings obtained with numerous measures (Plantinga and De Groot 2002), others reach unlike conclusions, such as convergence amongst a group of measures, nonetheless with the Sharpe ratio standing apart (Hwang and Salmon 2002). Peders-

2 Hand book of statistics on Indian Securities Markets and Statistics on Mutual Funds Investment extracted from http://www.sebi.gov.in/sebiweb/

en and Rudholm-Alfvin (2003) and Eling and Schuhmacher (2007) also accomplish convergence between the ranks produced by numerous measures, and recognize the Sharpe ratio as exhibiting dominance to establish the ranking. In the study by (Razafitombo 2010), the author chose 15 performance measures (Jensen's alpha, beta, bull beta, bear beta, absolute performance, relative performance, number of negative periods, number of positive periods, standard deviation, max drawdown, tracking error, information ratio, Sharpe ratio, Treynor ratio and Sortino ratio) and tried to recognize which ones are the most relevant ones for evaluating mutual funds. Using a sample of 210 equity mutual funds from the Reuters-Lipper database, he examined their statistical properties, over the phase from 2000 to 2006 and noted that his investigations were clearly comprehensive, associated to other studies, as he conducted three-step tests.

The results show that correlations between the various measures are changing over time and are rather weak. From this an inference can be made that all these performance indicators were worth considering as they bring complementary information to investors. Among performance measurement indicators considered in this study, the performance analysis i.e. the market exposure, the relative performance, and the manager's skilfulness and quality of tracking especially highlights the significance of information ratios, betas and Sharpe ratios to evaluate these three dimensions. Above all, the main conclusion of the author was that performance analysis should be usefully performed with a multi-criteria approach integrating all its various aspects, i.e. including calculations over different time periods (short term, medium term and long term), and including the three dimensions of performance evaluation (relative performance, beta exposure and manager skill).

(Plantinga and Groot 2001) examine to what extent performance measures can be used as alternatives for preference functions. The study consisted of Sharpe ratio, Sharpe's alpha, the expected return measure, the Fouse index, the Sortino ratio and the upside potential ratio. It was found that the first three measures correspond to the inclinations of investors with a low degree of risk aversion, while the latter three measures match to the preferences of investors with medium and high degrees of risk aversion. Therefore, the choice of the suitable performance measure should be determined by the preference function of the investor.

The choice of a performance measure may also be justified by other considerations. A frequently used justification of a performance measure is its ability to identify the investment skills of portfolio managers. An interesting contribution to this discussion is by Kothari and Warner [2001] which focused on the capability of numerous risk-adjusted performance measures, such as the Sharpe ratio and the Jensen's alpha, to identify investment skills and concluded that the performance measures have important difficulties in detecting investment skills.

Redman, Gullett and Manakyan (2000) evaluated the risk-adjusted returns using Treynor ratio, Sharpe ratio, and Jensen's Alpha for 5 portfolios of global mutual funds and for three time periods of nine and four years (1985-1994, 1985-1989, and

1990-1994) with the benchmark of Vanguard Index 500. During the first and second time frame, the portfolio performed better than the US markets, however during the third time frame, the earnings fell below the US index.

A study by Noulas and John (2005) surveyed the performance of 23 Greek equity funds amid the years 1997-2000 on a weekly basis. The performance was evaluated and ranked using the ratios of Treynor, Sharpe and Jensen. The results showed that the beta of all funds was less than one for four-year period establishing that the equity funds have neither the alike risk nor the same return.

On a global front, a study by Suzanne and Boudreaux (2007) studied ten sample portfolios of global mutual funds and examined the returns by using Sharpe's ratio for the time frame of 2000-2006. Nine out of ten of the sample mutual fund under study performed better than the benchmarked U.S. market. The portfolios which comprised of all global mutual funds did better than the portfolio which had only U.S stock mutual funds.

Using Modigliani and Modigliani (M squared) performance measure, Arugaslan and Ajay (2008) evaluated 50 extensive US global equity funds a ten-year period of 1994-2003. The results showed that risk effected the attractiveness of the fund as even though the funds had greater returns funds, they did lose attractiveness amongst the investors due to superior risk whereas the lesser return funds were attractive due to the minority of the risk.

Sathya Swaroop Debashish (2009) measured the performance of equity based mutual funds in India. There was a study of 23 schemes over a period of April 1996 to March 2009 (13 years) using various risk adjusted measures. The results show that UTI, Franklin Templeton, Prudential ICICI (in private sector) and SBI have out-performed the market portfolio with positive values, while Birla SunLife, HDFC and LIC mutual funds showed a poor below-average performance when measured against the risk-return relationship models and measures. A study by Ramesh and Dhume (2011) analyzed the performance of sector funds which were Banking, Infrastructure, FMCG, Technology and Pharmaceutical. The study focused on different performance measures. The findings of study discovered that all the except the infrastructure sector funds, other funds have outpaced the market.

Anitha (2011) assessed the performance of private and public sector mutual funds for a period of two years (2005-2007). Selected funds were studied using Statistical measures like Mean, Variance, Co-variance and Standard Deviation. The performance of all the selected funds has exhibited volatility during period of study leading it to a difficult situation to assign one particular fund that would outperform the others consistently. Patel and Prajapati (2012) estimated the performance of mutual funds in India using relative performance indices, Treynor's and Sharpe's ratio, risk-return analysis, Jensen's measure, and Fama's measure and concluded that most of the mutual funds have given positive return during the period of study. Jain (2012) investigated the performance of equity mutual funds in India using CAPM. The results show

that in the long run, the performance of private sector companies' MFs have been far better than the public sector ones. Out of the pool of sample companies, HDFC and ICICI were the best performers whereas LIC did not perform well. Thus, the overall analysis discovers that the private sector mutual fund schemes are less risky but more rewarding when compared to the public sector ones. Annapoorna and Gupta (2013) assess mutual fund schemes' performances ranked 1 by CRISIL and give a comparison of these returns with SBI's domestic term deposit rates. For the purpose of calculations, simple statistical methods of averages and rate of returns were used. The results obtained clearly depict that, in most cases the mutual fund schemes have been unsuccessful in providing the benefit of SBI domestic term deposits.

Karrupasamy and Vanaja (2013) study and evaluate the performance of Large-cap, mid cap and small cap equity mutual funds, on a risk-adjusted basis using Shrpe, Jensen and Treynor's measure for a period of three years. The findings suggest that most of the large cap and small and mid cap schemes have outperformed the category averaged as well as the benchmark indices. Also, they proposed that investors looking for an investment below 2 years can go for large cap schemes whereas those having investment beyond 3 years should invest in small and mid-cap schemes.

Bhavsar, Damani and Anvesha (2014) contribute by giving a comparative exploration of the performance of select private and public sector mutual funds and the conclusions are that mutual funds with public sector holdings have been greater performers when compared to their private sector complements. Also, with Jensen's Alpha, private sector funds have been ranked better but a higher rank was given to public sector funds under Treynor and Sharpe ratio. Arora (2015) studied the risk-adjusted performance of 100 mutual funds from the period April 1, 2000 to March 31, 2008 where the results for overall performance was mixed. Sharpe ratios of 52 mutual fund schemes were better than that their benchmark indices. Treynor ratios of 70 per cent of mutual fund schemes were higher than their respective indices. Thus majorly, almost half of the mutual funds have performed better than their indices.

3. DATA AND METHODOLOGY

A sample of 100 Mutual fund schemes which are in operation for a period of five years and performing significantly well during the period of study (January 1st, 2013 to June 30th, 2016) will be selected for the present study. The time frame of the study was selected from 1 January 2013 majorly to study the direct plans of mutual funds. With effect from January 1st 2013, it was made mandatory by SEBI that all open-ended mutual funds should have direct-plans. Direct plans help the investors to directly invest in the MFs by bypassing the distributor. As the distributor's commission is not embedded in the direct plans, their NAVs are higher. The mutual fund categories selected for the study is presented in Table 1. The benchmark index will vary according to the category of fund.

Table 1.: Mutual funds systematization

Type of Fund	Nature of the Fund
Large-Cap Equity funds	Funds that invest > 75% in CRISIL-defined Large Cap Stocks for a minimum of four out of six months in each period over the last 2 years.
Small/Mid-Cap Equity funds	Funds that invest < 45% in CRISIL-defined Large Cap Stocks for a minimum of four out of six months in each period over the last 2 years.
Diversified Equity funds	Equity funds outside the universe of Large Cap and Small & Midcap oriented funds.
Long term gilt funds	Funds investing in long-term securities issued by Central and state governments.
Long term Income funds	Funds investing in long-term corporate debt papers and government securities (G-Secs). Funds investing 60 per cent or more in G-Secs are excluded.
Short term Income fund	Funds investing in short term corporate debt papers, CDs, money market and GSecs.
ELSS (Tax Savings)	Funds aimed at enabling investors to avail tax rebates under Section 80 C of the Income Tax Act.

Source: Autors`

The data collected is for the daily closing NAVs of the mutual funds along with their benchmark index, expense ratios, type of fund, the ratings and returns. The sample of 100 funds selected is some of the top rated funds as per CRISIL, Value research and Morningstar India in their individual fund categories. The data is extracted from Datastream and Association of Mutual Funds in India.

3.1. Measures for Performance Evaluation

Absolute Returns: A return is gain or loss of a security or asset in which the investment is made during a particular period of time. The returns also consist of the capital gains and income on an investment and is usually quoted as a percentage.

Daily returns () : The daily returns for the mutual funds are calculated using the historical Net Asset Values (NAVs) as follows where denotes the Net Asset Value of the scheme at time and denotes the Net Asset value of the scheme at i.e. a day prior. We have used log returns as they are time consistent or time additive. Also, if the log returns are normally distributed, adding the log returns would produce an end log return which is also normally distributed.

Average daily returns: The average returns or the mean growth rate of the funds are calculated using:

Annualized average returns: Since the daily returns are natural logarithmic returns, the annual average returns are calculated as follows:

260 represents an average of 260 trading/working days in a year on which the values of the NAVs will change.

Standard deviation: Standard deviation is a measure of dispersion of a data set from its mean. The more spread the data, higher would be the deviation. It gives us the historical volatility which is used by the investors to apprehend the amount of expected volatility in future.

The **daily standard deviation** for the mutual funds are calculated as:

Where, represents standard deviation of the scheme, is the daily return, is the mean return, is the total number of values in the population.

The **annual standard deviation** is calculated using:

Sharpe Ratio: Sharpe Ratio is a risk-adjusted measure of return used to evaluate a portfolio's returns. It is a measure that gives the investor an estimation of the average returns earned in excess of risk-free rate of return per unit of total risk or volatility. The ratio is calculated as:

Where, is the mean scheme return, is the risk free rate of return and is the standard deviation of the returns.

Treynor Ratio: The Treynor ratio is a measurement of risk-adjusted performance measure for a portfolio. It measures the excess returns the fund earns over and above the risk free rate of returns with an adjustment to the volatility in the market measure in the form of Beta coefficient of the portfolio. It is also a measurement of efficiency adjusting for the market (systematic) risk measured by Beta. Beta is a measure which measures the sensitivity of the scheme to market movements to gauge the risk. The Treynor ratio is calculated as:

Where, is the mean scheme return , is the risk free rate of return and is the Beta coefficient of the returns. For calculation purposes, the Beta of the mutual fund schemes have been extracted from Thomson Reuters. Similar to Sharpe Ratio, the higher the Treynor Ratio, the better is the performance of the Scheme.

Jensen's Alpha: It is a measure of absolute performance on a risk-adjusted basis. It represents the average return a scheme would earn over and above the returns are predicted by the Capital Asset Pricing Model (CAPM) given the portfolio's beta and the mean market return. Jensen's Alpha is calculated as:

Where, is the mean scheme return , is the risk free rate of return , is the Beta coefficient of the returns, is the average returns of the benchmarked index.

Value at Risk: Value at Risk (VaR) can be described as the maximum loss in the value of a portfolio or an asset within a determined time period and with a pre-defined probability rate or confidence level under regular market conditions. It is the maximum level of loss that the fund will incur given a particular threshold of probability. In case we are calculating the daily VaR, we estimate the worst expected loss that the company can incur next trading day.

Value at Risk can be calculated as:

Where, is the mean scheme return, is the confidence interval and is the standard deviations of the returns.

4. RESULTS AND ANALYSIS

4.1 Sharpe Ratio

We computed Sharpe ratio for the former 36-month period by dividing the fund's annualized excess returns over the risk-free rate by its annualized standard deviation. Since Standard deviation (also known as volatility) can't be negative, Sharpe ratio is negative in case the funds' returns are lesser than the risk-free rate of return. Negative Sharpe ratios are problematic as, counter-intuitively, whilst returns are negative, bigger risk produces a higher Sharpe ratio. Additionally, a negative Sharpe ratio isn't significant because the ratio is designed to help put an outlay's excess returns into milieu, and when a fund has undesirable returns, it is perceptibly not beating the risk-free rate. The results are reported in Table 2.

Table 2.: Results of Sharpe Ratio

Percentage of Schemes having					
Name of the scheme	**Positive Ratios**	**Negative ratios**	**Highest Ratio**	**Lowest Ratio**	**No.of Funds**
Diversified Equity	88.9%	11.1%	1.200	-0.298	18
ELSS (Tax Savings)	100%	0%	1.114	0.109	9
Large-Cap	82.35%	17.65%	0.765	-0.514	17
Long term gilt	81.25%	18.75%	0.724	-0.085	16
Long term Income funds	100%	0%	0.825	0.073	8
Short term Income fund	100%	0%	1.147	0.010	8
Small/Mid-Cap	100%	0%	1.659	0.213	11
Ultra-short term debt fund	100%	0%	2.519	0.574	12

Source: Autors`

In our sample we observe that 11.1% of Diversified Equity, 17.65% of Large Cap funds and 18.75% of Long term gilt funds have a negative Sharpe ratio. This can be because that the funds did not perform well in the shorter duration of 36 months and provided a return less than the risk-free rate of return. However, funds under the ELSS scheme, Long tern Income funds, Short term income funds, small and mid cap funds and ultra short term debt, were able to provide a positive excess return over the risk free rate of return. This shows that if an investor is aiming to invest for a shorter period of time (say 3 years), he can look at these type of funds. According to the Sharpe Ratio, we see that Ultra-short term debt funds have the highest Sharpe Ratio of 2.519 which is very good and thus it is preferable to invest in ultra-short term debt funds as they have provided excess returns over the risk free index.

4.2. Treynor Ratio

The Treynor ratio is a function of beta, which measures a security's sensitivity to movements in the market, to gauge risk. Since the Treynor ratio is a function of beta, it also shares beta's caveats. Along with the pervasive condition that beta is grounded on historical performance and therefore has restricted usefulness as a predictor of imminent performance, the practicality of beta is also wholly dependent upon the level of correlation with its market benchmark. We use Treynor ratio to equate two schemes within the same fund category or to compare a scheme's ratio with that of category average or market benchmark. The results are presented in Table 3.

Table 3.: Results of Treynor Ratio

	Percentage of schemes having				
Name of the scheme	**Positive ratios**	**Negative ratios**	**Highest Ratio**	**Lowest Ratio**	**No.of Funds**
Diversified Equity	88.9%	11.1%	0.155	-0.048	18
ELSS (Tax Savings)	100%	0%	0.176	0.017	9
Large-Cap	82.35%	17.65%	0.010	-0.092	17
Long term gilt	81.25%	18.75%	0.025	-0.001	16
Long term Income funds	100%	0%	0.010	0.001	8
Short term Income fund	100%	0%	0.012	0.001	8
Small/Mid-Cap	100%	0%	0.169	0.024	11
Ultra-short term debt fund	100%	0%	0.040	0.003	12

Source: Autors`

If the portfolio return is less than the risk-free rate although the fund's beta remains positive (inferring that the fund removed the systematic risk but didn't surpass the risk-free rate), funds will have negative Treynor ratios. Since, all the funds have provided positive returns, tis explanation holds true. In our sample, we see that 11.1% of Diversified Equity, 17.65% of Large Cap funds and 18.75% of Long term gilt funds have a negative Treynor ratio. This indicates that these funds haven't sufficiently compensated their investors for the risk they have subjected them to and that its returns have been lesser than the risk-free rate of return during the former 3 years.

4.3. Jensen's Alpha

Alpha can be described as an extent of a manager's ability or skill to add value over a passive benchmark. Also, it is significant to consider that alpha first alters for the degree of market risk undertaken by the manager. Alpha is whatever remains after the market risk (beta) is netted out. The results appear in Table 4.

Table 4.: Results of Jensen's Alpha

Percentage of schemes having					
Name of the scheme	**Positive ratios**	**Negative ratios**	**Highest Ratio**	**Lowest Ratio**	**No.of Funds**
Diversified Equity	83.3%	16.7%	0.160	-0.096	18
ELSS (Tax Savings)	89%	11%	0.129	-0.008	9
Large-Cap	82.35%	17.65%	0.012	-0.136	17
Long term gilt	56.25%	43.75%	0.023	-0.015	16
Long term Income funds	38%	63%	0.018	-0.008	8
Short term Income fund	88%	13%	0.013	-0.007	8
Small/Mid-Cap	100%	0%	0.210	0.014	11
Ultra-short term debt fund	100%	0%	0.016	0.004	12

Source: Autors`

For calculating Jensen's Alpha, the bond funds and equity funds have two separate benchmark indexes. The benchmark index for equity funds is Nifty 500 with an average annualized returns of 11.36% and for bond funds, it is S&P BSE India Agency Bond Index with an average annualized returns of 9.34%. The beta considered for the calculation of Jensen's alpha has been separately considered for both equity and debt mutual funds and have been correspondingly correlated to their respective benchmark. We report that 16.7% of Diversified Equity, 11% of ELSS schemes, 17.65% of Large Cap funds, 43.75% of Long term gilt funds, 63% of long-term Income funds and 13% of short term income funds have a negative Jensen's Alpha. The reason is that the returns generated by the schemes did not compensate adequately over the average market return grounded on the beta of the scheme. Since the alpha of the market is zero, the negative alphas mean that the schemes are underperforming the market. Another factor for negative alpha can be that the manager has undertaken excess risks and was able to generate only a marginal outperformance with the benchmark.

4.4. Value-at-Risk

The calculation of Value-at-Risk is on a daily basis and a negative daily return (expressed in percent) is expected to occur about 1 out of a 260 trading days. An investor often desires to compute VaR for periods lengthier than one day, as it might not be possible to close a position in one day, particularly if it is illiquid. If, over and above normality, we assume that returns are consecutively independent, subsequently the standard deviation of longer-period returns surges with the square root of time. A serious shortcoming of parametric VaR is that it underrates the frequency of "extreme events," such as results several standard deviations away from the average. A reason for this is that asset return distributions demonstrate "fat tails," which means that more number of outcomes are positioned in the tails instead of the center of the distribution. The results are reported in Table 5.

Table 5.: Results of Value at Risk

Name of the scheme	Highest VaR	Lowest VaR	No.of Funds
Diversified Equity	-2.12%	-1.14%	18
ELSS (Tax Savings)	-1.62%	-1.33%	9
Large-Cap	-2.08%	-0.14%	17
Long term gilt	-0.58%	-0.42%	16
Long term Income funds	-0.52%	-0.25%	8
Short term Income fund	-1.71%	-0.09%	8
Small/Mid-Cap	-1.82%	-0.25%	11
Ultra-short term debt fund	-0.06%	-0.01%	12

Source: Autors`

We see that the VaR for equity funds is higher than that of debt funds. This is due to the higher returns of equity funds. Even though the standard deviations for the equity funds are higher as well, but the returns are relatively more in case of equity funds. The highest Value-at-Risk is 2.12% which is for diversified equity while the lowest VaR is 1.14% for the same class of funds. Ultra-short term debt are expected to have the lowest VaR of just 0.01% and even the maximum for that class of funds is 0.06%. This means that the potential losses in any given day for that fund is not more than 0.06% for those funds.

4.5. Expense Ratio

Expense ratios are also a key performance measure as it is possible that the expense ratios might eat away some of the fund's returns. An expense ratio is also a measure to show how efficient are returns over and above what investors paying for the management of its fees. Table 6 reflects extreme expense ratio for our sample funds.

Table 6.: Results of value, expense ratio, cumulative ranking and annualised returns for mutual funds sample

Category	Value	Expense Ratio	Name of the fund	Cumulative Ranking	Annualised Returns
Diversified Equity	Lowest	0.32	Birla Sun Life India GenNext Fund-Growth	12	18.1%
Diversified Equity	Highest	2.36	UTI-MNC Fund-Growth	3	22.6%
ELSS (Tax Savings)	Lowest	1.28	Axis Long Term Equity Fund-Growth	1	23.7%
ELSS (Tax Savings)	Highest	2.56	DSP BlackRock Tax Saver Fund-Direct-Growth	6	18.6%
Large-Cap	Lowest	1	Kotak Select Focus Fund-Growth-Direct	1	19.5%
Large-Cap	Highest	2.41	ICICI Prudential Top 100 Fund-Growth	9	14.1%
Long term gilt	Lowest	0.3	Birla Sun Life Gilt Plus-PF-Growth-Direct	5	10.3%
Long term gilt	Highest	1.4	Kotak Gilt Investment-Growth	16	7.9%
Long term Income funds	Lowest	0.59	Tata Dynamic Bond Fund-Direct-Growth	2	10.9%
Long term Income funds	Highest	1.85	Reliance Income Fund-Direct Growth-Growth-Growth	9	8.6%
Short term Income fund	Lowest	0.25	Tata Short Term Bond Fund-Direct-Growth	1	9.8%
Short term Income fund	Highest	1.08	IDFC Tax Advantage (ELSS) Fund-Direct-Dividend	8	8.5%
Small/ Mid-Cap	Lowest	0.25	Franklin India Smaller Companies Fd-Direct-Growth	2	31.7%
Small/ Mid-Cap	Highest	2.53	DSP BlackRock Strategic Bond Fd-Direct-Growth	9	9.5%
Ultra-short term debt fund	Lowest	0.1	Birla Sun Life Floating Rate-LT-Direct-Growth	5	9.5%
Ultra-short term debt fund	Highest	0.78	Franklin India Low Duration Fund-Direct-Growth	2	9.9%

Source: Autors`

We observe that the expense ratio for our sample mutual funds varies from 0.1% to 2.56%. The expense ratio for equity funds vary much more than that of debt funds and hold a higher percentage. The expense ratio for debt funds is as low as 0.1% however for equity funds it is 0.25%. Also, the highest expense ratio for equity funds is as high as 2.56% whereas for

debt funds, it is just 1.85% which is within the stipulated SEBI limits on expense ratios. Equity funds require more attention of the management so they command higher expense ratios. Index funds and bond funds necessitate comparatively much less work thus they typically have lower expense ratios. Along with that, the expense ratios are subject to SEBI-imposed limits. Debt funds are allowed an expense ratio of 0.25 percentage points lesser than equity funds. Another observation that can be made is that it is not necessary that the fund with the lowest expense ratio gives the lowest return or vice-versa. As per our cumulative ranking index, we see that many funds are ranked 1 (i.e. best in the fund category) and still have the lowest expense ratio. These funds are Axis Long Term Equity Fund-Growth, Kotak Select Focus Fund-Growth-Direct, Tata Short Term Bond Fund-Direct-Growth and Franklin India Smaller Companies Fund-Direct-Growth. A similarity in these schemes is that all these funds are direct funds and also they have given significantly higher annualised returns.

4.6. Comprehensive Rankings

The 100 funds sampled in the study have been assigned comprehensive rankings on the basis of various risk adjusted performance ratios and value at risk. All the funds have been first ranked individually on the basis of Sharpe ratio, Treynor ratio and Jensen's Alpha, where the funds with the highest ratios are ranked 1 and the ones with the lowest ratios are ranked lower (with 1 being the best ranking). Then the funds are also ranked on the basis of VaR with the fund with the lowest VaR has been ranked the highest (given the ranking of 1) and the fund with the highest VaR has been given the lowest rankings. After assigning individual ranking to the funds, a sum total of all the rankings helps derive the comprehensive rankings of the funds. Therefore, it is not necessary that a fund with the highest returns or the lowest standard deviation has the best ranking, neither it is necessary that a fund has to have the highest risk-adjusted performance ratio to have the lowest VaR. Further, it is to be noted that all the rankings of the ratios and VaR have been assigned equal weights. Table 7. lists best ranked mutual funds in each category while Appendix 1 reports overall ranking for top ten funds across all categories.

Table 7.: Best ranked mutual funds per category

Fund Category	Name of the scheme
Diversified Equity	Franklin Build India Fund-Direct-Growth
ELSS (Tax Savings)	L&T Tax Advantage Fund-Direct-Growth
Large-Cap	HDFC High Interest Fd-Dynamic-Direct-Growth
Long term gilt	Kotak Gilt Investment Prov Fd & Trust-Growth
Long term Income funds	Reliance Income Fund-Direct Growth-Growth-Growth
Short term Income fund	Reliance Short Term Fund-Growth
Small/Mid-Cap	Kotak Emerging Equity Scheme-Growth-Direct
Ultra-short term debt fund	DHFL Pramerica ShTm Floating Rate-Dir-Growth

Source: Autors`

5. CONCLUSION

This study assesses the performance of Indian mutual fund schemes using Sharpe ratio, Treynor ratio, Jensen's Alpha and Value at Risk for a sample of 100 Indian mutual fund schemes. The study period is from January 2013 to June 2016. The sample comprises of 18 diversified equity schemes, 9 tax saving schemes, 17 large cap funds, 16 long term gilt, 8 long term income, 8 short term income funds, 11 small/mid cap funds and 12 ultra-short term funds. The results of Sharpe ratio and Treynor ratio reflect that 90 percent of the schemes have performed better than their benchmarks which reflect that during this period that the funds have done fairly well and have outperformed the market. As per the Jensen's Alpha, the returns generated by 79 schemes compensated adequately over the average market return given the beta of the scheme. Majorly, the schemes with the negative Sharpe Ratio and Treynor Ratio are diversified equity, long term gilt or large cap equity funds. This implies that during the study period, a vast majority of long, short and ultra short debt funds, ELSS and Mid/small cap funds have consistently performed better. Hence, the investors who are interested in consistent returns may choose investment in these schemes. Additionally, the Value-at-Risk for mutual funds has been studied which is the potential loss for a fund in any given day. The Value at Risk for equity based mutual funds are higher than that of debt fund which shows that even though the equity funds have higher potential for returns but on the other hand, the downside risk is also comparatively higher. It is important for an investor to not only identify the category of fund for his investment but also pick-up the best fund in that category. This is because even within a category, the returns for the funds might vary vastly from scheme to scheme.

REFERENCES

Annapoorna, M.S. and Pradeep K. Gupta. *"A comparative analysis of returns of mutual fund schemes ranked 1 by CRISIL". Tactful Management Research Journal 2.1 (2013): 1-6. Retrieved from http://tmgt.lsrj.in/UploadedArticles/84.pdf*

Arora, Kavita. *"Risk-Adjusted Performance Evaluation of Indian Mutual Fund Schemes". SAGE Publications 19.1 (2015): 79-94. Retrieved from http://par.sagepub.com/content/19/1/79.full.pdf+html*

Arugaslan and Ajay., Evaluating large US-based equity mutual funds using risk-adjusted performance measures, International Journal of Commerce and Management, 17,1/2, pp.6-24,2008.

Bhavsar, A. C., & Damani, A. (2014). A comparative study of the performance of selected mutual fund growth schemes from the private sector and public sector schemes in india. Anvesha, 7(1), 1-9. Retrieved from http://search.proquest.com.spjain.idm.oclc.org/docview/1540771275?accountid=162730

Boudreaux and Suzanne , Empirical Analysis of International Mutual Fund performance, International Business & Economics Research Journal, 6, (2007): 19-22

Canadian Securities Administrators. Understanding Mutual Funds. 2016. Web. 26 Oct. 2016. Retrieved from http://www.osc.gov.on.ca/documents/en/Investors/res_mutual-funds_en.pdf

CRISIL Research(2016). For The Quarter Ended June 30, 2016. Mumbai. CRISIL Mutual Fund Ranking. Retrieved from http://www.crisil.com/pdf/capitalmarket/CRISIL_Mutual_Fund_Ranking-June-2016.pdf

Debasish Sathya Swaroop (2009), Investigating Performance of Equity-based Mutual Fund Schemes in Indian Scenario, KCA Journal of Business Management. VOL. 2, ISSUE 2.

Vasantha, S, Uma Maheswari, and K Subashini. *"Evaluating The Performance Of Some Selected Open Ended Equity Diversified Mutual Fund In Indian Mutual Fund Industry". www.rroij.com. N.p.*, 2013. Web. 4 Sept. 2016.

Eling, M. and F. and Schuhmacher., Does the choice of performance measure influence the evaluation of hedge funds? Journal of Banking and Finance 31(9), (2007): 2632-2647

Grau-Carles, Pilar et al. *"Different Risk-Adjusted Fund Performance Measures: A Comparison". Economics-ejournal.org. N.p.*, 2009. Web. 3 Nov. 2016.

Here is how demonetisation will affect the mutual fund industry - Cafemutual.com. (2016). Cafemutual. Retrieved 21 November 2016, from http://cafemutual.com/news/trends/768-here-is-how-demonetisation-will-affect-the-mutual-fund-industry

Hwang S., and M. Salmon., An analysis of performance measures using copulae. InPerformance Measurement in Finance: firms, funds and managers. J. Knight and S. Satchel, eds. Oxford, U.K.: Butterworth-Heinemann, 2002.

Jain, Sahil. *"Analysis Of Equity Based Mutual Funds In India". IOSR Journal of Business and Management (IOSRJBM) 2278-487X Volume 2.1 (2012): PP 01-04. Retrieved from: http://iosrjournals.org/iosr-jbm/papers/vol2-issue1/A0210104.pdf*

Kalpesh P Prajapati and Mahesh K Patel, Comparative Study On Performance Evaluation of Mutual Fund Schemes Of Indian Companies, Researchers world, Journal of Arts, Science & Commerce Vol-III, Issue3(3), July 2012, (2012): 47-59

Karrupasamy, R. and V. Vanaja. *"A Study On The Performance Of Selected Large Cap And Small & Mid Cap Mutual Fund Schemes In India". The International Journal of Management 2.3 (2013): 7-13. Retrieved from: http://www.theijm.com/vol2issue3/2.222.pdf*

Kidd, Deborah. *"Risk-Adjusted Performance Measures: A Case Study". Investment risk and performance n. pag. Retrieved from: http://www.cfapubs.org/doi/pdf/10.2469/irpn.v2012.n1.7*

Kothari, S.P. and Jerold B. Warner, *"Evaluating mutual fund performance",* Journal of finance, Vol. 56, No. 1, pp. (2001): 1985-2010

Markowitz, H., Portfolio selection. Journal of Finance 7(March), (1952): 77-91

Noulas, John and John, Performance of mutual funds. Managerial finance, 31(2), (2005): 101-112

Pedersen, C. S., and T. Rudholm-Alfvin., Selecting risk-adjusted shareholder performance measure. Journal of Asset Management 4(3), (2003): 152-172

Plantinga, A., and D. De Groot., Risk-adjusted performance measures and implied risk attitudes. Journal of Performance Measurement 6, (2002): 9-22

Pournima S. Shenvi Dhume and Prof. B. Ramesh, *"Performance Analysis of Indian Mutual Funds with a Special Reference to Sector Funds",* The Indian Journal of Commerce, Vol. 64, No. 9, (2011) July-September 2011.

Razafitombo, Hery. *"EDHEC-Risk - A Statistical Analysis Of Mutual Fund Performance Measures: The Relevance Of Irs,* Betas, And Sharpe Ratios". Edhec-risk.com. N.p., 2010. Web. 1 Oct. 2016.

R. Anitha, T. Devasenathipathi and C. Radhapriya, *"Comparative Analysis of Market Returns and Fund Flows with Reference to Mutual Funds" International Journal Of Research In Commerce,* It & Management, Volume no. 1, Issue no. 4, September, 2011.

Redman, A. L., Gullett, N. S., & Manakyan, H., The performance of global and international mutual funds. Journal of Financial and Strategic Decisions, 13(1), (2000): 75-85

Simons, Katerina, The Use Of Value At Risk By Institutional Investors. New England Economic Review, 2000. Print.

Sharma, Dr Preeti and Rao, D. N. A Study of Risk Orientation of Retail Investors in Indian Mutual Fund Industry with Special Reference to Rajasthan, India. (2014) Retrieved from SSRN: http://dx.doi.org/10.2139/ssrn.2467951

APPENDIX 1

Name	Annual Return (in %)	Annual Std dev	Beta	Sharpe Ratio	Treynor Ratio	Jensen's Alpha	VaR @ 95%	Expense Ratios	Ranks (Returns)	Ranks (Sharpe)	Ranks (Treynor)	Ranks (Alpha)	Ranks (VAR)	Fundwise rankings
Franklin Build India Fund-Direct-Growth	27.14%	15.70%	1.22	1.200	0.155	0.160	-1.51%	1.32	1	1	1	1	11	1
L&T Mid Cap Fund-Direct-Growth	25.70%	14.53%	1.20	1.198	0.145	0.150	-1.39%	1.57	2	2	3	2	7	2
UTI-MNC Fund-Growth	22.57%	11.99%	0.93	1.191	0.154	0.123	-1.14%	2.36	6	3	2	6	1	3
Franklin India High Growth Companies Fund-Dir-Gth	23.97%	14.48%	1.13	1.083	0.139	0.131	-1.39%	1.05	5	4	5	5	6	4
L&T India Value Fund-Direct-Growth	24.77%	16.80%	1.20	0.981	0.137	0.134	-1.63%	1.57	3	5	6	3	12	5
Principal Emerging Bluechip Fund-Direct-Growth	24.68%	16.83%	1.18	0.973	0.139	0.134	-1.63%	1.76	4	6	4	4	13	6
SBI Magnum Multicap Fund-Direct-Growth	20.39%	15.06%	1.04	0.803	0.116	0.092	-1.47%	1.41	8	9	7	9	10	7
Franklin India Prima Plus-Direct-Growth	19.95%	13.44%	1.55	0.867	0.075	0.091	-1.30%	2.3	10	7	13	10	3	8
Invesco India Contra-Direct-Growth	20.29%	14.94%	1.19	0.804	0.101	0.093	-1.45%	0.95	9	8	10	8	9	9
Birla Sun Life Advantage Fund-Direct-Growth	20.78%	16.86%	1.15	0.741	0.109	0.093	-1.65%	1.33	7	10	8	7	15	10

FISCAL AUSTERITY POLICY IMPACT ON WELFARE

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ABSTRACT

The ongoing global financial and economic crisis has caused a dramatic fall in growth, increased deficit, higher unemployment rates and strong price fluctuations. To achieve a balanced budget and reduce the national debt, the most of the national government have sacrificed the employment - one of the main indicators that reflect societies' well-being and implemented fiscal austerity policy. The aim of this paper is to contribute to the literature on this topic and assess the short analysis of fiscal consolidation. Despite the ongoing debate and numerous studies no consensus about whether and when austerity is likely to be beneficial has been achieved. Further, there are still open issues to understand the impact of austerity on poverty and welfare because of the difficulty of defining poverty and welfare also. The main conclusion is that the emphasis should be placed on correctly defining austerity methodology in a broader economic and social context.

Keywords:
Fiscal austerity, Economic growth, Welfare, Sustainability

1. INTRODUCTION

To achieve the long term sustainable growth, we cannot separate social and economic context of fiscal sustainability.

The sustainability of fiscal policy in a world of financial turmoil has become an important issue in the economy. Interest rates on government debt rose dramatically and Europe after more than five decades faces again with rising public debt and high budget deficit. Concerns about fiscal imbalance have implied a shift from fiscal stimulus to austerity. To achieve a balanced budget and reduce the national debt, the national government has sacrificed the employment - one of the main economic indicators that reflect societies' well-being. Cutting social security, health care, spending on education, has negatively affected economic growth, poverty and social stability especially in weaker member states. Further, significant variation in economy between the EU's member states have followed different paths to austerity. Despite diversity of national economies fiscal tightening became an almost universal recommendation and implemented policy.

Although many academic researchers have acknowledged a need for greater understanding in these area, see study of Alesina and Perotti (1995), Alesina et al. (1998), Alesina and Ardagna (1998, 2010), Blanchard and Perotti (2002), Wilhelm and Fiestas (2005), Arestis and Pelagridis (2010), Chang (2011), Crotty (2012), Calcagno (2012), Konzelman (2012), Blyth (2013), Galbraith (2014), Branas (2015), Shakina and Barajas (2014) consensus about austerity effects and consequences is still missing.

Further, there are still complications to define the impact of austerity on poverty and welfare because of the difficulty of defining poverty and welfare also. Consequently, we have incomplete picture and obstacle for growth and development.

Since structural adjustment policies have high social costs (have depressed employment, have led to large migration, have increased the cost of health care, education and other elements of well-being) the critical challenge is how to achieve public debt sustainability and decrease unemployment, poverty and inequality at the same time.

The purpose of this study is to analyze social and economic context link to sustainable growth. The answer can help policy maker on deciding if/when should governments undertake austerity policy. While there is no clear answer to the question, it may be useful to review recent research and analyze the moral hazard and the credibility of "belt tightening."

This paper has four parts. Firstly, it reviews the extant literature, then data analysis are presented and discussed. The paper concludes with a discussion of theoretical and statistical implications and directions for further research.

2. LITERATURE REVIEW

The central theme of these article has received extensive attention in the theoretical Perotti (1996), Chang (2011), Konzelman (2012), Krugman (2012), Crotty (2012), Stiglitz (2013), Galbraith (2014) and empirical literature Alesina et al. (1998), Blanchard and Perotti (2002), Alesina and Ardagna (1998, 2010), Matsaganis and Leventi (2014).

For example Perotti 1996, Alesina and Ardagna 1998, 2010, Romer and Romer 2010, found out that fiscal adjustments based on spending cuts or spending-based consolidation compare with fiscal adjustment based on tax, are more efficient in reducing public debt and led to economic growth. In contrast, Chang 2011, Krugman 2012, Galbraith 2014, Blyth 2013, Calcagno 2012, pointed out that more fiscal adjustment will only worsen the downturn, and that austerity is a dangerous idea and it is not a solution. Further, Auerbach and Gorodnichenko 2012 pointed out that fiscal consolidation has adverse effect on the economy during a recession than during an expansion.

Despite the growing literature, there is a lack of empirical investigation on defining the methodology of austerity especially in defining austerity methodology which will implement economic and social context.

Krugman (2012; 232) noted: "Anyway, the point is that out the question of how economy works should be settled on the basis of evidence, not prejudice."

Whereas there are conflicting points of view in attempt to answer the question "Are more/less government spending or tax increases or decreases more effective in reducing public debt and less harmful for economic growth and development" a chronological review of previous theoretical research and empirical studies are presented in Table 1. and Table 2.

Table 1.: Theoretical Studies on Fiscal Austerity

YEAR	AUTHOR	THEORETICAL APPROACH
1996	Perotti, R.	Fiscal consolidation in Europe
2005	Wilhelm, V., Fiestas, I.	Exploring the link between public spending and poverty reduction; (see more review of recent literature p. 24)
2008	Minsky, H.P.	Stabilizing an Unstable Economy
2010	Jayadev, A. Konczal, M.	The right time for austerity
2010	Pollin, R.	Politics of austerity
2010	Arestis, P. Pelagridis, T.	Austerity Policies in Europe
2011	Dietrich, D., Knedlik, T., Lindner, A.	Global financial crisis
2011	Kitson, M., Martin, R., Tyler, P.	The geographies of austerity
2011	Chang, H.J.	Rebuilding the World Economy
2011	Dunn, S.	The Great Crash and Galbraith' s prescience

YEAR	AUTHOR	THEORETICAL APPROACH
2011	Kitromilides, Y.	Deficit reduction, the age of austerity, and the paradox of insolvency
2011	Fontana, G. , Sawyer, M.	Fiscal austerity; lessons from recent events in the British Isles
2012	Konzelman, S.	The Economics of Austerity
2012	Mc Kee, M., Karanikolos, M, Belcher, P., Stucker, D.	The human cost of austerity
2012	Crotty, J.	Austerity war
2012	Calcagno, A.	Austerity policies
2012	Romer, C.	Lessons and policy implications of fiscal policy
2012	Hannsgen, G. , Papadimitrou, D.B.	Fiscal traps after the Eurozone crisis
2012	Krugman, P.	The Effects of Government Spending
2013	Blyth, M.	Austerity, The history of a dangerous idea
2013	Stuckler, D., Basu, S.	The human cost of austerity
2013	Blyth, M.	The History of a Dangerous Idea
2013	Stiglitz, J.	The Battle of the budget; The history of the deficit
2014	Antokakis, N. Collins, A.	The human cost of austerity
2014	Palley, T.	Europe's financial crisis
2014	Galbraith, J. K.	The European Crisis
2014	Edmiston, D.	Financial Sustainability of Welfare Reform in Europe (convergence in responses to economic crisis)
2014	Overmans, J.F.A.	Current austerity practices; successes and failures
2014	Hein, E. and Truger, A.	Fiscal Policy and Rebalancing in the Euro Area
2015	Branas et.al.	The human cost of austerity
2015	Škare, M., Pržiklas Družeta	Fiscal Austerity Versus growth in Croatia
2011, 2012	Arestis, P.	Fiscal policy: a strong macroeconomic role

Source: Authors' review of the literature

Table 2.: Empirical Studies on Fiscal Austerity

YEAR	AUTHOR	RESULTS
1995	Alesina, A., Perotti, R.	This paper considers budget expansions and adjustments in OECD countries in the last three decades. They found out that different types of governments show different degrees of success at implementing successful fiscal adjustment.
1998	Alesina, Perotti, Tavares	They reexamined (using data from nineteen countries in the OECD) the economic and political effects of fiscal adjustments. Their results indicate that governments that are willing to "bite the bullet" and persist in certain types of fiscal adjustment, despite union opposition, are not systematically punished at the ballot box.
1998	Alesina, A., Ardagna, S.	The focus is to shed light on which features of fiscal adjustments are more or less likely to imply the fiscal tightening is expansionary or contractionary. The paper examines the evidence in OECD countries from the early sixties. They conclude in summary that the only solution is a sharp reduction in spending to GDP ratios of several points of GDP.
2002	Blanchard, O.J., Perotti, R.	This paper characterizes the dynamic effects of shocks in government spending and taxes on U.S. activity in the postwar period. It does so by using a mixed structural VAR/event study approach. The results consistently show positive government spending shocks as having a positive effect on output, and positive tax shocks as having a negative effect.
2005	Christopher, S.A., and David, L.B.	This paper examines the relationship between fiscal deficits and growth for a panel of 45 developing countries. The analysis suggests that while the impacts on the growth of taxes and grants are reasonably straightforward, the implications of the deficit is likely to be complex, depending on the financing mix and the outstanding debt stock.
2006	Szalkolcai, G.	The aim of this paper is to show that the analysis of the twin deficit, the deficit of the current account and the state budget must be extended to the notion and analysis of the triple deficit, the same two deficits and the deficit of insufficiency of domestic savings. The result is contradictory to the common view that all problems are the consequences of state overspending and all of them can be solved by reducing the budget deficit and by cutting state expenditures.

YEAR	AUTHOR	RESULTS
2010	Alesina and Ardagna	They examined the evidence on episodes of large stances in fiscal policy, both in cases of fiscal stimuli and in that of fiscal adjustments in OECD countries from 1970-2007. They confirm with the regression analysis that also, adjustments on the spending side rather than on than tax side are less likely to create recessions.
2010	Alfonso, A.	Using alternative approaches to determine fiscal episodes (EU-15, period 1970-2005) they assess expansionary fiscal consolidations in Europe, via panel models for private consumption. They conclude that there is some concurring evidence for several budgetary spending items while the asymmetric effects of fiscal episodes do not seem to be corroborated by the results.
2010	Romer and Romer	The paper investigates the impact of tax changes on economic activity. The behavior of output following these more exogenous changes indicates that tax increases are highly contractionary.
2011	Sever et.al.	The objective of this paper is to analyze the relationship between government budget spending and the effect on the growth and structure of the GDP of Croatia during the past two decades. The main result showed (VAR analysis) that the structure of expenditures is essential for the effects of budgetary spending on economic growth. The reduction of capital expenditure reduces the growth of the economy in the long and short run.
2012	Zezza, G.	Paper presents a framework to assess the impact of fiscal austerity in the Euro area, as a response to the turmoil in the financial markets. Their analysis suggests that fiscal austerity in the presence of large public deficit will have strong implications for redistributing income from taxpayers to the owners of such debt, who are likely to save a larger share of their disposable income.
2012	Auerbach and and Gorodnichenko	A key issue in current research and policy is the size of fiscal multipliers when the economy is in recession. Using regime - switching models, they find large differences in the size of spending multipliers in recessions and expansions with fiscal policy being considerably more effective in recessions than in expansions.

YEAR	AUTHOR	RESULTS
2014	Šimović et al.	This paper analyzes the possibilities and limitations of fiscal policy in Croatia. For this purpose, they have been developed a structural VAR model. Further fiscal policy possibilities are synthesized through the proposed measures of so-called " smart fiscal consolidation."
2014	Matsaganis and Leventi	This paper (using a microsimulation model) assesses the distributional implications of the crisis in Greece, Spain, Italy and Portugal from 2009 to 2013. They find out that austerity has affected the capacity of welfare states to protect those affected.
2014	Bilbao-Ubillos, J., Fernandez-Sainz, A.I.	The article seeks to compare the significance of the links between fiscal policies and economic growth in the Eurozone before and after the imposition of adjustments. The results of regression could serve to accept the hypothesis that the impact of austerity policies has shrunk economic activity more than expected.
2014	Radulescu, M. Druica, E.	Using linear regression, this article presents the impact of the fiscal and monetary policies on attracting the foreign direct investments (FDIs) in Romania, based on monthly data series during 2000-2010. Fiscal factors (mainly direct taxes) seem to play a less important role, being relevant only in the long-term. Only by improving the other non-financial factors fiscal stimulus can be effective in attracting FDIs and supporting the economic growth at the same time.
2014	Shakina, E., Barajas, A.	This study investigates factors of corporate success over the crisis period 2008-2009. Regression analysis showed that investment restriction is not the best response to an economic recession.
2014	Caporale, G.M., Škare, M.	The paper analyses the linkages between output growth, inflation and employment growth for 119 countries over the period 1970-2008 using a panel VAR approach. It shows the existence of statistically significant relationships as well as heterogeneity across countries and panels.

Source: Author

3. DATA ANALYSIS

This chapter presents a framework to assess the analysis of austerity policy for 10 EU countries[1] in the period after a global financial crisis.

Namely, because of the problem of high public debt (especially countries which have exceeded the threshold value of 60 percent of GDP) and contraction in GDP growth rate, most governments are at the crossroad between a policy of fiscal stimulus (that should promote employment) or fiscal adjustment.

While most of the developed countries have been using first options, the weaker member states to reduce high debt promote the sharp cuts policy- fiscal austerity. However, the problem is that the same weak national economies which should promote politics of austerity have still a problem with the deficit reduction and high public debt and at the same time major problem with unemployment, poverty, and inequality.

Table 3.: Government finance statistics

Countries	Indicators	2009	2010	2011	2012	2013	2014
Portugal	Real GDP growth rate-volume	-3	1,9	-1,8	-3,3	-1,4	0,9
	Total general government revenue (% of GDP)	40,4	40,6	42,6	43	45,2	/
	Total general government expenditure (% of GDP)	50,2	51,8	50,0	48,5	50,1	/
	Government deficit (net lending (+)/net borrowing (-) (% of GDP)	-9,8	-11,2	-7,4	-5,5	-4,9	/
	General government gross debt (% of GDP)	83,6	96,2	111,1	124,8	128	/
Italy	Real GDP growth rate-volume	-5,5	1,7	0,6	-2,8	-1,7	-0,4
	Total general government revenue (% of GDP)	45,9	45,6	45,6	47,4	47,7	/
	Total general government expenditure (% of GDP)	51,1	49,9	49,1	50,4	50,5	/
	Government deficit (net lending (+)/net borrowing (-) (% of GDP)	-5,2	-4,3	-3,5	-3	-2,8	/

1 The countries included in the paper are the following: Portugal, Italy, Greece, Spain, Latvia, Lithuania, UK, Croatia, Estonia, Germany.

Countries	Indicators	2009	2010	2011	2012	2013	2014
	General government gross debt (% of GDP)	112,5	115,3	116,4	122,2	127,9	/
Greece	Real GDP growth rate-volume	-4,4	-5,4	-8,9	-6,6	-3,9	0,8
	Total general government revenue (% of GDP)	38,7	41	43,6	45,2	47	/
	Total general government expenditure (% of GDP)	54,0	52,1	53,7	53,8	59,2	/
	Government deficit (net lending (+)/net borrowing (-) (% of GDP)	-15,3	-11,1	-10,1	-8,6	-12,2	/
	General government gross debt (% of GDP)	126,8	14,6	171,3	156,9	174,9	/
Spain	Real GDP growth rate-volume	-3,6	0	-0,6	-2,1	-1,2	1,4
	Total general government revenue (% of GDP)	34,8	36,2	36	37	37,5	/
	Total general government expenditure (% of GDP)	45,8	45,6	45,4	47,3	44,3	/
	Government deficit (net lending (+)/net borrowing (-) (% of GDP)	-11	-9,4	-9,4	-10,3	-6,8	/
	General government gross debt (% of GDP)	52,7	60,1	69,2	84,4	92,1	/
Latvia	Real GDP growth rate-volume	-14,2	-2,9	5	4,8	4,2	2,4
	Total general government revenue (% of GDP)	34,5	36	35,5	35,8	34,8	/
	Total general government expenditure (% of GDP)	43,4	44,2	38,9	36,6	35,7	/
	Government deficit (net lending (+)/net borrowing (-) (% of GDP)	-8,9	-8,2	-3,4	-0,8	-0,9	/
	General government gross debt (% of GDP)	36,4	46,8	42,7	40,9	38,2	/
Lithuania	Real GDP growth rate-volume	-14,8	1,6	6,1	3,8	3,3	2,9

Countries	Indicators	2009	2010	2011	2012	2013	2014
UK	Total general government revenue (% of GDP)	35,6	35,4	33,5	33	32,8	/
	Total general government expenditure (% of GDP)	44,9	42,3	42,5	36,1	35,5	/
	Government deficit (net lending (+)/net borrowing (-) (% of GDP)	-9,3	-6,9	-9	-3,1	-2,7	/
	General government gross debt (% of GDP)	29	36,3	37,3	39,9	39	/
	Real GDP growth rate-volume	-4,3	1,9	1,6	0,7	1,7	2,6
Croatia	Total general government revenue (% of GDP)	38,9	39	39,2	38,7	39,7	/
	Total general government expenditure (% of GDP)	49,7	48,6	46,8	47,0	45,5	/
	Government deficit (net lending (+)/net borrowing (-) (% of GDP)	-10,8	-9,6	-7,6	-8,3	-5,8	/
	General government gross debt (% of GDP)	65,9	76,4	81,9	85,8	87,2	/
	Real GDP growth rate-volume	-7,4	-1,7	-0,3	-2,2	-0,9	-0,4
Estonia	Total general government revenue (% of GDP)	41,2	40,8	40,6	41,3	41,8	/
	Total general government expenditure (% of GDP)	47,2	46,8	48,2	46,9	47,0	/
	Government deficit (net lending (+)/net borrowing (-) (% of GDP)	-6	-6	-7,6	-5,6	-5,2	/
	General government gross debt (% of GDP)	44,5	52,8	59,9	64,4	75,7	/
	Real GDP growth rate-volume	-14,7	2,5	8,3	4,7	1,6	2,1
	Total general government revenue (% of GDP)	/	40,6	39,1	39,5	38,4	/
	Total general government expenditure (% of GDP)	/	40.4	38,0	39,7	38,9	/

Countries	Indicators	2009	2010	2011	2012	2013	2014
Germany	Government deficit (net lending (+)/net borrowing (-) (% of GDP)	/	0,2	1,1	-0,2	-0,5	/
	General government gross debt (% of GDP)	/	6,5	6	9,7	10,1	/
	Real GDP growth rate-volume	-5,6	4,1	3,6	0,4	0,1	1,6
	Total general government revenue (% of GDP)	44.4	43,1	43,7	44,3	44.5	/
	Total general government expenditure (% of GDP)	47.4	47.9	45.2	44.7	44.3	/
	Government deficit (net lending (+)/net borrowing (-) (% of GDP)	-3	-4,8	-1,5	-0,4	0,2	/
	General government gross debt (% of GDP)	72.4	80,3	77,6	79	76,9	/

Source: Autors` systematization according to:Eurostat
Real GDP growth rate:
http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00115&plugin=1
Total general government revenue:
http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00021&plugin=1
Total general government expenditure: **http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=gov_10a_main&lang=en**
General government gross debt:
http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=teina225&plugin=1

From the Table 3. we can see that in 2013 countries exceeding the threshold value of 60 percent of GDP of general government gross debt (% of GDP) were: Portugal 128%, Italy 127,9%, Greece 174, 9%, Spain 92,1%, Croatia 75,7%, UK 87,2%, and Germany 76,9%. In contrast, there are countries like Latvia reaching 38,2%, Lithuania 39%, Estonia 10,1%. Further, GDP growth rate in 2013 in Portugal was -1,4, in Italy -1,7, Greece -3,9, Spain -1,2, Croatia -0,9, in contrast with Latvia 4,2, Lithuania 3,3, UK 1,7, Estonia 1,6, Germany 0,1.

To achieve a balanced budget and reduce debts, governments have implemented a policy of austerity neglecting the diversity of sectoral structures. The weak and negative growth rates point to the fundamental problem - the structure of the Eurozone. Due to different economy structure, countries have followed different paths to austerity.

Whole adjustment program has been bad for weaker countries, which already facing with the downturn in the economy. Finally, the impact of austerity has been exacerbated and did not solve the problem with the deficit.

For example, in 2013 Portugal reached deficit of -4,9%, Greece -12,2%, Spain -6,8, Croatia -5,2%. It is worth noticing that countries like the UK also had a high deficit, but also positive GDP growth rate (because of the different structure of deficit and deficit financing).

It is critical to highlight that the magnitude of payment depends on how the deficit is financed and under what conditions (interest rates, repayment period, borrowing abroad or domestically) and for what it is used.

Also, negative growth rates in GDP growth during the period 2009-2014 was also associated with the structure of demand which negatively contributed to growth (see table 4).

Table 4.: World Development Indicators: Structure of demand

Countries	Indicators	2009	2010	2011	2012	2013	2014
Portugal	Final consumption expenditure of households and non-profit institutions serving	64,7	65,8	65,8	65,7	64,7	65,2
	Final consumption expenditure of general government	21,4	20,7	19,9	18,3	19	18,4
	Gross fixed capital formation (investment)	21,1	20,5	18,4	16,3	15,1	15
	Imports of goods and services (% GDP)	34,0	37,4	38,6	38,0	38,3	/
	Exports of goods and services (% of GDP)	27,1	29,9	34,3	37,3	39,3	/
Italy	Final consumption expenditure of households and non-profit institutions serving	60,7	61	61,5	61,6	60,8	60,8
	Final consumption expenditure of general government	20,6	20,4	19,6	19,6	19,6	19,5
	Gross fixed capital formation (investment)	20	19,9	19,6	18,3	17,4	16,8
	Imports of goods and services (% GDP)	23,1	27,1	28,6	27,4	26,3	/
	Exports of goods and services (% of GDP)	22,5	25,2	27	28,3	28,6	/
Greece	Final consumption expenditure of households and non-profit institutions serving	69,3	70	69,8	69,4	71,2	72
	Final consumption expenditure of general government	22,7	21,6	21,2	21,2	20	19,8

Countries	Indicators	2009	2010	2011	2012	2013	2014
Spain	Gross fixed capital formation (investment)	20,9	17,3	15,4	11,7	11.2	11,6
	Imports of goods and services (% GDP)	29,4	30,7	32,3	32,7	33,2	/
	Exports of goods and services (% of GDP)	19	22,1	25,5	28,8	30,3	/
	Final consumption expenditure of households and non-profit institutions serving	56,1	57,2	57,9	58,6	58,2	59
	Final consumption expenditure of general government	20,5	20,5	20,4	19,6	19,5	19,2
Latvia	Gross fixed capital formation (investment)	24,3	23	21,4	19,7	18,5	18,9
	Imports of goods and services (% GDP)	23,8	26,8	29	28,8	28,1	/
	Exports of goods and services (% of GDP)	22,7	25,5	28,8	30,3	31,6	/
	Final consumption expenditure of households and non-profit institutions serving	61,3	63,9	62,5	61,2	61,9	61,5
	Final consumption expenditure of general government	18,9	18,1	18,2	17,2	17,6	17,6
Lithuania	Gross fixed capital formation (investment)	22,5	19,1	22,1	25,2	23,3	23,2
	Imports of goods and services (% GDP)	45,4	55,2	62,7	/	/	/
	Exports of goods and services (% of GDP)	43,9	53,8	58,8	/	/	/
	Final consumption expenditure of households and non-profit institutions serving	68,1	64,1	62,5	62,6	62,8	63,9
	Final consumption expenditure of general government	21	19,7	18,2	17,3	16,8	17,1
	Gross fixed capital formation (investment)	17,9	16,9	18,4	17,3	18,2	19,2
	Imports of goods and services (% GDP)	55,7	68,8	78,6	/	/	/
	Exports of goods and services (% of GDP)	54,3	67,8	77,1	/	/	/

Countries	Indicators	2009	2010	2011	2012	2013	2014
UK	Final consumption expenditure of households and non-profit institutions serving	64,7	64,4	64,2	64,8	64,9	64,4
	Final consumption expenditure of general government	22,3	21,6	20,9	20,8	20,1	19,7
	Gross fixed capital formation (investment)	16,1	16,1	16,1	16,2	16,5	17
	Imports of goods and services (% GDP)	28,9	31,1	32,3	32,3	31,7	/
	Exports of goods and services (% of GDP)	27	28,7	30,9	30,2	29,8	/
Croatia	Final consumption expenditure of households and non-profit institutions serving	58,4	58,9	59,7	60,2	60,6	60,2
	Final consumption expenditure of general government	20,3	20,1	20,1	20,1	20	19,8
	Gross fixed capital formation (investment)	25,2	21,3	20,3	19,6	19,3	18,6
	Imports of goods and services (% GDP)	38,2	38,2	40,9	41,1	42,5	/
	Exports of goods and services (% of GDP)	34,5	37,7	40.4	41,6	42,9	/
Estonia	Final consumption expenditure of households and non-profit institutions serving	53,4	52,3	50,5	51,1	51,5	52,1
	Final consumption expenditure of general government	21	20,1	18,9	18,7	19,1	19,6
	Gross fixed capital formation (investment)	22,7	21,2	25,7	27	27,3	25,8
	Imports of goods and services (% GDP)	55,9	68,8	82,5	88,2	85,2	/
	Exports of goods and services (% of GDP)	60,8	75,1	86,1	88,3	86,1	
Germany	Final consumption expenditure of households and non-profit institutions serving households	57,3	56,1	55,8	56	55,9	55,3
	Final consumption expenditure of general government	19,6	19,2	18,7	19	19,3	19,3

Countries	Indicators	2009	2010	2011	2012	2013	2014
	Gross fixed capital formation (investment)	19,1	19,3	20,2	20	19,8	20
	Imports of goods and services (% GDP)	32,9	37,1	40	40	39,8	/
	Exports of goods and services (% of GDP)	37,8	42,3	44,8	45,9	45,6	/

Source: Final consumption expenditure of households and non-profit institutions serving households:
Eurostat: http://ec.europa.eu/eurostat/tgm/printTable.do?tab=table&plugin=1&language=en&pcode=tec00009&printPreview=true
Final consumption expenditure of general government:
http://ec.europa.eu/eurostat/tgm/printTable.do?tab=table&plugin=1&language=en&pcode=tec00010&printPreview=true
Gross fixed capital formation (investment):
http://ec.europa.eu/eurostat/tgm/printTable.do?tab=table&plugin=1&language=en&pcode=tec00011&printPreview=true
Imports of goods and services (% GDP): The World Bank:
http://data.worldbank.org/indicator/NE.IMP.GNFS.ZS
Exports of goods and services (% of GDP):
http://data.worldbank.org/indicator/NE.EXP.GNFS.ZS/countries

From the Table 4, it can be seen that structure of demand has a large contribution to economic growth. Also in countries like Estonia, UK, Latvia, Lithuania, Germany the rise in GDP growth, or the positive GDP growth during the period 2009-2014 was associated with a sharp surge in investment. Gross fixed capital formation in the period of 2009-2013 for Estonia was (22,7-27,3), UK(16,1-17), Latvia (22,5-23,3), Lithuania (17,9-18,2), Germany (19,1- 19,8).

In contrary countries like Portugal, Italy, Greece, Spain, Croatia, in the period of 2009-2013) had a negative GDP growth rate and decreasing trend in investments.

In the period of 2009-2013 Gross fixed capital formation (investment) in Portugal was (21,1-15,1), in Italy (20-17,4), Greece (20,9-11,6), Spain (24,3-18,9), Croatia (25,2-19,3).

It can be concluded that the reduction of capital expenditure especially during the recession it is not a solution for sustainable growth.

In the structure of aggregate demand in 2013, all countries except Estonia (the highest share in aggregate demand was the export of goods and services with 86,1%) recorded the highest share in final consumption expenditure of households and non-profit institutions serving. In 2013, the largest proportion in final consumption expenditure of households and non-profit institutions had Greece 71,2%, UK with 64,9%, Portugal 64,7%, in Italy 60,8%, Spain 58,2%, Latvia 61,9%, Lithuania 62,8%, Croatia 60,6%, Estonia 51,5%, Germany 55,9%.

Further, in the same period 2009-2013 because of politics of austerity, final consumption expenditure of general government decreased in all countries, while final consumption expenditure of households and nonprofit institutions just in few countries like; Lithuania, Estonia, Germany.

Shortly, the share of final consumption expenditure in general government decreased, and it can be seen dramatically decline in investment, due to it is very interesting that export it has not been decreased.

In the period 2009-2013 export has increased in Portugal (27,1-39,3%), Italy (22,5-28,6%), Greece (19-30,3%), Spain (22,7-31,6%), Latvia (43,9-58,8% in 2011), Lithuania (54,3-77,1% in 2011), UK (27-29,8%), Croatia (34,5-42,9%), Estonia (60,8-86,1%), Germany (37,8-45,6%).

It can be concluded that mechanism which links the balance of payment and government budget indicates a lack of tax revenue of public sector, which is offset mostly by borrowing abroad. Namely, the problem with the current deficit cannot be solved only by cutting the state expenditures and especially capital investment.

The following Table 5. indicates the most fundamental elements of the austerity open issues. It analyzes the social impact of fiscal austerity; unemployment, youth unemployment and poverty.

Table 5.: Basic socio-economic indicators for 2009-2013

Countries	Indicators	2009	2010	2011	2012	2013
Portugal	Unemployment rate (% of GDP)	9,1	11,8	13,4	15,8	17,7
	Unemployment, youth, total (% of total labor force ages 15-24) national estimate(WDI-2)	20	22,2	30	37,5	37,9
	At risk of poverty rate by poverty threshold age and sex	17,9	17,9	18	17,9	18,7
Italy	Unemployment rate (% of GDP)	7,8	8,4	8,4	10,7	12,2
	Unemployment, youth, total (% of total labor force ages 15-24) national estimate(WDI-2)	25,5	27,7	29,1	35,2	39,7
	At risk of poverty rate by poverty threshold age and sex	18,4	18,2	19,6	19,4	19,1
Greece	Unemployment rate (% of GDP)	9,5	12,5	17,7	24,2	27,3
	Unemployment, youth, total (% of total labor force ages 15-24) national estimate(WDI-2)	25,5	32,4	44,0	54,7	58,4
	At risk of poverty rate by poverty threshold age and sex	19,7	20,1	21,4	23,1	23,1
Spain	Unemployment rate (% of GDP)	18,1	20,2	21,7	25,2	26,6
	Unemployment, youth, total (% of total labor force ages 15-24) national estimate(WDI-2)	38,5	42,5	47,0	54,2	57,2
	At risk of poverty rate by poverty threshold age and sex	20,4	20,7	20,6	20,8	20,4
Latvia	Unemployment rate (% of GDP)	17,1	18,7	16,2	14,9	11,1
	Unemployment, youth, total (% of total labor force ages 15-24) national estimate(WDI-2)	33,9	34,9	31	28,2	20,2

Countries	Indicators	2009	2010	2011	2012	2013
	At risk of poverty rate by poverty threshold age and sex	26,4	20,9	19	19,2	19,4
Lithuania	Unemployment rate (% of GDP)	13,7	17,8	15,3	13,2	11,8
	Unemployment, youth, total (% of total labor force ages 15-24) national estimate(WDI-2)	29,2	35,2	32	26,2	21,8
	At risk of poverty rate by poverty threshold age and sex	20,3	20,5	19,2	18,6	20,6
UK	Unemployment rate (% of GDP)	7,8	7,9	7,8	8,0	7,5
	Unemployment, youth, total (% of total labor force ages 15-24) national estimate(WDI-2)	19,1	19,6	20,1	21,3	20,2
	At risk of poverty rate by poverty threshold age and sex	17,3	17,1	16,2	16	15,9
Croatia	Unemployment rate (% of GDP)	9,1	11,8	13,4	15,8	17,7
	Unemployment, youth, total (% of total labor force ages 15-24) national estimate(WDI-2)	25,7	33,5	36,5	44,0	51,5
	At risk of poverty rate by poverty threshold age and sex	17,9	20,6	20,9	20,4	19,5
Estonia	Unemployment rate (% of GDP)	13,8	16,9	12,5	10,1	8,8
	Unemployment, youth, total (% of total labor force ages 15-24) national estimate(WDI-2)	27,8	33,2	22,6	21	18,2
	At risk of poverty rate by poverty threshold age and sex	19,7	15,8	17,5	17,5	18,6
Germany	Unemployment rate (% of GDP)	7,7	7,1	5,9	5,4	5,3
	Unemployment, youth, total (% of total labor force ages 15-24) national estimate(WDI-2)	10,8	9,6	8,3	8,1	7,8
	At risk of poverty rate by poverty threshold age and sex	15,5	15,6	15,8	16,1	16,1

Source: Unemployment rate: http://data.worldbank.org/indicator/SL.UEM.TOTL.ZS?page=1
Unemployment, youth, total (% of total labor force ages 15-24) national estimate: (WDI-2) http://data.worldbank.org/data-catalog/world-development-indicators/
At risk of poverty rate: Eurostat (European Commission); http://ec.europa.eu/eurostat/statistics-explained/index.php/Income_distribution_statistics

Table 5. show that in the period of 2009-2013 most countries (because of fiscal austerity policy, accompanied with recession and slump in economic activity) increased unemployment, especially in youth unemployment, which influence negatively on social hardship and risk of poverty[2]. In the period of 2009-2013 unemployment rate was: Portugal (9,1-17,7), Italy (7,8-12,2), Greece (9,5-27,3), Spain (18,1-26,6), Croatia (9,1-17,7).

2 Poverty is measured by Indicator- Risk of poverty rate by poverty threshold age and sex (Eurostat). There are complications in establishing a nexus between fiscal austerity and poverty because of the difficulty in defining poverty.

The percentage of unemployment youth rate were even bigger. For example, in 2013 the highest unemployment youth rate was in Greece with 58,4%, Spain 57,2%, and Croatia 51,5%.

Other countries, with better financing and economic performance had a better result in employment and poverty also.

For example, in the period from 2009-2013 countries which decreased unemployment rate was: Latvia (17,1-11,1), Lithuania (13,7-11,8), UK (7,8-7,5), Estonia (7,8-7,5), Germany (7,7-5,3). The interesting fact is that the young unemployment rate in these countries was also higher. The most higher unemployment young rate was in Latvia and UK with (20,2%) and the smallest in Germany with 7,8%.

Finally, the progression on unemployment in the EU in the previous year has been remarkable and economic and social cost of fiscal adjustment has been very high.

The data analysis points to the problem of the structure of the Eurozone (significant variation in economy between the EU member states have followed a different path to austerity) and supporting the hypothesis that with eliminating the welfare state, we cannot achieve sustainable long time growth and decrease the deficit.

4. CONCLUSION

In most EU countries with shattered economy, with government debt still high and exceeding the threshold value of 60 percent of GDP, the big challenge in the future will be sustainable fiscal consolidation which supports long-term growth and employment as welfare state determinants.

Despite the ongoing debate and numerous studies, there is a lack of empirical investigation on the defining the methodology of austerity, especially in the social context. Due to no consensus about the implementation of fiscal austerity has been achieved. Therefore, until know, we do not have an answer to the questions when austerity is beneficial? Alternatively, "Should governments apply austerity despite their weak economies and diversity"?

The findings of these paper indicate that the important causes of deterioration of fiscal sustainability are neglecting the problem of diversity (structure of the Eurozone) and social implications for welfare. The main conclusion is that the emphasis should be placed on defining austerity methodology which will implement economic and social context.

The outcome of current research can serve as the basis for future research on the role of austerity in economic policy.

REFERENCES

Afonso, A., Expansionary fiscal consolidations in Europe: new evidence, Applied Economics Letters, Vol.17, (2010):105-109

Alesina, A. and Ardagna, S., Tales of Fiscal Adjustments, Economic Policy, 13 (27), (1998): 489-585

Alesina, A. Perotti, R., Tavares, J., The Political Economy of Fiscal Adjustments, Brookings Papers on Economic Activity, No.1, (1998): 197-266

Alesina, A., Ardagna, S., Large changes in fiscal policy: taxes versus spending, Tax Policy and the Economy, Vol.24. 2010.

Alesina, A., Ardagna, S., Large changes in fiscal policy: Taxes versus spending, Tax Policy and the Economy 24, (2010): 35-68

Alesina, A., Perotti, R., Fiscal expansions and adjustments in OECD countries, Economic Policy, Vol.21, (1995): 207-248

Antokakis, N. Collins, A., The impact of fiscal austerity on suicide: on the empirics of a modern Greek tragedy, Social Science and Medicine 112, (2014): 39-50

Arestis, P., Fiscal policy is Still an Effective Instrument of Macroeconomic Policy, Panoeconomicus, 58(2), (2011): 143-156

Arestis, P., Fiscal policy: a strong macroeconomic role, Review of Keynesian Economics, Innaugural Issue, (2012): 93-108

Arestis, P., Pelagidis, T., Absurd Austerity Policies in Europe, Challenge, Vol.53:6, (2010): 54-61

Auerbach, A. J. and Gorodnichenko, Y., Measuring the Output Responses to Fiscal Policy, American Economic Journal, Economic Policy, Vol.4, (2012): 1-27

Bilbao-Ubillos, J., Fernandez-Sainz, A.I., The impact of austerity policies in the Eurozone: fiscal multipliers and adjustment fatigue, Applied Economics Letters, Vol.21:14, (2014): 955-959

Blanchard, O.J., Perotti, R., *"An Empirical Investigation of the Dynamic Effects of Changes in Government Spending and Revenues on Output"*, Quarterly Journal of Economics, (2002): 1329-1368

Blyth, M., Austerity: The History of a dangerous idea, Oxford University Press, USA, 2013.

Branas, C.C. Kastanaki, A.E. , Michalodimitrakis, M., Tzougas, J., Kranioti, E.F. , Theodorakis, P.N., Carr, B.G. and Wiebe, D.J. *"The Impact of Economic austerity and prosperity events on suicide in Greece,* A30-Year Interrupted Time- Series- Analysis" (2015). BMJ open, DOI:10.1136/bmjopen-2014-005619.

Calcagno, A., Can austerity work? Review of Keynesian Economics, Inaugural Issue, (2012): 24-36

Caporale, G.M., Škare, M., Testing the linkages between output growth, inflation and employment growth: evidence from a panel vector autoregression, Transformations in Business and Economics, Vol.13, No.2 (32), (2014): 42-59

Caporale, G.M., Skare, S., Testing the linkages between output growth, inflation and employment growth: evidence from a panel vector autoregression, Transformation in Business and Economics, Vol.13, No.2 (32), (2014): 42-59

Chang, H.J., 23 Things they don't tell you about the capitalism, Penguin Group, England, 2011-

Christopher, S., Adam, D.L. , David, L. Bevan, Fiscal deficits and growth in developing countries", Journal of Public Economics 89 (2005): 571-597

Crotty, J., The great austerity war: what caused the US deficit crisis and who should pay to fix it? Cambridge Journal of Economics, Vol.36, Issue 1, (2012): 79-104

Dietrich, D., Knedlik, T., Lindner, A., Central and Eastern European countries in the global financial crisis: a typical twin crisis?, Post-Communist Economies, Vol.23, No.4, (2011): 415-432

Dunn, S., Was Galbraith Right? The Great Crash, 2008, and Galbraith' s Prescience, Challenge, Vol.54, Issue 6, (2011): 41-60

Edminston, D., The Age of Austerity: Contesting the Ethical Basis and Financial Sustainability of Welfare Reform in Europe, Journal of Contemporary European Studies, Vol.22, No.2, (2014): 118-131

Fontana, G. , Sawyer, M., Fiscal Austerity, Challenge, Vol. 54:2, (2011): 42-60

Galbraith, J.K., The end of Normal, New York, Simon and Shuster, 2014.

Hannsgen, G., Papadimitrou, D.B., Fiscal traps and macro policy after the Eurozone crisis, Public Policy Brief, No.127, 2012.

Hein, E. and Truger, A., Fiscal Policy and Rebalancing in the Euro Area: A Critique of the German Debt Brake from a Post-Keynesian Perspective, Vol.1, Special Issue, (2014): 21-38

Jayadev, A., Konczal, M., When is Austerity Right? In Boom, Not Bust, Challenge, Vol.53:6, (2010): 37-53

Jurčić, Lj., Hrvatska-oporavak ili stagnacija, Ekonomski pregled 64(6), (2013): 671-680

Kitromilides, Y., Deficit reduction, the age of austerity, and the paradox of insolvency, Journal of Post Keynesian Economics, Vol.33:3,(2011): 517-536

Kitson, M, Martin, R., Tyler, P., The geographies of austerity, Cambridge Journal of Regions, Economy and Society, Vol4(3), (2011): 289-302

Konzelmann, S. J., The Economics of Austerity, Centre for Business Research, University of Cambridge, Working Paper No. 434, 2012.

Krugman, P., End This Depression Now, N.Y. London, W.W. Norton and Company, 2012.

Matsaganis, M., Leventi, C., The Distributional Impact of Austerity and the Recession in Southern Europe, South European Society and Politics, Vol.19, No. 3, (2014): 393-412

Mc Kee, M. Karanikolos, M, Belcher, P, Stuckler, D., Austerity: a failed experiment on the people of Europe, Vol.12, no.4, (2012): 346-350

Minsky, H.P., Stabilizing an Unstable Economy, MacGraw Hill, 2008.

Mosley, P. et.al., The Politics of Poverty Reduction, Oxford University Press, Oxford, 2011.

Noell, E.S., Smith, S.L.S., Webb, B.G., Economic Growth, Unleashing the potential of human flourishing, AEI Press, Washington, D.C., 2013.

Overmans, J.F.A., Noordegraaf, M., Managing austerity: rhetorical and real responses to fiscal stress in local government, Public Money and Management, Vol. 34:2, (2014): 99-106

Palley, T., Europe's financial crisis, in Bresser-Pereira, L.C., Kregel, J., Burlamaqui, L. (2014), Financial Stability and Growth, London and New York, Routledge Taylor and Francis Group, (2014): 100 - 105

Partridge, M., Weinstein, A.L., Rising Inequality in an Era of Austerity: The Case of the US, European Planning Studies, Vol.21, No.3, (2013): 388-410

Perotti, R., Fiscal Consolidation in Europe, Composition Matters, The American Economic Review, Vol.86, No.2, Papers and Proceedings of the Hundredth and Eighth Annual Meeting of the American

Economic Association San Francisco, CA, (1996): 105-110

Pollin, R., Austerity is Not a Solution, Challenge, Vol.53:6, (2010): 6-36

Radulescu, M., Druica, E., The impact of fiscal policy on foreign direct investments. Empiric evidence from Romania, Economic Research, Vol.27, No.1, (2014): 86-106

Romer, C., Fiscal Policy in the Crisis: Lessons and Policy Implications, University of California, Berkley, Department of Economics, 2012.

Romer, C.D. and Romer, D.H., The macroeconomic effects of tax changes estimates based on a new measure of fiscal shocks, American Economic Review, vol.100, no.3, (2010): 763-801

Sever,I., Drezgić S., Blažić H., Budget spending and economic growth in Croatia, Zbornik radova Ekonomski Fakultet Rijeka, Vol.29, sv.2, (2011): 291-331

Shakina, E., Barajas, A., The dynamic of intellectual resources during the economic crisis, Economic Research, Vol.27, No.1, (2014): 861-881

Šimović, H., Ćorić, T., Deskar-Škrbić, M. (2014), Mogućnosti i ograničenja fiskalne politike u Hrvatskoj, Ekonomski pregled 65 (6), (2014): 541-575

Škare, M., Pržiklas Družeta, R., Fiscal Austerity Versus Growth in Croatia, Contemporary Economics, Vol.9, No.1, (2015): 77-92

Stiglitz, J., The Price of Inequality, New York, London, W.W. Norton and Company, 2013.

Štreimikiene, D., Baležentis, A., Integrated sustainability index: The case study of Lithuania, Intelectual Economics, Vol7, No.3 (17), (2013):289-303

Stuckler, D., Basu, S., The Body Economic: Why Austerity Kills, London, Basic Books, 2013.

Szalkolcai, G., The triple deficit of Hungary, Hungarian Statistical review, Vol.10. (2006): 40-62

Zavadskas, K.A., Kelpsiene, A.B.L., Kutut, D.B.V., Conceptual modeling of construction and real estate crisis with emphasis on comparative qualitative aspects description, Transformation in Business and Economics, Vol.9, No1 (19), (2010): 42-61

Zezza, G., The impact of fiscal austerity in the Eurozone, Review of Keynesian Economics, Inaugural Issue, (2012): 37-54

http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00115&plugin=1

http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00021&plugin=1

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=gov_10a_main&lang=en

http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=teina225&plugin=1

http://ec.europa.eu/eurostat/tgm/printTable.do?tab=table&plugin=1&language=en&pcode=tec00009&printPreview=true

http://ec.europa.eu/eurostat/tgm/printTable.do?tab=table&plugin=1&language=en&pcode=tec00010&printPreview=true

http://ec.europa.eu/eurostat/tgm/printTable.do?tab=table&plugin=1&language=en&pcode=tec00011&printPreview=true

http://data.worldbank.org/indicator/NE.IMP.GNFS.ZS

http://data.worldbank.org/indicator/NE.EXP.GNFS.ZS/countries

http://data.worldbank.org/indicator/SL.UEM.TOTL.ZS?page=1

http://data.worldbank.org/data-catalog/world-development-indicators/

http://ec.europa.eu/eurostat/statistics-explained/index.php/Income_distribution_statistics

INTERDISCIPLINARY APPROACH TO NEURAL NOISE AND PERCEPTION BIAS IN FINANCIAL DECISION MAKING

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ABSTRACT

The general goal of the interdisciplinary work refers to the research of complex experimental interactions and theoretical works on the subject of neural mechanisms in the perception of decision making; economic and perceptual decision making; high and low volatility bias of the investors perception, and the perception bias during the duration of the stimuli, according to the theory of subsequent effect. The work shows the complex interweaving of scientific achievements in the process of decision making. The given scientific and applicative research leads us towards understanding the levels of complexity of financial decision making with the principles of universality; spatial and temporal fluctuations of input in perceptual decision making (perception can be under the influence of attention and can surface subconsciously without conscious consciousness), possible extending of current results and models from two alternative choices and are they different in respect to spatial and temporal fluctuations (our capability of deciding can result from random fluctuations in the background of electric noise in the brain) effects on the results of decision making. The focus of this research paper is the analysis of testing the perception of investors which shows us the subsequent effect of volatility, which further indicates the twisted perception after prolonged exposure to extreme levels of volatility. This established framework can give us key insight in the domain of deductive reasoning. Bias in deductions is questioned using the VIX index

Key words:
Neural noise, Subsequent effect, Perceptual bias in decision making, Neuroeconomics, Neurofinance

1. INTRODUCTION

The interdisciplinary approach of the work to stand in a broader context to summarize the impact of the neural noise, perception bias and subsequent effect through contributions to neurophysiology / neuroscience as a center of research in understanding the research reaching the limits of separate items. Understanding outside the own discipline of science is a necessity. Despite today's information flow between disciplines scientific necessity lags (Gigerenzer / Selten, 2001). Our chosen approach interaction neurophysiology / neuroscience and neuroeconomics / neurofinance incentive review and continuation of further research. Of course this is not to be confused with scientific imperialism. The existence of controversy, in particular it relates to the economy and finance, where the human factor plays a significant role, despite the application of sophisticated technology, it is human nature unpredictable and unreliable. The question is how to build economic models on them, which are meaningful and coherent.

The aim was to investigate the effect of neural noise and perception bias of investors and the appearance of the subsequent effect through setting research questions; the extent to which the volatility of perception affects the decisions of investors and the extent to which we can summarize bias perception in the VIX index and in this context to explain the concept of volatility? The subject of research is the perception of investors showing subsequent effect volatility. McFadden (1999) points to the ubiquity of the perception of bias and should be respected as it explains many anomalies in behavior, and the history and past experience is more important in determining perception than what is allowed in traditional models. In the wake of McFadden analyze the latest research on the impact of the volatility of perception and distortion of asset prices. Research in the field of neurophysiology show that after long exposure to stimulus, perception bias creates the illusion of the opposite impulse. This bias subsequent effect illustrate documented research authors from Hurvich and Jameson, 1957, Barlow and Hill, 1963, Webster, Kapping, Mizokami and Duhamel, 2004 Rutherford, Chattha and Krysko, 2008. Subsequent effects occur within different time periods, a occur within a few seconds while others have a daily or monthly horizons (Delahunt, Webster, MA, Werner, 2004; Webster, McDermott and Bebis, 2007. from a theoretical point of Woodford, 2012, formally shows that the phenomenon of post-effect functions and values highlighted by Prospect theory (Kahneman and Tversky, 1979) which ultimately results in neural adaptation, the mechanism by which the brain increases the accuracy of perception subject to the limitations of processing capacity information.

Conducted testing (experimental work) perception of investors in the laboratory Payzan-Lenestour, Ballein, Berrada and Pearson (2014) shows the appearance of the subsequent effects that distort the perception of volatility using the VIX measures in shares of the S & P500. VIX is often called the fear index or the fear gauge. VIX

represents a measure of market expectations of volatility in the stock market during the next 30 days, which proves perceptual anomalies in the period volatility regime. Testing was conducted through a computer task designed to Bloomberg terminal displaying participant time series representing trajectories market index over a year on a daily frequency with reference to the perceived volatility of each trajectories. Results showed that the volatility trajectory always been 10%. But the perception of the participants was systematically varied from 10%. Perceived volatility is 32% higher after the extension (50 seconds) exposure to low volatility trajectory (2%), but after prolonged exposure to high volatility (45%) trajaktorija. Thus, the test is shown volatility subsequent effect that distorts the perception of volatility.

In assessing the realized volatility of assessors was used several times a coordinate grid (Zhang, Mykland and Ait-Sahalie, 2005) that provides a compromise between accuracy and simplicity. Low frequency evaluator is more accurate than Andersen, Bolersleve, Diaboldne and Labysove (2000) whose implementation is relatively simple. Empirical analyzes indicate nuanced prediction subsequent effect, therefore the perception of bias becomes stronger when exposed to stimuli very high / very low volatility. The perception of bias is having certain well-defined properties when they come to the sensory organs, but they are transduced and transmitted along paths that have multiples of synaptic workstations were also stronger when the stimulus intensity, and after more extreme levels of volatility. In accordance with the subsequent effect, the conducted research results showed no perception of bias threatening jumps in volatility that are not preceded by long-term exposure to very high / very low volatility, though you leaps comparable in magnitude to those that induce subsequent effect.

2. SCIENTIFIC AND THEORETICAL BACKGROUND

Explaining the occurrence of subsequent effect / theory of opponents process (Hurvich and Jameson, 1957 Hering, 1964 Griggs, 2009), evokes antagonistic association between pairs of neurons coding for an alternative presentation of incentives; for example, selective movement of the neurons encoding upwardly relative to downward, facial selective neuronal pairs encoding for happiness in regard to the expression of sad faces or male/ female traits. Subsequent effect arises from an imbalance between the characteristics of selective pairs of neurons. The application of the subsequent effects in the context of finance is based on the postulate of investor's perception of volatility, in a broader sense the volatility of time series as well as the variance of sequence numbers that include the variability pair of selective neurons. After long-term exposure to low levels of volatility, neurons signal low volatility, which will show the relative base activity compared to neurons that are encoded, looking for high volatility. The theory predicts biased perception of volatility.

Numerous studies in physiology, statistics, and behavioral tools enabled neuroscientists to establish strong ties between the behavior of individual neurons and perceptive experience. Development tools allowed us insights into the neural mechanisms of decision-making. Many decisions have significant biological and social effects, while others may have a more limited impact on our daily lives. Neural mechanisms of decision-making are an important subject of research in the field of cognitive and behavioral neuroscience. Studies include sensory discrimination tasks using visual movements that give a wealth of information about the nature of neural networks required to perform perceptual decision-making (Shadlen MN, 2007, Shalden MN Kiani, R. 2011. Salden MN, Newsome N.T, 1994).

At the core of decision-making are fundamental four processes of computation that are central to understanding the neural substrate of decision-making: the accumulation of evidence, forming a categorical choice, reward-based adaptation and stochastic properties of choice behavior (Wang, 2008). The question is why do we make incorrect decisions? The answer comes from the fact that the decision-making process is noisy (Knill and Pouget, 2004), indicating uncertainty. The noise in the nervous system can have multiple sources (Faisal et al., 2008), however uncertainty in making categorical decisions usually comes from the outside world or from internal insecurity. As the uncertainty in the overall decision-making process, it is assumed that the nervous system has a computer strategy and certain circles calculate the amount of uncertainty in the decision and take advantage of the calculation of the optimal motor and adjust behavior (Drugoeitsch et al., 2012, Cording, 2007). The natural environment is complex; one choice may bring more outcomes.

Perceptual decision making is one of the most important tasks performed by the brain. The brain has developed a sophisticated and fast decision-making mechanism from the outside world. Physical stimuli information may be delayed, or distort under the influence of down, efferent activity. The accumulation of these effects is the internal noise (Green DM, and includes stochastic nature of neuronal firing, the internal state of the organism (excited) or changes in attention. Percept or internal stimuli presented are imperfect representations of physical stimuli, and physical identical stimulation can cause variable perceptions. The mechanism decision-making must act on perceptual evidence available to achieve the objectives of the body. When the stimuli are at the upper limit, the behavioral decisions accurately reflect the characteristics of physical stimuli. The accuracy of the internal representation reduces the threshold by an external signal becomes weak. As the relative contributions of internal generation of noise increases the perception of decision-prone error.

The human brain has about 100 billion neurons, each of which sends thousands of signals every second other neurons. Understanding how neurons work individually or collectively it is important to know not only in the treatment of various diseases, but also in how financial decisions are made. Noise can be described as any change in neural activity in a way that does not depend on a task that the brain wants

to achieve (Xaq Pitkow, Rice University, Houston, Texas, 2015). Not only are neuronal responses noisy, but each neural noise is correlated with the noise in thousands of other neurons. This means that something that affects the output of one neuron that can be amplified to affect many others. These correlations are great difficulties to scientists in modeling small group of neurons in a way that will affect the person to reacts to a stimulus. Noise, a group activity of neurons in multiple brain regions are the base of making decisions. In the case of perceptual decision making, accumulation of the evidence over long periods could be achieved with relatively short memory properties. For example, discrimination movement in the dot task proves the direct direction of the field movement random dots with low coherence and a one-way and direct accumulation in a few seconds. In contrast, neurons that could be responsible for the variability in the time periods of several tens of milliseconds, indicating a kind of circle-type mechanism that could be the basis of accumulation.

Understanding bias seeks answers how fast the brain makes judgments, which are patterns that create assumptions and whether the brain self-adjust and correct our thoughts. Answers lie in the study of neural pathways that may offer clues to reduce prejudice and its effects. Neuroscientific research on neural foundations of bias and stereotypes are trying to identify how bias formed and affect behavior and how they can be regulated. The complex research process supports networks of neural structures in several regions of the brain. Perceptual decisions based on sensory information. They are a simple and frequency types of decisions that have been exposed by the people (Palmer, 1997), monkeys (Schall, 2003), rat (Kepecs et al., 2008), mice (Harvey, et al., 2012) and Drosophila (Zhang et al., 2007). So this is the beginning of the process of understanding the neural mechanisms that are specifically aimed at the behavioral origin. Even a simple behavior depends on the coordinated efforts across different areas of the brain. Different areas of the brain can implement various budgets or the same calculations can be arranged in various fields. Well, within a small area of the cortex different neurons have different morphology, connectivity patterns and properties of response depends on the position within the local micro-circuits. Therefore, within an area of the cortex different neuronal populations can implement a variety of budgets. At any given point of time, the external environment is a great unknown and performance requirements, which are based on a noisy sensory inputs. The behavior depends on the ability of fast and accurate decision-making between state process known as perceptual decision making (PDM; von Helmhotz, 1925, Tenenbaum and Griffths, 2001, Shalden and Newsome, 2001, Gold and Shalden, 2007). Various factors must be taken into account before making a decision. Decision-making variables represent the sum of the multiple choices of information (such as previous history, current emotional state, quantity and quality of available evidence, the value of each choice) and proper decision-making determines how and when the variable decision interpreted the arrival of a particular choice (Gold and Shalden, 2007) . Between the economy and perceptive

decision making, there is a visible defect in studies being conducted (Summerfield and Tsetsos, 2012, 2015). Example accumulation process perceptive decision can be explained by the dynamics of simple economic decisions (Krajbich and Rangel, 2011; Tsetos et al, 2012, Polania et al, 2014). While, robust biased decision-making in the context of the economic effect it was only recently discovered in perceptual decision making (Trueblood et al, 2013).

Financial decision-making is a complex area which is approached from different perspectives including comparisons of different scenarios and assessment of the perceived outcomes, different perspectives in multiple coordinate systems, allows us a deeper level of understanding of financial decisions, as well as insights that will change the way in time. The decision is the selection of the proposal or plan and the decision-making process includes the steps that lead to commitments that are often referred to deliberations among the options. Most decisions based on a variety of factors: prior knowledge regarding the relative value of the options, expected costs and rewards associated with a matrix of possible decisions and their outcomes, and other costs related to the collection of evidence (for example the cost of the elapsed time). As a rule, decision-making has a beginning and an end. For perceptual decisions, many complex factors are manifested in and through the personal perception that can be major obstacles in any decision-making process. The perception of bias seeks to disrupt lucid monitoring of the problem by introducing externalities which generally are not relevant to the decision; however, an individual can be biased by various factors structured prejudices.

3. THE METHODOLOGICAL FRAMEWORK OF RESEARCHING OBJECTIVES

The model is set up based on the detection of the regime volatility that induces subsequent effect. This framework can provide important insights into the domain of deductive reasoning. Belief bias in concluding examined by the VIX index. Deductive reasoning, we set up research framework emergence of subsequent effect that distorts market volatility index VIX.

A technical explanation of the volatility index (VIX) is a weighted measure that implies volatility to set up a real-time $ SPX and call options. Setting the calls are weighted according to the remaining time and the degree to which they are in or out of the money. From this he created a hypothetical option in cash with 30 days expiry period. In this way they are trying to set the value equal to the amount of dollars the current value of $ PX. This means that the VIX actually represents the implied volatility of a hypothetical option of setting / call $ SPX cash option value. In short VIX is a key measure of market expectations in the short term. VIX considered valuable barometer of investor sentiment and volatility. Many say that the VIX implied volatility, but it is very important to know that the VIX moves in the time of uncertainty and fear

and down in time greed and trust. Since the VIX moves in the opposite direction of the market it is possible to find out the expectations for the upcoming market trends by watching what happens to the VIX

Consideration empirical strategy allows measures VIX contains information on the perception of volatility investors through a model that incorporates the potential for bias in perception, because the theory subsequent effect gives clear guidance on the nature of prejudice and prediction that the focus of empirical research (Elise Payzan-Lenestour, Lionnel Pradier and Talis J. Putnins, 2015). Their tests show changes in the VIX when switching from a state or very high or very low volatility to the state of neutral volatility (neither high nor low). VIX found changes in the test cannot be attributed to changes in either the foundation or levels of risk aversion but is attributable to the effect of the subsequent effect. By inserting the subsequent effect as core attribution perception volatility through designed model provides scientific guidelines that are important for a deeper understanding of the economics and finance or space further study taking into account the scientific advances in neuroscience / quantum genetics, because regardless of the established models, they have to be rich and focus our thoughts and replace coherent approaches, many of the more remote areas of the current model, if we target a deep understanding of complex relationships, because the decision-maker is a mesh network of external and internal factors that are important for a comprehensive approach to understanding, however piecemeal approach regardless of the well-designed research undermines depth of market volatility.

Often economists cost assets are used together with models of determination by performing financial expectations. For example; Finance economists use federal funds future price for the measurement of expected interest rates (Krueger and Kuttner, 1995; Pakko and Wheelock, 1996). Similarly, much of the literature on fixed and target zones exchange rates used to measure the credibility of the exchange rate regime or predictions of their collapse (Svensson, 1991; Rose and Svensson, 1991, 1993; Neely, 1994). However helps measure of uncertainty associated with future property prices and their expectations. Since asset prices depend on the perceived volatility of the underlying assets, they can be used to quantify the expected volatility of asset prices (Zlatan and Rendleman, 1976).

The implied volatility requires assumptions about the statistical procedure governing. Changing the volatility in the market is a signal of change in the perception of risk participants in the movement of stock prices. The theme of the volatility is the subject of much scientific research. Many scientists observed changes in overall market volatility over time (Schwert, 1989, 1998), work Campbbelya et al (2001), locating idiosyncratic risk has increased over time (at company level) or the aggregate volatility remained stable from 1926 to 1997. Measuring volatility in various studies that were based on the standard deviation (Schwert, 1998) or the modified forms of the standard deviation (Schwert, Stambaugh, 1987) basically are based on realized

volatility. However, the VIX and VXO are options that imply volatility, so they give us a chance to look at the market volatility from the perspective of the future.

Indicative research backing the understanding of the meaning of changes in volatility in the works Granger and Ding (1996), Lobatto and Savin (1998); Diebold and Inoue (2001); Granger and Hyung (2004), however, though all of these studies go beyond focusing influence subsequent effect on asset prices leading to distortions of the VIX, as the perception of the average individual may be distorted, however sophisticated knowledge can enable visibility distortion.

Uncertainty is one of the most important changes facing companies in the financial area. This situation could have an impact on the variability of reported current income that reduces the ability of income anticipated future income. So volatility affects the empirical projections of future income to assess the company and the capital value to be analyzed.

Everyday life requires taking a series of decisions, be they large or small. Some are simple choices while complex elections seeking systematic approaches to decision making. The assessment of the existence and extent of the tendency of investors who are facing at the time of decision making leads us into the behavior biases as sample variations in judgment that occurs in certain situations which can sometimes lead to perceptual changes, incorrect judgments, illogical interpretation or irrationality.

Behaviors of investors sometimes are contrary to logic and reason whereby we have indicators of many prejudices that affect the decision-making process on investments. Emotional processes, mental errors, individual personality complicate financial decision-making, analysis of numbers, for the purchase of shares and other securities. Ignoring or inability to understand the perception of bias in decision-making can have an adverse effect on the performance of the portfolio. Behavior bias includes many species. So cognitive bias refers to the tendency to think and act in a certain way. Cognitive bias can be seen as rules or heuristics, which can lead to systematic deviations from the standard of rationality or until valid judgment. There is controversy whether some of the prejudices or irrational they result in useful positions behavior. Emotional bias results in feelings rather than facts, in fact there is some overlap between cognitive and emotional bias, and it is called the bias behavior. It is important knowledge and skills and awareness to avoid bias. Baker and Novsfinger (2002, 2010), Ricciardi (2008) Shares (2013), Parker (2013) and Seawright (2012) show us the behavior of investors and bias in the behavior and how to deal with bias. Representativeness; means investment as good or bad. A disposition effect; closely related to the aversion. Familiarity bias; overcoming the bias implies that investors spread their decisions on profit distribution expanding the portfolio diversification and risk reduction. Concerns; is linked to the fear of loss. Anchoring; occurs when an individual controls their cognitive decision-making process. Biased self-attribution; successful results are attributed to their own works, while poor results are attributed to external factors.

4. CONCLUSION

The interdisciplinary approach involves setting neuroscience and theories subsequent effect as the cause of biased perceptions in the activities and decision-making. Analysis of Psychology, Behavioral economics / finance, neurofinance indicates different cognitive limitations and biases that affect the perception of the behavior of individuals, departing from the traditional economic model of rational decision-maker. Market participants affect the overall market result. Observers are highly capitalized and sophisticated and relatively impartial arbitrators / speculators who manage to market outcomes in accordance with rational behavior or limits to arbitration or mass biased individuals that affect the cause of bias affecting the equilibrium price. Thus, studies show bias in individuals or bias has a significant impact on asset prices.

The problems and limitations inherent indicate the scientific necessity of linking scientific areas if we are to create a meaningful and coherent model. Within each national economy there are differences between the financial markets and the economy. Empirical Strategy on the perception of volatility investors measuring the VIX, which contains information on the perception of volatility inserting the potential for bias in the perception as a base subsequent effect gives us a partial insights about the nature of prejudice and prediction. The bias of the individual does not result from a lack of intelligence, but the question of the causes of the functioning of the perceptual system.

REFERENCES:

Glimcher, Paul W. Decisions, uncertainty and the Brain: The Science of neuroeconomics . MIT press, 2004.

Glimcher, Paul W., Colin F. Camerer, Ernst Fehr, and Russell A. Poldrack.*"Introduction: A Brief History of Neuroeconomics." In Neuroeconomics: Decision Making and the Brain,* ed., 2007.

Kuhnen, Camelia., Knuston, Brian. The Neural Basis of Financial Risk Taking, Neuron, 47, (2015): 763-770

LeDoux, J. and Phelps, E. Emotional Networks int he Brain. New York, NY: Simion and Shuster, 1996.

Mather, George, Foundations of Sensation and Perception, Psychology Press, 2010/2016: Dual Process Theory (2016): 221-332

Aydinonat, N. Emrah. Neuroeconomics: More than inspiration, Less than Revolution. Journal of Economic Methodology, 17, (2010): 159-169

Abler, Brigit, Herrnberger Barbel, Gron Georg and Spitzer Manfred. From uncertainty to reward: Bold chartceristics differentiate signaling pathways, BMC Neuroscience 2009.

Adorni, Roberta, and Alice Mado Proverbio. *"The neural manifestation of the word concreteness effect: An electrical neuroimaging study." Neuropsychologia 50,* no. 5 (2012): 880-891

Blau, Francine D. and Lawrence M. Kahn. Gender differences in Pay The Journal of Economic Perspectives, Vol. 14. No 4, (2000): 75-99

Croson, Rachel and Uri Gneezy Gender differences in preferences. The Journal of Economic Literature, Vol. 47, No 2., 2009.

Dreher, Jean-Claude, Khen, Philip and Berman, Karen Faith. Neural coding of distinct statistical properties of reward information in human. Oxford University Press, 2005.

Camerer, C. , Lowenstein., G., and Prelec, D. Neuroeconomics: How neuroscience can inform economics. Journal of Economics: How Neuroscience can inform Economics, (2005): 9-64

Frydman, C. Barberis, N., Camerer., C., Bossaerts, P., Rangel., A. Testing theories of investor behavior using neural dana. Journal of Finance, 1:69 (2), (2014): 907-946

Jacobsen, B., J. B. Lee, W. Marquering. C. Zhang. Gender differences in optimism and asset allocation. Journal of Economic Behavior & Organization Volume 107, Part B 2014, Pages (2014): 630-651

Knutston, B., and Bossaerts. P., Neural antecedents of Financial decision. Journal of Neuroscience, 27(31), (2007):8174- 8177

Ross, Don Economic Theory and Cognitive Science: Microexplanation, MIT Press, 2005.

Ross, Don Cognitive variables and parameters in Economic models. MIT Press, Forthcoming, 2011.

Ross, Don Neuroeconomics and Economic Methodology . MIT Press, 2011b.

Bossaerts, Peter Risk and risk prediction error signal sin anterior insula. The University of Melbourne, 2010.

Braver. TS., Barch, J. Gray JR. Molfese, DL. And Snyder, A. Anterior cingulate cortex and response conflict: effects of frequency, inhibition and errors. Journal of Neuroscience, 2001.

Breaban, Adriana and Noussair, Charles N. Emotional state and market behavior. Universitat Jaume, 2013.

Cavanna A. and Timble M.. The precuneus: a review of its fuctional anatomy and behavioural correlates. Journal of Neuroscience, 2004.

Jausovec, N. and Jausovec, K. Do women see things differently than men do? Neuroimage, 2009.

Knuston, B., Wilimer, GE., Kuhnen, CM., and Winkielman, P. Nuccleus acumbens activation mediates the influence of reward cues on financial risk taking. Neuroreport, 19 (5), (2008): 509-13

Mazur, Allan and Booth Alan. Testosterone and dominance in men. Horm Behav. 2006.

Sanfey, Alan., Riling, James Aronson, Jessica. Nystrom, Leight and Cohen, Jonathan. The neural basis of economic decision-making int he ultimatum game. Sience, 2003.

Sapra, Steven and Paul J. Zak Neurofinance: bridging psychology, neurology and investor behavior. Electronic Journal, 2008.

Zak, Paul, J. Neuroeconomics, Philosophical Transaction oft he Royal Society of London, 359, (2004): 1737- 48

3 VOLUME | 1 ISSUE

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