

# GLOBAL FINANCIAL CRISIS; RELATIONSHIP BETWEEN THE MORTGAGE LOAN RATES AND DOW JONES INDUSTRIAL AVERAGE STOCK INDEX AND THE IMPLICATION FOR THE NIGERIAN CAPITAL MARKET

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## Abstract

The convergence of global economy makes all countries and all markets sensible to the happening in other countries; the contagious effect is what makes other countries to take precautions against any impending disaster. The recent global financial crisis that has its origin from USA has its way to affect the Nigerian Capital Market, this study employed econometric tools to establish the linkages between the mortgage loan rate, Dow Jones Industrial Average stock index and All Share Index, and it is established that the variables are not significantly related in such a way that the contagious effect will affect Nigerian Capital Market.

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**Keywords:** Financial crisis, mortgage loan, stock market

## 1. Introduction

The crisis that engulfed the financial sector of the US in September 2008 has since spread across the globe. The recently released IMF World Economic Outlook (October 2008) describes the crisis as “the most dangerous financial shock in mature financial markets since the 1930s.” This global financial crisis will have far-reaching implications, both for the international economic order underlying globalization, especially the global financial architecture, as well as the policy regimes in developing countries (Prasenjit, 2008).

From the Wall Street financial headquarters in the United States, across to Europe, Japan and China, the global financial system around which modern free market economy and capitalism was built has crashed like a pack of cards.

The financial crisis, which had been brewing for a while, started to show its effects in October 2008. Around the world stock markets began to crash as billions of mortgage-related investments went bad. Mighty investment banks which once ruled the financial world such as Lehman Brothers and Merrill Lynch have either crumbled or reinvented themselves as humdrum commercial banks. In related circumstances, governments in the wealthiest of nations have had to come up with rescue packages to bail out their financial systems. Towards the end of October, the Bank of England reported that the world's financial firms had lost £1.8 trillion (\$2.8 trillion) as a result of the continuing credit crisis. Japan, the world's second-largest economy, has officially slipped into recession (Detail Commercial Solicitors, 2008).

The recent global economic melt-down was traceable to the sub-prime mortgage crisis and rising home foreclosures, which commenced in August 2007 in the United States (US). Sub-prime mortgages are granted to borrowers whose credit history is inadequate to attract conventional lending. The mortgages are packaged by banks into Mortgage Backed Securities (MBS) and sold to financial institutions created by the US government, namely: Federal National Mortgage Association and Federal Home Loan Mortgage Corporations, who in turn repackage the loans and sell them to individual investors and financial institutions around the world (Fiakpa in Obi, 2009).

However, certain factors, including rising fuel prices, the hurricane Katrina, global food crisis, amongst others led to rising domestic unemployment in the US which occasioned massive mortgage defaults and foreclosures. This development negatively affected the US capital markets and those of other economies worldwide with the consequential on-set of the global financial crisis.

Sampson (2008) observed that most third world capital markets could escape any significant fallout of a US recession, owing primarily to their relatively low exposure to foreign investors, yet, the major commodity exporters, such as Nigeria, might not be so lucky. Macroeconomic indicators points to the fact that all is not quite well with Nigeria. There is a good correlation between some of these indicators and the continuing global economic meltdown. For instance, the total market capitalization that stood at N12.40 trillion in March

2008 fell to N4.69 trillion in March 2009, which represents a whopping decline of 62.18%. Additionally, the nation's foreign reserves decelerated from \$64 billion in August 2008 to \$47 billion as at March 2009, a 27% decrease (Abubakar 2009).

The flight of hedge funds happened when Nigerian banks were estimated to have been heavily exposed to the Nigerian capital market through several share linked loans to individuals, institutional and other types of investors. The sudden withdrawal of hedge funds created panic among exposed banks which also panicked in a bid to cut their losses from the exposure to the capital market.

Banks panic in the capital market was compounded by the fact that most of them were also exposed to foreign banks through international credits and guarantees. The foreign banks hit by the global meltdown suddenly recalled these loans and dropped their guarantees. This created a liquidity challenge for Nigerian banks, further compelling them to sell down their stocks to boost their liquidity (Anthony 2009).

By 2008 ended foreign investors had pulled out N556.93 billion, culminating in a net outflow of about N406.8 billion. By the second week of January 2009, market capitalization had nose-dived from an all time high of N13.5 trillion in March 2008 to less than N4.6 trillion (Vanguard, 2011), therefore, this study is to investigate the extent to which the global financial crisis affected the Nigerian capital market. The study specifically; (i) ascertain the relationship between US capital market and the mortgage loan rate. (ii) Examine the relationship between Nigerian capital market and the US capital markets, and (iii) determine the effect of US financial crisis on Nigerian capital market.

## 2. **Theory of Financial Crisis (Minsky's Theory)**

Minsky proposed theories linking financial market fragility, in the normal life cycle of an economy, with speculative investment bubbles endogenous to financial markets. Minsky claimed that in prosperous times, when corporate cash flow rises beyond what is needed to pay off debt, a speculative euphoria develops, and soon thereafter debts exceed what borrowers can pay off from their incoming revenues, which in turn produces a financial crisis. As a result of such speculative borrowing bubbles, banks and lenders tighten credit availability, even to companies that can afford loans, and the economy subsequently contracts.

This slow movement of the financial system from stability to crisis is something for which Minsky is best known, and the phrase "Minsky moment" refers to this aspect of Minsky's academic work.

"He offered very good insights in the '60s and '70s when linkages between the financial markets and the economy were not as well understood as they are now," said Henry Kaufman, a Wall Street money manager and economist. "He showed us that financial markets could move frequently to excess. And he underscored the importance of the Federal Reserve as a lender of last resort."

Minsky's model of the credit system, which he dubbed the "financial instability hypothesis" (FIH), incorporated many ideas already circulated by John Stuart Mill, Alfred Marshall, Knut Wicksell and Irving Fisher. "A fundamental characteristic of our economy," Minsky wrote in 1974, "is that the financial system swings between robustness and fragility and these swings are an integral part of the process that generates business cycles."

Disagreeing with many mainstream economists of the day, he argued that these swings, and the booms and busts that can accompany them, are inevitable in a so-called free market economy – unless government steps in to control them, through regulation, central bank action and other tools. Such mechanisms did in fact come into existence in response to crises such as the Panic of 1907 and the Great Depression. Minsky opposed the deregulation that characterized the 1980s. Minsky argued that a key mechanism that pushes an economy towards a crisis is the accumulation of debt by the non-government sector. He identified three types of borrowers that contribute to the accumulation of insolvent debt: hedge borrowers, speculative borrowers, and Ponzi borrowers.

The "hedge borrower" can make debt payments (covering interest and principal) from current cash flows from investments. For the "speculative borrower", the cash flow from investments can service the debt, i.e., cover the interest due, but the borrower must regularly roll over, or re-borrow, the principal. The "Ponzi borrower" (named for Charles Ponzi, see also Ponzi scheme) borrows based on the belief that the appreciation of the value of the asset will be sufficient to refinance the debt but could not make sufficient payments on interest or principal with the cash flow from investments; only the appreciating asset value can keep the Ponzi borrower afloat. Because of the unlikelihood of most investments' capital gains being enough to pay interest and principal, much of this type of finance is fraudulent.

If the use of Ponzi finance is general enough in the financial system, then the inevitable disillusionment of the Ponzi borrower can cause the system to seize up: when the bubble pops, i.e., when the asset prices stop increasing, the speculative borrower can no longer refinance (roll over) the principal even if able to cover interest payments. As with a line of dominoes, collapse of the speculative borrowers can then bring down even hedge borrowers, who are unable to find loans despite the apparent soundness of the underlying investments. ( Wikipedia)

### 3. **Origin of the Crisis**

Since the 1990s, growth in the US economy has mainly been on account of credit-driven consumption. The level of indebtedness of American households reached unprecedented levels during this period, mainly due to housing loans (mortgages) and consumer loans (credit cards). The growth in consumption occurred despite increasing income and wealth inequalities in the US. This happened because of the stock and property market booms, which increased the financial wealth of upper class households, made them feel richer and drove them into greater borrowing and spending. The debt-income ratio in the US, i.e. total household debt as a proportion of total personal disposable income, increased steadily from around 67% in the 1960s and 1970s to 95.6% in the 1990s.

The first jolt to this debt-induced consumption spending in the US came with the stock market crash and the collapse of the ICT boom in the US in 2000. This led to a recession in the US in 2001, which also caused a global slowdown. The finance, which had flown out of the stock market following the bursting of the dotcom bubble, found its way in the housing market. This created a real estate boom, which led to economic recovery both in the US as well as in the global economy from 2002. This boom was partly engineered by the huge tax cuts announced by George Bush in June 2001 and partly by the Central Bank of the US, the Federal Reserve, through repeated cuts in interest rates. The real interest rate remained negative in the US from mid-2002 to early 2006, fuelling credit growth. The debt-income ratio reached an unprecedented 130% for the period 2000-08.

Liberalized rules for banks coupled with easy liquidity conditions enabled mortgage-lending banks to reduce mortgage rates and adopt reckless lending strategies. This fuelled housing demand, which increased property prices and the real estate bubble started building up. A Special Report released in 2005 by *The Economist* noted: The total value of residential

property in developed economies rose by more than \$30 trillion over the past five years, to over \$ 70 trillion, an increase equivalent to 100% of those countries' combined GDPs. Not only does this dwarf any previous house-price boom, it is larger than the global stock market bubble in the late 1990s (an increase over five years of 80% of GDP) or America's stock market bubble in the late 1920s (55% of GDP). In other words, it looks like *the biggest bubble in history*.

The extent of the speculative bubble in real estate could be seen from the increasing ratio of housing prices to the rental applicable to the houses in the US. While the ratio remained stable for more than two decades since 1975, there was a sharp increase in housing prices relative to rentals since 2000. According to the *Economist* Report, 23% of the homes bought in 2004 were purely for investment purposes, while 13% were bought as second homes. "Investors [were] prepared to buy houses they [would] rent out at a loss, just because they [thought] prices will keep rising—the very definition of a financial bubble."

With the US economy being driven by the growth in real estate financed by debt, there was an increasing tendency by the mortgage-lenders to indulge in reckless lending practices. In order to keep the real estate boom alive and push up their businesses, the mortgage lenders increasingly indulged in sub-prime lending—giving housing loans even to those borrowers whose ability to repay the loans were doubtful. Such borrowers were enticed into housing loans, which were sweetened by special treatment and unusual financing arrangements—little documentation or mere self-certification of income, no or little down payment, extended repayment periods and structured payment schedules involving low interest rates in the initial phases which moved sharply upwards at later periods. All these misleading offers of credit by the mortgage lenders encouraged borrowers to take loans which they could not afford to repay. The proportion of such loans with high risk of default, i.e. sub-prime loans, in total loans kept increasing over time. US Federal Reserve Chairman Ben Bernanke said in May 2007: "About 7.5 million first-lien subprime mortgages are now outstanding, accounting for about 14% of all first-lien mortgages.

So-called near-prime loans—loans to borrowers who typically have higher credit scores than subprime borrowers but whose applications may have other higher-risk aspects—account for an additional 8 to 10% of mortgages." These loans accumulated by the mortgage lending banks were packaged into securities and were sold off to other financial institutions like the Wall Street-based investment banks and hedge funds, in complex transactions that were made possible

by financial deregulation. The Wall Street-based investment banks such as Lehman Brothers, Bear Stearns, Merrill Lynch, Morgan Stanley, Goldman Sachs, etc., bought into these housing mortgages, pooled and packaged them into securities (Collateralised Debt Obligations or CDOs), got them rated by credit rating agencies, and sold them to other buyers in the financial markets like pension funds, mutual funds, etc., for huge fees and commissions. Estimates suggest that the value of such housing mortgage backed securities reached over \$2 trillion by 2003. Rather than correctly assessing the high risks associated with the assets underlying the securities they were trading, the investment banks were happy to transfer those risks by creating layers of complex derivatives and selling it to other market players for quick and high profits.

The assumption underlying such “financial innovations” was that it would enable the mortgage lenders as well as the investment banks to insulate themselves against loan defaults by spreading the risks associated with these loans. This, however, was a flawed assumption since spreading of risks through complex derivatives cannot make the risk disappear completely. Thus when defaults on such housing mortgage loans started rising, all the financial institutions linked to sub-prime mortgages were affected. Eventually a full-blown crisis surfaced in the US in 2006 when the housing bubble went bust. With increasing defaults and repossession of houses by the mortgage lenders, suddenly there were only sellers and no buyers left in the housing market.

Sharp falls in property prices and increasing interest rates also led to the collapse of hundreds of mortgage lenders engaged in sub-prime lending, with even the largest mortgage lender in the US, Countrywide Financial, heading towards bankruptcy. The investment banks, which had made huge investments in sub-prime mortgage based securities in order to reap speculative gains on the basis of the property bubble, started suffering huge losses.

The bankruptcy of Lehman Brothers, the fourth largest investment bank in the US, in September 2008 marked a considerable deepening of the financial crisis in the US, precipitated by the collapse of the real estate bubble. Another investment bank, Merrill Lynch, was taken over by the Bank of America through government facilitation, similar to the manner in which Bear Stearns got taken over by JP Morgan Chase some time ago. Goldman Sachs and Morgan Stanley have decided to transform themselves into ordinary deposit-receiving banks. Thus, investment banking in the US, representing the most powerful force on Wall Street which led the financial globalization offensive from the front, has been virtually decimated by the financial crisis. Two other mortgage-lending institutions, Fannie Mae and Freddie Mac have been

nationalized to prevent their collapse. AIG, the world's largest insurance company, has managed to survive for the present through the injection of funds worth \$85 billion from the US Government. Similar crises have simultaneously afflicted the banks and financial institutions in other advanced capitalist countries, which were heavily exposed to mortgage-backed securities. With the real estate bubbles going bust globally, crisis has spread across global financial markets causing huge losses for banks and financial companies. Faced with this financial meltdown, the Bush administration stepped in and announced a \$700 billion bailout package, aimed at buying up the bad debt of the US banks and financial institutions. After some initial discomfort and debate over using public funds to compensate for private sector losses, the US Congress finally approved the bailout package with minor modifications in early October 2008. The British Government has followed suit and announced a £500 billion rescue plan for its banks and financial institutions, including £50 billion of direct capital injection against preference shares for the government in private sector banks like Lloyds TSB, Royal Bank of Scotland and mortgage lender HBOS. The US Treasury has recently announced that \$250 billion out of the \$700 billion bailout package will be used to inject capital into private banks against shares transferred to the government.

Such measures towards partial nationalization of private banks in the US and UK set the stage for similar steps by other advanced capitalist countries. Iceland, a small European country, went bankrupt after it fully nationalized its three largest banks, which had their presence across Europe and had suffered heavy losses due to the crisis. In an unprecedented move, Central Banks across the world like the US Federal Reserve, the European Central Bank and others in England, China, Canada, Sweden, Switzerland and elsewhere have also cut interest rates in a coordinated manner in order to prevent a drying up of credit flow into the financial markets. However, with fears of a recession in the US spilling over into a global recession, gripping the financial markets across the world, no amount of interest rate cuts and pumping “liquidity” into the financial system will work. (Prasenjit, 2008)

#### **4. Effect On Us Capital Market**

On Tuesday, October 9, 2007, the Dow Jones Industrial Average (DJIA), a major United States stock market index, attained its highest value ever at 14,164.53. Since opening at 40.94 on May 26, 1896, the DJIA has increased steadily, despite several periods of decline.



However, by Wednesday, October 22, 2008, just over a year after DJIA's high, it had closed at 8,519.21, representing a 39.85% decline in the index.

In fact, a cyclical bear market is recognized to have commenced on July 2, 2008 when the Dow closed at 11,215.51, more than 20% below its record high, accelerating by mid-September with a series of panics related to financial instability caused in part by the failure and/or sub-prime mortgage lending difficulties of the investment banking industry in the United States, specifically Lehman Brothers, Merrill Lynch, Morgan Stanley and JP Morgan-Chase, as well as government-backed mortgage giants Fannie Mae and Freddie Mac. For example, the largest daily point loss (777+; closing DJIA 10,365.45) was on September 29, 2008; the largest daily point gain (936+; closing DJIA 9,387.61) was on October 13, 2000; and the largest intraday point swing (1,018+; closing DJIA 8,451.19) was on October 10, 2008. Furthermore, along the largest percentage gain since 1933 was 11%, achieved on October 13, 2008 (closing DJIA 9,387.61), while the largest percentage loss since 1987 (7.87%) was attained on October 15, 2008 (closing DJIA 8,577.91). The last day that the DJIA closed above the psychological 10,000 level was October 3 (at 10,325.38). (Mobolaji, 2008)

## **5. Effect On Global Capital Market**

This wild financial period was broad and not confined to the United States. According to a TIME magazine essay (October 20, 2008), through October 8, the year-to-date losses of the Standard & Poor 500 of the US was 33%; of the DAX index of Germany was 38%; of Brazil's BM&F Bovespa was 40%, of Shanghai's SE Composite was 60% and of Russia's RTS Index was 67%. In fact, the TIME essay also states that on October 6 and 7, 2008 alone, the global stock market lost a whopping \$6.5 trillion as measured by Standard & Poor's BMI Global, an index of major markets worldwide. (mobolaji, 2008)

## **6. Effect On Nigerian Capital Market**

It is perhaps in the capital market that the greatest impact was felt. The prolonged downturn in the capital market induced by significant divestment by foreign investors and compounded by lingering liquidity tightness, waning public confidence, and panic selling by domestic investors lead to significant losses by investors. The stock market which remained bullish between December 2005 and March 2008, suddenly became bearish in April 2008 and

has remained nearly so since then with only marginal recovery. At the height of the bull run in early March 11, 2008, equity market capitalization hit N12.64 trillion while the Nigerian Stock Exchange All Share Index (ASI) which rose by 37.8 per cent in 2006 and 1.01 per cent in 2005 gained a record 74.73 per cent in 2007. Between 31st December 2007 and the peak of the bull run in early March 2008, the market gained 14.45 per cent. By year end 2008, the NSE All Share Index which gained 74.73 per cent the previous year, had declined by 45.8 per cent while equity market capitalization declined by 32.4 per cent from N10.3 trillion at year- end 2008 to N6.96 trillion at the close of 2008. Thus, between 2007 and 2008 the ASI declined by 42.5 per cent compared to 33.8 per cent decline between 2008 and 2009. The corresponding figures for market capitalization were 27.5 and 28.3 per cent, respectively. (Sanusi, 2008)

## 7. Research Methodology

### 7.1 Type And Sources Of Data

The analysis focuses on monthly market developments from January 2007 to December 2009, being the period of pronouncement of the global crisis and the period of its reflection in Nigerian economy. Monthly data from 2000 to 2005 of Dow Jones Industrial Average Stock Index, mortgage Loan Rate and All Share Index and other Nigerian macroeconomic variables are used to established relationship.

The sources of data are the statistical bulletins of Central Bank of Nigeria (CBN), Dow Jones Industrial Average monthly data from wall street journal, Mortgage X historical data report, Security and Exchange commission and Nigerian stock exchange.

### 7.2 Technique Of Analysis

A set of econometric techniques have been employed to show the relationship between the stock indices in Nigeria and that of DJIA. These sets of analytical techniques include; Unit root test, cointegration test, and Vector Autoregressive techniques.

Consider a time series  $Y_t$  that is a function of past values and some random error:

$$Y_t = p Y_{t-1} + E_t \quad (1)$$

The "  $p$  " term dictates how strongly the present value of  $Y$  is dependent on the prior value of  $Y$  while  $E_t$  is an i.i.d. random variable. If  $p = 1$ , we say that  $Y_t$  is integrated, and the series has a permanent memory such that past shocks to the series cumulate. An integrated series has a mean and variance that depend on time (Bannerjee et al. 1993).

If we have an explanatory variable that is also integrated and causally related to  $Y$  then we say the two series are cointegrated. Cointegration implies that the two integrated series never drift far apart from each other, that is they maintain an equilibrium. The classic example of a cointegrating relationship is that of short and long term interest rates (Engle and Granger 1987). It would be surprising if these two series drifted apart from one another over time as that would present opportunities for arbitrage. The error correction model is the preferred method for estimation when two integrated time series are statistically related or cointegrated since the error correction model can be formally derived from the properties of integrated time series.

The error correction model, however, is particularly powerful since it allows an analyst to estimate both short term and long run effects of explanatory time series variables. The standard way to derive the error correction model is to show that if  $X$  and  $Y$  are linear functions of a latent integrated process, the residuals of  $Y$  regressed on  $X$  should be stationary. This derivation of the error correction model starts with the assumption that both  $Y$  and  $X$  are integrated and demonstrates that the error correction model captures the equilibrium causal movements between these two cointegrated processes.

Occasionally, however, some authors derive the error correction model from a different and more promising starting point (Bannerjee et al. 1993; Davidson and MacKinnon 1993; Verbeek 2000).

Engel and Granger (1987) point out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary series are said to be co-integrated. The stationary linear combination is called the co-integration equation interpreted as the long run relationship.

To investigate whether this long run relationship exists between ASI  
When the variables are integrated of order one or more, estimation of unrestricted VAR will be subjected to hazards of regression involving non stationary variables. In order to avoid this, restricted VAR will be specified as Vector Error Correction Model (VECM) to incorporate the co-integration relation (Johnston and Diniardo).

A variant of the VEC is Impulse Response Function. This is useful for studying the interaction between variables in a vector autoregressive model. It represents the reaction of variables to shocks hitting the system. The function stimulates the effect of a shock to one variable in the conditioning forecast of another variable.

Let  $Y_t$  be a  $K$ -dimensional vector series generated by

$$Y_t = A_1 Y_{t-1} + \dots + A_p Y_{t-p} + \mu_t \dots\dots\dots(1)$$

$$= \theta(B) U_t = \sum_{T=0}^{\infty} \theta_i \mu_{t-1}$$

$$I = ((1-A_1B- \dots -A_p B^p)\theta(B)) \theta(B) \dots\dots\dots(2)$$

Where  $cov(U_t) = \Sigma$ ,  $\theta$  is the Moving Average (MA) coefficient measuring the impulse response. More specifically  $\theta_{jkt}$  represent the response of variable  $j$  to a unit impulse in variable  $k$  occurring  $i$ -th period ago. Impulse response functions are used to evaluate the effectiveness of a policy, Jin (2006).

Next to IRF is Variance Decomposition. Variance Decomposition or forecast error variance decomposition indicates the amount of information each variable contributes to the other variables in a vector autoregressive (VAR) model, variance decomposition determines how much of the forecast error variance of each of the variable can be explained by the exogenous shock to the other variable (Wikipedia). It can also be defined as the decomposition of variance into different components so as to assess the impact of policies on the phenomenon under investigation.

In a VAR, the variance decomposition at horizon  $h$  is the set of  $R^2$  value associated with the dependent variable  $Y_t$  and each of the shocks  $h$  period prior.

$$\text{Mean square error (MSE) } \{Y_j, t(h)\} = \sum_{I=0}^{h-1} \sum_{k=1}^K (E_j \theta_i E_k)^2 \dots\dots\dots(3)$$

The amount of forecast error variance of variable  $j$  accounted for by exogenous shocks to variable  $k$  is given by  $w_{jkh}$

$$W_{jkh} = \sum_{I=1}^{h-1} (E_j \theta_i E_k)^2 / \text{MSE}(y_{it}(h)) \dots\dots\dots(4)$$

8.3 **Variables**

- (i) US macroeconomic variable (proxy of mortgage loan rate).
- (ii) US capital market (proxy of Dow Jones Industrial Average stock index) as independent variable.
- (iii) Nigerian capital market (proxy of All Share Index) as dependent variable.
- (iv) Price of crude oil, Exchange Rate, Credit to private sector, Outflow of Foreign Private Capital are proxies for global financial meltdown (independent variables).
- (v) Comparative analysis of All Share Index, New Issues, and total transactions of some key sectors in the market as well as Nigerian foreign reserve.

### 7.3 Theoretical Frame Work

According to macroeconomic hypothesis school, this approach attempt to examine the sensitivity of stock price to changes in macroeconomic variables. The approach posits that stock prices are influenced by changes in money supply, exchange rate, inflation, commodity price and other macroeconomic indicators.

It employs general equilibrium approach stressing the interaction between sectors as central to the understanding of the persistence and co-movement of macroeconomic time series, based on the economic logic which suggests that everything does depend on everything else.

### 7.4 Model Specification For The Regression Analysis

When there is no data that is integrated at any level of the critical value then vector error correction model cannot be estimated, in that case regression model is most appropriate model of specification.

For analyzing the relationship between the Dow Jones Industrial Average and the US mortgage, and also for the relationship between Nigerian capital market and the US capital market, the following functions have been specified.

$$DJIA = \alpha + \beta SPMR + e \quad (5)$$

SPMR = Sub prime mortgage loan

DJIA = Dow Jones Industrial Average

Where the a priori expectation is:  $\beta > 0$ ,

$$ASI = \alpha + \beta DJIA + e \quad (6)$$

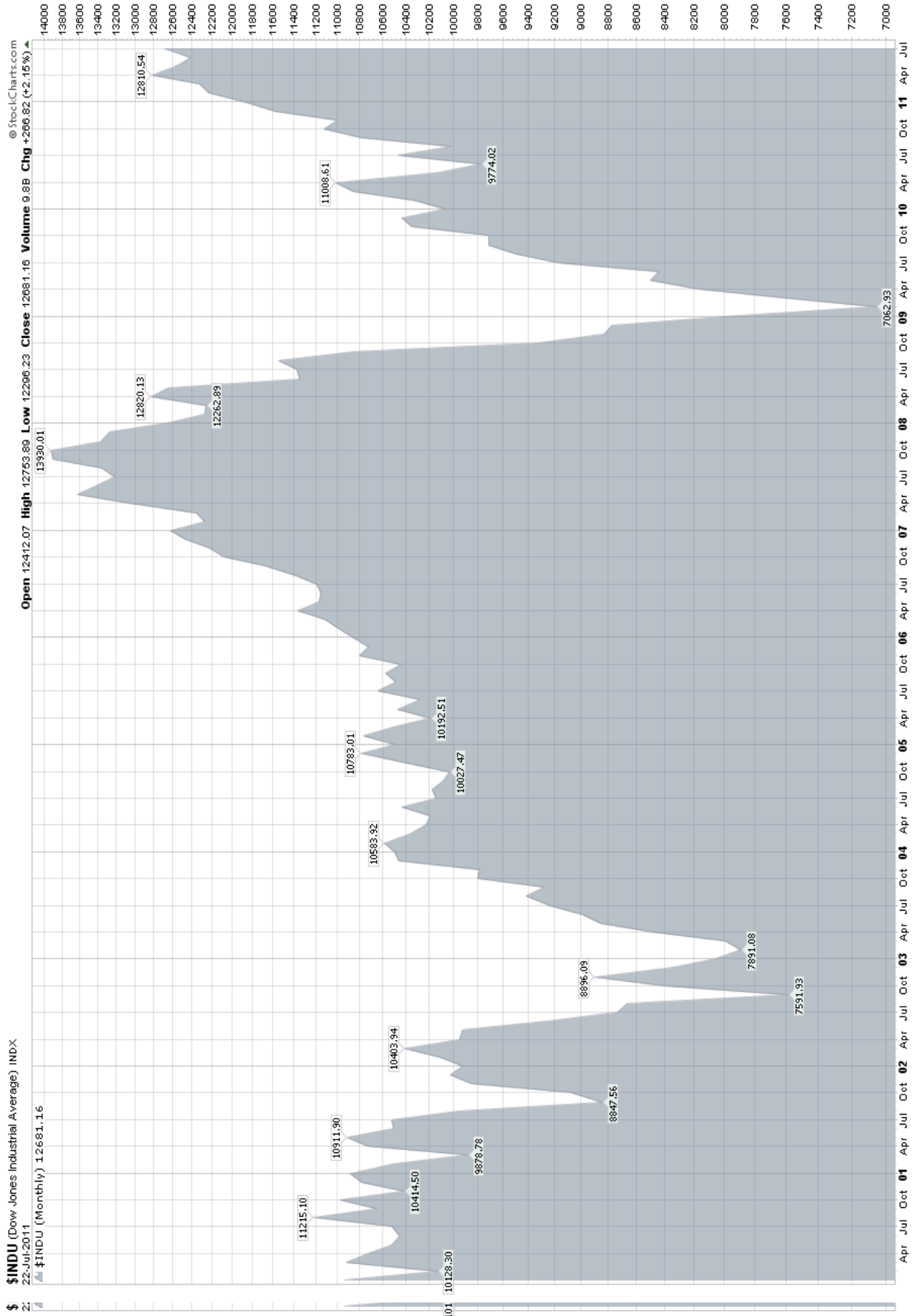
ASI = All Share Index

Where the a priori expectation is:  $\beta > 0$ ,

## 8. Results and Discussions

Before testing the relationship we descriptively show the flow chart of the DJIA stock index to depict the period and existence of the crisis. It is vivid from figure 1 below that the DJIA stock index value has been fluctuating between the index value of 10,000 to 7591.93 within the period of January 2000 to July 2002 and hence forth the market index start rising until it reached a pick of 13930.01 in the 4<sup>th</sup> quarter of the year 2007, suddenly the index fell rapidly within short period to a tune of 7042.93 in the first quarter of 2009.

This evidenced the period of financial crisis which is the focus of this study.



(fig.1)

Testing for this relationship we use the monthly 1-year mortgage loan rate and monthly Dow Jones Industrial Average Stock Index and the unit root test of result is given in table 2.

TABLE: 2

VARIABLES	LEVEL		FIRST DIFFERENCE		Remark
	ADF	PP	ADF	PP	
MORT	-1.0991	-1.1403	-2.6099*	-4.247*	I(1)
DJIA	-0.2009	-0.229	-5.1892*	-9.666*	I(1)

\* Data are stationary @1%, 5% and 10% level of significance because they are in absolute term greater than MacKinnon critical values for rejection of hypothesis of a unit root.

Table 3 shows the cointegration test statistics between Mortgage and and DJIA. Bothe the Trace and the Max-eiginevalue statistics in tables 3and 4 do not reject the null hypothesis of no cointegrating equations and 1% and 5% respectively.

TABLE: 3 Trace Rank Test

Hypothesis	$r = 0^*$	$R \leq 1$
Trace stats	10.00064	2.831970
5%	15.41	3.76
1%	20.04	6.65

TABLE: 4 Maximum Eigen Rank Test

Hypothesis	$r = 0^*$	$R \leq 1$
Eigen statistics	7.168669	2.831970



5%	14.07	3.76
1%	18.63	6.65

With the above result the Trace rank test and Maximum Eigen rank test indicating no cointegration between the two variables, the relationship between mortgage loan and DJIA is investigated by the structural regression equation, introducing the difference factor to ensure stationarity of the data to avoid spurious parameters. The regression result is presented in equation (7).

$$D(\text{DJIA}) = 0.000121 + 2.025680D(\text{MORTGAGE RATE}) \quad (7)$$

(0.005322)    (3.814646)  
[0.022698]    [0.531027]

The coefficient of regression of mortgage loan rate to Dow Jones Industrial Average stock index shows a positive relation contrary to the theoretical expectation, but the relationship is statistically insignificant, indicating that mortgage loan rate is not a good determinant of DJIA stock index behavior and that the reflection of the mortgage sector crisis to the capital market was as a result of reckless lending arrangement of subprime rate policy that looses lending stringent conditions which result to housing boom and followed by bust as result of default in payment, this signaled riskiness of the holdings (mortgage-backed security) and that was transmitted to the capital market.

Furthermore the causality test of the variables as presented in the table 5 suggests independence between mortgage loan and DJIA which is in conformity with the earlier results (regression results)

Table: 6 Granger causality results

Null Hypothesis:	Obs	F-Statistic	Probability
DJIA does not Granger Cause MORT	70	1.49054	0.23285
MORT does not Granger Cause DJIA		1.28968	0.28231

To investigate the relationship between the Nigeria capital market and the US capital market, the All share index and the DJIA have been used as the proxies for the two markets respectively. Table 7 shows that the series in the two markets are integrated of order (1). Consequently, the cointegration results in tables 8 and 9 show that both the trace statistics and the max eigenvalue statistics rejected the presence of cointegrating vectors. Hence, the regression analysis has therefore been employed to investigate the relation between the series in the two markets.

Table: 7 (UNIT ROOT TEST RESULT)

<i>VARIABLES</i>	<i>LEVEL</i>		<i>FIRST DIFFERENCE</i>		<i>Remark</i>
	ADF	PP	ADF	PP	
ASI	1.2540	1.3821	-4.3745*	-6.023*	I(1)
	6				
DJIA	-0.2009	-0.229	-5.1892*	-9.666*	I(1)

\* Data are stationary @1%, 5% and 10% level of significance because they are in absolute term greater than MacKinnon critical values for rejection of hypothesis of a unit root.

Table: 8 Trace Rank Test

<b>Hypothesis</b>	<b><math>r = 0^*</math></b>	<b><math>R \leq 1</math></b>
<b>Trace stats</b>	5.413183	1.017345
<b>5%</b>	15.41	3.76
<b>1%</b>	20.04	6.65

**Table: 9 Maximum Eigen Rank Test**

Hypothesis	$r = 0^*$	$R \leq 1$
<b>Eigen statistics</b>	4.395838	1.017345
5%	14.07	3.76
1%	18.63	6.65

D(ASI) =

$$258.8912 + 0.216917D(DJIA) \quad (8)$$

(119.7583)    (0.286157)  
[2.161781]    [0.758033]

The estimated regression result in equation (8) shows a positive relationship between ASI and DJIA which implies that ASI is explained by 21.69% change in DJIA. Although the result is not statistically significant, the direction of the relationship is in line with theoretical explanation of the relationship (dependency theory of globalization).

### Conclusion

Mortgage loan rate does not influence Dow Jones Industrial Average stock index significantly. It is as a result of flexing the stringent lending conditions that led to the mortgage industrial growth and collapse, as well as the failure of the financial institutions to be cautious of the high risk nature of securities that are tied to these mortgage loan, fall in demand and excess supply of houses trigger the crisis, and the proportion of mortgage backed security in the capital market and the role of information in an efficient market led to fall in the stock prices not only for mortgage industries but to financial institutions that invested in the securities and this transmitted to stock prices of other industries in the market. DJIA seems not to significantly influence the ASI. Other economic variables seem to have imparted more on the Nigerian capital market.

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