Analysis of Recovery Determinants of Defaulted Mortgages in Nigerian Lending Industry

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Abstract

Credit is a major input in the making of investments, the availability of which affects the level of development in sectors of nation's economy across all countries of the world. However, the continued increase in loan default with low corresponding recovery of same has reached a worrisome dimension globally. The huge credit losses arising largely from unrecovered defaulted mortgages have attracted the attention of practitioners and academia which has led to serious empirical researches. However, it is pertinent to note that much more attention has been given to loan default than the recovery of defaulted mortgage loans. The current paper attempts to investigate the determinants of recovery of defaulted mortgage loans in Nigerian lending industry. Data on three thousand, one hundred and ninety seven (3,197) defaulted mortgages from 1999-2011 were gathered from the databases of some selected Commercial Banks (CB) and Primary Mortgage Institutions (PMIs) in Nigeria. Using Logistics Regression Model (LRM), the result reveals that growth in Gross Domestic Product (GDP), borrower status, borrower's history of default, year of borrower, business relationship with bank, loan supervision, age of collateral and location of real estate collaterals are significantly positive determinants of loan recovery. It was also found that inflation growth rate, interest growth rates, priority of collateral and collateral revaluation are significantly but inversely related to loan recovery, while such factors as loan-to-value (LTV), loan size and loan duration though insignificant exert positive influence on possibility of recovery. A proper understanding of the interplay of these various factors provides information to lenders and finance regulators.

Keywords: credit; logistic model; mortgage; recovery

1. Introduction

Credit is a significant input in the making of investments, the availability of which measures the overall performance of economy across countries of the world. Lending industry is the channel through which funds are made available for different investment purposes. This lending more often is fraught with a number of risks which include risk of default and risk of recovery of the defaulted loans. Default risk refers to the inability of borrower in fulfilling the repayment obligation while risk of recovery of defaulted mortgage loans implies the probability that the amount in default will not be recovered. These risks appear to have become common phenomena in both the developed and developing countries. For instance, International Swaps and Derivative Association Inc-ISDA (2008) shows that the global volume of credit default grew from US$631.5 billion in 2001 to US$54.6 trillion by mid 2008 yielding a growth rate of 8,546% in less than a decade. Board of Governors of the Federal Reserve System (2011) reported mortgage loan default of 14 trillion dollars in the United States America-USA and Thomas (2009) presents equivalent situation for private sector debts in Europe. African financial deepening is beset by high rate of unrecovered loans and an efficient analysis of its nature holds the key to minimize the losses in the continent (Svetlana *et al*, 2011).

The situation in Nigeria appears more critical as Sanusi (2009) affirms that the bad debts in the financial industry stands in excess of ₦3 trillion with the percentage of non-performing loans ranging from 19% to 48%. Central Bank of Nigeria- CBN (2010) also reports that out of ₦461,988 billion loan in default state in Nigerian commercial banks only ₦15,962.60 billion were recovered representing only 3.4%. It is pertinent to note that between 2009 and 2010 the amount of bad debt increased by 38.72% with a drastic drop in the amount of loan recovered within the same period (Nigerian Deposit Insurance Corporation, 2010). While the former (risk of default) has being the subject of much analysis the same cannot be said of the latter (risk of recovery). It is pertinent to note that unrecovered debt is highly consequential to the financial survival of lending industry and the host economy (Caprio and Klingebriel 1999, Fofack, 2005, Somoye, 2008). Poor recovery level of loan in default by financial institution has turned right into huge problem and it has brought negative influences on bank's profit, government income and decline in the performance of the economy (Somoye, 2010).

The continued increase in loan default across the countries of the world and rising spate of uncertainties in the investment world has made a study like this a more compelling one. It is logical to suggest that a research which

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sets to analyze the determinants of loan recovery perhaps has a critical role to play in any genuine attempt to formulate mortgage and banking policies capable of re-invigorating financial sector for a virile economic development. Assessing the determinants of recovery of defaulted mortgage accounts play a critical role in credit risk modeling as it offers inputs information to lenders when originating credit transactions (Carlo, *et al,* 2009 and khieu *et al*, 2012).

The pertinent questions are: what are the characteristics of recovered and unrecovered loans? What are the effects of these factors on the recovery of defaulted mortgage loans? A proper understanding of the interplay of the various factors that influence loan recovery will no doubt provide a good guide to policy makers, financial regulators and lenders. Therefore, this paper assesses the determinants of loan recovery in the lending industry. The remainder of the paper is organized as follows: section 2 provides a brief review of the empirical literature on recovery of bonds and defaulted bank loans, section 3 describes the dataset and econometric specification, section 4 presents empirical analysis of the results and section 5 concludes with policy implications.

2.   Related Literature

Loan recovery rate is the ratio of total recovery of the defaulted loan at the end of the loan divided by the amount of outstanding at the date of default (Bandyopadhyay et al, 2009). Asarnow and Edwards (1995) affirm that structured loan has recorded higher recovery and they listed the characteristics of structured loans to include; the loans are closely monitored, the bank directly controls the company's cash receipt and disbursement, the loans contain many restrictive covenants, the loans are highly collaterised and lending is done on a formula basis. Dermine and Neto de Carvalho (2006) show that the loan recovery is a function of collateral asset, loan size, the industry factor and the age of the borrower. They further established that when the cost associated with recovery is high, the ultimate recovery is low. Inwon (2002) emphasizes that to enhance full recovery of loan there should exist a robust legal environment that prevents multiple pledging of asset that provides an efficient process for asset realization.

Furthermore, Basel Committee on Banking Supervision-BCBS (1999) enumerates the factors that enhance loan recovery, which include, borrower's current financial condition; borrower's paying ability, the current value of collateral and other factors. (Somoye, 2010) affirms that poor recovery level of loan in default by financial institution has turned into huge problem and brought negative influences on bank's profit, government income and decline in the performance of the economy. He further explained that this low recovery status calls for an effective method and mechanism that ensure early recovery of debts. Somoye (2008) opines that loan recovery could be achieved through constant visit to the borrower, appointment of rent receiver, liquidator, and legal actions for sum outstanding at fore closure. Oloyede (2004) enumerates options available for the recovery of an outstanding loan as: garnishment of the borrowers wages in the case of people on salaries, collection from guarantor by garnishment of their wages where such a guarantor is on paid employment, sale of the mortgaged property in situation where the value of the unpaid loan with accrued interest and seizure and management of the mortgaged property in situation where the property is in good tenantable condition and the rent recoverable over time would be in excess of the anticipated monthly repayment and the cost of management.

Moreover, Aremu *et al* (2010) opine that effective and aggressive loan recovery is the foundation upon which the superstructure of sound banking system is built. They further enumerate that the functions of the recovery unit include; determination of action plan, pursuance of all alternative to maximize recovery (place the borrowers into receivership or liquidation), ensuring that adequate and timely loan loss provisions are made on actual and expected losses, regular review of deteriorating loan, assigning the substandard account to a specific account manager in the recovery unit It is pertinent to note that most of the studies on recovery focus on the corporative recovery of the bonds and defaulted bank loans. For instance, Altman (1989) adopts actuarial analysis to investigate mortality rate of USA corporate bond and reported an average recovery rate of 37% over the period of 1982-2001.

Also, Schleifer and Vishny (1992) examine the impact of industry condition and liquidation value and concludes that recovery of default bond is affected negatively by supply of defaulted bonds. Furthermore, Carty (1998) analyses credit risk in privately placed bonds between 1986 and 1992 while Acharya et al (2003) report an

average recovery rate of 48% for senior secured bonds and 51% for senior unsecured bonds for the period of 1982-1999. Acharya et al (2007) report recovery rates of 81.12% for bank loans, 59% for senior secured bonds, 56% for senior unsecured bonds, 34% senior subordinated bonds, 27% for subordinated bonds and 18% for junior subordinated bonds between 1982 and 1999. While one may believe that recovery of bonds defaulted bank loans may be similar but it is also a known fact that bank loans have some peculiarities significantly different from that of bonds, hence the need for a study that examine bank loans separate from recovery of bonds. Although, it has been argued that recovery of defaulted bond and bank loan may have similar recovery but bank loans are likely to have some peculiarity significantly different from that of bonds (Khieu and Mullineaux 2009).

In the recent times, research has shown that there have been relative increase in the number of studies in recovery of defaulted bank loans, for instance, Asarnow and Edwards (1995) presents a univariate analysis of bank loans default data on 831 commercial and industrial loans and 89 structured loans made by Citibanks over 24 years. They found average recovery of 65% and 85% for unstructured and structured loan respectively. They further confirm that the higher recovery rate recorded for structured loan reflects the fact that such loans are heavily collateralized and contain many restrictive covenants. Grossman et al. (1998) analyze recovery rate on 60 syndicated bank loans over the period 1991–1997. Based on secondary market prices after the credit event, they reported an average recovery figure of 82% with a standard deviation of 24%, no information was provided on the shapeof the distribution of recovery rates. Felsovalyl and Hurt (1998) analyze 1,149 bank loans losses in Latin America over the period of 1970 – 1996, they showed an average recovery rate of 68.2%.

Caselli *et al* (2008) use a large sample of 11,649 loans to household (small and medium enterprises) from the five largest Italian banks between 1990 and 2004. They found that loan recovery and default depend on various macro-economic variables. Carty and Lieberman (1996) measure the recovery rate on a sample of 58 bank loans based on secondary market prices for defaulted bank loans for the period 1989–1996, they report an average defaulted bank loan price of 71% but did not observe a bi-modal distribution, but reported skewness toward the high end of the price scale. In the same study, the authors measure the recovery rate on a sample of 229 small and medium-size loans in the USA. They report an average recovery rate of 79%, based on the present value of cash flows. Again, the distribution was highly skewed toward the high end of the scale. Khieu and Mullineaux (2009) investigate the determinants of recovery of defaulted bank loans using Logistic Regression Model and found that loan characteristics are more significant than borrower characteristic as determinants of recovery rates.

Bastos (2010) works on prediction of bank loan recovery using artificial neural networks. He used a data sample of 374 loans in default state between 1995 and 2000. The input variables include, loan size, collateral, personal guarantee, manufacturing sector, trade sector, service sector, lending rate, age of firm, rating and year of relationship. From the foregoing, first, one could observe that many of these empirical studies are carried out in the developed countries. Second, most of the studies only reported recovery rates except the works of Khieu and Mulluneaux (2009) and Bastos (2010) which emphasizes on the determinants of recovery of defaulted loans. Following the works of Khieu and Mulluneaux (2009) and Bastos (2010), we attempt to investigate loan recovery determinants peculiar to developing countries especially Nigeria. To our knowledge, this research makes a first step in African countries by assessing the determinants of recovery of defaulted mortgage loans in Nigerian lending industries.

3. Methodology

The existing literature provides evidence that indicates a strong relationship between recovery of defaulted loans and several factors such as borrower's income, number of borrower's dependants, age of borrower, occupation of borrower, status of borrower, relationship of borrower with lender, year of relationship with lenders, GDP growth, inflation growth, interest growth, unemployment rate, exchange rate, loan size, loan type, loan-to-value ratio, loan monitoring and supervision, location of collateral, age of collateral, size of collateral, type of collateral, sector-based characteristics and recovery strategy characteristics (Grunert and Weber, 2005; Dermine and Neto de Carvalho, 2006; , Bandyopadhyay et al, 2009, Khieu and Mullineaux, 2009, Khieu *et al*, 2012). However, from the view points of both academia and practioners, research findings on some of these factors are

mixed and have sometimes produced contradictory evidence. For instance, Khieu et al(2012) assert that loan related factors are more significant than borrower characteristic, Bastos (2010) expresses that borrower characteristics are more influential in explaining determinants of loan recovery while Dermine and Neto de Carvalho, (2006) opine that macroeconomic factors are major and significant explanatory factors of loan recovery in lending institutions. Bastos (2010) opines that the direction of influence of these determinants on the recovery of defaulted mortgage loan is important to lender and financial regulators. Therefore, following Khieu and Mullineaux (2009), we examine loan recovery as a function of some financial and non-financial factors as contained in Table 1.

Data on Three thousand one hundred and ninety-seven (3,197) defaulted mortgage loan accounts from 1999 – 2011 were gathered from the databases of some selected Commercial Banks (CB) and Primary Mortgage Institutions (PMIs) in Nigeria. Also, data on GDP, inflation rate and interest rate were obtained from the Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS). These defaulted accounts were into two categories namely "fully recovered" and "partially recovered". Loans in the fully recovered category are the defaulted loans which were eventually recovered while the loans in the partially recovered category are those which were not fully recovered. On the basis of the recovery status of each of the defaulted loans accounts, a model was developed to determine the impact of each of the predictors on loan recovery.

We estimate the relations between loan recovery and explanatory factors. As observed in Table 1, most of the variables are bounded between 0 and 1. Ordinary Least Square (OLS) methods could have been adopted to estimate this relationship but because of the fact that using a linear model for a log-odds function makes it difficult to estimate the value of the fractional dependent variable (Papke and Woodrige, 1996). Khieu *et al* (2012) assert that one common method for handling binary (dummy) variables is the Quasi Maximum Likelihood Estimation (QMLE). In this regard, QMLE is adopted to estimate the effects of the explanatory variables on criterion variable. Following Papke and Woodridge (1996), Dermine and Neto de Carvalho, 2006 and Khie *et al* (2012), we apply the Quasi-Maximum Likelihood Estimation (QMLE) to estimate the effect of the explanatory variables on the criterion variable as follows.

$$LR = \alpha_0 + \sum_{j=1}^{n} \beta_j X_{ij} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.1$$

Where LR = loan recovery status, taking the values of 1 if the defaulted loan was fully recovered eventually and 0 if otherwise.

α_0 is constant; β_j = coefficient associated with the exogenous predictors; X_{ij} = explanatory factors (as contained in Table 1).

Let P_i be the probability of recovery of defaulted loans of borrower i.

$$LR = \frac{e^{\sum_{j=1}^{n} \theta_j x_{ij}}}{1 + e^{\sum_{j=1}^{n} \theta_j x_{ij}}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.2$$

Transforming equation 1 we derive the odd ratio as;

$$\frac{p_i}{1-p_i} = \exp\left(\alpha_0 + \sum_{j=1}^{n} \beta_j X_{ij}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.3$$

And the Logit Model will be;

$$\text{Log}\left\{\frac{p_i}{1-p_i}\right\} = \alpha_0 + \sum_{j=1}^{n} \beta_j X_{ij} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.4$$

In this regard, a unit increase in any of the explanatory factors raises the odd ratio by a value equal to the exponential of its corresponding parameter (Shmueli, Pate and Bruce, 2007).

Table 1: Operationalization of Variables

VARIABLE	DEFINITION	MEASUREMENT
Macro-economic characteristics		
GDP	The annual growth rate in GDP.	Scale
INFL	Growth in inflation rates	Scale (Percentage)
GINT	Growth in interest rates	Scale (Percentage)
Borrower characteristics		
BORTY	Borrower Type	Dummy (1, if corporate borrower, 0 if otherwise)
YBRB	Years of relationship with the bank	Dummy (Actual in year)
BORDH	Borrower default history	Dummy (1, if borrower has history of default, 0 if otherwise)
Loan characteristics		
LNSE	Loan size	Scale (₦)
LNDN	Loan duration	Scale (Monthly)
LTV	Loan-to-Value	Scale
LNSE	Documentation on loan security	Dummy (1, if loan is secured, 0 if otherwise)
LNSM	Loan Supervision and monitoring by Lender	Dummy (1, if bank partners with client, 0 if otherwise)
COLRV	Bank culture on revaluation/ monitoring of loan collateral	Dummy (1, if revaluation/ monitoring of collateral is done within loan duration 0 if other wise)
Loan Recovery Strategies		
RAPTD	Loan recovery through appeal to debtor	Dummy (1, if appeal method is used, 0 otherwise)
RTHBM	Recovery by threat and blackmail	Dummy (1, if threat and blackmail is used, 0 if otherwise)
RAPRR	Recovery by appointment of rent receiver	Dummy (1, if legal action is adopted, 0 if otherwise)
RDEFC	Recovery by debt- factoring companies	Dummy (1, if debt factoring is used 0 if otherwise)
RIND	Recovery by invoice discounting	Dummy (1, if invoice discounting is used, 0 if otherwise)
RFORS	Recovery by sale of collateral	Dummy (1, if sale of collateral is used, 0 if otherwise)
RNDIC	Recovery through NDIC	Dummy (1, if NIDC is used, 0 if otherwise)
Collateral characteristics		
COLLREST	Real estate only	Dummy (1, if collateral is real estate, 0 if otherwise)
COLLSHR	Stock/Shares only	Dummy (1, if collateral is stock/shares, 0 if otherwise)
COLLGPI	Guarantee/Pledges/Insurance	Dummy (1, if collateral is guarantee/ pledges/insurance, 0 if otherwise)
COLLCOM	Combination of collaterals	Dummy (1, if collateral is real estate, 0 if otherwise)
RECOLN	Real estate collateral location (if collateral used is real estate)	Dummy (1, if located within a built up environment, 0 if otherwise)
REAGE	Age of real estate collateral (if real estate)	Actual age in year
RECPE	Real estate collateral market value at foreclosure	Scale (₦)
Loan sector characteristics		
LSAG	Agricultural sector	Dummy (1, if loan is recovered from agricultural sector, 0 if otherwise)
LSMG	Mining related sector	Dummy (1, if loan is recovered from mining sector, 0 if otherwise)
LSOIL	Oil sector	Dummy (1, if loan is recovered from oil sector, 0 if otherwise)
LSRE	Real estate sector	Dummy (1, if loan is recovered from real estate sector, 0 if otherwise)
LSIND	Industrial sector	Dummy (1, if loan is recovered from industrial sector, 0 if otherwise)
LSMG	Manufacturing sector	Dummy (1, if loan is recovered from manufacturing sector, 0 if otherwise)
LSTEC	Telecommunication sector	Dummy (1, if loan is recovered from telecommunication sector, 0 if otherwise)

Source: Data Analysis, 2012

4. Empirical Results and Discussion

Table 2: Descriptive Statistics of the Sampled Loans

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Recovery status	3197	.00	1.00	.55	.497
Agriculture	3197	.00	1.00	.26	.441
Oil	3197	.00	1.00	.11	.313
Real Estate	3197	.00	1.00	.31	.463
Mining	3197	.00	1.00	.04	.189
Industry	3197	.00	1.00	.12	.324
Manufacturing	3197	.00	1.00	.10	.295
Telecommunication	3197	.00	1.00	.06	.241
Loan Sector	3197	1.00	7.00	3.17	1.873
Loan Status	3197	.00	1.00	.99	.098
Appeal to debtor	3197	.00	1.00	.29	.453
Threat and Blackmail	3197	.00	1.00	.18	.381
Foreclosure	3197	.00	1.00	.22	.413
Debtor's Quarantor	3197	.00	1.00	.02	.146
NDIC	3197	.00	1.00	.02	.149
EFCC	3197	.00	1.00	.05	.224
Debt factoring Company	3197	.00	1.00	.07	.259
Appointment of rent receiver	3197	.00	1.00	.01	.110
Others	3197	.00	1.00	.14	.343
Borrower Status	3197	.00	1.00	.61	.487
Borrower History of Default	3197	.00	1.00	.75	.434
Bank Participation in Project	3197	.00	1.00	.15	.359
Location of Collateral	2300	.00	1.00	.42	.494
Real Estate only	3166	.00	1.00	.73	.446
Shares only	3166	.00	1.00	.07	.250
Guarantee/Pledge/Insurance policy	3166	.00	1.00	.08	.279
Combination of Collaterals	3166	.00	1.00	.12	.327
Type of collateral	3166	1.00	4.00	1.60	1.068
External valuer	2300	.00	1.00	.49	.500
In-house Valuer	2300	.00	1.00	.10	.300
External+Inhouse valuer	2300	.00	1.00	.41	.492
Priority of Collateral	3166	.00	1.00	.94	.238
Collateral Revaluation	2300	.00	1.00	.37	.482
GDP Growth	3197	4.60	9.60	7.50	1.081
Inflation Growth	3197	-52.50	173.90	12.86	36.942
Interest Growth	3197	-16.10	33.40	-.12	10.025
Loan Amount	3197	.05	7000.00	135.37	650.823
Loan Duration	3197	6.00	112	21.26	12.977
Number of Year of Relationship with bank	3197	0.0	15	4.00	3.595
Value of Collateral	3197	.41	45000.00	298.73	2475.132
Age of Collateral	2300	1.00	28	13.95	5.542
Loan-to-value	3197	.01	1.00	.65	.238

Source: Data Analysis, 2012

Descriptive statistics for the entire sample are presented in Table 2. It indicates that 55.3% of the defaulted mortgage loans were fully recovered. The loan size has a mean value of ₦135.3m while the average loan duration of the sample loans is 21months. The table also revealed that average period of borrower relationship with bank is about 4months while the value of collateral and loan-to-value are on the average ₦298.73m and 0.65 respectively.

Table 3: Comparison of Fully and Partially recovered Loans

Variables	Fully Recovered (N=1037)		Partially Recovered (N=918)		T-Test Statistics		
	Mean	Std. Dev.	Mean	Std. Dev.	Mean Diff.	t	Sig. (2-tailed)
GDP_GROWTH[1]	7.80	1.02	7.37	1.02	0.43	9.40	0.00***
INFLA_GROWTH[2]	3.49	36.90	33.12	33.56	-29.63	-18.59	0.00***
INT_GROWTH[2]	-2.57	9.61	5.44	8.54	-8.01	-19.53	0.00***
Loan Amount[2]	35.24	77.75	106.35	585.08	-71.11	-3.65	0.00***
Value of Collateral[2]	53.83	134.39	140.81	707.48	-86.97	-3.67	0.00***
Loan-to-value[2]	0.75	0.18	0.75	0.15	0.00	-0.39	0.70
Total Amount Recovered[2]	35.24	77.75	78.03	419.44	-42.79	-3.05	0.00***
Total Cost of Recovery[2]	0.71	1.36	0.79	2.26	-0.08	-0.94	0.35
Loan Duration[2]	19.08	11.23	18.30	11.43	0.78	1.52	0.13*
Agriculture[2]	0.17	0.37	0.19	0.40	-0.03	-1.55	0.12*
Oil[2]	0.11	0.32	0.13	0.34	-0.02	-1.14	0.25
Real Estate[2]	0.47	0.50	0.32	0.47	0.15	6.96	0.00***
Mining[2]	0.01	0.08	0.04	0.19	-0.03	-4.69	0.00***
Industry[2]	0.10	0.30	0.14	0.34	-0.04	-2.73	0.01**
Manufacturing[1]	0.10	0.30	0.11	0.31	-0.01	-0.68	0.50
Telecommunication[2]	0.05	0.21	0.07	0.26	-0.03	-2.57	0.01**
Appeal to debtor[2]	0.34	0.48	0.22	0.42	0.12	6.17	0.00***
Threat and Blackmail[2]	0.29	0.45	0.12	0.32	0.17	9.80	0.00***
Foreclosure[2]	0.29	0.46	0.32	0.47	-0.03	-1.35	0.18
Debtor's Quarantor[1]	0.02	0.13	0.02	0.12	0.00	0.37	0.71
NDIC[2]	0.02	0.13	0.03	0.17	-0.01	-1.88	0.06*
EFCC[2]	0.01	0.09	0.05	0.22	-0.04	-5.52	0.00***
Debt factoring Company[2]	0.01	0.11	0.21	0.41	-0.20	-14.28	0.00***
Appointment of rent receiver[2]	0.00	0.07	0.01	0.11	-0.01	-1.71	0.09*
Others[2]	0.01	0.12	0.02	0.15	-0.01	-1.69	0.09*
Borrower Status[2]	0.61	0.49	0.55	0.50	0.06	2.63	0.01***
Borrower History of Default[2]	0.82	0.39	0.68	0.47	0.14	7.28	0.00***
Number of Year of Relationship with bank[2]	5.87	2.80	5.04	3.24	0.83	6.01	0.00***
Bank Participation in Project[2]	0.06	0.23	0.07	0.26	-0.02	-1.44	0.15*
Age of Collateral[2]	14.62	4.82	12.71	6.09	1.91	7.63	0.00***
Location of Collateral[2]	0.58	0.49	0.32	0.47	0.26	12.07	0.00***
Real Estate only	1.00	.000(a)	1.00	.000(a)			
Shares only	0.00	.000(a)	0.00	.000(a)			
Quarantee/Pledge/Insurance policy	0.00	.000(a)	0.00	.000(a)			
Combination of Collaterals	0.00	.000(a)	0.00	.000(a)			
External valuer[1]	0.49	0.50	0.50	0.50	-0.01	-0.56	0.57
In-house Valuer[2]	0.04	0.20	0.08	0.28	-0.04	-3.86	0.00***
External+Inhouse valuer[2]	0.47	0.50	0.42	0.49	0.06	2.45	0.01***
Priority of Collateral[1]	0.95	0.22	0.95	0.21	0.00	-0.36	0.72
Collateral Revaluation[2]	0.29	0.46	0.49	0.50	-0.19	-8.87	0.00***

Source: Data Analysis, 2012

Table 4. Determinants of Mortgage Loan Recovery (Logit Regression Model)

Variable	B	Wald	Sig.	Exp(B)	95.0% C.I. for EXP(B)		Effect (%)
					Lower	Upper	
GDP GROWTH	0.44	33.41	.000***	1.56	1.34	1.81	55.50
INFLATION GROWTH	-0.02	114.64	.000***	0.98	0.97	0.98	-2.40
INTEREST GROWTH	-0.08	103.63	.000***	0.92	0.91	0.94	-8.00
Loan Amount	0.00	0.39	0.53	1.00	0.99	1.00	-0.10
Value of collateral	0.00	0.35	0.56	1.00	1.00	1.00	-0.10
LTV	-0.73	2.00	0.16	0.48	0.18	1.32	-51.70
Loan duration	0.01	1.69	0.19	1.01	1.00	1.02	0.90
Agriculture	0.38	1.09	0.30	1.46	0.72	2.97	46.00
Oil	0.30	0.63	0.43	1.34	0.65	2.79	34.30
Real estate	0.99	8.56	.003**	2.70	1.39	5.24	169.50
Mining	-2.28	12.23	.000***	0.10	0.03	0.37	-89.80
Industrial	-0.45	1.45	0.23	0.64	0.31	1.33	-36.10
Manufacturing	0.48	1.67	0.20	1.62	0.78	3.37	62.10
Telecommunication	Dropped						
Appeal	1.60	9.10	.003**	4.94	1.75	13.96	394.30
Threat	2.17	15.72	.000***	8.78	3.00	25.70	778.10
Foreclosure	0.87	2.55	0.11	2.39	0.82	6.96	138.90
Guarantee	1.22	3.06	.080*	3.38	0.86	13.23	238.10
NDIC	0.13	0.04	0.85	1.13	0.31	4.19	13.40
EFCC	-1.47	4.44	.035**	0.23	0.06	0.90	-76.90
Debt Factor	-2.16	12.10	.001***	0.12	0.03	0.39	-88.40
Appointment	1.32	2.57	0.11	3.73	0.75	18.67	272.90
Others	Dropped						
Borrower Status	2.96	128.40	.000***	19.35	11.59	32.31	1835.40
Borrowers'_History of Default	2.07	100.81	.000***	7.92	5.29	11.86	691.60
Year of Business relationship with bank	0.05	3.35	.067*	1.05	1.00	1.10	4.80
Loan Supervision	3.37	82.26	.000***	29.00	14.01	60.05	2800.40
Age of Collateral	0.09	42.75	.000***	1.10	1.07	1.13	9.60
Location of Collateral	3.49	179.10	.000***	32.66	19.60	54.42	3166.30
ExternalValuer	-0.55	9.44	.002**	0.58	0.41	0.82	-42.10
In-house Valuer	-1.22	13.49	.000***	0.29	0.15	0.57	-70.60
Type_Valuer3	Dropped						
Priority_of Collateral	-1.98	28.12	.000***	0.14	0.07	0.29	-86.20
Collateral_Re-valuation	-1.20	54.73	.000***	0.30	0.22	0.42	-69.80
Constant	-7.60	52.15	.000***	0.00			

Source: Data Analysis, 2012

Table 3 presents analysis of independent t-test used in comparing the population characteristics of the sampled loan in the fully recovered and partially recovered categories. In all, out of a total of forty (40) variables evaluated, significant difference was observed in twenty-seven (27) variables at various levels of significance. The table indicates that the GDP growth is significantly higher in the fully recovered category than the partially recovered category at p ≤ 0.01 indicating that a positive growth in GDP as an indicator of growth in the real economy leads to increased odds of recovery of defaulted mortgage loan. In the contrary, growth in inflation and

interest rates are significantly higher in partially recovered category than the fully recovered category, indicating that growth in inflation and interest rates leads to low recovery of defaulted mortgage loan.

The result of the logistic model in table 4 reveals that the significant independent variables at various significant levels (P≤0.01, P≤0.05, and P≤0.1) are GDP growth, inflation growth, interest rate growth, mining sector, borrower status, borrower default history, loan supervision and monitoring, age of collateral, location of collateral, in-house valuers, priority of collateral taken and collateral revelation, others include real estate sectors, appeal to debtor, EFCC, external valuer, guarantees and number of year of business relationship with lender. While loan size, LTV, loan duration , Agricultural sector, oil sector, industrial sector, manufacturing sector, foreclosure NDIC and appointment of rent receivers show no statistical significance at P≤0.01, P≤0.05 and P≤0.1. The consistency or otherwise of this finding with other studies are discussed below in relation to each variable.

As earlier discussed in the t-test result which reveals that GDP growth is significantly higher in fully recovered category than partially recovered category, the logit result in Table 4 also shows that GDP is positively significant and raises the odd of recovery by 55.5%. This implies that GDP as a performance indicator of economic growth in any country is very important determinant of the profitability of many economic activities. This indicates that a good performance in real economy improves recovery of defaulted loan. Growth in inflation rate has a negative effect on loan recovery as shown by t-test Table 3 and logit result Table 4 which indicates that inflation growth is negatively significant to loan recovery. This suggests that when there is a persistent increase in prices of goods, the borrower's purchasing power is affected, hence become unable to fulfill his obligation of loan repayment. In all, growth in GDP and inflation are macro-economic variables which Panahian (2011) asserts are very significant for credit risk modeling. The finding in this study with respect to GDP and inflation corroborates the finding of Araten. *et al*. (2004); Altman *et al.* (2006) and Caselli *et al.* (2008) and Panahian (2011). However, this is contrary to the finding of Inwon (2002) and Dermine and Neto de Carvalho (2006) which claim that there is no relationship between macroeconomic factors and loan recovery.

Furthermore, the result of logit analysis in Table 4 reveals that increase in loan size reduces loan recovery by 0.10% indicating that lager loan size is associated with low probability of loan recovery. This finding is consistent with the position of Dermine and Neto de Carvallho (2006) and Kheiu and Mullineaux (2009). However Asernow and Edward (1995) and Thornburn (2000) claims that loan size has positive significant effect on loan recovery. Another loan characteristic is loan duration which the current study found has a positive effect of raising loan recovery by 0.9% as revealed by the logit Table 4. This indicates that the longer the loan term, the higher the probability of loan recovery. This was contrary to the opinion expressed by Fesolys and Hurt(1998), the longer the period of loan, the lower the probability of recovery while Derban *et al.* (2005) believe that longer loan period leads to lower recovery except if longer duration is arranged to have smaller installment. However, the finding of the current study is consistent with Kheiu and Mullineaux (2009). Also, evidence of positive and significant relationship was also found between loan and supervision/monitoring and odd of recovery at P≤0.1 as revealed by Logit result in table 4. This implies that a close supervisory and monitoring relationship between lending institution and borrowers enhances loan recovery which is consistent with Avyeetery and Nisanke (2000).

As revealed in Table 3 interest rate growth is significantly higher in partially recovered category than in the fully recovered category. This is further corroborated by the logit result in Table 4 which shows that growth in interest rate has negative and significant effect on loan recovery. The result indicates that 1% increase in the growth of interest rate chargeable reduces the probability of loan recovery by 8%. The result of this study is consistent with Besley and Coate (1995), Aryeetey *et al.* (2000) and Amonoo *et al.* (2003). This means that higher interest rate adversely affect the ability of borrower to make full payment of the debt. This is in line with Amonoo *et al.* (2003) which claim that an increase in interest rate increases cost of production, reduces returns, reduces borrower ability to make full payment of debt and constrains lenders from granting further loans.

On borrower characteristics, the result of the t-test in Table 3 reveals that the number of once-defaulted borrowers is significantly higher in the fully recovered group than that of the partially recovered category. This was also the case with the logit result in Table 4 which shows that borrower's history of default has a significant (p ≤ 0.01) effect and raises the odd of recovery by 691.6%. This result is not consistent with the opinion expressed by Frye, (2000a, 2000b and 2003), Altman *et al*, (2003) and Acharya *et al*, 2003a). However, Kheiu and Mullineaux (2009) opine that history of default may produce a higher recovery only if stringent collateral demand is made. This means that lenders may have a high loan recovery from a previously defaulted borrower if

the borrower is subjected to a stricter scrutiny during loan evaluation process. Another borrower characteristic is the borrower period of business relationship with lender which in Table 4 has significant positive relationship with odds of loan recovery. This implies that an increase in the year of borrower business relationship with banks increase the probability of loan recovery. This finding is in line with Altman *et al* (2003) and Frank *et al.* (2004) which claim that client with longer business relationship exhibits higher recovery. However, this was contrary to Inwon (2002) which expresses that number of years of borrower relationship with bank has negative effect on the amount recovered.

5. Conclusion and Policy Implications

Much research has been devoted to understanding the factors affecting mortgage loan default than recovery of defaulted mortgage loans (Kheiu and Mullineaux, 2009). In view of the growing trend of credit losses largely occasioned by loan default across countries of the world especially in the developing countries, it is important to understand every conceivable factor that explains the probability of recovery of defaulted mortgage loans.

The paper attempts to investigate the determinants of recovery of defaulted bank loans in Nigerian lending institutions using Logistic Regression Model similar to Kheiu and Mullineaux (2009). The result shows that macroeconomic factors such as, growth in GDP, growth in inflation rate and interest rates are significant (at p-value ≤ 0.01). Specifically, growth in GDP is positively significant determinant of loan recovery (at $p \leq 0.01$). We also find evidence of a significant inverse relationship between growth in inflation rate and loan recovery on one hand and growth in interest rate and loan recovery on the other hand. The positive sign in GDP growth implies that a good performance in the real economy could result in high recovery of defaulted bank loans while an increase in inflation rate and interest rate as indicated by negative sign result in low recovery of defaulted mortgage loans.

With respect to loan characteristics such as, loan size, loan duration, loan supervision and monitoring and loan-to-value ratio, the result indicates that all of these factors have positive impact on loan recovery but are not significant except loan supervision which exerts positive significant influence on loan recovery.

On borrower characteristics such as borrower history of default, years of borrower relationship with lender and borrower status, the result shows that these factors are positively significant determinants of loan recovery. Also, collateral characteristics, such as location of real estate collateral, age real estate collateral, priority of collateral taken and revaluation of real estate collateral are significant determinants of loan recovery.

The implication of the foregoing is that lending institutions should pay special attention to these factors when originating credit transactions in order to minimize loan losses and rather than solely centralizing analysis on the credit worthiness of the borrower as often the practice of some lending institutions, a holistic analysis may be more appropriate in this regard.

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