FOREIGN EXCHANGE RATE AND PERFORMANCE OF THE NIGERIAN MANUFACTURING SECTOR

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Abstract

This study examined the impact of foreign exchange rate on performance of the manufacturing sector in Nigeria. The study spanned from 1991-2017 The independent variables used for the study are real effective exchange rate, parallel exchange rate, interest rate, inflation rate, money supply while the dependent variable is returns on equity for fifteen manufacturing firms in Nigeria. Time series data were used and gotten from CBN Statistical Bulletin 2017 and annual report of the firms under study. The study applied E-view 7.0 version and the estimation technique applied are ordinary least square (OLS), diagnostic test, serial correlation test, stability test, unit root test, granger causality and co integration test. The result revealed the p-value of real effective exchange rate (REER) is 0.036, parallel exchange rate (PER) is 0.000, interest rate (INT) 0.031, inflation rate (INF) 0.000, money supply (MSP) 0.017. The result also revealed that all the independent variables under study have significant impact on returns on equity of manufacturing firms in Nigeria because their p-values are all less than 5% significant level. The normality test suggest that the series distribution is normal as the p-value is 0.3 89 which is greater than 5% significant level, we accept H0 which states that the residuals are normally distributed and it is desirable and further connote that the influence of other omitted and neglected variables is small and at best random. While serial correlation test shows that the p-value of the f-statistics is 0.122 which is greater that the critical value of 5%, we conclude by accepting H0 that there is no presence of serial correlation which is desirable and implies that the variables are independently distributed. The study recommended that the monetary authority should continue to initiate policies that will stabilize exchange rate and remove negative effect of exchange rate fluctuations on Nigeria's manufacturing performance.

Keywords: Exchange Rate, Real Effective Exchange Rate, Interest Rate, Money Supply

Introduction

The desire of every developing country like Nigeria is to ensure rapid industrialization.

Lawal (2016) stated that in Nigeria, the government and economic experts have emphasized the role that industrialization plays in the structural transformation of the economy. Lawal (2016) also stated that the major goal is to achieve an accelerated pace of industrial development for the nation. Hence, several fiscal, monetary, exchange rate and commercial policies and measures have been adopted to encourage industrialization within the range of available resources.

According to Chong and Tan (2016) foreign exchange rate is responsible for changes in macroeconomic fundamentals for the developing economies. It is relevant to establish that foreign exchange rate fluctuations influence domestic prices through their effects on aggregate supply

and demand. Kandil, (2014) stated that the higher cost of imported inputs linked with exchange rate depreciation increases marginal costs and leads to higher price of domestically produced goods. Also, import-competing firms might gain prices in reaction to extraneous competitor price increases to improve profit margins. The extent of such price adjustment depends on a variety of factors such as market structure, the relative number of domestic and foreign firms in the market, the nature of government exchange rate policy and product substitutability, (Fouquin, Sekkat, Mansour, Mulder, and Nayman, 2012).

The Manufacturers Association of Nigeria (MAN) (2012) recorded that of the 2780 registered members, a total of 839 (30.2%) manufacturing firms closed their factories in 2009. This is due to their inability to cope with the challenges posted by the harsh operating environment in Nigeria. In addition, in the Newsletter edition of the Association for March, 2010, it was reported that one million jobs have been lost in the sector between 2006 and 2010.

Statement of the Problem

Up to the time of (SAP), it appeared that Nigerian's exchange rate policy tends to encourage over-valuation of the Naira. This, in turn, encouraged imports, and discouraged non-oil export and over dependence on imported inputs. Exchange rate policy was not pitched towards the attainment of long-run equilibrium rate that would equilibrate the balance of payment in the medium and long-term and facilitate the achievement of certain structural adjustment objectives e.g. export diversification. The performance of the manufacturing sector since 1986 has been poorly ascribed to macroeconomic instability and inconsistence in the exchange rate. The manufacturing sector is weak and heavily import dependent. It is in the light of the foregoing that this study seeks to examine the impact of foreign exchange rate on the manufacturing sector performance in Nigeria.

Theoretical Review

Balance of Payment Theory of Exchange Rate

It holds that the price of foreign money in terms of domestic money is determined by the free forces of demand and supply on the foreign exchange market, propounded by Bretton Woods in (1970).

It follows that the external value of a country's currency will depend upon the demand for and supply of the currency.

According to the theory, a deficit in the balance of payment leads to fall or depreciation in the rate of exchange, while a surplus in the balance of payment strengthens the foreign exchange reserves, causing an appreciation in the price of home currency in terms of foreign currency.

In short, the balance of payments theory admits that the exchange rates are determined by the balance of payments connoting demand and supply positions of foreign exchange in the country concerned. As such, the theory is also designated as "Demand-Supply Theory."

Empirical Review

In the past, many researchers have explored the relationship between foreign exchange rate and manufacturing employment. Different methodologies employed have resulted in different results some contradictory to past evidences where some in support as the case may be. The empirical results of these studies however were ambiguous and mixed (Campa and Goldberg, 2017) therefore, a conclusive remark as not

been reached. This is not surprising as output effect of exchange rates (which is expected to be highly correlated with employment) (Changes in employment are linked to changes in output via a production function) is transmitted via the trade balance and the foreign trade multiplier. Because the conclusions of the theoretical models of the trade effect of exchange rate movement are ambiguous, this abates the possibility of concluding a significant systematic relationship between the exchange rate and employment. Most of the empirical works on the subject of this study concentrated more on the disaggregated level.

The concern has mostly been with the manufacturing sub-sector where most of the work done has concentrated on a particular country. The presumed relationship in these studies is negative that is an appreciation of the currency is expected to lead to a decrease in employment and vice versa. Some empirical studies established that exchange rate fluctuations have significant negative effect on employment (Alexandre et al., 2012; Demir, 2012; Frenkel, 1976; Nucci and Pozzolo, 2014; Goldberg and Tracy, 2012; Burgess and Knetter, 2016; Revenga, 2012; Branson and Love, 2013). Some studies on the other hand, found weaker implications of exchange rates for employment but more pronounced effects for wages (Campa and Goldberg, 2017; Goldberg and Tracy, 2012). Some studies established positive relationship between exchange rate and general employment (Ngandu, 2013).

Opaluwa, Umeh and Ameh (2012) examined the impact of exchange rate fluctuations on the Nigerian manufacturing sector during a twenty (20) year period (1986 — 2005). The variables used are: MGDP f (MER, MFPI, EXR), where MGDP is manufacturing gross domestic product, MER is manufacturing employment rate, MFPI is manufacturing foreign private investment and EXR is exchange rate. The methodology adopted for the study is empirical. The econometric tool of regression was used for the analysis. The result of the regression analysis shows that coefficients of the variables carried both positive and negative signs. The study actually shows adverse effect and is all statistically significant in the final analysis.

Ehinomen and Oladipo (2012) studied exchange rate management and the manufacturing sector performance in the Nigerian economy. Variables like manufacturing GDP, manufacturing direct investment, exchange rate, inflation rate, real interest rate were used Ordinary Least Square (OLS) multiple regression analysis was employed using E-view. The study covered the periods of 1986-20 10 with the use of time-series data. The study shows that depreciation which forms part of the structural adjustment policy (SAP) 1986, and which dominated the period under review has no significant relationship with the manufacturing's sector productivity. While study like Adewuyi (2015) has even established that trade policy variables have no significant effect on the manufacturing wage and employment in Nigeria during the SAP reform period.

Klein, Schun, and Triest, (2013) where it was established that the effect of the exchange rate on employment is magnified by trade openness. In their study, they measured industry openness using a 5 years moving average of the ratio of total trade to total market sales.

Methods

The study chose ex-post facto research design because the study intends to

establish cause and effect relationship, also the researcher has no control over the variables of interest and therefore cannot manipulate them.

The sampling frame which is the list of all the thirty seven (37) manufacturing firms quoted in the Nigeria stock exchange makes up the population of the study. Thus, the sample size of fifteen (15) manufacturing firms out of the population was used, which are: Flour Mills Nigeria Pie (Lagos State), Dangote Cement Plc. (Lagos State), Berger Paints Plc. (Lagos State), Beta Glass Pie. (Lagos State), Premier Paints Pie. (Ogun State), Cutix Plc. (Anambra State), Portland Paints & Products Nigeria Plc. (Lagos State), Meyer Plc. (Lagos State), Honeywell Flour Mill Plc. (Lagos), 7-UP Bottling Company (Lagos), Cadbury Nigeria Plc. (Lagos), Guinness Nigeria Plc. (Lagos), Nestle Nigeria Pie. (Lagos), Golden Guinea Brewery Plc. (Lagos), and VitaFoam Nigeria Plc. (Lagos).

In order to estimate the regression model, the software the researcher used in the analysis is E-view version 7.0. The procedure involves specifying the dependent and independent variables. In this process, we shall obtain the values of constant (slope), coefficient of regression and the error term. In addition Caner and Kilian (201) noted that the estimation will show the t-statistics and the p-values for the coefficient which result in either rejecting or accepting the hypotheses at a specific level of significance. The p-value is the probability of getting a result that is at least as extreme as the critical value.

Model Specification

To achieve the objectives of the study, we build the ideas of our reasoning by construction of econometrics process. Model specification is a process of constructing logical thinking abstraction of economic reality. Model specification entails establishing the coefficient(s) of regression for a sample and making inference on the population. The linear regression equation is stated as follows:

ROE = f (REER, PER, INTR, INFR, DOP, MSP) ……(1)

The econometric model is expressed below:

ROE = $\beta_0 + \beta_1$REER + β_2PER + β_3INTR + β_4IINFR + β_5MSP + μ…… (2)

Where:

ROE = Returns on Equity, (dependent variable)

REER = Real Effective Exchange rate

PER = Parallel Exchange Rate

INTR = Interest Rate

INFR = Inflation rate

MSP = Money Supply

μ = Stochastic Disturbance (Error Term)

Independent Variables

f = Functional Relationship

B_0 = Intercept of relationship in the model constant

B_1-B_5 = coefficients of each of the independent variables

By log linearizing, the model becomes;

Log (ROE) = β_0+ $\beta_1$log(REER) + $\beta_2$log(PER) + $\beta_3$1og(INTR) + $\beta_4$log(INFR) + $\beta_5$log(MSP) + μ

Apriori Expectations

REER > 0

The expectation of the result is proposed as real effective exchange rate will have positive impact on returns on equity of manufacturing firms in Nigeria.

PER > 0

The expectation of the result is proposed as parallel exchange rate will have positive impact on returns on equity of manufacturing firms in Nigeria.

INTR<O

The expectation of the result is proposed as interest rate will have negative impact on returns on equity of manufacturing firms in Nigeria.

INFR<O

The expectation of the result is proposed as inflation rate will have negative impact on returns on equity of manufacturing firms in Nigeria.

MSP> 0

The expectation of the result is proposed as money supply (MSP) will have positive impact on returns on equity of deposit money banks in Nigeria.

Results and Discussion

Ordinary Least Square (OLS)

Table 1: Ordinary Least Square (OLS) Result

Dependent Variable: ROE
Method: Least Squares
Date: 07/02/18 Time: 03:52
Sample (adjusted): 1991 2017
Included observations: 27

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10240.53	861.9526	11.88062	0.0000
REER	27564.29	12311.18.	2.238964	0.0361
PER	43.57128	10.08997	4.318279	0.0003
INTR	-5.957460	2.587455	-2.302440	0.0316
INF	193.0052	19.86838	9.714190	0.0000
MSP	5.488378	2.119877	2.589252	0.0171
R-squared	0.987175	Mean dependent var.		37276.75
Adjusted R-squared	0.984122	S.D. dependent var.		17800.00
S.E. of regression	2242.962	Akaike info criterion		18.46211
Sum squared resid	1.06E+08	Schwarz criterion		18.75008
Log likelihood	-243.2385	Hannan-Quinn criter.		18.54774
F-statistic	323.2912	Durbin-Watson stat		2.231710
Prob(F-statistic)	0.000000			

Estimation Command:

LS ROE C REER PER INTR INF MSP

Estimation Equation:

ROE = C(1) ÷ C(2)*REER + C(3)*PER + C(4)*INTR ÷ C(5)*INF + C(6)*MSP

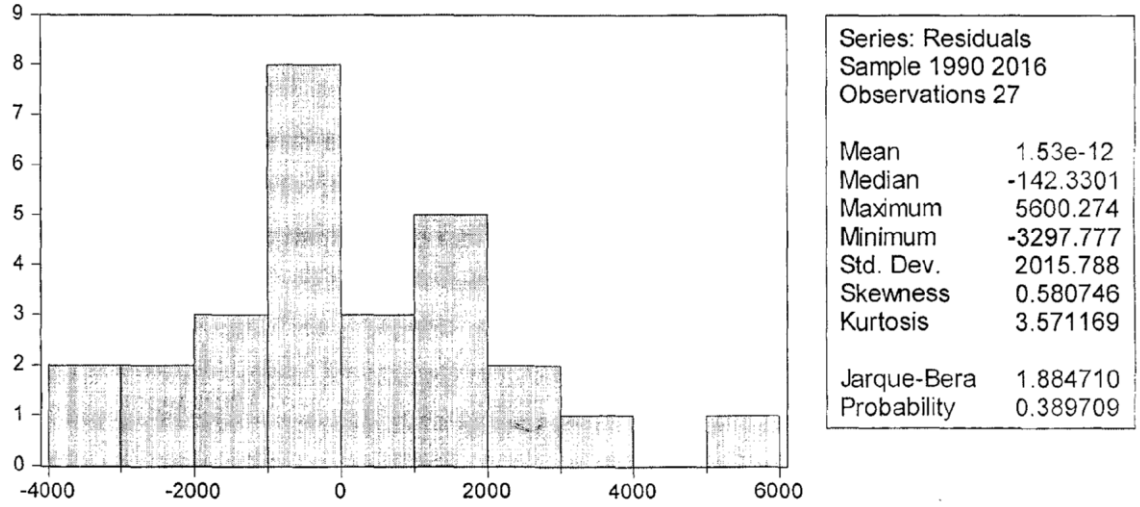
Substituted Coefficients:

ROE = 10240.5321566+ 27564.2905494*REER + 43.5712842006*PER - 5.957460351 12*INTR + 193.00516561 2*INF + 5.48837788877*MSP

Source: Author's Computation using E—view 7.0 (2018)

Table 1 shows the result for ordinary least square. Real effective exchange rate (REER) is positive in the coefficient column which connotes that a unit increase in real effective exchange rate can lead to 10240 increases in returns on equity of manufacturing firms in Nigeria. Parallel exchange rate (PER) is positive in the coefficient column and signifies that a unit increase in parallel exchange rate can lead to 43.5% increase in returns on equity of manufacturing firms in Nigeria. Interest rate (INTR) is negative also a unit increase in interest rate can lead to -5.95% decrease in returns on equity. Inflation rate (INF) and money supply (MSP) are positive and a unit increase in them can lead to 193.00 and 5.48 increase in returns on equity of manufacturing firms in Nigeria respectively.
All the independent variables have significant impact on returns on equity of manufacturing firms in Nigeria.

Diagnostic Test
Table 2.: Normality test



Source: Author's Computation using E-view 7.0 (2017)

The series distribution is normal as the p-value associated with JB- Jarque Bera statistics is 0.389 which is greater that the critical value of 0.05.

Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.727732	Prob. F(2,19)	0.1431
Obs*R-squared	7.608920	Prob. Chi-Square(2)	0.1223

Source: Author's Computation using E-view 7.0 (2018)
The p-value of the f-statistics is 0.143 which is greater that the critical value of 5%, we conclude by accepting H0 that there is no presence of serial correlation.

Heteroskedasticity Test

Heteroskeclasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.202043	Prob. F(5,21)	0.3423
Obs*R-squared	6.007942	Prob. Chi-Square(5)	0.3054
Scaled explained SS	4.672373	Prob. Chi-Square(5)	0.4572

Source: Author's Computation using E-view 7.0 (2018)

The p-value of the observed R-squared is 0.3 05 which is greater than the critical value of 5%, meaning that we accept null hypothesis that the residuals are not heteroscedastic in nature.

Stability Test

Ramsey RESET Test
Equation: UNTITLED
Specification: ROE C REER PER INTR INF MSP
Omitted Variables: Squares of fitted values

	Value	**dt**	**Probability**
t-statistic	3.662975	20	0.0015
F-statistic	13.41739	(1, 20)	0.0015
Likelihood ratio	13.86029	1	0.0002

Source: Author's Computation using E-view 7.0 (2018)

The p-value of the f-stat of ramsey reset test is 0.001 which is less than critical value of 5%, we conclude by accepting H1 that the series are not in functional form and it is not structurally stable.

Unit root test for ROE

Null Hypothesis: D(ROE,2) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.412934	0.0206
Test critical values:	1% level	-3.737853	
	5% level	-2.991876	
	10% level	-2.635542	

Source: Author's Computation using E-view 7.0 (2018)

The Augmented Dicker Fuller test (ADF) at second difference 1(2) for ROB is -3.412 > - 2.991 at 0.05 level of significance, this shows no unit root and that the series is stationary.

Unit root test for REER

Null Hypothesis: D(REER2) has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.640428	0.0202
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	

	10% level	-2.650413

Source: Author's Computation using E-view 7.0 (2018)

The Augmented Dicker Fuller test (ADF) at second difference 1(2) for REER is -5.6404> - 3.020 at 0.05 level of significance, this shows no unit root and that the series is stationary.

Unit root test for PER

Null Hypothesis: D(PER) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.372414	0.0022
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

Source: Author's Computation using E-view 7.0 (2018)

The Augmented Dicker Fuller test (ADF) at first difference 1(1) for PER is -4.372 > -2.986 at 0.05 level of significance, this shows no unit root and that the series is stationary.

Unit root test for INTR

Null Hypothesis: D(INtR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.391648	0.0021
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

Source: Author's Computation using E-view 7.0 (2018)

The Augmented Dick Fuller test (ADF) at first difference 1(1) for INTR is -4.39 1 > -2.986 at 0.05 level of significance, this shows no unit root and that the series is stationary.

Unit root test for TNF

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.357253	0.0228
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

Source: Author's Computation using E-view 7.0 (2018)

The Augmented Dicker Fuller test (ADF) at first difference 1(1) for TNF is -3.357> -2.986 at 0.05 level of significance, this shows no unit root and that the series is stationary.

Table 3: Unit root test for MSP

Null Hypothesis: D(MSP2) has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on SIC, maxlag6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.549772	0.00179
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

Source: Author's Computation using E-view 7.0 (2018)

The Augmented Dicker Fuller test (ADF) at second difference 1(2) for MSP is -3.549> -3.029 at 0.05 level of significance, this shows no unit root and that the series is stationary.

Granger Causality Test

Diagnostic Check	F-stat	Prob.	Conclusion
REER and ROE	10.1294	0.0009	REER granger cause ROE
ROE and REER	7.62524	0.0035	ROE granger cause REER
PER and ROE	0.63600	0.5398	PER does not granger cause ROE
ROE and PER	1.99297	0.1625	ROE does not granger cause PER
INTR and ROE	6.63804	0.0062	INTR granger cause ROE
ROE and INTR	2.95789	0.0749	ROE does not granger cause LNTR
INF and ROE	0.81969	0.0062	INF granger cause ROE
ROE and INF	8.85650	0.0487	ROE granger cause INF

Prob. Value < 0.05, Sig. at 5% for granger causality test, vice versa.
Source: Author's Computation using E-view 7.0 (2018)

Jobansen Cointegration

Date: 12/02117 Time: 04:10
Sample (adjusted): 1991 2016
Included observations: 26 after adjustments
Trend assumption: Linear deterministic trend
Series: ROE REER PER INTR INF MSP
Lags interval (in first differences):

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Elgenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.851317	111.9662	95.75366	0.0024
At most 1	0.643477	62.41173	69.81889	0.1689
At most 2	0.428389	35.59648	47.85613	0.4169
At most 3	0.402802	21.05478	29.79707	0,3542
At most 4	0.232283	7.651592	15.49471	0.5034
At most 5	0.029514	0.778919	3.841466	0.3775

Trace test indicates 1 cointegrating eqn(s) at the 005 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: Author's Computation using B-view 7.0 (2018)

The co integration result shows that the trace statistics of ROE (None *) is greater than 5% critical value, while the trace statistics of real effective exchange rate (REER) (At most 1), parallel exchange rate (PER) (At most 2), interest rate (At most 3), inflation rate (At most 4) and money supply (At most 5) are less than 5% critical value.

Conclusion

Based on the discussion of findings, the following are the conclusion:

i. The Ordinary least square test conclude that real effective exchange rate (REER) parallel exchange rate, interest rate, inflation and money supply have significant impact on returns on equity of manufacturing firms in Nigeria. We reject the null hypothesis H0 and conclude that foreign exchange rate have significant impact on performance of manufacturing sector in Nigeria.

ii. The diagnostic test suggests we accept H0 that the series distribution is normal, which is desirable. For serial correlation test, we accept H0 that the residuals are not serially correlated and it connotes that each of the observation are independent of one another. In Heteroskedasticity test we accept the null hypothesis H0 that the residuals are homoscedastic which signify that they are of equal variance and desirable.

iii. For unit root test, all the variables were stationary at second difference 1(2) except for parallel exchange rate, interest rate and inflation rate which were stationary at first difference 1(1).

iv. There exist a dual causality relationship between REER and ROE and MSP and ROE while a uni-directional granger causality relationship exist among PER and ROE, INTR and ROE, 1NF and ROE.

The study is consistent with the works of Ehinomen and Oladipo (2012), Frenkel (1976) also contradicts the study of Opaluwa, Umeh and Ameh (2012), Lawal, (2016).

Recommendations

1. Excess provisions for inflation should be cut to barest minimal level to avert the ideal of external borrowing which most consequently result in external debt and interest rate services.
2. The monetary authority should continue to initiate policies that will stabilize exchange rate and remove negative effect of exchange rate fluctuations on Nigeria's manufacturing performance.
3. Since manufacturing sector depends much on foreign inputs, and for the importation of these foreign inputs not be continuous, efforts should be geared towards improving the level of technological advancement, increasing agricultural production, and developing local raw materials in the country.
4. The government should ensure stable electricity, good roads, water, telecommunication etc. And more importantly as regards this study, the exchange rate appreciation is what the Government should intensify efforts to achieve in Nigeria.
5. Furthermore a technological policy aimed at developing a local engineering industry is advocated. By so doing, the link between agriculture and the manufacturing sector will be established, leading to expansion of export base which would attract more foreign exchange into the country. This

could culminate into high external reserves build up and reduce adverse pressure on inflation rate and money supply.

6. The monetary authority (the Central Bank of Nigeria) should monitor deposit money banks to ensure unethical practices (high interest rate) are not condoled.

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