

EFFECTS OF TRADE UNION ON ECONOMIC GROWTH AND WELFARE OF THE MEMBERS IN NIGERIA: A TEST FOR COINTEGRATION

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ABSTRACT:

The objective of this study is to investigate the effect of trade union membership on members= welfare and economic growth in Nigeria. In order to achieve the first part of this objective, a cross-sectional secondary data set on the characteristics of main occupation of individuals, collected during the Nigeria Household Living Standard Survey 2003/2004 conducted by National Bureau of Statistics (2004) in collaboration with European Union, World Bank and Department for International Development has been accessed and used. Descriptive method, Two-Sample t-test, Fisher=s Exact test, Ordinary Least Squares (OLS) estimator and Logistic Model as well as robust regressions have been applied to accomplish the first part of the objective. For the second part of the objective, time series data set covering the period, 1970-2004 has been sourced from the Central Bank of Nigeria=s Statistical Bulletin 2006 and Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.2, September 2006. Cointegration regression and error correction mechanisms have been applied to test for both the short and long run effects of trade union disputes on economic growth in Nigeria. The findings of this study indicate a significant positive relationship between trade union membership and workers pay and welfare. Therefore, the direct way to achieve improvement in income and welfare of the workers is to encourage them to organize themselves and bargain collectively so as to achieve the millennium development goal of reducing poverty by the year 2015. Similarly, trade unions disputes are found to have both short run and long run negative impacts on economic growth. In view of this, policies that will resolve the disputes before the unions embark upon industrial action should be given prominence.

Key words: trade unionism, workers= welfare, economic growth, wage-fund theory, collective bargaining theory

1. INTRODUCTION

Poverty, especially among the working families serves as the greatest obstacle to the pursuance of an enduring socio-economic growth in Nigeria. Its reduction is the most difficult challenge facing Nigeria and its people despite the enormous wealth in the country. Available facts have shown the yawning gaps between the economic potential of the country and standard of living of its workforce (NBS, 2004). The working families and pensioners in Nigeria are in tough times. The abundant human and natural resources in the country should be good news for the Nigerian economy, but only few individuals at the top hierarchy, the bureaucrats and business tycoons are enjoying higher living standards. The wage level and conditions of service of the working families in Nigeria, coupled with the level of brain drain disclose the stark realities of the living standard of working families. Yet, those on power do not take any serious step in mitigating the menace. Although unilateral efforts have been made by various regimes in Nigeria to increase salaries and improve welfare of the workers, workers= standard of living is sympathetic. Trade unions, therefore serve as protective organisations set up by workers with the same profession to bargain collectively with their employers, for the purpose of improving the conditions under which they work, to pull the working families out of poverty or prevent them from falling into poverty trap.

Nonetheless, the weapon used by the trade union institution for bringing an employer to total submission to their demands is the strike by way of halting production (SPGB, 1980). Consequence to this, it has been argued that trade unionism retards economic growth by reducing the level of output during strike.

However, to certain extent, unions may raise wages and welfare, not only for union members, but even for nonunion workers as well, especially in industries where union density is high. The unions are therefore playing the role of intermediary institution that provides a necessary complement to legislate benefits and protections to the workers (Mishel and Walters, 2003; and Hirsch and Schumacher, 2001). Trade unions are therefore the principal voice of the working families in the struggle for issues such as the minimum wage, unemployment insurance, the treatment of immigrant workers, medical care, overtime pay, paid holidays, workers= compensation, and paid leave for care of newborn children and sick family members, civil right, and a lot of other social and welfare issues and protections to the workers by ensuring the

enforcement of labour legislation (Mishel and Walters, 2003; and Hirsch and Schumacher, 2001). The institution of trade union has played a vital role in the enactment of a wide range of labour laws and regulations covering the issues mentioned. As such, the institution may have the capacity to reduce poverty and promote pro-poor growth. In fact, welfare state itself is a direct outgrowth of the growing strength of labour union movement in society (Beland, 2001).

Although there is a large body of research on trade unionism in general, to some extent, most of the studies are done in developed countries based on firm level data and are concerned with the impact of industrial actions on firm performance rather than on the economy in general. Furthermore, in Nigeria, less research has examined the welfare effect of trade union membership on the union members and health of the economy in particular. In fact, to the best of our knowledge, no empirical work has been done on these issues in Nigeria. This study will therefore contribute to the body of literature on trade unionism, workers welfare and economic growth. In addition, stylised facts have indicated a consistent increase in trade unions= disputes in Nigeria, particularly from 1970s to early 1980s and 1990s. This attracts considerable attention from entrepreneurs, government and researchers.

This study therefore aimed at addressing the research questions such as; does trade union institution in Nigeria really improve union members= earnings and welfare? What other variables could influence workers= earnings and welfare in Nigeria? Do the trade unions disputes exert any long run significant influence on the economy?

To achieve the objective of this paper, it has been divided into eight sections. Apart from this section, section 2 states the objective of the study and section 3 deals with the hypotheses. Section 4 focuses on theoretical framework and section 5 concentrates on the review of relevant literature. Section 6 concerns with methodology and section 7 deals with results. Finally, section 8 concludes the paper and gives policy implications.

2. Objectives of the Paper

The main objective of this study is to investigate the effects of trade union membership on members= welfare and economic growth in Nigeria. Specifically, the study has the following objectives to achieve:

- To investigate the effect of trade union membership on the welfare of the members
- To examine the impact of trade unions disputes on the long run

economic growth of Nigeria.

3. Hypotheses

Based on the objectives stated, this study i tested the following hypotheses:

- Trade union membership does not significantly affect members= welfare.
- Trade unions disputes do not have any significant long run impact on economic growth of Nigeria.

4. Theoretical Framework

The Wage-Fund Theory suggests that the level of wages depends on the proportion of the wage-fund or capital in relation to the number of workers (Hutt, 1954). Thus, trade unions could not affect the size of this fund and hence all efforts to raise general level of wages remain dim. But after the renunciation of this theory by some scholars, the economic justification of trade unions has been achieved. According to Hutt (1954), Mills in 1869 rejected wage-fund theory and argued that there was some way in which trade unions can gain, not at the expense of other workers but at the expense of the capitalists. However, the Collective Bargaining Theory suggests that organised workers can ensure that the wage they get is the current value of their labour-power and, at times when the demand for labour-power exceeds the supply, they can temporarily push wages above the current value of labour-power or even, in the long run, raise its value (SPGB, 1980).

5. Review of Literature

This section of the paper deals with the review of relevant literature on the effect of trade union on members= welfare and economic growth.

Review of the Relationship Between Trade Union Membership and Meers= Welfare

Industrial relations literature on the impact of trade unionism on workers pay and welfare is not unanimous. Some studies suggest a positive relationship between trade union membership and pay, while some do indicate no significant relationship.

Blanchflower and Bryson (2002) argue that there is no significant union wage differential in countries where union wage settlements frequently spillover into the nonunion sector. However, using Staffing Report for Colleges and University Faculties data set, for a sample of 163 institutions in the United States of America, Klaff and Ehrenberg (2003) find that in each occupation, employees that are union members earn considerably more than those that are not, with the raw differential in the mean salaries varying

across occupations from 17% to 42%. These findings echo those of Hansen (1998), which indicate that union members earn an average of 17.5% more than their nonunion counterparts. According to Klaff and Ehrenberg (2003), the twenty-two days sit-in embarked upon by the staff of Harvard University in 2001 generated an almost two-dollar increase in wages, as well as a substantial improvement in benefits for many of the university's workers who were union members. Using Current Population Survey data set for the period 1973-2001, Farber (2002) finds that more than half of the decline in the average wage paid to workers with a high school education or less can be attributed to the decline in union density. The industrial relations literature has also indicated that trade union institution exerts greater influence on workers fringe benefits or welfare.

The findings of Hansen (1998) suggest that welfare packages under union contracts are generally higher than for nonunion workers. Mishel and Walters (2003) argue that unionised workers are given employer-provided health and pension benefits far more frequently than nonunion workers. Their findings suggest that 71.9% of unionized workers have pension provided by their employers, while only 43.8% of nonunionised workers achieve this benefit. In addition, Buchmueller *et al.* (1999) find that the decline in employment-based health insurance coincides with a similar decline in union density of 9.4 percentage points. These findings confirm those of Fronstin (1999). Similarly, tax deductions for unionised workers are 18% less than those of nonunionised employees. This concurs with the findings of Rapanos (2004). Concerning the influence of trade union institution on workers training, Frazis *et al.* (1995) finds that unionised establishments are more likely to offer formal training to their workers.

Other determinants of workers remuneration are hours of work, locality of workplace and nature of work (i.e., pleasant or unpleasant). According to ODI (2007), most rural work is poorly rewarded.

Review of the Relationship Between Trade Union Disputes and Economic Growth

Trade union disputes in Nigeria have attracted a considerable attention from entrepreneurs, government, students and other stakeholders due to the likely effect they may have on the general public. However, very little is known about the long run effect of industrial disputes on economic growth.

Trade union disputes at a particular organisation may affect the

performance of other organizations that are not directly involved in the disputes (McDonald and Bloch, 1997). This means that the effect may spillover to other organisations in the economy which may affect the economic performance in general. Freeman and Kleiner (1999) argue that almost all the studies on trade unionism find that unionism is associated with higher wages and benefits for workers but lower profit for firms. This may then lead to low level of investment, which may eventually affect economic growth.

Apart from trade union membership, economic openness is said to have significant influence on economic growth. According the findings of Brandt (2004), economic openness exerts a significant influence on GDP per worker. These findings support those of Pernia and Quising (2003) who find a significant positive relationship between economic openness and regional development in Philippines.

6. Methodology

This section deals with the method of data collection, sample size and sampling techniques adopted in selecting the objects of study as well as variables measurements and method of data analysis.

Sample Size and Sampling Techniques

The survey captured data on 5,392 respondents in connection with trade unionism. All the respondents covered by the survey concerning trade unionism were included into the sample. For the time series data set, this study covers the period, 1970-2004. The choice of the period was informed by the availability of the relevant data for this study. Therefore, sample selection was based on the non-probability sampling method in the form of availability sampling technique, as data on some key variables could be accessed only for certain years.

Data

A cross-sectional secondary data set on the characteristics of main occupation of individuals collected during the Nigeria Household Living Standard Survey 2003/2004 conducted by National Bureau of Statistics (2004) in collaboration with European Union, World Bank and Department of International Development has been accessed and used. The data set has been accessed through National Bureau of Statistics= website.

But the time series data set has been generated from the Central Bank of Nigeria=s Statistical Bulletin (2006) and Alan *et al.* (2006) Penn World Table Version 6.2.

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Table 1: Variables Measurements

Dependent Variables	Definitions of variables
Pay	Amount of remuneration for the work done
Remuneration	Value of other forms of remuneration enjoyed by a worker in naira.
Employer provides transport	A dummy variable taking the value of 1 if an employer provides transport to a worker, and 0 otherwise.
Bonus	Value of bonus received by a worker in naira
Fringe benefits	Number of fringe benefits enjoyed by a worker (bonuses, accommodation, transport, paid leave, paid sick leave, pension provision, medical care, and training) in naira
Accommodation	A dummy variable taking the value of 1 if an employer provides accommodation to a worker, and 0 otherwise.
Paid holiday	A dummy variable taking the value of 1 if a worker enjoys paid holiday, and 0 otherwise.
Paid sick leave	A dummy variable taking the value of 1 if a worker enjoys paid sick leave, and 0 otherwise.
Receive pension	A dummy variable taking the value of 1 if a worker enjoys employer-provided pension, and 0 otherwise.
Medical care	A dummy variable taking the value of 1 if a worker enjoys employer-provided medical care, and 0 otherwise.
No. of work stoppages	Number of work stoppages as a result of trade union disputes
Training	A dummy variable taking the value of 1 if a worker enjoys employer-sponsored training, and 0 otherwise.
Economic Growth	Real Per Capita Gross Domestic Product at 1985 international price in naira.
Independent Variables	
Trade union membership	A dummy variable taking the value of 1 for a trade union member, and 0 otherwise.
Locality of workplace	A dummy variable taking the value of 1 for an individual working in urban area, and 0 otherwise.
Hours of work	Number of hours worked for the earning.
Nature of work	A dummy variable taking the value of 1 for unpleasant occupation, and 0 otherwise.
Trade unions dispute	Number of trade unions disputes in a year
Openness	(Exports+Imports)/Nominal GDP
No. of workers involved in traded union disputes	Number of workers involved in trade union disputes in a year
Man-day lost	Number of man-day lost as a result of trade union disputes

Data Analysis

Descriptive and inferential statistical methods were applied in this study. Descriptive analysis was used to have clear picture of the variables to be controlled in our econometric models. Some preliminary tests such as: two-sample t test, Pearson Product-Moment Correlation, Spearman Rank Correlation and Fisher's Exact Test were performed. The two objectives of this research can be achieved and the hypotheses tested by running OLS, robust White variance estimator (robust regression) and Logistic regression models for the first objective, and cointegration regression and error correction mechanism for the second objective using STATA package. In addition, some pre and post estimation tests such as: unit root, normality of residual, heteroskedasticity, multicollinearity and omitted variable bias were performed to ascertain that valid models were applied.

To test for the significant relationship between the frequencies of two categorical variables with chi-square or a likelihood ratio, the strength of the relationship from the cross-tabulation can be obtained from a Cramer's V statistic or a gamma (g) statistic through Fisher's Exact Test (Yaffee, 2002b). Since we have some categorical variables, to get their correlation with trade union membership, we can then use the Spearman Rank Correlation Coefficient (Yaffee, 2002b). This analysis will pave way for logistic regression analysis.

We need to make preliminary analysis on some quantitative benefits that workers can enjoy as a result of joining a trade union. This can be done by applying two-sample t test with equal variance (Yaffee, 2002b). The null hypothesis is that, there is no significant difference in the mean benefits (i.e., amount of remuneration, other forms of remuneration, value of bonuses, number of fringe benefits and length of training) enjoyed by the unionised workers and those enjoyed by their non-unionised counterparts.

To confirm the existence of association between trade union membership and quantitative benefits that can be derived therein, which may pave way for running OLS and robust regressions, Pearson Product-Moment Correlation test can be applied (Yaffee, 2002b).

In order to fulfill the assumptions of the classical linear regression, sometimes an analyst can transform his variables. Usually, however, a transformation will not eliminate or mitigate the leverage of influential outliers that bias the prediction and distort the significance of parameter estimates. Under these circumstances, robust regression that is resistant to the

influence of outliers may be the only reasonable remedy (Dougherty, 2007; and Yaffee, 2002b). Robust regression option generates consistent standard error in the event of heteroskedasticity and when residuals are not normally distributed (Yaffee, 2002b). Robust regression analysis therefore provides an alternative to a least squares regression model when fundamental assumptions are unfulfilled by the nature of the data (Yaffee, 2002b).

Realising that part of the dependent variables we are dealing with in this study are qualitative in nature, we explore the application of logistic regression. Logistic regression models can be used to predict the relationship between multilevel ordinal outcomes and a set of explanatory variables (Gujarati 1995 and Yaffee, 2002b).

Model Specification and Estimation

The following models have been used to estimate the coefficients of the variables that have been captured in our econometric models (OLS and Logistic Models):

$$\ln\text{PAY}_i = \beta_0 + \beta_1 \mathbf{D}_i + \beta_2 \mathbf{X}_i + \epsilon_i \quad (1)$$

Where:

$\ln\text{PAY}$ = **Natural log of the amount of remuneration for the work done**

β_0 = Constant parameter or intercept

β_1 = Parameter of trade union membership

\mathbf{D} = Trade union membership dummy.

β_2 = Vector of the parameters of other control variables.

\mathbf{X} = Vector of other control variables that have influence on workers= pay.

ϵ_i = Error term.

The priori expectation is that there would be a significant positive relationship between trade union membership and workers= remuneration.

$$\text{Welfare} = \beta_0 + \beta_1 \mathbf{D}_i + \beta_2 \mathbf{Z}_i + \epsilon_i \quad (2)$$

Where:

WELFARE	=	A measure of welfare represented by fringe benefits enjoyed by a worker (a dummy variable taking the value of 1 if a worker enjoys, 0 otherwise)
β_0	=	Constant parameter or intercept
β_1	=	Parameter of trade union membership
D	=	Trade union membership.
β_2	=	Vector of the parameters of other control variables.
Z	=	Vector of other control variables that have influence on workers= welfare.
ϵ_1	=	Error term.

Equation 2 was regressed several times depending on the number of fringe benefits as proxies for welfare.

The priori expectation for this model is that there would be a significant positive relationship between trade union membership and workers= welfare.

Diagnostic Tests to Confirm Breakdown of Classical OLS Model

Assumptions of residual normality, proper functional form, no outliers, homoskedasticity, and no multicollinearity must be fulfilled for the model to be valid (Yaffee, 2002a). First, we conducted a test for residual normality so as to correct for normal distribution of the residuals. To test for the normality assumption of the residuals, we use the predicted residuals and perform Kolmogorov-Smirnov test for normality with Skewness/Kurtosis test. The null hypothesis of the test is that the residuals are not statistically different from the theoretical normal distribution. If the test is statistically significant by at most 0.05 level, the residuals are different from the theoretical normal distribution (Yaffee, 2002b). If not, then they are normally distributed.

Second, we checked for mis-specification due to an omitted variable or measurement error in an independent variable. Measurement error in the

dependent variable merely inflates the variances of the regression coefficients and measurement error in the explanatory variables causes OLS estimates of the coefficients to be biased and invalidates standard errors, *t* tests, and *F* tests. Ramsey's RESET test of functional misspecification provides a simple means for detecting omitted variable bias and nonlinearity (Yaffee, 2002b). The null hypothesis of the test is that the model has no omitted variable. If the F-Value of the test is statistically significant, then there is omitted variable bias, if not, there is not.

Third, we tested for multicollinearity problem using Variance Inflation Factor (VIF). Multicollinearity in its severe form could make the parameter estimates not significant even when the overall model may actually be adequate (Pallant, 2004). Variance Inflation Factor (VIF) can be employed as a means for checking for the presence of multicollinearity (DeCoster, 2005). VIF has a minimum value of 1, but once it is below 10, there is no ground to suspect severity of multicollinearity; when it is above 10, it is a cause of worry. In that situation, adequate remedial measures are recommended (Hair *et al.*, 1995). If condition index or mean of VIF is greater than 10, then significant collinearity exists, and if it is greater than 30, severe collinearity exists (Gupta, 1999).

Fourth, we tested for heteroskedasticity and measurement error in the dependent variable. Running a standard OLS regression in the presence of heteroscedasticity will continuously overestimate or underestimate the standard error. To test for heteroskedasticity using STATA package, the Breusch-Pagan/Cook-Weisberg test for the violation of homoskedasticity can be performed (Yaffee, 2002b). The null hypothesis of the test is; there is no heteroskedasticity or the variance does not vary while the alternative hypothesis is saying there is heteroskedasticity or variance varies. Therefore, if the calculated value of the test is greater than or equal to its critical value, the problem of heteroskedasticity exists, if not the problem does not exist.

Heteroscedasticity does not destroy the unbiasedness and consistency properties of the OLS estimators, but they are no longer efficient, even with large sample size. This lack of efficiency makes the usual hypothesis-testing procedure of dubious value. Therefore, remedial measures are clearly called for. And the most straightforward method of correcting heteroscedasticity is by means of GLS regression and robust regression (Dougherty, 2007; and Yaffee, 2002b).

While dealing with time series data, a lot of unit root tests for stationarity of the series variables have to be conducted. An alternative test of

stationarity that has recently become popular is known as the unit root test (Gujarati, 1995). Nelson and Plosser (1982) cited in Glynn *et al.* (2007), argue that virtually all macroeconomic time series variables a researcher uses are non-stationary or have unit root. If a series is stationary rather than non-stationary, it fluctuates around a constant long-run mean, indicating that the series has a finite variance which does not depend on time (Glynn *et al.*, 2007). Unit root test can be conducted by either running OLS regression on level variables through autoregressive process or by using Dickey-Fuller (DF) or Augmented Dickey-Fuller (ADF) or Phillips and Perron (1988) test. For the purpose of this study, all of these tests have been performed, with exception of autoregressive process, for its inferiority over the others. But the advantage of the Phillips-Perron test over the Dickey-Fuller unit root test is that the test statistics from the Phillips-Perron test have been adjusted to take into account the serial correlation time dependent heteroscedasticity by using the Newey and West (1987) covariance matrix (Vanegas and Croes, 2007). Phillips-Perron unit root test also takes care of the structural break in a time series variable. The null hypothesis of the Phillips-Perron unit root test is that the variable has a unit root.

We should also take note of autocorrelation problem. To test for autocorrelation, the authors used Breusch-Godfrey test for residual serial correlation. The null hypothesis for Breusch-Godfrey test is there is no serial correlation. If the Breusch-Godfrey calculated value is greater than its critical value, we reject the null hypothesis of no serial correlation and accept the alternative one. This test does not require that all the regressors be strictly exogenous, unlike Durbin-Watson Test. The authors also test for autocorrelations of squared residuals. According to Enders (2003), to test for this problem, Engle (1982) proposes the use of Lagrange Multiplier (*LM*) test for Autoregressive Conditional Heteroskedasticity (ARCH) disturbances. The null hypothesis of the test is that, there are no autocorrelation conditional heteroskedasticity errors, i.e., the regression has no time-varying variance.

Now consider the following first order autoregressive process (AR(1)) model:

$$Y = Y_{t-1} + \mu_t \quad (3)$$

Where μ_t is the stochastic error term that follows the classical assumptions, namely, it has zero mean, constant variance, and is nonautocorrelated. Now if OLS regression is run and the absolute coefficient

value of Y_{t-1} is less than 1 and not closer to unity, then Y_t is stationary. However, if coefficient value of Y_{t-1} is equal to or greater than 1, we face what is known as the *unit root problem*, that is, nonstationarity situation. In time series econometrics, a time series that has a unit root is known as a *random walk* time series. This test has not been performed for its inferiority over the others.

The hypotheses test for Dickey-Fuller unit root test differs from other tests because the standard t-table does not apply to it and absolute values of the test statistic (TS) and critical value (CV) are not taken. In Dickey-Fuller unit root test, the null hypothesis is, the series is not stationary, and if the $TS > CV$, we reject alternative hypothesis of stationarity and accept the null of non-stationarity, unlike in the normal hypothesis test (Dougherty, 2007).

Augmented Dickey-Fuller (ADF) unit-root test model can be given as:

$$\Delta Y_t = \beta_0 + \alpha_i \Delta Y_{t-1} + \hat{\psi}_t \quad (4)$$

Where;

ΔY_t	=	the differenced value of a given time series variable
β_0	=	Constant parameter or intercept
α_i	=	coefficient of the lag value of the differenced time series variable
ΔY_{t-1}	=	first lag value of the differenced time series variable
$\hat{\psi}_t$	=	Estimated error term.

Econometric model of multiple regression in the form of autoregressive distributed lag model (ADL) would have been used to estimate parameters of the model if the series variables were stationary. However, after undertaking unit root tests for stationarity using Dickey-Fuller, Phillips-Perron and Augmented Dickey-Fuller, we found that the variables were not stationary, as such, cointegration test was conducted. The results of the tests indicate that the series are cointegrated of the same order at their first difference. This gave room for testing for long run relationships by testing for the unit root of the residuals of the cointegration regression.

$$\text{LRGDPPC}_t = \alpha_0 + \alpha_1 \text{LTRADDISP}_t + \alpha_2 \text{LOPENES}_t + \hat{\psi}_t \quad (5)$$

Where:

LRGDPPC_t	=	Natural log of Real Per Capita Gross Domestic Product at 1985
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		international price as a proxy for economic growth
LTRADDIS	=	Natural log of a measure of trade unions dispute
P_t		
LOPENES _t	=	Natural log of a measure of openness of the economy
α_0	=	Constant parameter or intercept
α_1	=	Parameter of the measure of trade unions disputes
α_2	=	Parameter of the measure of economic openness
ε_t	=	Error term

Equation (5) has been used to estimate the parameters of the cointegration regression in order to predict the residuals of the model.

To conduct Engle-Granger test for cointegration of the estimated residual, you subject the residuals estimated from cointegration regression to differencing and run the differenced value of the residuals on the estimated lagged value of the residuals, using Augmented Dickey-Fuller unit root test. If the test statistic (TS) is less than its critical value (CV), then residual is stationary, that is, there is no unit root, and the series are cointegrated, hence, long run relationship exists.

Engle and Granger (1987) residual approach for cointegration test using ADF has been applied and given as:

$$\Delta \hat{\mu}_t = \alpha_0 + \alpha_1 \hat{\mu}_{t-1} + \sum_{i=1}^n \alpha_i \Delta \hat{\mu}_{t-i} + \varepsilon_t \quad (6)$$

Where;

$\hat{\mu}_t$ is the first difference of the estimated residual term in cointegration regression in Equation (1), $\hat{\mu}_{t-1}$ is the lag value of the first difference of the estimated residual term, and ε_t is the estimated error term for the Augmented Engle-Granger (AEG) cointegration model.

Akaike information criteria (AIC) and Bayes information criteria (BIC) were also used to test for the optimum lag selection for the residual of the cointegration regression. Dougherty (2007) argues that Bayes Information Criteria (BIC, also known as the Schwartz Information Criteria - SIC) and AIC have become popular for helping to determine the appropriate number of lags in time series analysis in general and unit root test in particular. For both

methods, the optimal lag specification is the one that minimizes the statistic, i.e., the one that gives the minimum test statistic (Dougherty, 2007). But increasing the number of parameters is penalized more heavily in the BIC than the AIC. This indicates that BIC tends to produce optimum lag specifications with fewer lags than the AIC, as such BIC provides consistent estimate of the lags length than AIC. But for finite samples neither has an obvious advantage over the other, and both are used in practice (Dougherty, 2007).

If the residual of the cointegration regression is stationary, on the basis of the Engle-Granger approach, the next step is to include the residual as additional variable in the error correction model, which makes it error correction model (ECM). The error correction model is given as:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta y_{t-1} + \alpha_2 \Delta X_{1t-1} + \alpha_3 \Delta X_{2t} + \alpha_4 \Delta \mu \psi_{t-1} + \varepsilon_t \text{ ----- (7)}$$

- ΔY_t = The differenced value of the measure of economic growth
- α_0 = Constant parameter or intercept
- α_1 = Coefficient of the lag value of the differenced value of the measure of economic growth
- ΔY_{t-1} = First lag value of the differenced value of the measure of economic growth
- α_2 = Coefficient of the first lag value of the differenced value of the measure of trade unions disputes
- ΔX_{1t-1} = First lag value of the differenced value of the measure of trade unions disputes
- α_3 = Coefficient of the differenced value of the measure of economic openness
- ΔX_{2t} = Differenced value of the measure of economic openness
- α_4 = Coefficient value of the first lag of the differenced value of the estimated residual
- $\mu \psi_{t-1}$ = First lag of the estimated residual
- ε_t = Error term

The priori expectation for this model is that there would be a

significant long run relationship between trade union disputes and economic growth.

The difference terms (ΔX_{1t-1} and ΔX_{2t}) capture the short run dynamic structure, while the error correction term ($\mu\psi_{t-1}$) captures the long run level variables information (effect). If the coefficient of the differenced value of the explanatory variable and the coefficient of the lagged value of the error correction term are significant, then there is error correction long-run equilibrium. If only the coefficient of the differenced value of the explanatory variable is significant or neither of them is significant, then there is no error correction long-run equilibrium. For long-run equilibrium to exist in a ECM, the sign of the error correction term should be negative and statistically significant (Martinez-Espineira, 2005; and Al-Rabbaie and Hunt, 2004). The significant negative sign of the error correction term also indicates that if the dependent variable is above the long-run equilibrium, it will decrease to return to equilibrium (Salvatore and Reagle, 2002).

7. RESULTS

The results have been divided into twofold, descriptive and regression results. The table of all the results are given in the appendix.

Descriptive Results: Union Membership and Workers = Welfare

Table 2 represents descriptive results that give clear picture of some of the variables captured in our econometric models. The results indicate that the survey captured data on 5,392 respondents in connection with trade unionism. From the results, 32.97 percent of the respondents were union members while 67.03 percent of them were not members of any union, indicating that majority of the respondents were not union members. In addition, the results in Table 2 reveal that 80.55 percent of the respondents did not enjoy bonuses, tips and other allowances from their workplaces while only 19.45 percent of them enjoyed these incentives. This suggests that majority of the respondents did not enjoy some privileges in their workplaces. Concerning the provision of accommodation to the workers by the employer, the results reveal that 90.73 percent of the workers were not provided with accommodation by their employers but only 9.27 percent of them were able to get it. The results further indicate that 93.82 percent of the workers were not provided with transport by their employers while just 6.18 percent of them were able to enjoy that privilege. In addition, 59.35 percent of the workers were reported not able to have enjoyed paid leave while 40.65 percent of them enjoyed such a privilege.

As regards to other privileges, 71.88 percent of the workers were

unable to enjoy paid sick leave while the results indicated that only 28.12 percent of them were able to enjoy such a privilege. As regards the pension plan, the descriptive results showed that 61.55 percent of the workers were not provided with pension plan by their employers while 38.45 percent of them enjoyed such a plan. Also the results indicate that 79.73 percent of the workers did not receive any medical care from their employers while only 20.27 percent of them did receive. Concerning training, 96.42 percent of the workers did not enjoy training sponsorship while just 3.58 percent of them were privileged to enjoy the sponsorship.

From the results, it is evident that majority of the workers did not enjoy most of the privileges given to workers in an ideal situation. Since privilege variables are qualitative in nature, the authors use Fisher's Exact Test to test for significant relationship between trade union membership and ability to enjoy some privileges in the workplace.

The results of Fisher's Exact Test are presented in Table 3. The results of the test reveal that 10.10 percent of non-union workers enjoyed employer provided accommodation while just 7.59 percent of the union members enjoyed such a privilege. The P-Value of the test indicates a significant difference between non-union members and union members in enjoying accommodation provided by the employers. This suggests that non-union members significantly enjoyed the employer provided accommodation than union members. This is contrary to our priori expectation. Nonetheless, it may be as a result of the free choice that union members have on whether to accept employer provided accommodation and forfeit the rent allowance or to reject the offer and enjoy it.

The tested results indicate that 39.43 percent of the union members enjoyed bonuses, tips and other allowances while only 9.63 percent of the non-union workers enjoyed such privileges. In addition, the P-Value of the test indicates that union members significantly enjoyed these privileges more than did the non-union members. This is in conformity with our a priori expectation. Concerning transportation, the results reveal that 8.83 percent of the union members enjoyed employer provided transport while 4.87 percent of the non-union members enjoyed the same privilege. Although both percentages are very negligible, P-Value of the test indicates that union members significantly enjoyed employer provided transport more than the non-union members.

For the paid leave, 82.56 percent of the union members enjoyed it while only 20.03 percent of the non-union members enjoyed such a privilege.

The P-Value of the test also indicates that unionised workers significantly enjoyed paid leave more than the non-unionised workers. This is also in conformity with our a priori expectation. Sick leave is another privilege that some workers may enjoy. The results of Fisher=s Exact Test further reveal that 54.84 percent of the unionised workers enjoyed paid sick leave while only 14.97 percent of the non-unionised workers enjoyed the same privilege. The P-Value of the test also suggests that unionsized workers significantly enjoyed paid leave more than their non-unionised counterparts.

Pension plan provision by the employer is another privilege that may be enjoyed by the workers. The results in Table 3 showed that 80.88 percent of the unionised workers during the survey period were enjoying pension plan while only 17.57 percent of their non-unionised counterparts were enjoying the scheme. The results of the test indicate that unionised workers significantly enjoyed pension plan more than the non-unionised workers. Medical care is another privilege that may be provided to the workers by their employers. The results in Table 3 disclose that 34.14 percent of the unionised workers were provided with free medical care by their employers while only 13.45 percent of their non-unionised counterparts were provided with such services. The outcomes of the test suggest that unionised workers were significantly provided with free medical care than non-unionised ones. Finally, 6.69 percent of the unionised workers were able to enjoy access to training while only 2.05 percent of their non-unionised counterparts succeeded in deriving that benefit. It is obvious from Table 3 that unionised workers significantly enjoyed all the privileges more than their non-unionised counterparts.

The results of the Spearman Rank Correlation Coefficient are presented in Table 4. The results reveal significant positive associations between trade union membership and all other privileges at 1 percent levels of significant with the exception of provision of accommodation by the employer, which indicates a significant negative correlation at 1 percent level also. These results justify the use of more robust method of analysis in the form of logistic regression to further ascertain the existing relationships.

Table 5 discloses the results of two-sample t test with equal variance. The results of the test indicate that the overall mean remuneration of union members was N35,437.18 while that of non-union members was N22,342.47, with a difference of N13,094.71 (58.61% greater than non-union members). The results of the test further reveal that there are significant differences in the mean benefits enjoyed by trade union members and those of their non-

union counterparts with exception of the mean value of bonuses enjoyed, which indicates no significant difference even at 10 percent level of significance.

Table 6 presents the results of Pearson Product-Moment Correlation test. The results in Table 6 disclose that there are significant associations at 1 percent between the amount of remuneration, other form of remuneration, number of fringe benefits and trade union membership. However, the results reveal no significant associations between value of bonuses, length of training and trade union membership. The test however, did not show which of the variables affects which, and therefore, regression models were used to establish the relationship.

Regression Results: Relationship Among Trade Union Membership, Workers= Welfare and Economic Growth

To be able to conduct post estimation tests, OLS regression without transforming the variables captured in the models was run. The results are presented in Table 7. Five different quantitative dependent variables capturing the benefits that a worker may derive are each regressed on a set of four independent variables. From the results in Table 7, it is apparent that trade union membership has a significant positive influence on the amount of remuneration, other forms of remuneration and number of fringe benefits. However, results of the models in columns 4 and 6 reveal that trade union membership does not exert any significant impact on the value of bonuses and length of training. The results further indicate that nature of work (i.e., unpleasant occupation) does have a significant positive impact on only the amount of remuneration without any significant effect on other four specifications. But hours of work tend to influence all the specifications with exception of the number of fringe benefits enjoyed by an employee. The results further reveal that locality of workplace, i.e., working in an urban area plays a significant positive impact on the amount of remuneration or pay, value of bonuses and number of fringe benefits that an employee can derive. It does not however influence other forms of remuneration and length of training.

From the results of Table 7, although the R^2 values are very small, the F statistic of each of the model, which is the measure of the adequacy of the model is significant at even 1 percent level of significance. As regards diagnostic tests, the results disclose the existence of heteroskedasticity in all the models. This is because the results indicate the rejection of the null

hypothesis of no instability in the variances and acceptance of the alternative hypothesis that states that the variances vary, i.e., there is presence of heteroskedasticity. Similarly, the results of the test for omitted variable bias reveal the presence of omitted variable problem in four out of the five models run. In addition, the results of the test for the normal distribution of residuals disclose that the residuals are not normally distributed. However, the test for multicollinearity indicates absence of multicollinearity problem in all the models since the VIF condition index of each of the models is not above 10.

To solve the problems of heteroskedasticity and abnormality of residuals associated with cross-sectional data, we first take logarithmic transformation of the dependent variables. The regression results of the transformed variables are presented in Table 8.

From the results of Table 8, it appears that trade union membership has a significant positive effect on four out of five specifications, unlike in the case of the earlier regressions when the variables were not transformed, in which trade union membership has a significant influence on three out of five specifications. But still the nature of the work has a significant positive effect on only one of the specifications, i.e., on the natural log of the amount of remuneration. Similarly, locality of workplace still retains its significance in the same three specifications. But heteroskedasticity problem manifests in only one model that appears in column 5. In addition, omitted variable bias also appears in three of the models unlike in the regressions with untransformed variables where the problem occurs in four of the models. With transformation of the variables however, the model in column 6 appears to be not adequate.

The results of robust regressions are presented in Table 9. From the results in Table 9, trade union membership continues to exert a significant positive influence on all the four specifications. This suggests that trade union membership tends to improve the pay, other forms of remuneration, values of bonuses and number of fringe benefits enjoyed by an employee, which concurs with the findings of Klaff and Ehrenberg (2003), Hansen (1998), Klaff and Ehrenberg (2003), Mishel and Walters (2003). The findings further confirm the Collective Bargaining Theory and refute the Wage-Fund Theory. Apart from trade union membership, the results reveal that the nature of work, hours of work and locality of workplace each has the potential of improving workers= pay. Interestingly, all the models are adequate enough. The significant impact of locality of workplace suggests the presence of rural-urban wage differential in Nigeria. This echoes the view of ODI (2007)

that most rural work is poorly rewarded.

Table 10 presents the logistic regressions results. From the results of Table 10, it is evident that trade union membership has a significant positive likely impact on all the eight categories of fringe benefits with the exception of accommodation provision, in the case of which a significant negative relationship has been revealed. The results therefore, suggest that a trade union member is more likely to enjoy paid leave, paid sick leave, bonuses and other allowances, transport, medical care, pension plan and training than a worker that does not belong to any trade union. This is in conformity with the findings of Hansen (1998) that suggest that welfare packages under union contracts are generally higher than for nonunion workers, and the view of Mishel and Walters (2003) that unionised workers are given employer-provided health and pension benefits far more frequently than nonunion workers.

The results from logistic regressions in Table 10 further indicate that workers in unpleasant occupations are more likely to enjoy paid leave, paid sick leave, transport and medical care than those in pleasant jobs. Similarly, workers working in urban areas are more likely to enjoy paid leave, bonuses and other allowances, accommodation and medical care than their counterparts in the rural areas. This reveals that there are other factors that determine workers pay and welfare apart from trade union membership. But hours of work are more likely have a significant impact only on bonuses enjoyed by the worker. Although the Pseudo R^2 values in all the models are small, the F statistic of each model is significant, indicating the adequacy of all the models. According to Gujarati (1995) and Gupta (1999), sometimes researchers play the game of maximizing R^2 , that is, choosing the model that gives the highest R^2 . But this may be dangerous, for in regression analysis our objective is not to obtain a high R^2 *per se* but rather to obtain dependable estimates of the true population regression coefficients and draw statistical inferences about them. In empirical analysis it is not unusual to obtain high R^2 but find that some of the regression coefficients either are statistically not significant or have signs that are contrary to theoretical expectations. Thus, the researcher should be more concerned about the logical or theoretical relevance of the explanatory variables to the dependent variable and their statistical significance. On the other hand, if R^2 is low, it does not mean the model is necessarily bad (Gujarati, 1995) as long as most of the parameters and F statistic are statistically significant.

The results in Tables 2 to 10 emanate from the cross-section data set. However, the results from the time series data set are presented in Tables 11 to 15. Table 11 presents Dickey-Fuller and Phillips-Perron unit root tests

results. From the results of Table 11, it is confirmed that three series variables are not stationary and three other variables (other proxies for economic growth) are stationary. Those not stationary include: natural log of real GDP per capita, natural log of the number of trade union disputes and natural log of openness of the economy. Consequently, we conduct ADF unit root test. Table 12 presents the results of ADF unit root tests.

Now ADF unit root tests have indicated that the all the natural log values of the three series variables which were not stationary in their level values are now stationary in their first differenced values. As such, they are integrated of the same order, given us room for conducting cointegration test. We now regress the dependent variable on all the cointegrated explanatory variables at their log level values using OLS (cointegration regression). Table 13 presents the summary of results of the cointegration regression.

From the results in Table 13, it is obvious that trade union disputes and openness of the economy have significant influence on economic growth. However, we cannot ascertain this until we conduct ADF unit root test again on the predicted residuals of the cointegration regression and find that the residuals are stationary.

One may include many lagged variables of the residual but the larger the lagged variables the higher the collinearity among them. Table 14 presents the results of ADF unit root test and optimum lag selection criteria on residuals. From the optimum lag selection test, inclusion of one differenced lag value of the residual gives stationary value and the minimum statistic value in both AIC and BIC criteria. As such, one lag of the residual should be included in the error correction model. The cointegration test indicates long run relationship among the variables. We can now perform error correction analysis. Table 15 presents the results of Error Correction Mechanism (ECM).

The first lag of differenced value of the natural log of the number of trade union disputes represents the short-run effect of the variable on economic growth while the first lag of differenced value of the residuals represents the long-run effect of the cointegrated variables on economic growth. The significant negative sign of the error correction term also indicates that if the dependent variable is above the long-run equilibrium, it will decrease to return to equilibrium. The results therefore suggest that trade union disputes have a significant negative short and long run effect on economic growth in Nigeria. The results further indicate that the past value of real GDP exert a significant positive impact on economic growth in Nigeria. However, although the coefficient of economic openness has a right sign, it does not exert any significant short run effect on economic growth. But F-

Value of the model indicates that the model is adequate at 10 percent level.

The diagnostic tests of the model reveal that the residuals are normally distributed, no multicollinearity problem, no omitted variable bias, no autocorrelation and no autoregressive conditional heteroskedasticity problem.

8. CONCLUSIONS AND IMPLICATIONS

On the basis of the findings of this study, first, it is concluded that trade union membership improves the pay, other forms of remuneration, values of bonuses and number of fringe benefits enjoyed by an employee. This conclusion by implication suggests that for workers to get their pay, allowances and fringe benefit improved, they should join trade unions. Second, a trade union member is more likely to enjoy paid leave, paid sick leave, bonuses and other allowances, transport, medical care, pension plan and training than a worker that does not belong to any trade union in Nigeria. This has the implication that the direct way to achieve improvement in income and welfare of the workers is to encourage them to organize themselves and bargain collectively. Third, it is further concluded that trade union disputes have both negative short and long run effects on economic growth in Nigeria. The implication of this conclusion is that policies that will resolve the disputes before the unions embark upon industrial action should be given prominence by the government.

The conclusions of this study however, are not without some caveats. On the part of the cross-sectional data set used, the data set does not capture some other determinants of workers pay and welfare, which may lead to omitted variable bias. In addition, even some of the variables captured in the data have some missing values, leading to reduction in sample size and degrees of freedom. To minimize the effects of these problems, tests for omitted variable bias have been conducted and appropriate models applied. Another limitation of this study is on the part of the type of cointegration and Error Correction Mechanism applied for the analysis of the time series data. Engle and Granger (1987) residual two-stage approach has been applied in this study instead of Johanson (1988) approach. According to Gulen (1996), to test for cointegration among more than two variables, Johansen's (1988) cointegration procedure is preferred to Engle and Granger's (1987) procedure. But the procedure is extremely data intensive, therefore, it is applied to long time series data (monthly and quarterly). Applying it to annual data sets will lead to having results that are likely to be subject to significant small sample bias and error. However, future research on this area may explore this important technique.

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APPENDIX

Descriptive Results from Cross-Sectional Data, charocc2.dta

Table 2: Descriptive results on some variables

Variable	Variable Category	Frequency	Percentage	Frequency Total
Trade union membership	Not member	3,614	67.03	
	Member	1,778	32.97	5,392
Bonuses, tips & other allowances enjoyed	Not enjoyed	4,343	80.55	
	Enjoyed	1,049	19.45	5,392
Employer provides accommodation	Does not provide	4,892	90.73	
	Provides	500	9.27	5,392
Employer provides transport	Does not provide	5,059	93.82	
	Provides	333	6.18	5392
Enjoying paid leave	Don=t enjoy	3,200	59.35	
	Enjoy	2,192	40.65	5,392
Enjoying paid sick leave	Don=t enjoy	3,876	71.88	
	Enjoy	1,516	28.12	5,392
Enjoying pension plan	Don=t enjoy	3,319	61.55	
	Enjoy	2,073	38.45	5,392
Receiving medical care	Don=t receive	4,299	79.73	
	Receive	1,093	20.27	5,392
	Don=t Enjoy	5,199	96.42	

Variable	Variable Category	Frequency	Percentage	Frequency Total
Enjoying training	Enjoy	193	3.58	5,392

Source: Generated from Nigeria Household Living Standard Survey 2003/2004.

Table 3: Fisher's Exact Test Results on Trade Union Membership and some Qualitative Variables

Variables		Trade union membership		
		Non-member	Member	P-Value of Fisher=s Exact Test
Employer provides accommodation	Does not provide	3,249 (89.90%)	1,643 (92.41%)	0.001***
	Provides	365 (10.10%)	135 (7.59%)	
Bonuses, tips & other allowances enjoyed	Not enjoyed	3,266 (90.37%)	1,077 (60.57%)	0.000***
	Enjoyed	348 (9.63%)	701 (39.43%)	
Employer provides transport	Does not provide	3,438 (95.13%)	1621 (91.17%)	0.000***
	Provides	176 (4.87%)	157 (8.83%)	
Enjoying paid leave	Don=t enjoy	2,890 (79.97%)	310 (17.44%)	0.000***
	Enjoy	724 (20.03%)	1,468 (82.56%)	
Enjoying paid sick leave	Don=t enjoy	3,073 (85.03%)	803 (45.16%)	0.000***
	Enjoy	541 (14.97%)	975 (54.84%)	
Enjoying pension plan	Don=t enjoy	2,979 (82.43%)	340 (19.12%)	0.000***
	Enjoy	635 (17.57%)	1,438 (80.88%)	
Receiving medical care	Don=t receive	3,128 (86.55%)	1,171 (65.86%)	0.000***
	Receive	486 (13.45%)	607 (34.14%)	
Enjoying training	Don=t Enjoy	3,540 (97.95%)	1,659 (93.31%)	

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Variables		Trade union membership		
		Non-member	Member	P-Value of Fisher=s Exact Test
	Enjoy	74 (2.05%)	119 (6.69%)	0.000***

Significant at 1% (***)

Source: Generated from Nigeria Household Living Standard Survey 2003/2004.

Table 4: Spearman Rank Correlation Results on Trade Union Membership and some Qualitative Variables

Variables	Trade union membership
	Coefficients and P-Values
Enjoying paid leave	0.599 (0.000)***
Enjoying paid sick leave	0.0417 (0.000)***
Bonuses, tips & other allowances enjoyed	0.354 (0.000)***
Employer provides accommodation	-0.041 (0.003)***
Employer provides transport	0.077 (0.000)***
Receiving medical care	0.0242 (0.000)***
Enjoying pension plan	0.612 (0.000)***
Enjoying training	0.118 (0.000)***

Significant at 1% (***)

Source: Generated from Nigeria Household Living Standard Survey 2003/2004.

RESULTS OF SOME PRELIMINARY TESTS

Table 5: Results of Two-Sample T Test with equal variance

	Variables									
Group variable	Amount of remuneration		Other form of remuneration		Value of bonuses		Fringe benefits		Length of Training	
Trade Union Membership	No. of Observations	Mean	No. of Observations	Mean	No. of Observations	Mean	No. of Observations	Mean	No. of Observations	Mean
Non-Member	1616	22342.47	93	5121.56	348	9019.39	3614	6.27	74	5.62
Member	1693	35437.18	64	14660.17	701	11410.26	1778	6.72	119	9.48
Difference		-13094.71		-9538.61		-2390.87		-0.45		-3.86
T-Value	-6.08 ^{***}		-4.53 ^{***}		-1.43		-19.62 ^{***}		-2.11 ^{**}	

Significant at 5% (**); 1% (***)

Source: Generated from Nigeria Household Living Standard Survey 2003/2004.

Table 6: Pearson Product-Moment Correlation Results on some Quantitative Variables

	Coefficients and P-Values of the correlated variables				
1	2	3	4	5	6
Variables	Amount of remuneration	Other form of remuneration	Value of bonuses	Number of Fringe benefits	Length of Training
Trade union membership	0.105 (0.000) ***	0.342 (0.000) ***	0.044 (0.811)	0.258 (0.000) ***	0.151 (0.311)
Nature of work	0.051 (0.000) ***	0.025 (1.000)	0.033 (1.000)	0.039 (0.169)	0.015 (1.000)
Hours of work	0.266 (0.000) ***	0.115 (0.898)	0.054 (0.594)	-0.001 (1.000)	0.197 (0.073) *
Locality of workplace	0.066 (0.000) ***	0.042 (1.000)	0.042 (0.860)	0.143 (0.000) ***	-0.053 (1.000)

Significant at 10% (*); 1% (***).

Source: Generated from Nigeria Household Living Standard Survey 2003/2004.

Table 7: Regression Results on Untransformed Variables

	Dependent Variables				
1	2	3	4	5	6
	Amount of remuneration	Other form of remuneration	Value of bonuses	Number of Fringe benefits	Length of Training
independent Variables					
Trade union membership	12990.76 (5.07)***	6846.42 (2.59)**	828.47 (0.39)	0.32 (7.55)***	3.34 (1.64)
Nature of work	14566.25 (2.34)**	172.52 (0.03)	4143 (0.97)	-0.05 (-0.45)	-0.67 (-0.18)
Hours of work	23.17 (15.36)***	5.18 (2.19)**	2.51 (2.33)**	0.00 (0.86)	0.01 (3.64)***
Locality of workplace	6420.08 (2.50)**	-140.51 (-0.05)	5201.78 (2.62)***	0.08 (2.06)**	-1.43 (-0.45)
R ²	0.13	0.18	0.02	0.04	0.15
F Value	70.34***	3.66**	3.30**	18.10***	4.63***
No. of Observations	1923	72	581	1980	107

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	Dependent Variables				
1	2	3	4	5	6
	Amount of remuneration	Other form of remuneration	Value of bonuses	Number of Fringe benefits	Length of Training
independent Variables					
VIF condition index/Mean	1.01	1.06	1.01	1.01	1.04
VIF					
1) Breusch-Pagan/Cook-Weisberg test for heteroskedasticity	1496.68 ^{***}	24.01 ^{***}	66.08 ^{***}	38.90 ^{***}	66.24 ^{***}
2) Ramsey RESET Test for Omitted variable F-Value	39.15 ^{***}	1.24	3.07 ^{**}	2.62 ^{**}	4.80 ^{***}
3) Kolmogorov-Smirnov test for normality P-Value	0.000 ^{***}	0.000 ^{***}	0.000 ^{***}	0.000 ^{***}	0.000 ^{***}

Significant at 5% (**); 1% (***).

Source: Generated from Nigeria Household Living Standard Survey 2003/2004.

- 1) H_0 - constant variance; 2) H_0 - no omitted variables; 3) H_0 Not different from normally distributed residuals.

Table 8: Regression Results on Transformed Variables

1	Dependent Variables				
	2	3	4	5	6
	Natural log of amount of remuneration	Natural log of other form of remuneration	Natural log of value of bonuses	Natural log of Number of Fringe benefits	Natural log of Length of Training
independent Variables					
Trade union membership	0.62 (9.77)***	1.27 (2.73)***	0.43 (2.76)***	0.05 (7.48)***	0.09 (0.35)
Nature of work	0.35 (2.77)**	0.62 (0.55)	-0.39 (-1.26)	-0.01 (-0.49)	-0.11 (-0.16)
Hours of work	0.00 (12.16)***	0.00 (0.71)	0.00 (2.89)***	0.00 (0.82)	0.00 (2.43)**
Locality of workplace	0.33 (5.28)***	0.03 (0.06)	0.51 (3.51)***	0.01 (1.87)*	0.11 (0.44)
R ²	0.13	0.13	0.05	0.03	0.03
F Value	74.79***	2.51**	8.20***	16.31***	1.59
No. of Observations	1923	72	581	1980	77
VIF condition index/Mean VIF	1.01	1.06	1.01	1.01	1.04
1) Breusch-Pagan/Cook-Weisberg test for heteroskedasticity	0.08	1.35	2.53	47.57***	1.07
2) Ramsey RESET Test for Omitted variable F-Value	21.92***	1.65	1.97	2.32*	2.89**

Significant at 10% (*); 5% (**); 1% (***).

Source: Generated from Nigeria Household Living Standard Survey 2003/2004.

1) H₀ - constant variance; 2) H₀ - no omitted variables;

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Table 9: Robust (The robust White variance estimator) Regression Results

	Dependent Variables			
1	2	3	4	5
Dependent Variables	Natural log of amount of remuneration	Natural log of other form of remuneration	Natural log of value of bonuses	Natural log of Number of Fringe benefits
independent Variables				
Trade union membership	0.62 (9.90)***	1.27 (2.69)***	0.43 (2.61)***	0.05 (7.34)***
Nature of work	0.35 (2.41)**	0.62 (0.67)	-0.39 (-1.07)	-0.01 (-0.46)
Hours of work	0.00 (8.53)***	0.00 (0.74)	0.00 (2.72)***	0.00 (0.79)
Locality of workplace	0.33 (5.36)***	0.03 (0.05)	0.51 (3.54)***	0.01 (1.83)*
R ²	0.13	0.13	0.05	0.03
F Value	55.23***	3.42**	7.07***	16.66***
No. of Observations	1923	72	581	1980

Significant at 10% (*); 5% (**); 1% (***)

Source: Generated from Nigeria Household Living Standard Survey 2003/2004.

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Logistic regression models can be used to predict the relationship between multilevel ordinal outcomes and a set of explanatory variables (Yaffee, 2002b).

Table 10: Logistic Regression Results

1	2	3	4	5	6	7	8	9
Dependent Variables	Paid leave	Paid sick leave	Bonuses & others enjoyed	Accommodation Enjoyed	Transport enjoyed	Receive medical care	Enjoy pension plan	Receive training
independent Variables								
Trade union membership	7.54 (19.39)***	3.73 (13.18)***	3.17 (10.94)***	0.56 (-3.23)***	2.63 (4.87)***	2.67 (8.61)***	7.85 (4.87)***	2.08 (3.49)***
Nature of work	1.73 (2.07)**	1.48 (1.68)*	1.47 (1.61)	1.53 (1.16)	2.32 (2.55)***	4.34 (6.32)***	1.42 (1.37)	1.77 (1.47)
Hours of work	1.00 (0.84)	1.00 (0.43)	1.00 (2.06)**	1.00 (0.32)	1.00 (0.69)	1.00 (0.47)	1.00 (0.33)	1.00 (0.72)
Locality of workplace	1.27 (2.35)**	1.02 (0.24)	1.35 (2.92)***	1.39 (1.90)*	1.15 (0.76)	1.42 (3.13)***	0.95 (0.49)	1.19 (0.86)
Pseudo R ²	0.17	0.07	0.06	0.01	0.04	0.06	0.17	0.02
Value of Likelihood Ratio (LR)	457.86***	192.55***	154.00***	14.33***	34.35***	137.77***	462.05***	17.26***
No. of Observations	1980	1980	1980	1980	1980	1980	1980	1980

Significant at 10% (*); 5% (**); 1% (***).

Source: Generated by the authors from Nigeria Household Living Standard Survey 2003/2004.

Results from Time Series Data, tradunio2.dta

Table 11: Dickey-Fuller and Phillips-Perron Unit Root Tests Results

Natural Log of Level Variables	Dickey-Fuller Unit Root Test					Phillips-Perron Unit Root Test				
	Test Statistic	Critical Values				Test Statistic	Critical Values			
1	2	3	4	5	6	7	8	9	10	11
		1%	5%	10%	McKinnon P-Value		1%	5%	10%	McKinnon P-Value
Natural log of the number of trade union disputes	-2.138	-3.675	-2.969	-2.617	0.230	-2.169	-3.675	-2.969	-2.617	0.218
Natural log of the number of work stoppages	-3.185	-3.675	-2.969	-2.617	0.020**	-3.240	-3.675	-2.969	-2.617	0.018**
Natural log of the number of workers involved in the disputes	-3.740	-3.675	-2.969	-2.617	0.004***	-3.715	-3.675	-2.969	-2.617	0.004***
Natural log of man-day lost	-4.138	-3.675	-2.969	-2.617	0.001***	-4.144	-3.675	-2.969	-2.617	0.001***
Natural log of real GDP per capita	-1.699	-3.689	-2.975	-2.619	0.432	-1.852	-3.689	-2.975	-2.619	0.355
Natural log of openness of the economy	-1.828	-3.689	-2.975	-2.619	0.367	-1.744	-3.689	-2.975	-2.619	0.409

Significantly stationary at 5% (**); 1% (***).

Source: Generated from Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.2, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, 119 September 2006 and CBN Statistical Bulletin 2006.

Table 14: Augmented Dickey-Fuller Unit Root Test and Optimum Lag Selection Criteria for Residuals

1	2	3	4	5	6	7
No of Lags for residual	Test Statistic	Critical value 1%	Critical value 5%	Critical value 10%	AIC	BIC
1	-4.690***	-3.702	-2.980	-2.622	-76.065	-71.668
2	-4.802***	-3.709	-2.983	-2.623	-74.123	-68.388

Significantly stationary at 1% (***).

Table 15: Summary of Error Correction Regression Results. Differenced Value of Real Gross Domestic Product Per Capita= Dependent Variable

1	2
Differenced value of Independent Variables	First differenced value of Real GDP Per Capita
First lag of differenced value of the natural log of real GDP per capita	1.251 (2.75)***
First lag of differenced value of the natural log of the number of trade union disputes	-0.082 (-2.76)***
First differenced value of the natural log of economic openness	0.026 (0.58)
First lag of differenced value of the residuals	-1.151 (2.77)***
R ²	0.25
F-Value	2.27*
No. of observations	33
VIF Condition Index (Mean VIF)	5.11
1) Ramsey RESET Test for Omitted variable F-Value	0.07 (0.977)
2) Breusch-Godfrey LM Test for autocorrelation P-Value	0.769
3) LM Test for autoregressive conditional heteroskedasticity P-Value	0.854
4) Kolmogorov-Smirnov test for normality P-Value	0.337

Significantly stationary at 10% (*); 1% (***).

Source: Generated from Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.2, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, September 2006 and CBN Statistical Bulletin 2006.

1) H₀ - no omitted variables; 2) H₀ B no serial correlation (no autocorrelation); 3) H₀ - no ARCH effect (conditional variance is not fluctuating); 4) H₀ Bnot different from normally distributed residuals.