

Financial Accounting Ratios as a Tools for Evaluation of Organizational Performance in Nigerian Deposit Money Banks

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Abstract: This study investigates the role of financial accounting ratios in evaluating the organisational performance of listed deposit money banks in Nigeria. Given the complexity and significance of financial performance analysis in the banking sector, this research focuses on determining how well key financial ratios serve as diagnostic and predictive tools. Using panel data covering 10 listed Nigerian banks over a 10-year period (2014-2023), the study employs descriptive statistics, correlation analysis, and multiple regression analysis to evaluate the relationship between financial ratios and performance indicators. The selected financial ratios include Return on Assets (ROA), Return on Equity (ROE), Earnings Per Share (EPS), Debt-to-Equity Ratio (DER), Net Interest Margin (NIM), Loan-to-Deposit Ratio (LDR), and Cost-to-Income Ratio (CIR). Results show that profitability and efficiency ratios, especially ROA, ROE, and CIR, have the most significant influence on organisational performance. Meanwhile, leverage and liquidity ratios such as DER and LDR present mixed and less statistically significant results. The findings contribute to the literature by affirming the relevance of traditional ratio analysis in modern financial decision-making. The study recommends that managers adopt ratio-driven performance assessment in strategic planning, and that policymakers emphasise financial transparency through regulatory frameworks that mandate comprehensive ratio disclosures.

Keywords: Financial Accounting Ratios; Organisational Performance; Efficiency Ratios; Financial Performance Analysis; Liquidity Ratios; Net Interest Margin (NIM); Loan-To-Deposit Ratio (LDR).

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1. Introduction

Organisational performance has become a central issue for financial institutions globally, particularly in the banking sector, where efficient resource allocation, prudent risk-taking, and sustained profitability are essential for maintaining economic resilience. As the backbone of financial intermediation, banks contribute significantly to national development by mobilising savings, facilitating investments, and supporting the implementation of monetary policy [5]. In Nigeria, deposit money banks play a crucial role in promoting macroeconomic stability, fostering employment creation, and facilitating capital formation. Thus, the accurate and timely evaluation of their performance has become a matter of strategic importance for investors,

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regulators, policymakers, and bank managers [6]. One of the most widely used methods for evaluating financial performance is the use of financial accounting ratios. These ratios, derived from financial statements, serve as compact indicators that provide valuable insights into a bank's operational and financial health [12]. They are grouped into different categories: profitability, efficiency, leverage, and liquidity, each of which plays a distinct role in informing performance assessments. Profitability ratios such as Return on Assets (ROA) and Return on Equity (ROE) reflect how effectively a bank converts its assets and equity into net income. Earnings Per Share (EPS) indicates the return available to equity shareholders. Efficiency indicators, such as the Cost-to-Income Ratio (CIR) and Net Interest Margin (NIM), assess a bank's ability to manage operating expenses and interest income. Leverage ratios, such as the Debt-to-Equity Ratio (DER), provide insight into a company's capital structure.

At the same time, the Loan-to-Deposit Ratio (LDR) is a critical measure of liquidity and credit deployment. Given Nigeria's evolving financial landscape marked by regulatory reforms, digital transformation, macroeconomic fluctuations, and rising competition, it becomes increasingly crucial to adopt robust financial performance evaluation models [13]. The Nigerian banking industry has witnessed significant structural changes over the past decade, including recapitalisation efforts, mergers and acquisitions, and the introduction of the Basel III capital framework. These shifts necessitate the use of consistent monitoring and assessment tools to ensure that banks remain sound, solvent, and efficient. Furthermore, the need for transparency and accountability in financial reporting has never been greater [14].

Investors and analysts rely on these financial ratios to make informed decisions about asset allocation, portfolio diversification, and risk mitigation. Regulators, including the Central Bank of Nigeria (CBN) and the Nigerian Deposit Insurance Corporation (NDIC), also use these ratios to track systemic risks and enforce prudential standards. For bank managers, ratio analysis serves as an internal control mechanism that supports budgeting, cost control, and strategy formulation. Against this background, this study seeks to empirically examine how financial accounting ratios can be effectively used as tools for evaluating the organisational performance of listed deposit money banks in Nigeria. By employing panel data analysis on ten systematically important banks listed on the Nigerian Exchange Group (NGX) over a ten-year period (2014–2023), the study aims to identify which ratios significantly explain performance and how stakeholders can leverage these insights [15].

2. Literature Review and Theoretical Framework

2.1. Conceptual Review

Financial ratios are numerical tools derived from a firm's financial statements, used to interpret its financial health and operational efficiency. In the banking sector, these ratios are crucial for monitoring institutional performance across various dimensions, including profitability, liquidity, solvency, and efficiency. Profitability ratios such as Return on Assets (ROA), Return on Equity (ROE), and Earnings Per Share (EPS) assess a bank's ability to generate profits from its resources. ROA shows how efficiently a bank utilises its total assets to earn net income. ROE reveals how much profit a bank generates with shareholders' equity, while EPS offers insight into earnings allocated per unit of outstanding shares. Efficiency and cost management are captured through the Net Interest Margin (NIM) and Cost-to-Income Ratio (CIR). NIM assesses the difference between interest income generated and interest paid relative to earning assets, while CIR evaluates the cost-effectiveness of a bank's operations. Leverage and liquidity are examined through the Debt-to-Equity Ratio (DER) and Loan-to-Deposit Ratio (LDR). DER indicates the proportion of equity and debt used to finance the bank's assets. LDR reflects a bank's liquidity position by comparing its total loans to its total deposits.

2.2. Empirical Review

Previous studies have shown that the influence of financial accounting ratios on the performance of deposit money banks remains a highly debated issue. The inconsistency in findings may be attributed to differences in the measurement of financial performance, the choice of financial ratios, and the specific characteristics of the banking environment in different countries. This section reviews the existing literature on the relationship between selected financial ratios, such as profitability (ROA, ROE), efficiency (NIM, CIR), and liquidity (LDR), and organisational performance in the banking sector. In a study by Hasan [2], the relationship between profitability ratios (ROA and ROE) and performance in Nigerian banks was explored. The research concluded that higher profitability ratios lead to better financial performance, though the study acknowledged variations due to different market conditions. Similarly, Adam and Ikechi [7] found that institutions with strong ROE and efficient CIR reported higher stock performance and investor confidence. However, their study highlighted that the effectiveness of ROE was often context-dependent, particularly during periods of macroeconomic instability.

In contrast, Abuzarqa [11] argued that financial leverage, measured by the Debt-to-Equity Ratio (DER), has a significant impact on the financial stability of banks. He observed that higher DER can lead to higher risk exposure, especially during periods of economic downturn. The study recommended that banks maintain a balanced leverage strategy to sustain performance and minimise risk. Dadepo and Afolabi [9] investigated the effects of liquidity ratios, particularly LDR, on the operational efficiency

of Nigerian banks. Their findings revealed a mixed influence of LDR on financial performance, where a higher ratio was associated with higher profits for some banks. Still, excessive lending and inadequate deposit mobilisation could reduce performance in others. Furthermore, Inah et al. [3] examined the efficiency ratios such as NIM and CIR across Nigerian banks. They found that banks with higher NIM and lower CIR experienced more consistent financial performance. High operational costs relative to income (reflected in CIR) were found to negatively affect profitability, which corroborates the findings of Oladipupo and Ogunleye [10], who emphasised the importance of operational efficiency in sustaining long-term profitability in the banking sector.

This body of literature underscores the varied and often context-dependent nature of financial ratios in assessing bank performance. The studies also reveal that while profitability and efficiency ratios are generally robust indicators of performance, their influence can be altered by macroeconomic factors, regulatory changes, and institutional characteristics. Numerous studies have been conducted to examine the effect of financial ratios on the performance of deposit money banks. Hasan [2] emphasised the strong relationship between ROA, ROE, and bank profitability in the Nigerian context. The study found that banks with higher ROA and ROE tended to report superior stock performance and better capital adequacy. Adam and Ikechi [7] assessed the performance of Nigerian banks post-recapitalisation, highlighting the critical role of CIR and EPS in signalling bank efficiency. They reported that banks with low CIR and consistent EPS growth attracted more investor confidence.

Abuzarqa [11] investigated Jordanian banks and discovered that DER and NIM were significant in evaluating financial stability. These findings also apply to the Nigerian banking environment, where capital structure decisions have a direct impact on profitability. Dadebo and Afolabi [9] utilised a multi-bank dataset spanning 2006 to 2018 to evaluate performance using financial ratios. Their regression results supported the predictive validity of LDR and ROE in performance determination. Inah et al. [3] found that a combination of CIR, DER, and NIM served as important predictors of long-term financial sustainability among Nigerian banks. Their study emphasised cost control and leverage optimisation as performance-enhancing strategies. Oladipupo and Ogunleye [10] also emphasised EPS and ROE in their empirical analysis of Nigerian banks' market performance. They concluded that these indicators could serve as early warning tools for bank investors and regulators.

2.3. Theoretical Framework

This study is grounded in Signalling Theory, which is highly relevant for understanding how financial ratios can be used as tools for evaluating organisational performance, particularly in the banking sector. Signalling Theory, originally proposed by Spence [8], posits that organisations convey information to reduce information asymmetry between managers and external stakeholders such as investors, regulators, and analysts. In the context of financial performance, firms send "signals" to the market through financial disclosures, including financial ratios. These ratios, such as Return on Assets (ROA), Return on Equity (ROE), Earnings Per Share (EPS), and others, serve as observable indicators of the firm's internal quality and efficiency, which are otherwise unobservable to outsiders. In the Nigerian banking industry, where stakeholders often lack direct access to internal operations, financial ratios serve as a credible mechanism for banks to demonstrate their stability, profitability, and risk profile. Strong financial ratios signal sound management, effective resource utilisation, and resilience attributes that build investor confidence and enhance market reputation. Thus, Signalling Theory offers a robust framework for interpreting how financial ratio disclosures influence stakeholder perceptions and decisions, and ultimately, how these ratios are employed in evaluating organisational performance.

3. Methodology and Model Specification

The research design used for this study is correlational, as it is best suited for examining the statistical relationship between two or more variables. In this study, financial accounting ratios are the independent variables, while organisational performance is the dependent variable. The financial ratios examined include: Return on Assets (ROA), Return on Equity (ROE), Earnings Per Share (EPS), Debt-to-Equity Ratio (DER), Net Interest Margin (NIM), Loan-to-Deposit Ratio (LDR), and Cost-to-Income Ratio (CIR). Organisational performance is measured using Return on Equity (ROE) as the primary performance indicator. The population of this study comprises all the listed deposit money banks in Nigeria as of 2023. A filter sampling approach was adopted to select banks that have complete financial reports for the ten years spanning 2014 to 2023. Only banks with consistent and complete financial data required to measure the variables over the entire study period were included.

A total of ten banks were selected based on this criterion. Data for this study were obtained from secondary sources, specifically from the published annual reports and financial statements of the banks under consideration. Additional data were accessed from the Nigerian Exchange Group (NGX) and official bank websites. To analyse the data, the study employed multiple regression analysis. This technique was used to estimate the relationship between the financial accounting ratios and organisational performance. The regression was conducted using a panel data methodology in STATA software to control for time- and entity-specific effects across the sampled banks.

3.1. Variables Measurement and Model Specification

The variables of this study consist of the Dependent Variable, which is Organisational Performance, measured by Return on Equity (ROE), a widely used proxy for financial performance in the banking sector [2]; [10]. The analysis was conducted in two stages: first, computing the necessary financial ratios from secondary data sources, and second, running the regression model to determine the impact of these ratios on organisational performance (Appendix A). The Independent Variables are financial accounting ratios, which include Return on Assets (ROA), Earnings Per Share (EPS), Debt-to-Equity Ratio (DER), Net Interest Margin (NIM), Loan-to-Deposit Ratio (LDR), and Cost-to-Income Ratio (CIR). These variables were selected based on their relevance in previous empirical studies on bank performance [7]; [3]. A summary of the variables used in the study, along with their operational definitions, is presented in Table 1 below.

Table 1: Summary of variables and their measurement

Variable Type	Variable Name	Measurement	Source
DV	Organizational Performance	Measured by Return on Equity (ROE), Net Income / Shareholders' Equity	[1]; [10]
IV	Liquidity	Measured by the Loan-to-Deposit Ratio (LDR), Total Loans / Total Deposits	[9]
IV	Profitability	Measured by Earnings Per Share (EPS), Net Profit to Shareholders / No. Of Outstanding Shares	[10]; [7]
IV	Efficiency Ratio	Measured by Cost-to-Income Ratio (CIR) Operating Expenses / Operating Income	[7]; [3]
IV	Market Ratio	Measured by Debt-to-Equity Ratio (DER), Total Liabilities / Shareholders' Equity	[11]; [3]

Source: Author Compilation, 2024

As shown in Table 1, this study employs a widely accepted panel data regression model to examine the relationship between financial accounting ratios and the organisational performance of listed deposit money banks in Nigeria. The variables are categorised into four major financial ratio groups: profitability, liquidity, efficiency, and market ratios. The model aims to evaluate how each category of financial ratios influences the financial performance of the banks over the study period (2014–2023). The panel data approach accounts for both time-series and cross-sectional variations across banks.

Model Specification:

$$FPERFit = \beta_0 + \beta_1PROFit + \beta_2LIQit + \beta_3EFFit + \beta_4MRKit + \varepsilon_{it}$$

Where:

- FPERF = Financial Performance (proxied by ROE)
- PROF = Profitability Ratios (ROA, EPS)
- LIQ = Liquidity Ratio (LDR)
- EFF = Efficiency Ratios (CIR, NIM)
- MRK = Market Ratio (DER)
- β_0 = Constant
- $\beta_1 - \beta_4$ = Coefficients of the independent ratio categories
- ε = Error term
- i = Bank (cross-sectional unit), t = Time (year)

This model enables the empirical testing of hypotheses on how different financial ratio categories influence bank performance. The use of grouped ratio categories allows for a broader interpretation of performance indicators in strategic financial management.

4. Results and Discussion

4.1. Descriptive Statistics

The results show an average ROA of 2.24%, indicating modest profitability. EPS is relatively low with high variation, suggesting differing earnings capacity across banks. DER averages above 4.0, reflecting heavy reliance on debt financing. NIM is moderate, while LDR indicates active loan deployment. CIR is relatively high, implying potential inefficiency (Table 2).

Table 2: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	100	2.2432	1.29285	0.6	6.2
EPS	100	2.9465	3.43609	0.18	21.55
DER	100	4.2571	1.69783	0.3	6.86
NIM	100	7.1427	1.41834	0.9	9.6
LDR	100	63.8296	10.944	32.8	95.7
CIR	100	59.3825	10.7469	29.1	76.8

Source: STATA V14

4.2. Correlation Matrix

The correlation matrix reveals a strong positive relationship between ROA and EPS ($r = 0.6557$) and a strong negative relationship between ROA and CIR ($r = -0.7742$). CIR and EPS are also negatively correlated. Other relationships are weaker or negligible (Table 3).

Table 3: Correlation matrix

	ROA	EPS	DER	NIM	LDR	CIR
ROA	1					
EPS	0.6557	1				
DER	-0.2461	-0.191	1			
NIM	0.3288	0.1854	0.1779	1		
LDR	0.0282	-0.2863	-0.0579	0.0261	1	
CIR	-0.7742	-0.7426	0.1913	-0.3679	0.1467	1

Source: STATA V14

4.3. Regression Analysis

The model explains approximately 65.8% of the variation in ROA. The regression is significant overall, with CIR, EPS, and LDR having statistically significant effects on ROA (Table 4).

Table 4: Panel-corrected regression results

Panel-corrected						
ROA	Coef.	Std. Err.	Z	P>z	[95% Conf.	Interval]
EPS	.09640	.0271458	3.55	0.000	0.0432	0.14961
DER	-.0729	.0461733	1.58	0.114	-0.1634	0.01758
NIM	.08030	.0687435	1.17	0.243	-0.0544	0.21504
LDR	.02075	.0069102	3	0.003	0.00721	0.0343
CIR	-.0673	.0149441	4.5	0.000	-0.0965	-0.038
_cons	4.36462	1.405871	3.1	0.002	1.60916	7.12008
Number of obs	100					
R-squared	0.6583					
Wald chi2(5)	180.5					
Prob > chi2	0.000					
Heteroscedasticity	0.0008					
VIF	1.72					

Source: STATA V14

4.4. Earnings per Share (EPS) and ROA

The coefficient of EPS is 0.0964 and statistically significant at the 1% level ($p = 0.000$). This indicates that for every one-unit increase in EPS, ROA increases by approximately 9.64%. This suggests that firms with higher shareholder returns also achieve better performance in terms of asset utilisation.

- **Hypothesis H₀₁ Rejected:** Earnings per share have a significant effect on the return on assets of listed banks.

4.5. Debt-to-Equity Ratio (DER) and ROA

The coefficient of DER is -0.0729, but it is statistically insignificant ($p = 0.114$). Although the sign is negative, indicating that higher leverage may reduce profitability, the result lacks statistical support.

- **Hypothesis H₀₂ Not Rejected:** Debt-to-equity ratio does not significantly affect the return on assets of listed banks.

4.6. Net Interest Margin (NIM) and ROA

NIM has a coefficient of 0.0803, which is positive, but it is statistically insignificant ($p = 0.243$). This implies that although better interest margins may support profitability, the relationship is not strong enough to conclude significance in this dataset.

- **Hypothesis H₀₃ Not Rejected:** Net interest margin does not significantly affect the return on assets of listed banks.

4.7. Loan-to-Deposit Ratio (LDR) and ROA

The coefficient for LDR is 0.0208, significant at the 1% level ($p = 0.003$). This means that banks that effectively utilise deposits for lending tend to be more profitable, though the magnitude of the effect is modest.

- **Hypothesis H₀₄ Rejected:** Loan-to-deposit ratio has a significant effect on the return on assets of listed banks.

4.8. Cost-to-Income Ratio (CIR) and ROA

CIR shows a strong negative and highly significant relationship with ROA, with a coefficient of -0.0673 ($p = 0.000$). This indicates that inefficiencies and high operating costs directly reduce profitability, consistent with prior studies and economic theory.

- **Hypothesis H₀₅ Rejected:** Cost-to-income ratio has a significant effect on the return on assets of listed banks.

5. Discussion and Findings

The findings of this study provide insights into how financial accounting ratios influence the organisational performance of listed deposit money banks in Nigeria, with Return on Assets (ROA) serving as the measure of performance. The regression results and correlation analysis offer a comprehensive view of how each variable contributes to or hinders profitability. The study revealed a positive and statistically significant relationship between EPS and ROA, implying that an increase in shareholder earnings is associated with higher returns on assets. This finding is consistent with that of Baba [1], who concluded that profitability indicators such as EPS positively drive bank performance. The result suggests that banks that can generate strong earnings for shareholders are also likely to manage their assets more profitably.

Furthermore, the analysis found a positive and significant relationship between the Loan-to-Deposit Ratio (LDR) and ROA. This indicates that banks with better lending performance relative to deposit mobilisation achieve higher profitability. This finding aligns with Musa [4], who noted that effective credit deployment enhances bank performance by improving interest income. It also confirms that managing liquidity and credit efficiently contributes positively to organisational success. However, the study revealed a negative and statistically significant relationship between the Cost-to-Income Ratio (CIR) and ROA. This shows that higher operational costs relative to income significantly reduce profitability. The result corroborates the findings of Musa [4], who emphasised the importance of cost efficiency in achieving sustainable financial performance. In line with economic theory, inefficient operations erode profits and reduce asset productivity.

On the other hand, Debt-to-Equity Ratio (DER) and Net Interest Margin (NIM) were both found to have no statistically significant effect on ROA. Although the DER was negatively related to ROA, the effect was weak and insignificant. This contradicts the earlier result by Baba [1], who found that excessive financial leverage reduces profitability. Similarly, while NIM showed a positive sign, it was not significant, implying that variations in interest income do not independently drive performance in the sampled banks. These results may be due to regulatory caps on interest spreads and capital structure

decisions unique to Nigerian banks. Overall, the findings of this study suggest that earnings generation (EPS), cost efficiency (CIR), and loan utilisation (LDR) are the most influential accounting ratios in determining bank performance. The study supports the continued use of financial ratio analysis as a reliable tool for organisational evaluation and performance monitoring in the Nigerian banking sector.

6. Conclusion and Recommendation

6.1. Conclusion

Based on the empirical evidence, the study concludes that profitability and efficiency ratios are the most significant predictors of organisational performance in Nigerian deposit money banks. Specifically, banks with strong returns on assets and earnings per share tend to achieve higher returns on equity. Efficient cost management and income generation, reflected in CIR and NIM, also play critical roles. On the other hand, high financial leverage (as measured by DER) and suboptimal liquidity levels may compromise performance. This conclusion aligns with previous literature, including the findings of Hasan [2], Inah et al. [3], and Dadebo and Afolabi [9], reinforcing the role of financial ratios as diagnostic tools for managers, investors, and regulators.

6.2. Recommendations

Based on the findings and conclusions drawn from this study, the following recommendations are proposed to enhance the use of financial ratios in evaluating and improving the performance of Nigerian deposit money banks. These recommendations are targeted at key stakeholders, including bank managers, investors, and regulatory authorities.

- **For Bank Management:** Managers should prioritise profitability strategies such as asset utilisation and shareholder value creation (e.g., ROA and EPS). Operational efficiency must also be improved to maintain competitive cost-to-income ratios.
- **For Investors:** Investors should evaluate banks using a combination of profitability and efficiency ratios before making investment decisions, as these offer the most predictive insight into organisational performance.
- **For Regulators (CBN and NDIC):** Regulatory bodies should enforce consistent disclosure of financial ratios in financial reports and consider incorporating ratio thresholds as part of compliance and supervision frameworks.
- **For future strategic planning:** Banks should adopt ratio-driven financial planning, where trends in key ratios, such as CIR, ROA, and DER, continuously inform strategic decisions.

Appendix A: Panel Corrected Test Due to Heteroscedasticity

```
. xtpcse roa eps der nim ldr cir
```

Linear regression, correlated panels corrected standard errors (PCSEs)

Group variable:	id	Number of obs	=	100
Time variable:	year	Number of groups	=	10
Panels:	correlated (balanced)	Obs per group:		
Autocorrelation:	no autocorrelation	min	=	10
		avg	=	10
		max	=	10
Estimated covariances	=	55	R-squared	= 0.6583
Estimated autocorrelations	=	0	Wald chi2(5)	= 180.50
Estimated coefficients	=	6	Prob > chi2	= 0.0000

roa	Panel-corrected		z	P> z	[95% Conf. Interval]	
	Coef.	Std. Err.				
eps	.0964042	.0271458	3.55	0.000	.0431995	.149609
der	-.0729228	.0461733	-1.58	0.114	-.1634208	.0175752
nim	.0803003	.0687435	1.17	0.243	-.0544345	.2150351
ldr	.0207567	.0069102	3.00	0.003	.007213	.0343003
cir	-.0672502	.0149441	-4.50	0.000	-.0965401	-.0379604
_cons	4.36462	1.405871	3.10	0.002	1.609163	7.120076

A.1. Langarian Multiplier Test

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

roa[id,t] = Xb + u[id] + e[id,t]

Estimated results:

```

	Var	sd = sqrt(Var)
roa	1.671464	1.292851
e	.2908455	.5393009
u	.2192809	.4682744

```

Test:  Var(u) = 0
      chibar2(01) =   34.53
      Prob > chibar2 =   0.0000

```

A.2. Descriptive, Correlation, and OLS Analysis

```

(R)
Statistics/Data Analysis 14.2 Copyright 1985-2015 StataCorp LLC
StataCorp
4905 Lakeway Drive
College Station, Texas 77845 USA
800-STATA-PC http://www.stata.com
979-696-4600 stata@stata.com
979-696-4601 (fax)

Single-user Stata perpetual license:
Serial number: 10699393
Licensed to: Andrey

Notes:
1. Unicode is supported; see help unicode advice.

*(8 variables, 100 observations pasted into data editor)

. xtset id year
    panel variable: id (strongly balanced)
    time variable: year, 2014 to 2023
    delta: 1 unit

. sum roa eps der nim ldr cir

```

Variable	Obs	Mean	Std. Dev.	Min	Max
roa	100	2.2432	1.292851	.6	6.2
eps	100	2.9465	3.43609	.18	21.55
der	100	4.2571	1.697832	.3	6.86
nim	100	7.1427	1.418338	.9	9.6
ldr	100	63.8296	10.94398	32.8	95.7
cir	100	59.3825	10.7469	29.1	76.8

```

. pwcorr roa eps der nim ldr cir

```

	roa	eps	der	nim	ldr	cir
roa	1.0000					
eps	0.6557	1.0000				
der	-0.2461	-0.1910	1.0000			
nim	0.3288	0.1854	0.1779	1.0000		
ldr	0.0282	-0.2863	-0.0579	0.0261	1.0000	
cir	-0.7742	-0.7426	0.1913	-0.3679	0.1467	1.0000

```

. reg roa eps der nim ldr cir

```

Source	SS	df	MS	Number of obs	=	100
Model	108.93124	5	21.7862479	F(5, 94)	=	36.22
Residual	56.5437339	94	.601529084	Prob > F	=	0.0000
Total	165.474973	99	1.67146438	R-squared	=	0.6583
				Adj R-squared	=	0.6401
				Root MSE	=	.77558

```


```

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
roa					
eps	.0964042	.0355123	2.71	0.008	.0258937 .1669148
der	-.0729228	.0490678	-1.49	0.141	-.170348 .0245024
nim	.0803003	.0621355	1.29	0.199	-.0430712 .2036718
ldr	.0207567	.0075487	2.75	0.007	.0057685 .0357448
cir	-.0672502	.0117433	-5.73	0.000	-.0905668 -.0439337
_cons	4.36462	1.130744	3.86	0.000	2.1195 6.609739

A.3. Post Diagnostics Test

```
. vif
```

Variable	VIF	1/VIF
cir	2.62	0.381485
eps	2.45	0.408069
nim	1.28	0.782316
der	1.14	0.875466
ldr	1.12	0.890276
Mean VIF	1.72	

```
. estat hettest
```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

H0: Constant variance

Variable(s): Fitted values of roa

chi2(1) = 11.31

Prob > chi2 = 0.0008

A.4. Hausman Test

```
. xtreg roa eps der nim ldr cir, fe
```

Fixed-effects (within) regression

Group variable: id

Number of obs = 100

Number of groups = 10

R-sq:

within = 0.3365

between = 0.6255

overall = 0.4996

Obs per group:

min = 10

avg = 10.0

max = 10

corr(u_i, Xb) = 0.4343

F(5, 85) = 8.62

Prob > F = 0.0000

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
eps	.0807017	.0296537	2.72	0.008	.0217422 .1396612
der	-.0303996	.0530537	-0.57	0.568	-.1358845 .0750854
nim	.2178424	.0590136	3.69	0.000	.1005076 .3351771
ldr	.0188367	.0059866	3.15	0.002	.0069338 .0307396
cir	-.0099768	.0120645	-0.83	0.411	-.0339644 .0140107
_cons	-.0310441	1.105105	-0.03	0.978	-2.22829 2.166202
sigma_u	.89179437				
sigma_e	.5393009				
rho	.73222168	(fraction of variance due to u_i)			

F test that all u_i=0: F(9, 85) = 12.16

Prob > F = 0.0000

```
. estimate store fe
```

```
. xtreg roa eps der nim ldr cir, re
```

Random-effects GLS regression

Group variable: id

Number of obs = 100

Number of groups = 10

R-sq:

within = 0.3185

between = 0.7570

overall = 0.6017

Obs per group:

min = 10

avg = 10.0

max = 10

corr(u_i, X) = 0 (assumed)

Wald chi2(5) = 61.45

Prob > chi2 = 0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
eps	.0862237	.0308972	2.79	0.005	.0256663 .1467811
der	-.0495538	.0525412	-0.94	0.346	-.1525326 .053425
nim	.200001	.060176	3.32	0.001	.0820583 .3179438
ldr	.0180235	.0062926	2.86	0.004	.0056902 .0303569
cir	-.0274811	.0119559	-2.30	0.022	-.0509142 -.004048
_cons	1.253014	1.12647	1.11	0.266	-.9548256 3.460854
sigma_u	.46827438				
sigma_e	.5393009				
rho	.42985605	(fraction of variance due to u_i)			

```
. estimate store re
```

```
. hausman fe re
```

	Coefficients		(b-B)	sqrt(diag(V_b-V_B))
	(b) fe	(B) re	Difference	S.E.
eps	.0807017	.0862237	-.005522	.
der	-.0303996	-.0495538	.0191542	.0073565
nim	.2178424	.200001	.0178413	.
ldr	.0188367	.0180235	.0008132	.
cir	-.0099768	-.0274811	.0175043	.0016156

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 18.08

Prob>chi2 = 0.0028

(V_b-V_B is not positive definite)

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