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# Earnings Management in Light of the Shift to International Financial Reporting Standards (IFRS): An Exploratory Study on Saudi Corporations

By Dr. Fahad Sulaiman M Alnafea

*Qassim University*

**Abstract-** This study aims to study the Earnings management in light of the shift to International Financial Reporting Standards (IFRS) through a field study, which has occurred in Saudi joint-stock companies. Through research, I achieved several results, such as: That there is change expected to happen in Earnings management in light of the shift to International Financial Reporting Standards (IFRS) via: Manipulating both the expenditure and revenue in the income statement, The manipulation of the accounts of Balance Sheet Statement, The manipulation of cash flows statement, as well as through the manipulation of reports of the changes in equity statement. The accountants in Saudi Corporations are concerned to shift to IFRS, expecting that the Earnings management is going on; thus, the IFRS had implemented.

**Keywords:** *international financial reporting standards (IFRS), earnings management, income smoothing.*

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# Earnings Management in Light of the Shift to International Financial Reporting Standards (IFRS): An Exploratory Study on Saudi Corporations

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**Abstract-** This study aims to study the Earnings management in light of the shift to International Financial Reporting Standards (IFRS) through a field study, which has occurred in Saudi joint-stock companies. Through research, I achieved several results, such as: That there is change expected to happen in Earnings management in light of the shift to International Financial Reporting Standards (IFRS) via: Manipulating both the expenditure and revenue in the income statement, The manipulation of the accounts of Balance Sheet Statement, The manipulation of cash flows statement, as well as through the manipulation of reports of the changes in equity statement. The accountants in Saudi Corporations are concerned to shift to IFRS, expecting that the Earnings management is going on; thus, the IFRS had implemented. On the other hand, they also expect to improve the quality of the accounting information. Based on previous results, the researcher included a set of recommendations such as the need to educate accountants in Saudi listed firms about the importance of the transition to International Financial Reporting Standards (IFRS), and its positive role in reducing the Earnings management and improving the quality of accounting information, the need to work out a partnership between Saudi universities, Saudi Organization of Certified Public Accountants (SOCPA) and Saudi audit firms to study the phenomenon of Earnings management and its methods to work on reducing its existence, and its impact on the quality of accounting information. The need for governmental intervention through the SEC to contribute and labour establish strict laws and regulations, which reduce the Earnings management in companies and increase the transparency and quality of accounting information.

**Keywords:** *international financial reporting standards (IFRS), earnings management, income smoothing.*

## I. INTRODUCTION

Net profit indicator is substantial to both investors and management, which makes administration seeks to increase earnings to improve the financial position of companies in the stock market or to show its good conduct through accounting procedures, which are known as earnings management. These procedures are some sort of manipulative income to reach a predetermined managerial goal through manipulating the measurement and the external financial report to be compatible with specific workflows

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and gaining earnings especially for the company or its management.

According to the International Accounting Standards Board (IASB), more than 100 countries have adopted International Financial Reporting Standards (IFRS) (IASB 2009). At present, the Kingdom of Saudi Arabia (KSA) is considering its adaptation too, especially after several events in the Saudi stock market that resulted from the lack of transparency and disclosure of information on the status of financial positions of companies which have not yet reached the limit that the investor hopes. Perhaps developments that took place in the Kingdom with about either the issuance of new influential systems such as the capital market for securities and attracting foreign investment or updating the regulations and regulations such as the corporate system, it's most are companies? Adding to that the increased number of the listed companies, the increased international investments, frequent flow of information, including financial reports via the Internet, and The Kingdom's accession to the World Trade Organization (WTO), all this underscores the importance of taking practical steps to review, modernize and develop everything related to the capital market for securities and the profession of accounting and auditing in the Kingdom because of a major impact in the economy and its dealers of facilities and individuals (Alsalan: 2012) including the accounting standards system. This development of standards will have a role in reducing the earnings management of companies, which, if not taken strict measures, may lead to the collapse of companies and the erosion of capital in addition to the effects on the national economy in general.

Therefore, this research will try to answer the following questions:

1. What is the expected change of earnings management in light of the transition to IFRS?
2. Does switching to IFRS improve the quality of financial reporting?

*This research aims to:*

1. To show the concept of earnings management and the quality of accounting information.

2. To show how to measure the earnings management and the quality of accounting information.
3. To show the impact of the shift to international standards on earnings management and the quality of accounting information.

There is no doubt that the unifying of global harmony and conformity in the financial report by increasing the comparability, understanding, and disclosure of accounting information plays a role in raising the accounting information quality, which highlights the importance of this research in two ways:

*First:* That this research comes at a time when the Kingdom is considering the adoption of international standards for financial reporting, and the SOCPA has taken several measures to ensure a successful transition to the application of these standards. Hence, this research becomes an indicator of the validity or non-validity of this transformation.

*Second:* It represents a practical experience on the extent to which the adoption of these standards affects the quality of accounting information which are provided by accounting systems for Saudi companies after adopting these standards. Also, compliance with these standards by Saudi companies will increase confidence in the data and information contained in its financial statements. This will help make correct decisions by decision makers of all degrees. The Kingdom's entry into the G-20 will also make it a commitment to adopt these criteria (Abdelmawli and Abu Amara, 2012).

## II. RESEARCH ASSUMPTIONS

The research will examine the following two basic assumptions:

*The first basic assumption:* There is no expected change in earnings management in light of the transition to IFRS.

*First Hypothesis:* There is no expected change in earnings management in light of the transition to IFRS by manipulating expenses in the income statement.

*Second Hypothesis:* There is no expected change in earnings management in light of the transition to IFRS by manipulating revenue in the income statement.

*Third Hypothesis:* There is no expected change in earnings management in light of the transition to IFRS by manipulating the accounts of the financial position.

*Fourth Hypothesis:* There is no expected change in earnings management in light of the transition to IFRS by manipulating the cash flow statement.

*Fifth Hypothesis:* There is no expected change in earnings management in light of the transition to IFRS by manipulating change in statement of equity.

*The second basic assumption:* There is no statistically significant impact at the level of indication ( $\alpha = 0.05$ ) of

the shift in IFRS to improve the quality of accounting information.

*The third basic assumption:* There is no statistically significant impact at the level of indication ( $\alpha = 0.05$ ) in the expected change in earnings management in light of the transition to IFRSs attributable to the accounting qualification of accountants.

*The fourth basic assumption:* There is no statistically significant impact at the level of indication ( $\alpha = 0.05$ ) in the expected change in earnings management in light of the transition to IFRSs attributable to the experience of accountants.

## III. RESEARCH THEORETICAL FRAMEWORK

### a) Previous studies

Many of the researches dealt with this subject from several angles as follows:

#### i. Studies on the positive impact of the transformation of international financial reporting standards on earnings management

The study of Guoping Liu, Jerry Sun 2014, examined the positive effect of the optional adoption of IFRS on reducing earnings management, in addition to improving the quality of accounting information in Canadian companies.

And the study of WARES Karim, 2011, demonstrated the impact of the adoption of IFRS and investor protection on profit quality. This study showed that 64 countries around the world had adopted the mandatory adoption of IFRS standards, which increased the value of earnings, especially when there is a protection system for the most investors. The results of this study highlight the importance of protecting the investor from obtaining the quality of financial reports and the need for regulators to design procedures or mechanisms that limit the practice of managing managers' earnings.

The study of Yuang-Lin Chang, and Dr. Cheng-Hwai Liou, 2013, also examined the impact of mandatory adoption of IFRS and the institutional environment on the quality of accounting information. The researchers concluded the result of the apparent improvement in the quality of accounting information after adoption of these standards.

And the study of Yi Lin (Elaine) Chua, Chee Seng Cheong, and Graeme Gould, 2012, examined the impact of compulsory adoption of IFRS on the quality of accounting information, focusing on three issues: managing earnings, recognizing the loss in the right time, and the importance of value. Based on the mandatory application results of these standards for four years, the researchers concluded that the compulsory application of IFRS resulted in better accounting information than under local Australian standards (Australian GAAP). More precisely,

earnings management has been reduced by earnings smoothing. At the same time immediate recognition of losses is improving after the adoption of IFRS. The value of financial information, especially in non-profit companies, has also improved. These results were contrary to expectations that there is evidence that Australian financial firms are involved in managing earnings after the mandatory adoption of IFRS.

The study of Ying Wang and Michael Campbell, 2012 examined earnings management in China under both GAAP and IFRS. In this study, data from companies listed on the Chinese stock market for the period 1998-2009 had used to compare earnings management indicators before and after IRFS adoption. There has been no evidence that the adoption of IFRS standards will increase or reduce earnings management in Chinese companies.

The study of Lei Cai, Asheq Rahman, and Stephen Centenary, 2006, was on the Effect of the Adoption of International Financial Reporting Standards on earnings management: An International Comparison. Where researchers studied the mandatory adoption of IFRS standards, its impact on the financial report and earnings management. The study was on more than 10,000 companies around the world, during the period of the project from 2003-2006. The result was that earnings management declined significantly in those countries that adopted IFRS. Countries with enforcement measures were also less likely to earnings management.

The study of Stergios Leventis and Panagiotis E. Dimitropoulos Asokan Anandarajan, 2011, on "Loan Loss Provisions, Earnings Management and Capital Management under IFRS: The Case of Commercial Banks in the European Union" examined the impact of the adoption of IFRS on the use of provisions for loan losses in earnings and capital management. The study sample included 91 commercial banks during ten years of study before and after the adoption of IFRS. The study concluded that the level of earnings management in those banks that adopted IFRS standards had reduced by reducing the tendency of managers of commercial banks listed in the European market to earnings management by taking loan loss provisions.

A study by Barth, Landsman, and Lang, 2008 focused on the quality of accounting in 21 countries that adopted IFRS standards from 1994 to 2003. The researchers tested the adoption of IFRS standards on the quality of accounting information, they concluded that the countries that adopted the IFRS standards had better accounting information quality, less manipulation of the earnings of companies, recognition of losses for more than once, and a higher degree of integration between accounting information, prices and returns.

In the study of Wagehofer, 2005, on "The impact of accounting standards on reducing earnings

management," the researcher concluded that the existence of more stringent accounting standards has a direct impact on the quality of profitability, which reduces the number of alternative accounting treatments and describes clear and specific rules for these accounting treatments. Some studies also addressed the relationship between IFRS standards and earnings management, and earnings management appears to be less pronounced in those economies with large equity markets for private equity firms.

b) *Studies on the negative impact of the transformation of international financial reporting standards on earnings management*

The Harris Peter 2012 study found that despite the advantages of IFRS, it limits the earnings management. Vedran Capkun and others, 2012, found that earnings management in companies that adopted IFRS was better than those they did not adopt, which is the opposite of the conclusion of the Stergioua Leventis and others 2013 study.

The study of Liu Guoping and Jerry Sun, 2011, on the effect of mandatory adoption of International Financial Reporting Standards (IFRS) on the quality of earnings in Canadian companies found that the profit of these companies had not yet improved after the adoption of IFRS, for a sample of 487 Canadian companies. On the contrary, the expected absolute receivables value of mining companies increased after the adoption of IFRS. This indicates a decline in earnings after the adoption of IFRS. The researchers concluded that the increase in the quality of profits in the Canadian private sector could not have been traced back to the adoption of IFRS standards.

The study of Akinobu and Kazuyuki Suda, 2005, on earnings management to avoid losses-an applied study from Japan, showed that Japanese companies have already exercised earnings management to reduce and conceal losses. Dividends in Japanese companies indicate that managers in Japanese firms are more likely to engage in earnings management to avoid losses than the managers in the USA firms. The study showed that firms able to manage earnings at a lower cost are more likely to engage in earnings management.

A study conducted by Anwar S. Ahmed, Michael Neel, and Dechum Wang, 2012 examined the effect of compulsory adoption of IFRS on quality accounting by studying a sample of 20 countries in the world. The study showed that the countries that adopted these standards showed an increase in profits smoothing and the report of the aggressive receivables and a decline in recognition of a loss at the right time. These results contradict some of the previous studies that suggest that the adoption of IFRS standards will lead to higher quality accounting. The study was in those companies located in countries with strict

guidelines. It found that the strict guidelines in these countries was not sufficient to counteract the flexibilities given by the IFRS standards as compared to the local gauge of those countries.

The study of Michael Firth, Demitrius Gounopoulos, and Jannis Pulm, 2013, on the effect of IFRS standards on predicting the earnings management of Australian subscription companies came to the result: at the as a result of the adoption of IFRS standards leads to higher expectations of errors compared to the period in which GAAP standards were in place. The size of the forecast errors is related to the size of the establishment and the industry branch to which it belongs.

The study of Guoping Liu and Jerry Sun, 2013, was on the effect of compulsory adoption of IFRS on the quality of earnings of Canadian companies. In this study, a comparison is made for the quality of the profits that were measured by expected absolute receivables, small positive earnings, and big positive profits before and after adopting IFRS standards for a sample of 487 companies. It found that the quality of profits did not improve after the adaptation of IFRS. On the contrary, the expected absolute receivables of the mining companies increased after the adaptability of IFRS.

The study of Thomas Jeanjeana and Herve Stlowya, 2008 was on the mandatory application of IFRS and its impact on revenue quality and earnings management. The earnings management has not decreased after adopting IFRS standards, but on the contrary, it rose in France after the adoption of the new standards, while it remained the same in Britain and Australia. The study found that IFRS was unsuccessful in reducing earnings management in companies that adopted these standards.

The study of Goncharov and Zimmermann, 2007 studied earnings management in the German companies using different accounting standards: German accounting standards, the USA accounting standards, and IFRS standards. The study showed that companies that applied US accounting standards (US GAAP) had low levels of earnings management. While the companies that adopted the German accounting standards as well as, international accounting standards (G GAAP, IFRS) were equally earnings management. They concluded that different accounting processes would have an impact on earnings management levels.

c) *Studies on the different impacts of IFRS adoption from several aspects*

Leuz, 2003 studied the impact of IFRS standards on capital cost (Daske, 2006, Lambert, Leuz and Verrecchia, 2007), and the contribution of IFRS standards to improve market liquidity (Daske, Hail, Leuz and Berdi, 2008). Clements, Neil and Stovall, 2010 analyzed the cultural diversity and size of the country

to determine and relate to the shift to IFRS standards and the reluctance of others. The result was that cultural differences did not appear to play a role in that transformation, while the larger the size of the country, the less there is a desire to switch to the IFRS standards. This is because these countries have developed their accounting reporting systems well and are reluctant to bear the additional costs of switching to the IFRS standards.

In an analytic study of Peng and Smith, 2010, the authors analyzed the process of transforming China from GAAP standards to IFRS standards. They concluded that significant steps had taken towards China's transformation in the process of issuing local Chinese standards, which took place in four stages: 1992, 1998, 2001 and 2006. They made a table showing the transformation process during each of the four phases. The percentage of transformation varied from 20% in 1992 to 77% in 2006. Leuz devised a way to measure the level of earnings management in companies that had implemented on 1/1/2007.

Ying Wang and Michael Campbell, 2012, also used the method in which earnings management were measured, which was invented by Leuz. Leuz and Daske et al., 2008 looked at the economic outcome of applying IFRS standards in the companies. They concluded that the liquidity of the market increased at the beginning of stratifying these standards. They also noted a drop in the cost of capital and an increase in equity valuations. The effects possibly occurred before the official date of adoption of the IFRS standards. However, these effects occur in those countries that have incentives to act transparently and have powerful enforcement of laws. The study of Patricia et al. 2011, presented a new approach to the discovery of earnings management based on interest in the quality of revenues, not in abundance the quality here means the viability of such revenues for collection.

In Souichi Matsuura, 2008 study on real earnings management and accountant earnings management for earnings smoothing in Japan, the researcher proposed a division of earnings management to actual earnings management and accounting earnings management. The estimated cash flows were used as a variable parameter to measure the earnings management; the estimated receivables had also used as a basis for calculating the accounting earnings management. The researcher concluded that there is a smooth relationship between the real earnings management and accounting earnings management, and managers also use both true earnings management and accounting earnings management to set earnings smoothing.

Through my review, the researcher can reach the following concepts:

d) *Income Smoothing*

Several researchers have dealt with the concept of income smoothing for study and analysis. The Fudenberg and Tirole, 1955 study referred to the idea of income smoothing as all the methods and processes used by management in business organizations, to reduce income to reduce the degree of risk in the Company's investments. Ashari et al.1994 also defined income smoothing as a deliberate act by the management of the enterprise for reducing income fluctuations using specific accounting tools. Also, the Mathews, 1991 study referred to the income smoothing as a set of mechanisms in which earnings are reduced in periods of significant increase and increased in periods when they fall significantly. Belkaoui, 2000 sees income smoothing as "a deliberate settlement of the declared income to reach the desired level or direction, and it expresses the administration's desire to reduce the abnormal deviation in income to the extent possible or permissible under the accepted principles of accounting and management. "Several researchers, such as Trueman, Dahrnan, and Van Pray, also see the income smoothing as reflecting the administration's desire to minimize unexpected income distortions. "It is supposed to reduce the variance and fluctuations in the income figures for different accounting periods," said Shirazi, 1990. The accounting practices through which this effect can achieve are as large as the basis of recognition (timing of recognition) revenue, the basis of recognition (timing of recognition) expenditure, methods of tabulation of ordinary and extraordinary items in the income statement, and the desire of the administration to avoid showing the variation in the results of the establishment from time to time, in other words, it is a kind of blurring of facts or temporarily abandons them from the owners which leads to misdirection of resources among alternative investment areas.

*Earnings management:* Since the rise of net profit is a significant indicator for the investor, gives the impression of a valid performance of the company and the safety of its financial position and reduces the fear of the level of risk attached to it; the administration was interested in loading this element of accounting specifically- net profit- accounting methods were adopted to control these profits, and distribute them as it deems appropriate in light of the available accounting options and choices, which is called the earnings management. It is defined by Shipper, 1989 as "deliberate intervention by management in the process of measurement and external financial reporting to obtain special gains to the company or its management." Earnings management is one of the most important forms of creative accounting discussed in accounting literature.

*Creative Accounting:* "Some or all of the steps had used to practice the game of financial figures, including the arbitrary selection of accounting principles, fraud in the financial report and any other procedures taken to earnings management or income smoothing (Levitt. 1998).

e) *The concept of earnings management*

The net profit index is beneficial for both investors and management; therefore, the administration seeks to streamline profits to improve the financial position of companies in the stock market or to demonstrate their good conduct through accounting procedures called earnings management. Both Healy and Wahlen, 1999, defined earnings management as; a change in corporate financial reporting by insiders, to either, mislead some stakeholders or influence the contractual results, which depend on the figures in the financial reports. Leuz et al; 2003 acknowledged this definition. It is defined by Shipper, 1989 as "deliberate intervention by management in the process of measurement and external financial reporting with obtaining special gains to the company or its management." Linda Halabi, 2009 also defined earnings management as manipulation of income to achieve a pre-defined goal by administration, or predicted by a financial analyst, or to be consistent with specific courses of action; the study sees that the earnings management is a trial from insiders in companies to protect their interests and their positions by manipulating financial information which had provided to third parties. Several researchers, such as Van Pray, Trueman and Dahrnan, distinguish between the concept of income smoothing and the concept of earnings management (Habib, 2003). The first expresses the management's desire to reduce the unexpected deviations in income to as much as possible, While the second came across as the request of the administration to reach specific goals, including increased managerial incentives, or reduce tax payments or reduce borrowing costs. Profit management is one of the most important forms of creative accounting in accounting literature. It has classified into two types: the real earnings management, which affect cash flows, and earnings management through the administration of accruals through changes in accounting policies and estimates. The second type is the most common, which falls under the concept of innovative accounting. But the first type - real management-may involve fraud and violation of principles. Accounting literature relied primarily on the consideration of the discretionary accruals component to detect the earnings management in companies because the discretionary accruals constitute the difference between profits and cash flows. Several researchers (Berton and Stolowy, 2000 and Skinner and Dechow, 2000) believe that the earnings

management of this kind – accrual management - does not include changing the facts, but another way to deal with the apparent differences in short-term earnings, by bringing profits to the year in need and paying expenses. Earnings management also has a common accounting approach to dealing with losses called Big Bath Accounting, Where the Big Bath hypotheses suggest the method of reducing the estimates of earnings and profits of the company in a certain period against the overstatement of losses. This approach aims to eliminate accumulated losses in a year of losses, by doubling losses (overestimated) to ensure better profits in the coming year or years.

Several researchers (Berton and Stolowy, 2000) (Jiang, 2006) (Shuto, 2007) also believe that managerial compensation plans have the best impact in adopting this approach, where the new CEO blame for the company's loss on the former manager, while at the same time ensuring an increase in its share of subsequent managerial compensation, as it has linked to the earnings rate which will undoubtedly be better in the coming years. The earning management and the income smoothing had mostly done using several tools, including taxes on investments, classification of extraordinary items in the income statement, dividends, gains and losses on securities, pension funds, research and development expenses, advertising expenses, inventory, depreciation and currency conversion.

The following definitions are:

f) *Measuring earnings management*

The issue of measurement of earnings management has challenged, and researchers have developed multiple methods of measurement, including the model developed by Leaz et al. 2003, which had based on the previous work of (Dechow, Sloan, and Sweeny, 1995; Healy and Whalen, 1999, and Skinner and Dechow, 2000). Therefore, earnings management should be classified as follows: manipulate earnings (EM1, EM2) and aggressive earnings (EM3). The insiders can mitigate and reduce the fluctuations in earnings by changing the receivables of revenues and expenses.

The operational definition of receivables is as follows: Accruals

$$= (DCA- Dcash) - (DCL - DSTD - DTP) - Dep Equ. (1)$$

Where:

DCA: Change in Total Current Assets

Dash: Change in cash and equivalents

DCL: Change in total current liabilities

DSTD: Change in short term borrowings included in current liabilities

DTP: Change in income tax payable

Dep: Depreciation and amortization expenses

We can then calculate cash flows from the following operations:

$$\text{Cash flow from operations} = \text{Operating earnings} - \text{Accruals Equ. (2)}$$

Earnings management EM1 measures the degree to which insiders can use their powers to alert receivables and thus reduce operating profit volatility:

$$EM1 = SD (\text{Operating earnings}) / SD (\text{Cash flow from operations}) \text{ Equ. (3)}$$

Where:

*SD Standard deviation:* Cash flows from operations have been identified in equation (2).

The low value of this measure reveals that insiders use their powers to facilitate declared profits, while the high value of this measure shows that the company is less likely to earnings management. And the implicit assumption that there will be fluctuations in operating earnings on an accrual basis against cash flows from operations. If the fluctuations in operating earnings are small compared to change in the cash movements of operations, this indicates that the management uses the estimated receivables to manipulate operating earnings.

*EM2:* Based on the new correlation between change in receivables and changes in cash flows from operations. This measure has based on the idea that insiders attempt to conceal the shortage of cash flows by manipulating receivables.

$$EM2 = \text{Spearman (DACCruals, Cash flow from operations)} \text{ Equ. (4)}$$

Spearman is the Spearman correlation coefficient used to measure the correlation between two variables. The correlation coefficient is good +1 if there is a positive correlation between the two variables, and would be -1 if the correlation between the two variables is negative. If the coefficient of correlation is zero, this means that there is no correlation between the two variables. Insiders may use their estimates to report on accounting receivables that compensate for the economic shocks of cash flows from operations, which in turn will affect declared profits. The existence of a negative correlation means the use of the estimated receivables to offset the unwanted cash flows and hence clearly demonstrates the earnings management. So the greater the EM2 value, the less likely there is to earnings management. EM3 shows aggressive earnings. They are used by insiders in their reports to distort and defect the actual economic performance. The assumption is that the receivables of companies that want to manipulate the earnings to have reported will be wider than cash flows from operations.

Therefore, EM3 is to compare the absolute value of receivables and the entire value of cash flows from operations using the following equation:

EM3 = 1 Accruals A Cash flow from equations Equ. (5)

The larger the EM3, the greater the significance of the use of receivables on a wide scale to distort reports on accounting earnings.

First: Use of earnings management methods through the income statement. Net income has manipulated, as shown in the following table (Schilit, 2002), (Howard, 2002):

g) *Methods of earnings management*

Earnings management has used through the following methods:

Methods of earnings management to manipulate the income statement

Item	Methods of earnings management
The sales	<ol style="list-style-type: none"> <li>1. Make nonreal sales transactions to had canceled during the following year.</li> <li>2. Make real sales transactions on easy terms.</li> <li>3. Registration of the Secretariat's goods had sent to the agencies as sales.</li> </ol>
Cost of goods sold	<ol style="list-style-type: none"> <li>1. The entity liquidates the commodity inventory, which has been valued by the LIFO method.</li> <li>2. Unjustified change in inventory valuation method.</li> </ol>
Operating expenses	<ol style="list-style-type: none"> <li>1. Capitalization of capital expenditure which is not subject to capitalization requirements.</li> <li>2. Unjustifiable change in consumption and firefighting methods.</li> </ol>
Result of non-recurring activities	<ol style="list-style-type: none"> <li>1. Not to disclose in the income statement the effect of the decision to close a production line, especially if the result is necessary to the outcome of the business.</li> </ol>
Unusual and extraordinary items	<ol style="list-style-type: none"> <li>1. Inclusion of extraordinary and exceptional items in operating earnings.</li> <li>2. Incorporate the Parent Company's share in the subsidiaries or associates without disclosing them.</li> </ol>

Second: Use of earnings management methods through the statement of financial position, as shown in the following table (Al-Halabi, 2009):

Methods of earnings management in the statement of financial position

Item	Methods of earnings management
Cash	<ol style="list-style-type: none"> <li>1. Non-disclosure of registered cash items.</li> <li>2. Manipulation of exchange rates when translating transactions in a foreign currency.</li> </ol>
Current investments	<ol style="list-style-type: none"> <li>1. Manipulate market prices when evaluating a financial portfolios.</li> <li>2. They are manipulating the classification of investments, such as the classification of traded ones to long-term when falling.</li> <li>3. Unjustified reduction in provision for a decline in securities prices.</li> </ol>
Accounts receivable	<ol style="list-style-type: none"> <li>1. Non-disclosure of stagnant debt and impaired debt to reduce provision for doubtful debts.</li> <li>2. Include the number of debtors to related parties (subsidiaries or associates).</li> <li>3. A deliberate error in classifying receivables to convert long-term receivables into short-term receivables to improve liquidity.</li> </ol>

<b>Inventory</b>	<ol style="list-style-type: none"> <li>1. Inventory lists include stagnant or obsolete goods.</li> <li>2. They are intentionally manipulating for prices.</li> <li>3. Unjustified change in stock pricing method from FIFO to WA.</li> </ol>
<b>Long-term investments</b>	<ol style="list-style-type: none"> <li>1. Change the accounting method for long-term investments from the cost method to equity method.</li> <li>2. Avoid showing the parent company's share of the losses of the subsidiary or associate.</li> <li>3. Not to exclude the effect of mutual transactions between the holding company and the subsidiary.</li> </ol>
<b>Property, Plant, and equipment</b>	<ol style="list-style-type: none"> <li>1. Non-compliance with the historical cost principle and the adoption of revaluation at market value and showing a surplus in income statement rather than equity.</li> <li>2. Reduce consumption rates in the market.</li> <li>3. Unjustifiable change in consumption methods.</li> <li>4. Reclassification of certain assets between fixed and current assets and long-term investments.</li> <li>5. Not to disclose the encumbered assets as collateral for the loan.</li> </ol>
<b>Intangible assets</b>	<ol style="list-style-type: none"> <li>1. Overvaluation of the intangible assets resulting from the merger.</li> <li>2. Register of intangible assets not purchased.</li> <li>3. Reduce the amortization rate of intangible assets over the recognized rates.</li> </ol>
<b>Current liabilities</b>	<ol style="list-style-type: none"> <li>1. Non-accruals of long-term loans are not included in current liabilities to improve the liquidity ratio.</li> <li>2. Repayment of a short-term loan through long-term borrowing to improve liquidity ratios.</li> <li>3. Suspend receipt of advance payments to improve leverage rates.</li> </ol>
<b>Long-term liabilities</b>	<ol style="list-style-type: none"> <li>1. Obtain long-term loans before the end of the fiscal year to repay a short-term loan to improve liquidity ratios.</li> <li>2. Extinguish callable deposits before maturity and add gains to net profit rather than extraordinary items.</li> </ol>
<b>Shareholders' equity</b>	<ol style="list-style-type: none"> <li>1. Adding previous years 'gains to current years' profits rather than being included in retained earnings.</li> <li>2. Include exchange gains or losses on equity instead of the income statement.</li> <li>3. Incorporation of gains or losses on translation of financial statements in the income statement rather than equity.</li> </ol>
<b>Contingent assets and liabilities</b>	<ol style="list-style-type: none"> <li>1. Register probable assets before they have acquired as revenue expected to be collected from a lawsuit before judgment has rendered.</li> <li>2. Obligation to disclose contingent or contingent obligations.</li> </ol>

*Third:* Earnings management techniques in the Cash Flow Statement: Earnings management occurs through the cash flow statement as follows:

1. The accountant classifies operating expenses as investment expenses or financing expenses. Cash financing expenses can also have classified as

- operating cash, and these do not change the final values.
2. Payment of capital development costs, and recording them as external cash inflows and taking it away from cash outflows.
3. The purpose of the manipulation of operational cash flows is to escape partly from paying taxes. One



example is the reduction of the gain on the sale of investments from net income during the calculation of operating cash flows.

*Fourth:* Earnings management techniques in the statement of changes in equity:

Earnings management procedures are being carried by making fictitious changes in the increase or reduction of paid capital, as well as the acquired and calculated principles, which have exercised to recalculate the size of previous mistakes or losses of previous options and balances of foreign currencies (Jarrar, 2006).

*h) The impact of the shift to IFRS on the earnings management*

All professional organizations advocate the need to apply IFRS to increase disclosure and transparency in financial statements. These standards began to replace some of the International Accounting Standards (IAS) in 2005 gradually. The International Financial Reporting Standards Committee clarified that it aims to introduce several changes, including the elimination of the majority of alternatives (standard and alternative treatment). In the current international accounting standards and to have only one accounting treatment, with the aim of standardization and ease of comparison. And work to eliminate the contradictions and conflicts between some of the criteria in addition to the vagueness of some. And the introduction of the interpretations attached to the standards within the accounting standards themselves rather than being separated in an annex to each gauge. And add enclosures to each accounting standard that explains how to apply.

Also, companies in the G-20 have begun to adopt IFRS standards but in a limited way and prepare their financial reports accordingly. According to the International Accounting Standards Board (IASB), more than 100 countries have adopted IFRS standards (IASB, 2009). The United States was considering adopting these standards in 2011. Due to the many problems in the transition from GAAP to IFRS standards, the US Securities and Exchange Commission changed the beginning of the adoption of IFRS standards to 2015. It defines a set of considerations must be taken into

account before the implementation of IFRS standards (Steven M. Mintz, 2010): adequate development of accounting systems to allow the performance of IFRS Standards, the authors of those standards should be independent enough, and give courses for investors to understand the effects of these standards, and the examination of the organizational environment in the United States, which will be affected by changes in accounting standards, the availability of the legal and legislative environment, and the availability of human resources.

With the adoption of IFRS standards on an imminent global scale, there is an opportunity to check whether IFRS standards improve the quality of accounting information and provide benefits to investors; there are a range of advantages that companies can obtain if they apply IFRS when preparing their financial statements, including access to global markets, ease of access to finance, low long-term cost of capital, low price of preparing financial statements, transfer of knowledge about IFRS to practitioners, and improved learning opportunities for practitioners from accountants.

**IV. RESEARCH METHODOLOGY**

The research had based on the inductive and deductive approaches, in which a review was done to what has been stated in accounting thoughts in general and in the field of international standards for the preparation of financial reports in particular, to reaching a theoretical framework for research. Based on this framework, a field study was done conducted on a sample of Saudi shareholding companies in different sectors whose shares are traded on the Saudi Stock Exchange, to learn about the impact of changing these companies to international standards on limiting its earnings management, which reflected in the quality of the accounting information provided by the financial reports in these companies. The study society consists of the shareholding companies whose shares had traded on the Saudi Stock Exchange in the various sectors, and they are 145 companies (according to the Tadawul website). All of them have sent questionnaires. The following table shows the sender and recipient of these questionnaires:

*Table 1:* Establishments representing the society of the study

No.	The Sector	No. of sent questionnaires	No. of received questionnaires
1	Banks and Financial Services	15	11
2	Petrochemical Industries	12	8
3	Cement	9	7
4	Retail	16	10
5	Energy and utilities	2	1

6	Agriculture and food industries	14	10
7	Communications and Information Technology	5	3
8	Insurance	25	18
9	Multi-investment companies	7	4
10	Industrial Investment	12	8
11	Construction	15	10
12	Real estate development	8	5
13	Transportation	5	2
14	Hotels and Tourism	2	2
15	Media and Publishing	2	-
<b>Total</b>		<b>149</b>	<b>100</b>

a) *Distribution of sample by sector*

The following table shows the sample distribution by economic sector followed by the sample

companies. Showing the number of companies selected from each section as well as the percentage of the number chosen as follows:

*Table 2:* Sample distribution according to economic sectors

No.	The Sector	No. of companies	%
1	Banks and Financial Services	11	11
2	Petrochemical Industries	8	8
3	Cement	7	7
4	Retail	10	10
5	Energy and utilities	1	1
6	Agriculture and food industries	10	10
7	Communications and Information Technology	3	3
8	Insurance	18	18
9	Multi-investment companies	4	4
10	Industrial Investment	8	8
11	Construction	10	10
12	Real estate development	5	5
13	Transportation	3	3
14	Hotels and Tourism	2	2
<b>Total</b>		<b>100</b>	<b>100</b>

b) *Characteristics of the study sample*

*Table 3*

Variable	Category	Number	%
Function	Financial Manager	10	10
	Head of Accounts Section	21	21

<b>Qualification</b>	<b>First Accountant</b>	<b>21</b>	<b>21</b>
	<b>Second Accountant</b>	<b>17</b>	<b>17</b>
	<b>Trainee Accountant</b>	<b>17</b>	<b>17</b>
	<b>Others</b>	<b>14</b>	<b>14</b>
<b>Qualification</b>	<b>Average Diploma</b>	<b>24</b>	<b>24</b>
	<b>Bachelor and high diploma</b>	<b>63</b>	<b>63</b>
	<b>Postgraduate</b>	<b>13</b>	<b>13</b>
<b>Experience</b>	<b>Less than six years</b>	<b>49</b>	<b>49</b>
	<b>From 6 to 12 years</b>	<b>29</b>	<b>29</b>
	<b>More than 12 years</b>	<b>22</b>	<b>22</b>

It is clear from Table (3) that the respondents to the questionnaire are financial managers and their proportion of 10%, and 21% top of accounts sections, and 21% first accountants, as well as a second accountant, trainee accountant their percentages, were 17% and 7.8% respectively, other accountant jobs, representing 14% of the total sample, but all jobs are in accounting, which can be reassuring to their answers. As shown in table (3), 63% of the group has a bachelor's degree and a high diploma in accounting, which can also be reassuring to the answers received from them on this questionnaire, and that their response represent to some extent the reality of accounting profession in the Kingdom of Saudi Arabia, including the Masters and Ph.D. degrees 13% each.

Finally, it is clear from the previous table that 49% have experience up to 6 years, and that 29% have experience ranging from 6 to 12 years, and 22% of the accountants in the sample have more than 12 years experience. These ratios make it possible to rely on answers.

c) *Stability of the study tool*

The consistency of the study questionnaire was verified by extracting the internal consistency coefficient, depending on the equation Cronbach Alpha for each variable in all dimensions of the study variables. The stability coefficients of all the variables were high, which are great stability rates and acceptable in human research and studies. Table (4) shows the results of the test.

Table 4: The stability coefficient values for each variable of the example

<b>Study variables</b>	<b>Dimensions</b>	<b>Interval s</b>	<b>Cronbach factor Alpha</b>
<b>Earnings Management</b>	<b>Earnings Management by manipulating expenses in the income statement</b>	<b>1-9</b>	<b>0.78</b>
	<b>Earnings Management by manipulating revenue in the income statement</b>	<b>10-21</b>	<b>0.81</b>
	<b>Earnings management by manipulating the accounts of the financial position</b>	<b>22-43</b>	<b>0.88</b>
	<b>Earnings management by manipulating the cash flow statement accounts</b>	<b>44-48</b>	<b>0.70</b>
	<b>Earnings management by manipulating changes in the list of equity</b>	<b>49-51</b>	<b>0.70</b>
<b>Quality of expected accounting information</b>	<b>The quality of expected accounting information after the expected conversion of IFRS standards compared to local Saudi standards</b>	<b>52-60</b>	<b>0.79</b>

d) *Statistical Processing*

SPSS statistical package had used to conduct descriptive analysis to answer the study's questions and test hypotheses as shown:

1. The mean and standard deviations and t-test for one sample to test the initial assumption.
2. Multiple regression tests for the second hypothesis.

- Analysis of the mono-variance to test the third and fourth hypotheses, as well as the Schiffe test for post comparisons.

## V. THE RESULTS

*First:* Test the first basic assumption that reads: There is no expected change in earnings management in light of the transition to IFRS., and its sub-assumptions arising from it:

To test the first basic assumption, and its sub-assumptions arising from it, the accounting averages and standard deviations of the expected change in earnings management were extracted in light of the transition to IFRS, in addition to the use of t-test for one sample compared to the mean (3), and table (5) shows that.

*Table 5:* Averages and standard deviations and the t-test results of the expected change in earnings management in light of the transition to IFRS

Hypot hesis	Earnings management dimensions	Avera ge	stand ard devia tion	Avera ge differ ence	Calculat ed t-teas	Probabilit y Value
H1.1	Earnings Management by manipulating expenses in the income statement	3.18	0.70	0.18	2.606	0.011x
H1.2	Earnings management by manipulating revenue in the income statement	3.28	0.65	0.28	4.268	0.000x
H1.3	Earnings management by manipulating the accounts of the financial position	3.30	0.60	0.30	4.988	0.000x
H1.4	Earnings management by manipulating the cash flow statement	3.60	0.66	0.60	9.117	0.000x
H1.5	Earnings management by manipulating changes in statement equity	3.35	0.86	0.35	4.022	0.000x
H1	Earnings Management	3.31	0.54	0.31	5.688	0.000x

*x means statistically significant at the level of (a = 0.05)*

The results in Table (3) show that the calculated t value of the change in the total earnings management was (5.688) with a chance of (0.000), which is less than the level of significance ( $\alpha = 0.05$ ), Thus rejecting the null assumption (primary principle) and accepting the alternative hypothesis that "there is an expected change in earnings management in light of the transition to IFRS," and the mean difference was (0.31) compared to the hypothetical mean (3).

The results also showed that the value of (t) calculated for change in expenses in the income statement was (2.606) with a probability of (0.011), which is less than the significance level ( $\alpha = 0.05$ ), thus rejecting the null hypothesis (H1.1) and accept the

alternative assumption, which states "there is an expected change in earnings management in light of the transition to IFRS by manipulating expenses in the income statement," and the mean difference was (0.18) compared to the hypothetical mean (3).

The results also showed that the value of (t) calculated for change in revenue in the income statement was (4.268) with a probability of (0.000), which is less than the significance level ( $\alpha = 0.05$ ), thus rejecting the null hypothesis (H1.2) and accept the alternative assumption, which states "there is an expected change in earnings management in light of the transition to IFRS by manipulating revenue in the

income statement,” and the mean difference was (0.28) compared to the hypothetical mean (3).

The results also showed that the value of (t) calculated for change in the accounts of the financial position was (4.988) with a probability of (0.000), which is less than the significance level ( $\alpha = 0.05$ ), thus rejecting the null hypothesis (H1.3) and accept the alternative assumption, which states “there is an expected change in earnings management in light of the transition to IFRS by manipulating the accounts of the financial position,” and the mean difference was (0.30) compared to the hypothetical mean (3).

The results also showed that the value of (t) calculated for change in the cash flow statement was (9.117) with a probability of (0.000), which is less than the significance level ( $\alpha = 0.05$ ), thus rejecting the null hypothesis (H1.4) and accept the alternative assumption, which states “there is an expected change in earnings management in light of the transition to IFRS by manipulating the cash flow statement,” and the mean difference was (0.60) compared to the hypothetical mean (3).

Finally, the results showed that the value of (t) calculated for change in the statement of equity was (4.022) with a probability of (0.000), which is less than the significance level ( $\alpha = 0.05$ ), thus rejecting the null hypothesis (H5.2) and accept the alternative assumption, which states “there is an expected change in earnings management in light of the transition to IFRS by manipulating changes in the list of equity,” and the mean difference was (0.35) compared to the hypothetical mean (3).

*Second:* Test the second basic assumption that reads: There is no statistically significant impact at the level of indication ( $\alpha = 0.05$ ) of the shift in IFRS to improve the quality of accounting information and to test this hypothesis, a multiple regression test had used to determine the impact of the shift to IFRS (expenses in the income statement, revenue in the income statement, the accounts of the financial position, the cash flow statement, list of equity) in improving the quality of accounting information. Table (6) shows the results of the test.

**Table 6:** The results of the multiple regression for the impact of alteration to IFRS on improving the quality of accounting information

Earnings management dimensions	Beta	Calculated t	Significance level	r square	Calculated f	Probability Value
Earnings Management by manipulating expenses in the income statement	0.069	0.541	0.590			
Earnings management by manipulating revenue in the income statement	0.004	0.030	0.967			
Earnings management by manipulating the accounts of the financial position	0.425	3.398	0.001 x	0.234	5.751	0.000 x
Earnings management by manipulating the cash flow statement	0.411	3.384	0.001 x			
Earnings management by manipulating changes in list equity	0.248	2.151	0.034 x			

x means statistically significant at the level of ( $\alpha = 0.05$ )

Note from Table (6) that the value of the calculated (f) is (5.751) with a probability value (0.000), which is less than the significance level ( $\alpha=0.05$ ), indicating a statistically significant impact on the transition to IFRS in improving the quality of accounting information. The table also shows that the dimensions of earnings management (expenses in the income statement, revenue in the income statement, the

accounts of the financial position, the cash flow statement, list of equity) explain 23.4% of the change in the quality of accounting information.

The table also indicates that the dimensions of earnings management (the accounts of the financial position, the cash flow statement, list of equity) have an impact on the quality of the accounting information, where the values of (t) were (3.398, 3.384, 2.151)

respectively, with probability values (0.001, 0.001, 0.034), which is less than the significance level ( $\alpha = 0.05$ ). The follow-up of beta factors for these dimensions shows that the accounts of the financial position dimension is the most powerful of the earnings dimensions in affecting the quality of the accounting information, with a beta value of (0.425). It also becomes apparent that the two earnings management dimensions (expenses in the income statement, revenue in the income statement) has no effect on the quality of accounting information, where the values of (t) for them were (0.541, 0.030), respectively, with probability values (0.590, 0.976), respectively, which is greater than the significance level ( $\alpha = 0.05$ ).

Based on these results, the alternative hypothesis is accepted "there is a statistically significant impact at the significance level of ( $\alpha = 0.05$ ) of the transition to IFRS (the accounts of the financial position,

the cash flow statement, list of equity) in improving the quality of accounting information." The null hypothesis was also accepted: "There is no statistically significant impact at the significance level of ( $\alpha = 0.05$ ) of the transition to IFRS (expenses in the income statement, revenue in the income statement) in improving the quality of accounting information."

*Third:* Test the third basic assumption that reads: There is no statistically significant impact at the level of indication ( $\alpha = 0.05$ ) in the expected change in earnings management in light of the transition to IFRSs attributable to the accounting qualification of accountants and to test this hypothesis, single variance analysis had used to determine the differences in the expected change in earnings management in light of the transition to IFRS due to the qualification of the accountants. Table (7) shows the results of the analysis.

**Table 7:** The results of the single variance of the differences in the expected change in earnings management in light of the transition to IFRS due to the qualification of the accountants

Earnings management dimensions	Qualification	Average	Standard deviation	Calculated f	Probability Value
Earnings Management by manipulating expenses in the income statement	Average Diploma	3.20	0.55	1.754	0.178
	Bachelor and high diploma	3.11	0.79		
	Postgraduate	3.50	0.36		
Earnings management by manipulating revenue in the income statement	Average Diploma	3.33	0.49	0.691	0.504
	Bachelor and high diploma	3.29	0.75		
	Postgraduate	3.08	0.28		
Earnings management by manipulating the accounts of the financial position	Average Diploma	3.12	0.51	1.453	0.239
	Bachelor and high diploma	3.35	0.64		
	Postgraduate	3.38	0.51		
Earnings management by manipulating the cash flow statement	Average Diploma	3.69	0.62	1.044	0.356
	Bachelor and high diploma	3.62	0.70		
	Postgraduate	3.37	0.52		
	Average Diploma	3.28	0.72	0.100	0.905

Table (7) shows no statistically significant differences at the significance level ( $\alpha = 0.05$ ) in the expected change in earnings management in light of the transition to IFRS due to the qualification of the accountants, since the value of the calculated (f) for the expenses in the income statement was (1.754), for the revenue in the income statement (0.691), for the accounts of the financial position (1.453), for the cash flow statement (1.044), for list of equity (0.100), and the earnings management as a whole (0.175), with probability values (0.178, 0.504, 0.329, 0.356, 0.905, and 0.839) respectively, which is more than the

significance level of ( $\alpha = 0.05$ ). Based on these results, the null hypothesis had accepted: "There is no statistically significant impact at the significance level of ( $\alpha = 0.05$ ), in the expected change in earnings management in light of the transition to IFRS due to the qualification of the accountants".

*Fourth:* Test the fourth basic assumption that reads: There is no statistically significant impact at the significance level of ( $\alpha = 0.05$ ) in the expected change in earnings management in light of the transition to IFRSs attributable to the experience of accountants and

to test this hypothesis, single variance analysis had transition to IFRS due to the experience of the used to determine the differences in the expected accountants. Table (8) shows the results of the change in earnings management in light of the analysis.

Table 8: The results of the single variance of the differences in the expected change in earnings management in light of the transition to IFRS due to the experience of the accountants

Earnings management dimensions	Experience	Average	Standard deviation	Calculated f	Probability Value
Earnings Management by manipulating expenses in the income statement	Less than six years	3.14	0.708	0.257	0.774
	From 6 to 12 years	3.26	0.797		
	More than 12 years	3.18	0.546		
Earnings management by manipulating revenue in the income statement	Less than six years	3.24	0.701	2.512	0.086
	From 6 to 12 years	3.48	0.624		
	More than 12 years	3.09	0.460		
Earnings management by manipulating the accounts of the financial position	Less than six years	3.07	0.596	8.334	0.000 x
	From 6 to 12 years	3.47	0.549		
	More than 12 years	3.59	0.497		
Earnings management by manipulating the cash flow statement	Less than six years	3.60	0.709	4.257	0.017 x
	From 6 to 12 years	3.83	0.599		
	More than 12 years	3.30	0.517		
Earnings management by manipulating changes in list equity	Less than six years	3.37	0.772	0.052	0.949 x
	From 6 to 12 years	3.31	0.996		
	More than 12 years	3.33	0.903		
(Total) Earnings Management	Less than six years	3.19	0.607	2.428	0.094
	From 6 to 12 years	3.46	0.501		
	More than 12 years	3.36	0.353		

Table (8) shows no statistically significant differences at the significance level ( $\alpha = 0.05$ ) in the expected change in earnings management in light of the transition to IFRS (expenses in the income statement, revenue in the income statement, list of equity, earnings management as a whole) due to the experience of the accountants, since the value of the calculated (f) for the expenses in the income statement was (2.512), for the revenue in the income statement (2.512), for list of equity (0.052), and the earnings management as a whole (2.428), with probability values (0.774, 0.086, 0.949, 0.356, and 0.094) respectively, which is more than the significance level of ( $\alpha = 0.05$ ).

The results also indicated that there were statistically significant differences at the significance level of ( $\alpha = 0.05$ ) in the expected change in earnings management in light of the transition to IFRS (the accounts of the financial position, the cash flow statement) due to the experience of the accountants since the value of the calculated (f) for the accounts of the financial position was (8.334), and for the cash flow statement (4.257), with probability values (0.000, and 0.017) respectively, which is less than the significance level of ( $\alpha = 0.05$ ). To determine the direction of these differences, use the Schiffe test for post-comparisons. Table (9) shows the test results.

**Table 9:** Results of Schiffe test for the expected change in earnings management in light of the transition to IFRS (the accounts of the financial position, the cash flow statement) due to the experience of the accountants

Earnings management dimensions	Experience	Average	Less than 6 years	From 6 to 12 years	More than 12 years
Earnings management by manipulating the accounts of the financial position	Less than six years	3.07	-	-0.40	0.52x
	From 6 to 12 years	3.47		-	0.12
	More than 12 years	3.59			-
Earnings management by manipulating the cash flow statement	Less than six years	3.60	-	0.23	0.30
	From 6 to 12 years	3.83		-	0.53x
	More than 12 years	3.30			-

Table (9) shows statistically significant differences at the significance level ( $\alpha = 0.05$ ) in the expected change in earnings management by manipulating the accounts of the financial position in light of the transition to IFRS due to the experience of the accountants, where these differences were in favor of accountants whose experience was six years and more compared to accountants who have experience less than 6 years, the results also indicate that there are differences of statistical significance at the significance level ( $\alpha = 0.05$ ) in the expected change in earnings management by manipulating the cash flow statement in light of the transition to IFRS due to the experience of the accountants, where these differences were in favor of accountants whose experience was more than 12 years compared to accountants who have experience from 6 to 12 years.

The basis on these results, the null hypothesis is accepted that reads: “there are no statistically significant differences at the significance level ( $\alpha = 0.05$ ) in the expected change in earnings management in

light of the transition to IFRS (expenses in the income statement, revenue in the income statement, list of equity, earnings management as a whole) due to the experience of the accountants”. The null hypothesis is rejected and accepts the alternative assumption which states: “there were statistically significant differences at the significance level of ( $\alpha = 0.05$ ) in the expected change in earnings management in light of the transition to IFRS (the accounts of the financial position, the cash flow statement) due to the experience of the accountants.

#### VI. BASED ON THE ABOVE RESULTS, THE RESEARCH RECOMMENDS THE FOLLOWING

1. The necessity of increasing the awareness of the accountants in Saudi joint-stock companies, on the importance of the transition to international financial reporting standards. And to show its positive role in reducing the management of profitability and improve the quality of accounting information.



2. The necessity for a partnership between the Saudi universities and the Saudi Organization for Certified Public Accountants (SOCPA) and Audit Offices in the Kingdom of Saudi Arabia to study the phenomenon of earnings management and work to limit its existence, and the intimate relationship between reducing them and improving the quality of accounting information through:
    - a. To organize national and international scientific and international workshops, seminars, and conferences in which universities had hosted by experts from the Saudi Organization for Certified Public Accountants (SOCPA) and experts from the labor market, Audit Offices, and international experts to show the methods of earnings management, how to discover and limit them, and to indicate the minus effects of this phenomenon on business establishments, the national economy, and the quality of accounting information.
    - b. The Saudi Commission for Certified Public Accountants (SOCPA) in cooperation with universities, auditing offices, and employers on developing an accounting standard dealing with earnings management in companies and the quality of accounting information.
    - c. To complete the gradual adoption of International Financial Reporting Standards (IFRS) by the Saudi Organization for Certified Public Accountants (SOCPA), and the mandatory application of these standards by companies listed on the Saudi Stock Exchange by the end of the period determined by SOCPA to complete the transition to these international standards.
    - d. Field training for Saudi university graduates in accounting offices and in companies, through which they learn about the methods of earnings management applied by some companies, how to discover and report on them, and how to improve the quality of accounting information.
    - e. Urge and encourage Saudi university graduates to obtain a fellowship qualification certificate for Saudi Certified Public Accountants, enabling them to gain a broad understanding of national and international accounting standards; they can identify and manage ways to earnings management in companies, which increases the quality of accounting information.
    - f. The continuous rehabilitation and development of corporate accountants in specialized courses in the International Financial Reporting Standards (IFRS) held by the Saudi Universities or the Saudi Organization for Saudi Certified Public Accountants, to show the methods of earnings management, how to discover and limit it, and its relation to the quality of accounting information.
    - g. Developing the national regulations for the ethics of the accounting profession that include the subject of earnings management and the quality of accounting information.
    - h. The preparation of explanatory leaflets and brochures for business people and investors shows the importance of adopting the International Financial Reporting Standards (IFRS), the risks of earnings management on companies and capital, and the quality of accounting information.
  3. The necessity to allocate a semester of courses in the accounting major or to define a path for dealing with profit management and to find the quality of accounting information.
  4. The necessity of writing accounting books and carrying out more scientific research to show the risks of earnings management of companies, the importance and maintenance of corporate capital, and how to increase the quality of accounting information.
  5. The necessity to form a team of accounting practitioners in companies and audit offices in the Kingdom of Saudi Arabia to study the most common methods of earnings management in companies registered in the Saudi financial market and come up with recommendations on how to reduce this phenomenon.
  6. The necessity for government intervention by the financial market of companies and work to find strict laws and legislation that limit the earnings management in companies and work to increase the transparency and quality of accounting information.
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## Bank Liquidity in Distressed Macro-Economic Conditions: The Case of Zimbabwe

By Lillian Gumbo, Cleopas Njerekai, Collade Murungu & James Damabaza

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**Abstract-** The bank liquidity phenomenon remains an unending theme of much debate among banking sector officials and the general banking public since it has the tenacity to derail economic activities in the event of chronic macro-economic fluctuations. Unstable macro economic environments are a formidable threat to bank liquidity positions as they play a significant role in deteriorating banks' assets value which often diminishes banks' liquidity. In the last two decades, the Zimbabwean economy has undergone periods of unstable economic conditions whose impact on the banking sector and especially on bank liquidity needs to be analysed so that appropriate intervention strategies can be designed to mitigate negative impacts in the event of recurrences. To analyse the liquidity positions of the country during these two decades of economic downturn, this research employed panel data stretching from 2010 to 2018 and panel regression models, to investigate the potential impact of macroeconomic changes on Zimbabwe's bank liquidity.

**Keywords:** bank liquidity, liquidity ratios, macro-economic factors, distressed economic environment, regressors.

**GJMBR-C Classification:** JEL Code: O10



*Strictly as per the compliance and regulations of:*



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# Bank Liquidity in Distressed Macro-Economic Conditions: The Case of Zimbabwe

Lillian Gumbo <sup>α</sup>, Cleopas Njerekai <sup>σ</sup>, Collade Murungu <sup>ρ</sup> & James Damabaza <sup>ω</sup>

**Abstract-** The bank liquidity phenomenon remains an unending theme of much debate among banking sector officials and the general banking public since it has the tenacity to derail economic activities in the event of chronic macro-economic fluctuations. Unstable macro-economic environments are a formidable threat to bank liquidity positions as they play a significant role in deteriorating banks' assets value which often diminishes banks' liquidity. In the last two decades, the Zimbabwean economy has undergone periods of unstable economic conditions whose impact on the banking sector and especially on bank liquidity needs to be analysed so that appropriate intervention strategies can be designed to mitigate negative impacts in the event of recurrences. To analyse the liquidity positions of the country during these two decades of economic downturn, this research employed panel data stretching from 2010 to 2018 and panel regression models, to investigate the potential impact of macroeconomic changes on Zimbabwe's bank liquidity. The model's regressors were inflation, gross domestic product, lending interest rate, and real interest rate. It also included one microeconomic variable, namely bank size. Findings from this research revealed that macroeconomic changes inversely affected bank liquidity as evidenced by a negative nexus between bank liquidity measured by cash to total assets, loans to total assets, loans to deposits, deposits to total assets and an array of other macroeconomic factors under study with bank size displaying compelling a positive linear relationship. The study recommends the need to strategically propel policies that eliminate economic rigidities and the transitory deposits syndrome to strengthen the national savings' power of the economy as this will improve bank liquidity through increased savings and bank deposit base.

**Keywords:** bank liquidity, liquidity ratios, macro-economic factors, distressed economic environment, regressors.

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## I. INTRODUCTION AND BACKGROUND OF THE STUDY

Traditionally banks function as financial intermediaries which pool and transform small short-term deposits from surplus units into bigger and longer-term loans for the deficit sectors. This bank intermediation role exposes the bank to various types of risk, namely; liquidity risk (due to the mismatch of deposit and loan maturities), interest rate risk (mismatch between fixed and floating interest rates charged on assets and liabilities), default risk, and operational risk. Since loans are illiquid and deposit withdrawals usually random, banks should hold adequate liquidity to meet daily depositors' demand and wholesale commitments (Sekoni, 2015).

Various techniques in banking like the matched book, repricing model and duration model have been developed to manage this core idiosyncratic liquidity risk (Choudhry, 2018). The repricing model, although it ignores the time value of money, over-aggregates assets and liabilities into time buckets and ignores cash flows from off-balance-sheet assets, remains an important model in bank asset and liability management and is the bedrock upon which better models like duration and value at risk models are constructed (Saunders and Cornet 2011).

Modern-day banking is now complex and dynamic. Banks operate with a wide array of complex hybrid financial products across international markets and have evolved into one-stop-shop conglomerates. However, at the core of all capital and money market activities lies the original logic behind the raison d'être of all banks which is to bring together the suppliers of capital with the borrowers of capital (Choudhry, 2018).

Sekoni (2015) argued that liquidity acts as the grease that facilitates the smooth functioning of a financial system. Indeed liquidity is the lifeblood of the banking sector, even though other fundamentals like capital adequacy are managed well, illiquidity can paralyze a bank and cause bank runs that can have repercussions on the bank's overall financial performance.

The global financial crisis of 2008 was a wakeup call for the world's financial sector and to regulators all over the world that financial sector liquidity regulations needed to be strengthened. Considering the

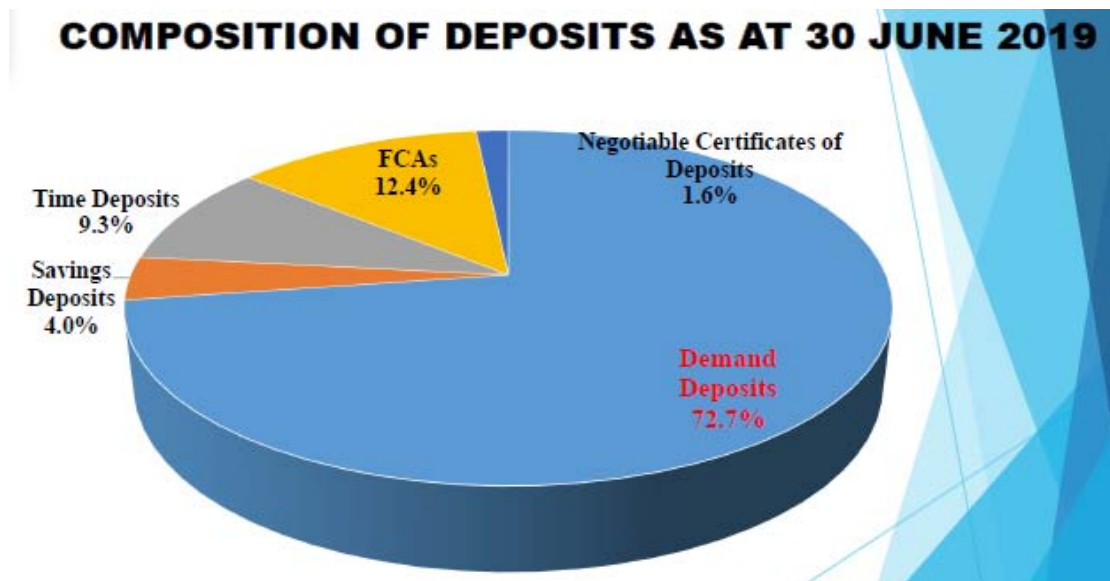
shortcomings of the Basel II accord, the Basel Committee developed a new accord to create a more resilient financial sector that could absorb severe economic shocks. At the centrepiece of this regulation, Basel III consists of liquidity management regulations that changed how banks view, categorize and manage their assets and liabilities.

The new liquidity coverage ratio requires banks to hold high-quality liquid assets that can be easily converted into cash within a day and without a decrease in value. These assets should meet the expected net cash outflows for 30 calendar days (Bank for International Settlements 2013). The net stable funding ratio supplements the liquidity coverage ratio by promoting liquidity risk resilience over a longer time horizon of up to a year. Banks are required to fund their activities with more stable sources of funding on an ongoing process (Bank for International Settlements, 2013). However, the Centre of Global Development (2019) argues that this regulation requires a well-established financial market in terms of market depth and market breadth to be effective and suggested that there is a need for a differentiated approach to the implementation of bank regulations for emerging markets/developing economies and developed economies.

Zimbabwe's financial sector performance has always been a function of the domestic macroeconomic fundamentals and developments in the global and regional economies (Reserve Bank of Zimbabwe, 2019). After the accelerated Land reform program embarked by the Zimbabwean government in 2000, the financial sector faced a myriad of challenges and financial crises like inflationary pressures and speculative activities in the foreign exchange and stock market, among other factors (RBZ 2008).

In the year 2009, Zimbabwe adopted the multi-currency regime and during this period, the economy stabilized for a while. Inflationary pressures were subdued to deflation, unemployment decreased, GDP growth rates improved. However, bank liquidity remained one of the most critical challenges during this period. The demand for foreign currency in the Zimbabwean economy, mainly the United States Dollar, continued to outweigh supply and bank liquidity deteriorated substantially. The Reserve Bank of Zimbabwe responded by introducing bond coins at a rate of 1:1 with the United States Dollar. This policy facilitated bank runs and severe bank illiquidity as the general public was afraid of the return of the Zimbabwean dollar and the exchange rate was not justifiable, thereby loss of confidence by the general public.

In October 2018, all-local USD denominated bank accounts opened during the multicurrency regime before the introduction of the local currency were converted into RTGS\$ accounts at one as to one rate and new foreign currency accounts (FCA) were introduced specifically for foreign currency deposits. This transition disheartened depositors and investors, thereby losing confidence in the financial sector. The statutory instrument SI 33/2019 of 22 February liberalized the exchange rate, and finally SI 142/2019 of 24 June 2019 removed the multi-currency system and re-introduced the local currency ZWL as the sole legal tender in the country (RBZ, 2019). Figure 1 shows the composition of bank deposits as of 30 June 2019. Due to loss of confidence in the financial sector, the bulk of deposits in Zimbabwe are transitory, thus, account holders can withdraw the money at any time. Such deposits are difficult to manage and to transform/pool into profitable loans without compromising bank liquidity.



Source: Reserve Bank of Zimbabwe

Figure 1: Composition of bank deposits for Zimbabwe as at 30 June 2019

Currently, the Zimbabwean foreign market is mainly characterized by multiple exchange rates, which aggravate opportunities for foreign exchange arbitrage opportunities. Discrepancies between the official interbank rate, which is usually lower than the Old Mutual implied rate, and the black market rate, which is usually higher than the official exchange rate cause depreciation of the local currency in the parallel market. Due to these discrepancies in the official and black-market rates, commodities are also charged based on the prevailing black market rates and not official bank rates. This causes inflationary pressures on commodity prices and poverty levels as only a few will afford them. Today, prices are still being denominated in both foreign currency and local currency and such differentiated pricing forces consumers to buy in foreign currency where prices are perceived lower, thereby increasing the demand for the scarce foreign currency.

Zimbabwe has passed through various macroeconomic phases as explained in the background above; therefore the need for this research to econometrically analyse the impact of such macroeconomic changes on bank liquidity. There is no research that has analysed the impact of macroeconomic factors on bank liquidity in Zimbabwe. The Zimbabwe banking system architecture comprises of thirteen commercial banks, five-building societies, and one savings bank.

The primary objective of this research was therefore, to determine the effect of different macroeconomic conditions on bank liquidity. Specifically, the study analysed the effect of gross domestic product, inflation, unemployment, loan interest rate, and the real interest rate on bank liquidity.

## II. LITERATURE REVIEW

Liquidity is defined as the ability of a bank to fund increases in assets and meet obligations as they become due, without incurring unacceptable losses (Vodova, 2014). This liquidity can be categorised into two, that is, market liquidity and funding liquidity (Yu Tian, 2009). Market liquidity is the ability of a market participant to execute a trade or liquidate a position with little or no cost, risk or inconvenience and funding liquidity is the ability of a bank to fund increases in assets and meet obligations as they become due, without incurring unacceptable losses (Yu Tian, 2009). Existing literature further postulates that from these two categories of liquidity, emanates two categories of liquidity risk, which are, market liquidity risk and funding liquidity risk. In the same vein, Vodova (2014) also categorized liquidity risk into two categories; the funding liquidity risk, where a bank will not be able to adequately fund its operations without affecting its daily operations or the financial position of the bank and market liquidity

risk category, where a bank cannot easily offset a position at the market price because of inadequate market depth and market disruption.

Saunders and Cornnet (2014) however, categorised liquidity risk into liability side liquidity risk and asset size liquidity risk. Just as market liquidity risk established by Vodova (2014) these authors argue that when liability holders of a bank demand cash by withdrawing their deposits, the bank should meet this demand by cash, sale of bank liquid assets or by borrowing additional funds. If the bank funds this deposit drain by sale of bank assets at low fire-sale prices, this will threaten the liquidity position of the Bank. Asset side liquidity risks represent the ability of a Bank to fund loan requests and exercise off-balance sheet loan commitments and other credit lines. Saunders and Cornet (2014) established that when a borrower finally draws a loan on commitment, the bank should fund this loan immediately through additional borrowing, sale of liquid assets or sale of liquid assets. The ability to fund such commitments represents the level of asset-side liquidity risk.

There is no consensus in the literature on the way liquidity risk should be measured. Moorad (2018) postulated that liquidity risk could be measured by liquidity gap, the difference between bank assets and bank liabilities in different maturity buckets. Since it is fundamental for a bank to keep the value of assets equal to the value of its liabilities. Moorad (2018) argued that the bank's liquidity position should be squared on a daily basis, taking into consideration the value of its rate-sensitive assets and rate-sensitive liabilities. Saunders and Cornet (2014) however, argued that liquidity should be measured by the use of peer group liquidity ratio comparisons, liquidity index and the level of the financing gap. The liquidity index measures the potential loss a bank could suffer as a result of immediate disposal of an asset, while ratios such as loans to deposit ratios and borrowed funds to total assets ratios are compared among banks of similar size and location. Liquidity risk could also be measured by the difference between the bid-ask spread of an asset (ask price is the price the seller is willing to accept for an asset and the bid, the price the buyer is willing to pay for an asset). Thus the difference between the lowest ask price and the highest bid price becomes the value of liquidity risk (Yu Tian, 2009). This spread measure can be incorporated into the traditional Markowitz portfolio theory or the convectional VaR model. The bank of International settlements however, implemented new liquidity measures, the liquid coverage ratio, the net stable funding ratios and other risk control measures to ensure financial system stability.

Various authors concur that bank liquidity is a function of micro bank-specific factors under the control



of bank management and macro-economic, external factors that the bank has no control over. Al- Homaidi et. al. (2019), analysed the determinants of bank liquidity of listed commercial banks in India. The authors established that macro-economic factors like interest and the exchange rates had a significant negative impact on bank liquidity, while bank-specific factors like bank size, capital adequacy ratio, operational efficiency ratio and return on assets ratio had a significant positive impact on liquidity. Asset quality ratio, asset management ratio, return on equity ratio and net interest margin also had a negative significant impact on bank liquidity. The general method of moments (GMM), pooled fixed effects and random-effects models were used to analyse data for 37 listed Indian commercial banks.

Madhi (2017) analysed the impact of macroeconomic factors on bank liquidity for a sample of 13 Albanian banks. The author argued that bank liquidity was difficult to measure and there was no universal standard to measure liquidity. Therefore they used various ratios to measure bank liquidity including; liquid assets to total assets ratio, loans to total assets ratio, loans to deposits and short term financing ratio, and liquid assets to deposits plus short term borrowing. Inflation, unemployment rate, GDP growth rate, public deficit, interbank interest rate, and interest rate were used as macroeconomic indicators. Fixed regression results proved a significant relationship between bank liquidity and unemployment rate, capital adequacy, interest rate, and non-performing loans. Surprisingly there was no significant relationship for bank liquidity, GDP, and inflation.

Trenca et. al (2015) analysed the impact of macroeconomic variables upon banking system liquidity of a group of European countries, namely; Greece, Portugal, Spain, Italy, Cyprus, and Croatia. Net loans to total deposits ratio was used as the dependant variable. In this case, the higher the ratio, the lower the liquidity as banks rely on borrowed funds. The authors established that inflation and liquidity rate in the previous period were the major determinants of liquidity in banks. However, the authors expected a negative relationship between liquidity and inflation as they argued that inflation lowered the purchasing power of people, thereby increasing bank lending as people need more money to buy the same products, thus lowering liquidity.

Zheng et. al. (2016) argue that a well-functioning and established interbank market, is crucial for channelling liquidity between a bank with surplus and shortages and minimizes bank holding of costly liquid assets. The author further established that the disruption of this crucial interbank market during the 2007-2008 global economic crisis was one of the major causes of bank failures as banks refrained from lending to each other and individually hoarding liquidity resulting in market illiquidity and bank failures.

Zheng et. al. (2016) further posited that there were two main schools of thought that explain the impact of liquidity on a bank. The precautionary motive and the moral hazard motive. The precautionary motive posits that liquidity hoarding by individual banks causes overall market illiquidity and therefore, bank failure. Precautionary motive predicts that bank liquidity is positively related to bank failure risk. The moral hazard motive posits that government support of banks in distress incentivizes banks to engage in risky behaviour and discourages the holding of adequate liquidity and thereby causing failure risk. The authors further established that, the moral hazard effect is prone to larger banks due to the too big to fail effect. They tend to get more government support in times of distress while the precautionary motive is prone to small banks which have less access to external capital markets and therefore end up hoarding liquidity to curb financial constraints.

Calomiris (2003) analyzed Argentina and the Brazilian financial crisis as a case study. The authors argued that unlike in developed economies where an independent bank controls the monetary policy, in emerging countries, government controls the central bank and in times of distress, banks are forced to finance government debt and those who refuse are penalized. This, therefore, reduces bank liquidity and eventually leads to a countrywide financial crisis.

In the same vein, Ondiro (2018) analyzed the effect of macro-economic factors on commercial banks' liquidity in Kenya. The author analyzed panel data for a sample of 30 commercial banks through a random-effects model. Ondiro (2018) established that the liquidity of a bank was positively related to loan loss provision, interest rates, and inflation rates while bank profitability and gross domestic product negatively influenced bank liquidity.

Madhi (2017) concurred with Zheng et. al. (2016) precautionary and moral hazard liquidity principles as they established a negative relationship between bank size and bank liquidity, affirming the too big to fail principle of big banks and small banks' liquidity hoarding. In the same vein. Vodova's (2012) study of Czech and Slovak's bank established that big banks relied on the inter-bank market and on the lender of last resort liquidity assistance in times of distress while small and medium-sized banks held a buffer of liquidity assets. There is no research that has empirically analyzed the effect of bank size on liquidity in Zimbabwe and hence, this research adds bank size as one of the independent variables affecting bank liquidity.

### III. RESEARCH METHODOLOGY

#### a) *Data collection and sampling*

Data was collected from Reserve Bank supervision and surveillance annual reports for all

deposit-taking banks in Zimbabwean. A census of all banks in Zimbabwe was considered since there are only 19 banks in Zimbabwe. However, only fifteen banks were in operation for the selected period 2010-2018. Other banks were established during the selected period, and banks that failed during the same period were not considered for this research. The period 2010 to 2018 was considered to account for the multicurrency regime and the period after the introduction of the Zimbabwean dollar. Due to Base II and III accord pillar three of market discipline and market disclosure, banks are mandated to publish their audited financial statements. Therefore, bank financial data was readily available.

#### b) Econometric model specification

To analyse the impact of Zimbabwean macro-economic factors on bank liquidity. The following panel regression model was estimated:

$$Lit = \alpha + X'it\beta + (ui + vit)$$

Where

Lit represents the dependent variable, one of the liquidity ratios for bank *i* at time *t*

Xit is a vector of explanatory variables for bank *i* in time *t*,  $\alpha$  is a constant,  $\beta'$  are coefficient which represents the slope of variables, *ui* represent the random effect specific to bank *i* and *v* it is the error term (Myoung, 2011).

#### c) Dependent variable

In literature, there is no consensus on how liquidity can be adequately measured. Although different authors recommend different liquidity ratios, there is no one standard ratio that can capture all liquidity risk of a bank (Ondiro 2018, Vodova 2012, Madhi 2017). Therefore the need for this research to fill this gap in the literature and to use different liquidity ratios as dependent variables. This research will use four liquidity ratios as the dependent variable, namely; loans to deposits ratio, cash to total assets, loans to total assets and deposits to total assets ratio.

$$LTD = \frac{\text{loans}}{\text{total deposits}} \times 100$$

This is a ratio of the most illiquid assets loans to the most liquid liabilities deposits. A lower ratio

represents that the bank is using ordinary low-cost deposits to fund loans. The higher the ratio, the higher the illiquidity of a bank.

$$CTA = \frac{\text{liquid assets (cash)}}{\text{total assets}} \times 100$$

The ratio of liquid assets to total assets represents the capacity of a bank to absorb liquidity shocks and unexpected demands for cash. This ratio is measured as the proportion of liquid assets (cash and money market instruments) to total assets. The higher the ratio the higher the liquidity of a bank. Zimbabwe has faced several liquidity challenges in the past two decades and these liquidity crunches have crippled the whole financial sector of the country every time they have occurred. Due to the trading of cash on the black market at a premium, financial markets have been disrupted and have lacked the adequate market depth to provide liquidity. Therefore the researcher considered cash as the major liquid asset to be considered for a bank in Zimbabwe.

$$LTA = \frac{\text{loans}}{\text{total assets}} \times 100$$

This ratio represents the proportion of loans to total assets of a bank. Loans are categorised as one of the most illiquid assets of a bank. Therefore, this ratio indicates the percentage of bank assets tied up in illiquid loans. The higher the ratio, the higher the bank illiquidity (Vodova 2012).

$$DTA = \frac{\text{deposits}}{\text{total assets}} \times 100$$

Bank deposits are categorised into transitory deposits which do not pay any interest to depositor and term deposits which are deposited for a stipulated period of time. Deposits should be one of the major sources of funding for banks and therefore increases bank liquidity. The higher the ratio, the higher the liquidity of a bank.

#### d) Explanatory/ independent variables

Explanatory variables were represented by gross domestic product, inflation, unemployment, bank size and return on equity. The variables and the expected signs are explained in table 1,

Table 1: Explanatory variables description

Variable	Explanation	Source	Expected signs (CTA & DTA)	Expected signs (LTA & LTD)
Bsize	Bank size, calculated as the natural logarithm of bank total assets.	RBZ reports	+/-	+/-
GDP	Growth rate of gross domestic product	World Bank	+	- \
INF	Inflation measures the volatility in consolidated consumer price index	World Bank	-	+

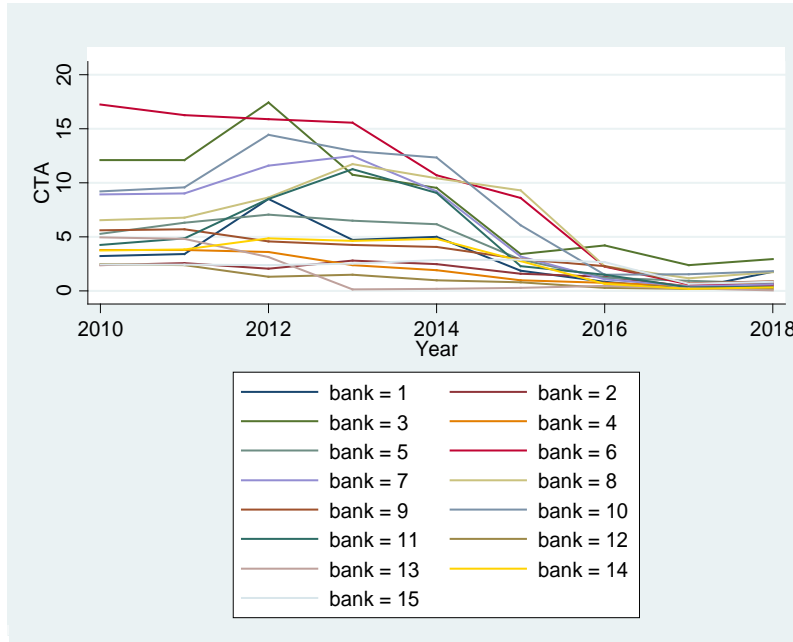
UNMP	The rate of unemployment in the economy	World Bank	-	+
REALINT	Interest rate adjusted for inflation	World Bank	-	+
LENDINT	Interest rate on loans:	World Bank	-	+

Source: author's processing

#### IV. DATA ANALYSIS

Panel data exploration in fig 2 confirms a sharp decline in the proportion of cash to total assets during the period 2016 and 2018. This is the period when local currency bond notes and coins were introduced. A higher value of cash to total assets ratio represents

higher liquidity. The graph also confirms a decrease of bank liquidity from years 2014 to 2018. Foreign-owned banks had the highest level of cash to total assets during the period 2010 – 2014 which was the foreign currency regime, while the savings bank (6) maintained a steady proportion of cash to total assets during the entire period.



Source: author's processing

Figure 2: Cash to total assets ratio

Figure 3 below, loans to total assets ratio trend shows that banks continued to lend during the entire period regardless of the change in operating conditions.

To continue lending banks could easily change their risk appetite and lend to less risky sectors. However, there was a slight decline in the years 2017 and 2018.

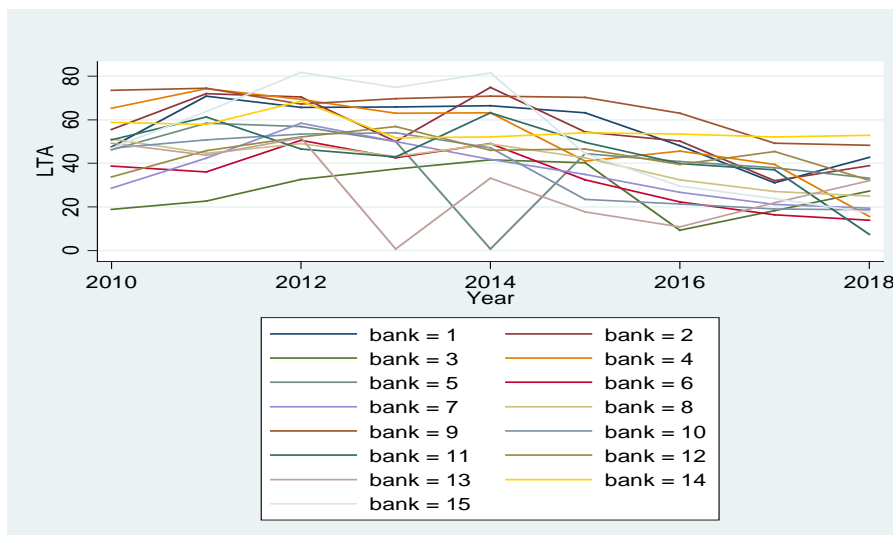
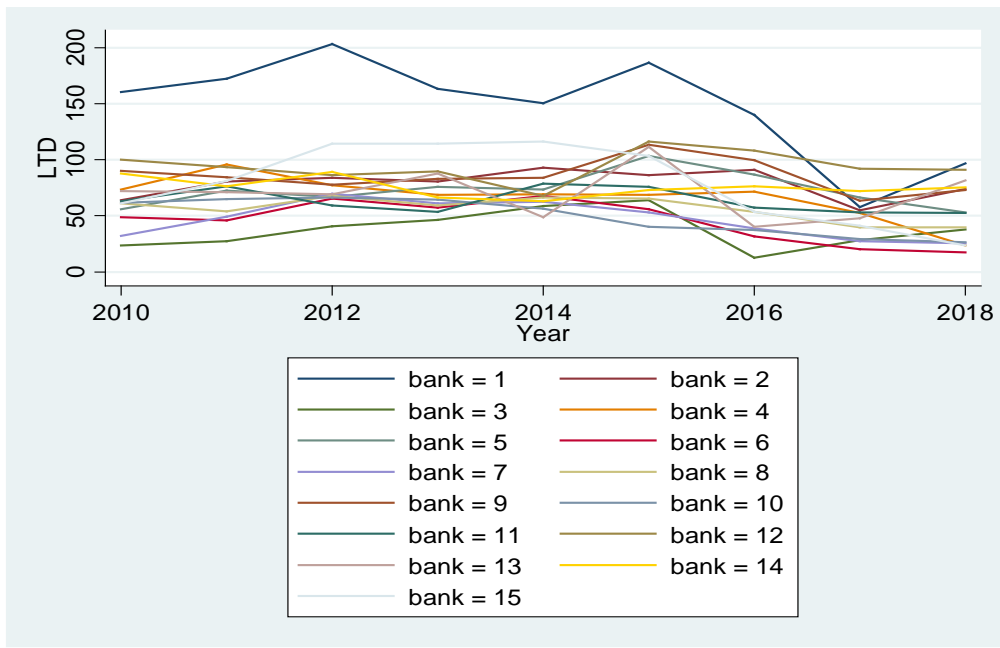


Figure 3: Loans to total assets ratio

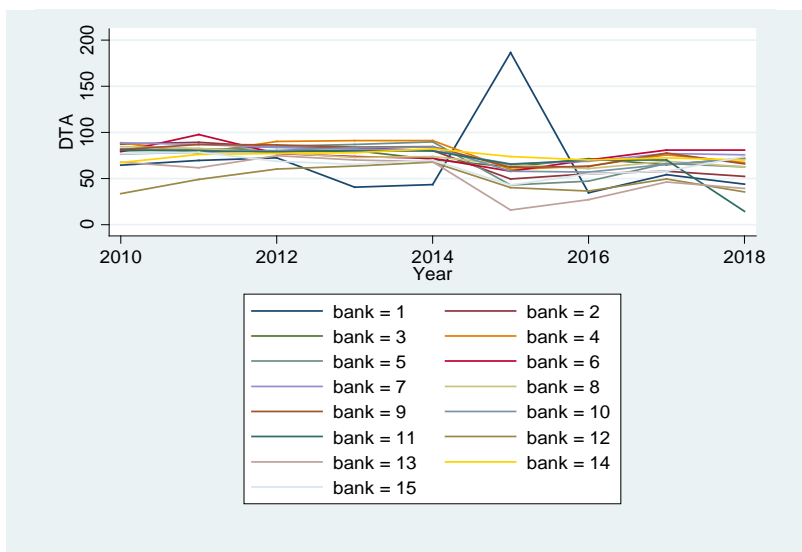


Source: author's processing

Figure 4: Loan to total deposits ratio

Banks continued to square off their net position of bank assets and liabilities. However, the proportion of loans to deposits increased in the years 2014 and 2015 for most banks. The ratio is a measure of illiquidity. The higher the ratio, the lower the liquidity. The trend in figure 4 shows that bank liquidity declined during the period 2015 and 2018. The increase in the ratio was caused by a decline in bank deposits or an increase in loans. The Zimbabwean economy is agro-based, therefore the country's agricultural bank, funded by government had the highest proportion of loans to deposit ratio during the entire period.

Generally, the proportion of deposits to total assets remained steady during the entire period. As reflected in figure 5; a higher value of this ratio represents a higher liquidity. It is evident that bank liquidity remained fairly low during the entire period. Through financial technology and innovations, banks can expand and grow their deposit base. The country's economy is highly in-formalised and the deposits that pass through the formal sector are transitory in nature. Therefore, an improved macroeconomic environment deemed temporary will not improve the deposit base of banks. Deposits are a function of customer confidence in the financial sector.



Source: author's processing

Figure 5: Deposits to total assets ratio

### V. REGRESSION RESULTS

Panel data is a dataset in which the behaviour of entities in this case banks,, are observed over time and this data is usually analysed by fixed effects or random-effects model depending on whether the unobserved individual effect, embodies elements that

are correlated with the regressors in the model. A correlation matrix represented in table 2 established that independent variables were not correlated with the majority of variables having less than 0.5 correlation index.

Table 2: Correlation matrix

	Lendint	ltd	cta	lta	dta	bsize	gdp	inf	unempr	ealint
ltd	1.0000									
cta	-0.1214	1.0000								
lta	0.4134	0.1203	1.0000							
dta	-0.0687	0.3554	0.3045	1.0000						
bsize	-0.4178	-0.0790	-0.2738	0.0956	1.0000					
gdp	0.0398	0.3091	0.2605	0.2616	-0.3048	1.0000				
inf	-0.2018	-0.2268	-0.2810	-0.1501	0.2860	0.0589	1.0000			
unemp	0.2902	0.4006	0.3663	0.1532	-0.2580	0.1494	-0.0629	1.0000		
realint	0.2517	0.3467	0.3975	0.2346	-0.3911	0.2615	-0.4892	0.2883	1.0000	
lendint	0.2170	0.5390	0.4854	0.3839	-0.4583	0.4067	-0.2763	0.4324	0.4773	1.0000

A Hausman test was used to test for multicollinearity among the independent variables and to decide the appropriate model between fixed or random-effects model. The null hypothesis for the Hausman test is that the preferred model is random-effects vs. the alternative the fixed effects. Hausman tests whether the unique errors (*ui*) are correlated with the regressors. The null hypothesis was that the unique errors were not correlated. Hausmantest p-value for all models were above 0.05. Therefore, the author failed to reject the null hypothesis hence the random-effects model was the most appropriate model (see appendices).

The Breusch-Pagan Lagrange multiplier test was conducted to decide between a random-effects model and a simple ordinary least squares regression. The null hypothesis for the Breusch-Pagan Lagrange multiplier test is that variances across entities are zero. This means no significant difference across units, hence no panel effect (Torres Oscar, 2007). The chi2 results for all models expect for DTA (0.044) model was 0.0001, thus less than 0.05. Therefore, the null hypothesis was rejected since there was a significant difference across units that represented the panel effect of data. The author chose random effects regression over the ordinary least squares regression model for all models.

Table 3: Breusch and Pagan Lagrangian multiplier test for random effects

<p>CTA Breusch and Pagan Lagrangian multiplier test for random effects</p> $cta[bank,t] = Xb + u[bank] + e[bank,t]$ <p>Estimated results:</p> <table border="1"> <thead> <tr> <th></th> <th>Var</th> <th>sd = sqrt(Var)</th> </tr> </thead> <tbody> <tr> <td>cta  </td> <td>18.33863</td> <td>4.282363</td> </tr> <tr> <td>e  </td> <td>5.723499</td> <td>2.392384</td> </tr> <tr> <td>u  </td> <td>6.643395</td> <td>2.577478</td> </tr> </tbody> </table> <p>Test: Var(u) = 0 chi2(1) = 141.53 Prob &gt; chi2 = 0.0000</p>		Var	sd = sqrt(Var)	cta	18.33863	4.282363	e	5.723499	2.392384	u	6.643395	2.577478	<p>LTA Breusch and Pagan Lagrangian multiplier test for random effects</p> $lta[bank,t] = Xb + u[bank] + e[bank,t]$ <p>Estimated results:</p> <table border="1"> <thead> <tr> <th></th> <th>Var</th> <th>sd = sqrt(Var)</th> </tr> </thead> <tbody> <tr> <td>lta  </td> <td>312.5141</td> <td>17.67807</td> </tr> <tr> <td>e  </td> <td>123.7172</td> <td>11.12282</td> </tr> <tr> <td>u  </td> <td>118.8743</td> <td>10.90295</td> </tr> </tbody> </table> <p>Test: Var(u) = 0 chi2(1) = 115.63 Prob &gt; chi2 = 0.0000</p>		Var	sd = sqrt(Var)	lta	312.5141	17.67807	e	123.7172	11.12282	u	118.8743	10.90295
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lta																									
e																									
u																									

dta	352.1084	18.76455	lta	312.5141	17.67807
e	254.4204	15.95056	e	123.7172	11.12282
u	5.458666	2.336379	u	118.8743	10.90295
Test: Var(u) =	0		Test: Var(u) =	0	
chi2(1) =	110.53		chi2(1) =	115.63	
Prob > chi2 =	0.4413		Prob > chi2 =	0.0000	

## VI. REGRESSION RESULTS

### a) Cost to total assets ratio model

The explanatory power of this model was quite fair, with a probability chi-square of 0.0001. Gross domestic product, inflation and real interest rate had a negative significant relationship with bank liquidity. A positive relationship was expected for GDP. However, the negative relationship from regression results reflects the high demand for loans by borrowers during periods of economic expansion to fund investments and projects (Vodova, 2014). As expected, inflation had a significant negative relationship with bank liquidity,

signalling that inflation deteriorates the overall economic environment and thereby lowering bank liquidity. Surprisingly, unemployment had a positive relationship with bank liquidity. In Zimbabwe, this could be a reflection of most banks issuing salary-based loans and shunning of SME loans. Therefore the lesser the formally employed people, the lesser the number of retail loans. Higher lending interest rates had a tendency to discourage unnecessary borrowing thereby a positive significant relationship between lending interest rates and bank liquidity. The effects on bank size was insignificant.

Table 4: Cash to total assets ratio model

R-sq: within = 0.5716  
 between = 0.0883  
 overall = 0.3877

Prob > chi2 = 0.0000

	Coef.	Robust Std. Err.	z	P> z
ctta				
bsize	1.15312	.807228	1.43	0.153
gdp	-.1945458	.0748522	-2.60	0.009
inf	-.0788035	.0319764	-2.46	0.014
unemp	.7389438	.3645302	2.03	0.043
realint	-.1400158	.0535218	-2.62	0.009
lendint	1.971494	.4318708	4.57	0.000
_cons	-38.23019	18.94197	-2.02	0.044

### b) Deposit to total assets model

Liquidity was also measured by deposits to total assets ratio as reflected in table 5. The higher the ratio of deposit to total assets, the higher the liquidity of a bank. Bank size and lending interest rates had a positive significant relationship with bank liquidity while gross domestic product, unemployment and real interest rates had negative significant relationships as shown in table 5. Both models where liquidity was measured cash to total assets ratio and deposit to total assets ratio, established that gross domestic product hurt bank liquidity. During periods of economic expansion, banks tend to lend more, thereby holding less liquidity. There is no consensus in the literature concerning the relationship between bank size and liquidity, therefore, the positive relationship between bank size and bank

liquidity in Zimbabwe is a reflection of the dominance of the big five banks in deposit market share and loan market share. Large banks therefore, held more liquidity than smaller banks.

The Zimbabwean economy is highly informalised, with most of the people employed in the informal sector, which rarely banks its money but promotes the circulation of hard currency outside the formal sector. This explains the significant negative relationship between unemployment and bank liquidity. A thriving black market for foreign currency has become a hide-out for most unemployed people. These black market dealers offer higher rates for foreign currency compared to formal market rate, thereby reducing bank foreign currency inflows and bank liquidity.

Table 5: Deposits to total assets model

```

-----
R-sq:  within = 0.2047
       between = 0.5997
       overall = 0.2780
Prob > chi2    = 0.0000
-----

```

dta	Coef.	Robust Std. Err.	z	P> z
bsize	6.869611	3.015848	2.28	0.023
gdp	-1.149363	.2276696	-5.05	0.000
inf	.0225772	.1778906	0.13	0.899
unemp	-11.87631	2.725202	-4.36	0.000
realint	-.0767964	.3959855	-0.19	0.846
lendint	9.312248	1.808493	5.15	0.000
_cons	-82.38374	66.45098	-1.24	0.215

The explanatory power for loans to total assets model and loans to deposit ratio model was quite low and most of the variables were insignificant. These two models had loans to total deposits and loans to total assets as measures of liquidity and are measures of illiquidity therefore, their regression signs are interpreted in reverse.

There is only one significant variable for the loan to total assets model. This lending interest rate had a negative significant relationship with bank liquidity. That is, the higher the lending interest rate, the lower the bank liquidity as the bank lends more for profit.

Table 6: Loan to total assets

```

-----
R-sq:  within = 0.4644
       between = 0.0002
       overall = 0.2842
Prob > chi2    = 0.0000
-----

```

lta	Coef.	Robust Std. Err.	z	P> z
bsize	-1.986706	2.565788	-0.77	0.439
gdp	-.6882942	.4509921	-1.53	0.127
inf	-.0397532	.2934422	-0.14	0.892
unemp	2.343802	3.075726	0.76	0.446
realint	.0967871	.5175608	0.19	0.852
lendint	5.044383	1.267794	3.98	0.000
_cons	28.91118	53.46368	0.54	0.589

Unemployment was significant at 90% confidence level. The higher the unemployment in the economy, the higher the illiquidity of banks since the

pooling of depositors funds works effectively when there are more ordinary people with disposable income.

Table 7: Loans to deposits ratio

R-sq: within = 0.3264  
 between = 0.2062  
 overall = 0.1834

Prob > chi2 = 0.0017

ltd	Coef.	Robust Std. Err.	z	P> z
bsize	-4.180885	2.62656	-1.59	0.111
gdp	-.4726743	.5843468	-0.81	0.419
inf	-.168063	.2510467	-0.67	0.503
unemp	18.74367	7.271476	2.58	0.010
realint	.277995	.380588	0.73	0.465
lendint	1.102237	2.179823	0.51	0.613
_cons	49.43021	53.14222	0.93	0.352

## VII. CONCLUSION

The aim of this study was to analyse the effect of macro-economic factors like inflation, gross domestic product, real interest rate, lending interest rate, unemployment on bank liquidity. The research established that gross domestic product, real interest rate and inflation had a negative significant relationship with bank liquidity in Zimbabwe while bank size; a bank-specific variable, had a positive relationship with liquidity. Banks therefore held low proportions of cash to their total assets. Policymakers should therefore improve the availability of cash in banks to improve financial system liquidity and stability during distressed economic environments.

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## APPENDIX

### CTA Hausman test

#### CTA Hausman test

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt (diag (V_b-V_B))
	fixed	random	Difference	S.E.
bsize	1.17526	1.15312	.0221402	.2355061
gdp	-.1946402	-.1945458	-.0000944	.0079071
inf	-.0790745	-.0788035	-.000271	.0057199
unemp	.7405269	.7389438	.0015831	.0921714
realint	-.1400185	-.1400158	-2.69e-06	.0084785
lendint	1.975834	1.971494	.00434	.0547256

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

$$\begin{aligned}
 \text{chi2}(6) &= (b-B)' [(V_b-V_B)^{-1}] (b-B) \\
 &= 0.01 \\
 \text{Prob}>\text{chi2} &= 1.0000
 \end{aligned}$$

CTA Regression

```

Random-effects GLS regression                Number of obs   =   135
Group variable: bank                        Number of groups =   15

R-sq:  within = 0.5716                      Obs per group:  min =    9
        between = 0.0883                      avg   =   9.0
        overall = 0.3877                      max   =    9

Random effects u_i ~ Gaussian                Wald chi2(6)    =   77.69
corr(u_i, X) = 0 (assumed)                  Prob > chi2     =   0.0000
    
```

(Std. Err. adjusted for 15 clusters in bank)

cta	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
bsize	1.15312	.807228	1.43	0.153	-.4290176	2.735258
gdp	-.1945458	.0748522	-2.60	0.009	-.3412535	-.0478382
inf	-.0788035	.0319764	-2.46	0.014	-.1414762	-.0161309
unemp	.7389438	.3645302	2.03	0.043	.0244776	1.45341
realint	-.1400158	.0535218	-2.62	0.009	-.2449165	-.035115
lendint	1.971494	.4318708	4.57	0.000	1.125043	2.817945
_cons	-38.23019	18.94197	-2.02	0.044	-75.35577	-1.104611
sigma_u	2.5774784					
sigma_e	2.3923836					
rho	.53719188	(fraction of variance due to u_i)				

LTA Hausman Test

	---- Coefficients ----			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
bsize	-2.705738	-1.986706	-.7190316	1.161674
gdp	-.6852283	-.6882942	.0030659	.0290649
inf	-.0309522	-.0397532	.0088011	.0229704
unemp	2.292389	2.343802	-.051413	.3411732
realint	.0968745	.0967871	.0000874	.0309603
lendint	4.903435	5.044383	-.1409479	.2517367

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

$$\begin{aligned}
 \text{chi2}(6) &= (b-B)' [(V_b-V_B)^{-1}] (b-B) \\
 &= 0.38 \\
 \text{Prob}>\text{chi2} &= 0.9990
 \end{aligned}$$

LTA Regression

```

Random-effects GLS regression           Number of obs   =    135
Group variable: bank                   Number of groups =    15

R-sq:  within = 0.4644                  Obs per group:  min =     9
      between = 0.0002                  avg   =    9.0
      overall  = 0.2842                  max   =     9

Random effects u_i ~ Gaussian           Wald chi2(6)     =    64.82
corr(u_i, X) = 0 (assumed)              Prob > chi2      =    0.0000
    
```

(Std. Err. adjusted for 15 clusters in bank)

lta	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
bsize	-1.986706	2.565788	-0.77	0.439	-7.015559	3.042146
gdp	-.6882942	.4509921	-1.53	0.127	-1.572222	.195634
inf	-.0397532	.2934422	-0.14	0.892	-.6148893	.5353828
unemp	2.343802	3.075726	0.76	0.446	-3.68451	8.372114
realint	.0967871	.5175608	0.19	0.852	-.9176133	1.111188
lendint	5.044383	1.267794	3.98	0.000	2.559553	7.529214
_cons	28.91118	53.46368	0.54	0.589	-75.87571	133.6981
sigma_u	10.902948					
sigma_e	11.122822					
rho	.49001841	(fraction of variance due to u_i)				

DTA Hausman Test

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	random	Difference	S.E.
bsize	1.061681	6.869611	-5.80793	2.827396
gdp	-1.124598	-1.149363	.0247648	.
inf	.0936672	.0225772	.0710901	.
unemp	-12.2916	-11.87631	-.4152848	.
realint	-.0760902	-.0767964	.0007062	.
lendint	8.17375	9.312248	-1.138497	.4289322

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(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        = 4.22
Prob>chi2 = 0.6470
(V_b-V_B is not positive definite)
    
```

DTA Regression

```

Random-effects GLS regression           Number of obs   =   135
Group variable: bank                   Number of groups =   15

R-sq:  within = 0.2047                  Obs per group:  min =    9
      between = 0.5997                    avg   =   9.0
      overall  = 0.2780                    max   =    9

Random effects u_i ~ Gaussian          Wald chi2(6)    =   61.92
corr(u_i, X) = 0 (assumed)             Prob > chi2    =   0.0000
    
```

(Std. Err. adjusted for 15 clusters in bank)

dta	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
bsize	6.869611	3.015848	2.28	0.023	.958657	12.78057
gdp	-1.149363	.2276696	-5.05	0.000	-1.595587	-.7031387
inf	.0225772	.1778906	0.13	0.899	-.3260821	.3712364
unemp	-11.87631	2.725202	-4.36	0.000	-17.21761	-6.535012
realint	-.0767964	.3959855	-0.19	0.846	-.8529138	.699321
lendint	9.312248	1.808493	5.15	0.000	5.767666	12.85683
_cons	-82.38374	66.45098	-1.24	0.215	-212.6253	47.85779
sigma_u	2.3363789					
sigma_e	15.950561					
rho	.02100464	(fraction of variance due to u_i)				

LTD Hausman Test

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	random	Difference	S.E.
bsize	-2.105296	-4.180885	2.07559	1.373566
gdp	-.4815245	-.4726743	-.0088502	.
inf	-.1934686	-.168063	-.0254056	.
unemp	18.89208	18.74367	.148411	.
realint	.2777426	.277995	-.0002524	.
lendint	1.509104	1.102237	.4068667	.1361363

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

$$\begin{aligned}
 \text{chi2}(6) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\
 &= 2.28 \\
 \text{Prob}>\text{chi2} &= 0.8919 \\
 &(\text{V}_b\text{-V}_B \text{ is not positive definite})
 \end{aligned}$$

## LTD Regression

```

Random-effects GLS regression           Number of obs   =    135
Group variable: bank                   Number of groups =    15

R-sq:  within = 0.3264                 Obs per group:  min =    9
      between = 0.2062                   avg =           9.0
      overall  = 0.1834                   max =           9

Random effects u_i ~ Gaussian          Wald chi2(6)    =    21.25
corr(u_i, X) = 0 (assumed)            Prob > chi2     =    0.0017

```

(Std. Err. adjusted for 15 clusters in bank)

	ltd	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]
	bsize	-4.180885	2.62656	-1.59	0.111	-9.328849 .9670786
	gdp	-.4726743	.5843468	-0.81	0.419	-1.617973 .6726244
	inf	-.168063	.2510467	-0.67	0.503	-.6601054 .3239795
	unemp	18.74367	7.271476	2.58	0.010	4.491842 32.9955
	realint	.277995	.380588	0.73	0.465	-.4679438 1.023934
	lendint	1.102237	2.179823	0.51	0.613	-3.170137 5.374612
	_cons	49.43021	53.14222	0.93	0.352	-54.72662 153.587
	sigma_u	23.878778				
	sigma_e	17.439517				
	rho	.65214989	(fraction of variance due to u_i)			



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# Commercial Banking Stability Determinants in European Countries

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*Doctor of Finance University*

**Abstract-** The purpose of this paper was to investigate the determinants of banking stability in European countries. This study used a sample of 280 commercial banks in 26 European Banks from 2002-2019. The bank stability most common measure is the insolvency risk (Z-Score). We used the GMM estimator technique described by Arellano and Bover (1995) to estimate the impact of bank specific and macroeconomic variables on European bank stability across different European regions by subdividing the original sample into five subsamples.

We find significant differences in the determinants of stability between banks from East, South, North, South and Central European countries, respectively. We show that the impact of bank specific factors on bank stability differs across different European regions.

**Keywords:** bank stability, financial crisis, GMM estimation.

**GJMBR-C Classification:** JEL Code: G15, G21, G2, G28



COMMERCIAL BANKING STABILITY DETERMINANTS IN EUROPEAN COUNTRIES

*Strictly as per the compliance and regulations of:*



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**Abstract-** The purpose of this paper was to investigate the determinants of banking stability in European countries. This study used a sample of 280 commercial banks in 26 European Banks from 2002-2019. The bank stability most common measure is the insolvency risk (Z-Score). We used the GMM estimator technique described by Arellano and Bover (1995) to estimate the impact of bank specific and macroeconomic variables on European bank stability across different European regions by subdividing the original sample into five sub-samples.

We find significant differences in the determinants of stability between banks from East, South, North, South and Central European countries, respectively. We show that the impact of bank specific factors on bank stability differs across different European regions. We showed that the macroeconomic variables, especially the real GDP growth rate and inflation rate, have a strong effect on the bank stability. Therefore, an increase of the GDP growth rate systematically generates an increase of bank stability.

**Keywords:** bank stability, financial crisis, GMM estimation.

## I. INTRODUCTION

During the past two decades, many countries have experienced significant episodes of systemic banking crises. The financial crises experienced in recent decades prompted efforts to develop models that could help identify the possible factors underlying the bank risk excess. Indeed, the global financial crisis of 2007–2008, followed by the European sovereign debt crisis late in 2009, provides a natural experiment that allows us to investigate the determinants of bank stability. Banking stability is defined as the absence of banking crises, achieved through the stability of all banks in the banking system or sector (Brunnermeier et al., 2009). In fact, the role and development of commercial banks has always attracted the attention of academic research. In fact, commercial banks are known to play an important role in the economic development of a country, and that an efficient and profitable banking system is a crucial condition for economic growth. In addition, the recent global financial crisis has emphasized the importance of an early identification of riskier banks, as this allows for solving the problems at a lower cost (Baselga-Pascual et al. 2015). Laeven and Levine (2009); Barillet et al. (2010);

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Ozili (2018) and Albaity et al. (2019) found that bank stability is closely tied to several microeconomic and macroeconomic factors. Furthermore, Salas and Saurina (2002) combined macroeconomic as well as microeconomic variables to explain nonperforming loans of Spanish Commercial and Savings banks from 1985 to 1997. They found that bank-specific factors may serve as early warning indicators for future changes in bank stability.

According to this study, various economic and institutional features differ amongst different European regions. In this paper, we investigated why commercial banks stability varies across these groups of countries and whether bank stability determinants depend on the bank specific characteristics and their macroeconomic environment. Our study sought to shed light on the determinants of bank stability and how the subdivision of the sample affected these determinants. The role of banks remains central in the financing of the economic activity in general, and in different segments of the market in particular (Athanasoglou et al. 2008). The banks' stability helps to predict financial crises because a profitable banking sector has a better ability to withstand negative shocks.

For this purpose, we used a sample of over 280 commercial banks from 26 European countries<sup>1</sup> over the time period spanning from 2002 to 2019. We analyzed which external and internal environmental factors that have an impact on bank stability and whether the determinants vary amongst banks operating in different regions of European countries. We investigated the effect of bank-specific (e.g., capital ratio, bank size) and macroeconomic determinants (e.g. Inflation and GDP growth) on bank stability. The global sample was divided into five sub-samples (Eastern Europe; Western Europe; Northern Europe; Southern Europe and Central Europe). By separately considering these groups, we were able to analyze how the relevant determinants affect bank stability and how these effects differ between the different regions categories. Through this paper, we wanted to investigate the determinants of bank stability and whether the various economic and institutional features across groups of European

<sup>1</sup> The sample includes 280 listed Commercial banks from Germany, Austria, Belgium, Bulgaria, Cyprus, Denmark, Spain, Estonia, France, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Poland, Portugal, Czech Republic, Romania, United Kingdom, Slovakia, Slovenia, Sweden and Finland.

countries have an impact on these determinants. By applying a dynamic GMM technique, we were able to account for stability persistence and potential endogeneity problems. The existing literature on bank stability is quite large and provides a comprehensive examination of the effects of bank-specific and macroeconomic determinants on bank stability.

Most of the papers, however, study this topic within a single-country setup or a small group of countries from either developed or developing countries. A wide range of results from these studies strongly suggests that microeconomic and macroeconomic factors have an important impact on bank stability. Only a few papers, however, have dealt with bank stability for a larger sample of countries and opted to sample subdivision.

This research study is thought to contribute to the existing literature in important ways. First, to the best of our knowledge, this is one of the pioneering studies for European countries to examine the bank stability determinants between different European sub-samples. Most studies that have focused on this aspect are primarily based on US economy (Shrieves and Dahl, 1992) or on other developed countries (Heid et al. 2004; Rime, 2001 and Stolz, 2007) and emerging markets (Ghosh et al. 2003 and Godlewski, 2005). Second, it is the first paper among empirical banking studies to combine bank-specific and macroeconomic variables to test their impact on European bank stability. Third, to control for unobserved heterogeneity as well as endogeneity issues, we relied on the generalized method of moments (GMM) estimators, also referred to as the difference-GMM and system-GMM estimators, developed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) for dynamic panel data models.

This dynamic panel GMM technique aims to address problems of endogeneity, heteroscedasticity, autocorrelation (Doytch and Uctum, 2011) and to monitor individual and time specific effects. The use of the dynamic approach allows for the persistence of stability estimation.

The remainder of the paper is structured as follows. Section 2 surveyed the relevant literature. Section 3 detailed our model, as well as the dependent and independent variables used in our analyses. Section 4 described and discussed the results of our empirical analysis and Section 5 provided the relevant conclusions drawn from this study.

## II. LITERATURE REVIEW

Undoubtedly, bank stability has been extensively studied. The respective empirical studies have focused their analyses either on cross-country evidence or on the banking system of individual countries. According to the related literature, (De Nicolo,

2000; Konishi and Yasuda (2004); Cihak and Hesse, 2006; Machler et al., 2007; Garcia-Marco and Robles-Fernandez (2008); Laeven and Levine, 2009; Houston et al., 2010; Turk Ariss (2010); Angkinand Wihlborg (2010); Forssbaeck (2011); Agoraki et al. (2011); Delis et al. (2012); Beck et al., 2013; Lepetit and Strobel, 2013; Fernández et al., 2016 and Ahamed and Mallick (2017); Kabir and Worthington (2017); Ozili, 2018 and Albaity et al. (2019)), bank stability has always been measured by z-score. The employed measure is based on Roy (1952) and is expressed as a function of internal and external determinants. The internal determinants include bank-specific variables whereas the external ones reflect the environmental variables, that are generally expected to affect the stability of financial institutions. In most studies, variables such as bank size and capital ratio serve as internal determinants of banking stability (e. g., Bourke, 1989; Demircug-Kunt and Huizinga, 1999; Goddard et al. 2004; Pasiouras and Kosmidou, 2007; Javaid et al. 2011; Jokipii and Monnin, 2013; Boateng et al., 2015; Tan and Anchor, 2017 and Ozili, 2018). The external determinants of bank stability, as presented in the literature, include factors such as the inflation rate and GDP growth rate. Most studies (Athanasoglou et al. 2008; Demircug-Kunt and Huizinga, 1999; Jokipi and Monnin, 2013; Boateng et al., 2015 and Ozili, 2018) have shown a positive relationship between inflation, GDP growth and bank stability.

### a) *Specific banks factors*

In general, banks with high capital ratios are considered safer (than their counterparts). The conventional risk-return hypothesis would thus imply a negative relationship between the equity to assets ratio and bank stability. Furthermore, banks with higher equity-to-assets ratios normally have a reduced need for external funding, which has again a positive effect on their stability. Given that we have effects pointing in opposite directions, the overall effect of this variable is indeterminate from a theoretical point of view. Delis et al. (2011) argued that bank capitalization is negatively related to bank risk-taking. This finding seems to be intuitive since a higher equity capital, as a consequence of stricter capital requirements, implies a more prudent bank behavior. Low bank capitalization leads to an increase in bank risk taking bases on the moral hazard theory. Berger and De Young (1997) argued that bank managers increase their loan portfolio risk if banks are less capitalized. We referred to the capital ratio, the cost-to-income ratio and bank size as internal determinants of bank stability. In line with previous research of Athanasoglou et al. (2008) and Iannotta et al. (2007), among others, the ratio of equity to assets (capital ratio) was used as a measure of capital strength.

Bank size is often considered an important determinant of its stability. As in most studies in banking



(e.g., Athanasoglou et al.2008; Demirguc-Kunt and Huizinga, 1999), we used total assets of the bank as a proxy for its size. Larger banks are more likely to have economies of scale advantages than smaller banks. We thus expected a positive effect of size on bank stability, (Pasiouras and Kosmidou, 2007; Smirlock, 1985). However, Stiroh and Rumble (2006), Berger et al. (1987) and Pasiouras and Kosmidou (2007) have shown that banks that have become extremely large exhibit a negative relationship between size and stability due to bureaucratic and other size-related reasons. Accordingly, the overall effect needs to be investigated empirically.

b) *Macroeconomic factors*

The macroeconomic environment plays an important role in banking sector stability. We chose two macro variables. First, we used the real GDP growth rate where we expected a higher growth reflects better conditions for financial stability. However, in countries where credit and real economy cycles are highly correlated the opposite might occur.

Next, we used the inflation rate and assumed that price stability contributes to the stability of the banking sector. Furthermore, an important element of the macroeconomic analysis is the study of the link between business cycle fluctuations and a banking sector stability. Indeed, Männasoo and Mayes (2009) argued that during favorable macroeconomic conditions, the GDP growth and bank stability are significantly and negatively related. Bad economic conditions can worsen the quality of the loan portfolio generating credit losses, which eventually reduces a bank stability. Furthermore, banks stability might be procyclical because GDP growth also influences net interest income via the lending activity as demand for lending increases (decreases) in cyclical upswings (downswings). We thus expected a positive impact on a bank stability, according to the literature on the association between economic growth and financial sector stability (e.g., Demirguc-Kunt and Huizinga, 1999; Bikker and Hu, 2002; Athanasoglou et al. 2008; Albertazzi and Gambacorta, 2009; Checherita-Westphal

and Rother, 2012; Baum et al., 2013; Ghosh et al., 2013; Calderon and Schaeck, 2016).

The effect of inflation on bank stability depends on whether wages and other operating expenses increase at a faster rate than the inflation. Most studies (e.g., Bourke, 1989; Molyneux and Thornton, 1992) found a positive relationship between inflation and stability. However, if inflation is not anticipated and banks do not adjust their interest rates correctly, there is a possibility that costs may increase faster than revenues and hence affect bank stability adversely. Demirguc-Kunt and Detragiache (2005) showed that inflation is highly significant in increasing the probability of bank risk of developed and developing countries over the period running from 1980 to 1995 using a multivariate Logit model. Jimenez et al. (2008) found that a strict monetary policy is associated with a higher bank stability in the Spanish context. Ioannidou et al. (2009) found similar results using the monetary policy decision as an exogenous variable for the Bolivian banking industry.

III. DATA AND METHODOLOGY

This section identified the sources of our data, presented the data and described the regression model we used to investigate the effects of internal and external factors on bank stability.

a) *Data*

Our main data source for the bank-specific characteristics is the Fitch-IBCA Bank scope (BSC) database, which provides annual financial information on banks in 26 countries around the world.

The macroeconomic factors, namely inflation and GDP growth were collected from the IMF World Economic Outlook database. The Demirguc-Kunt et al. (2008) database was used for the deposit insurance variable. The most common bank stability measure is the insolvency risk (Z-Score).

b) *Methodology*

We empirically investigated the internal and external factors effects on bank stability using a dynamic linear model given by:

$$LogZscore_{i,t} = \beta_0 + \beta_1 LogZscore_{i,t-1} + \beta_2 H_{i,t} + \beta_3 I_t + \eta_i + v_{i,t} \forall i, t \tag{1}$$

Where  $Logzscore_{i,t}$  represents the stability of bank  $i$  at time  $t$ , with  $i = 1, \dots, N$ ,  $t = 1, \dots, T$ ,  $\beta_0$  is a constant term,  $\beta_1$  is the bank persistence coefficients for stability.  $H_{i,t}$  denotes the bank-specific explanatory variables;  $I_t$  denotes the macroeconomic explanatory variables;  $\eta_i$  represents the individual random effects and  $v_{i,t}$  denotes the error terms. As a consequence, we specified a dynamic model by including a lagged dependent variable within the regression, i.e.,  $Logzscore_{i,t-1}$  is the one-period lagged profitability

$$ZScore_{i,t} = (ROA_{i,t} + CAR_{i,t})/\sigma_i(ROA_{i,t}) \tag{2}$$

Where  $ROA_{i,t}$  represents the rate of return on assets of bank  $i$  at year  $t$ ;  $CAR_{i,t}$  represents the ratio of equity capital to total assets for the bank  $i$  at year  $t$ ;  $\sigma_i(ROA_{i,t})$  is the estimate of the standard deviation of the return on assets rate of bank  $i$  at year  $t$ . While several authors used the Z-Score variable as indicated above Laeven and Levine (2009), among others applied the natural logarithm of the Z-score as the insolvency bank risk (log Zscore). Roy (1952) and Boyd et al. (1993) argued that Z-score represents a measure of a bank's distance from insolvency, which is defined as a

situation in which losses exceed equity. A higher Z-Score level indicates that the bank is more stable. Following Roy (1952), Boyd et al. (1993) and Laeven and Levine (2009), we examined the impact of internal

and external factors on bank stability in terms of bank specific and macroeconomic variables. The variable definitions and the data sources are described in table (1).

*Table 1: Variables description and data sources*

This table presents different dependent and independent variables used in our estimations. The dependent variable (LogZscore) is used to capture bank stability. Bank specific variables are bank size and bank capitalization. Macroeconomic variables include inflation and GDP growth rate.

Variable		Descriptions	Sources
	Bank stability proxy		
	Log Zscore	It is defined as the inverse of the probability of insolvency and is equal to the return on assets plus the capital asset ratio divided by the standard deviation of asset returns. The z-score measures the distance from insolvency (Roy, 1952). We use the natural logarithm of the Z-score which is less skewed and follows the normal distribution. A higher z-score indicates that the bank is more stable	Bankscope
	Bank specific variables		
	LnTA	Bank size : The natural logarithm of total assets	Bankscope
	BC	Bank capitalization ratio (%) = Total equity divided by total assets	Bankscope
	Macroeconomic variables		
	INF	The inflation rate	World Development Indicators
	GDP	The GDP growth rate	

*Notes: Bank-level variables include bank capital and bank size. Macroeconomic variables include GDP growth rate and inflation rate. Domestic credit to private sector and real interest rate. The Bureau Van Dijk Bank scope data base is the main source of the financial statements. The macroeconomic data are obtained from WDI.*

We adopted a two-step dynamic panel data methodology as proposed by Arellano & Bond (1991); Blundell & Bond (1998). The GMM technique was used to address the issues of endogeneity, heteroscedasticity, autocorrelation in the data and to monitor individual and time specific effects. The number of lags was determined by Arellano–Bond autocorrelation test and test for over identification (Hansen, 1982). It is worth noting that the system GMM estimator also controls for unobserved heterogeneity and for the persistence of the dependent variable. Overall, this estimator has been found to yield consistent estimations of the parameters (see e.g., Delis and Kouretas, 2011). Given the focus of our study, we reported the estimation results for the full sample. In addition, we separately estimated the model for each of the five sub-samples as defined above. Finally, because the simultaneous inclusion of certain variables could raise concerns of multicollinearity, we computed several tests to make sure that multicollinearity issues do not affect our results.

The descriptive statistics on the different variables used in this analysis are reported in Table 2. It should be noted that the stability variables high standard deviations indicate the existence of substantial cross-sectional variation in the bank stability levels of the European commercial banks.

*c) Empirical results*

The bank stability determinants for the European sampled institutions were examined and then the different sub-panels were checked separately (Eastern Europe; Western Europe; Northern Europe; Southern Europe and Central Europe). Furthermore, the impact of bank specific and macroeconomic variables on European bank stability across different European regions was investigated by separating the full sample into five sub-samples. Table 2 reports the descriptive statistics for the variables used in our analyses. We report the mean and the standard deviation for the full sample, and for our five sub-samples.

Table 2: Descriptive statistics

Variable	Correlation	Full sample		Eastern Europe		Western Europe		Northern Europe		Southern Europe		Central Europe	
		Mean	Std.dev	Mean	Std.dev	Mean	Std.dev	Mean	Std.dev	Mean	Std.dev	Mean	Std.dev
LogZscore		2.574	1.019	2.129	0.781	1.812	2.022	1.892	1.248	2.847	1.111	2.125	0.568
Ln TA		7.614	1.134	6.119	2.116	7.325	1.523	6.159	1.714	7.432	1.548	8.456	1.369
BC		6.977	4.784	7.325	2.238	6.546	5.638	0.285	0.293	0.113	0.197	6.824	2.215
GDP		2.132	2.124	1.835	4.258	0.547	1.814	1.145	2.695	0.645	1.256	1.213	3.784
INF		1.795	1.823	0.625	1.877	1.194	1.017	2.136	3.281	1.109	1.456	2.122	1.695

Notes: Dependent variable is bank stability; LogZscore. Independent variables are bank size (LnTA); bank capitalization (BC); (GDP) growth rate and inflation rate (INF).

We thought it would be interesting to briefly highlight a few observations. The bank stability proxy high standard deviations suggest that there is a substantial cross-sectional variation in the bank stability level. As expected, there is a large heterogeneity across the country categories. The stability among banks tends to vary, which is explained by a higher homogeneity of institutions. The capitalization of banks also differs considerably between country categories. In fact, banks in East and West European countries are better capitalized than those in Northern and Southern Europe countries. These observations can be partly explained by regulatory interventions, which also differ between countries indifferent economic development stages. Finally, we considered the macroeconomic factors included as explanatory variables in our analyses. The inflation rates are on average higher in North and Central European countries. This is partly related to an often inflationary monetary policy and a less stable macroeconomic environment, in general.

Table 3 reports the regression results for our main stability measure. We provided separate estimations for five sub-sample categories. The first column of the table displays the results when the banks from all countries are simultaneously considered, whereas columns two through six show the estimation results by region. Our estimation results have stable coefficients. The Wald-test indicates fine goodness of fit for the estimated model and the Saran test shows no evidence of over-identifying restrictions. The equation indicates the existence of negative first-order autocorrelations. However, this does not imply that the

estimates are inconsistent. Inconsistency would be implied if there was a second-order auto-correlation (Arellano and Bond, 1991). The test value of the second-order autocorrelation (AR 2 errors), however, implies that the moment conditions of the model are valid. The significance of the coefficient on our lagged dependent variable across all models confirms the use of a dynamic model. We remarked that our stability measure reveals a high persistence degree proving the validity of our GMM model.

Table 7: GMM System Estimation Results

Variable	Full Sample	Eastern Europe	Western Europe	Northern Europe	Southern Europe	Central Europe
Logzscore <sub>(t-1)</sub>	0.652*** (0.000)	0.621*** (0.002)	0.589*** (0.007)	1.106*** (0.005)	0.639*** (0.007)	0.914*** (0.006)
Ln TA	0.024** (0.034)	0.124** (0.043)	0.056** (0.049)	0.821** (0.028)	-0.123** (0.046)	-0.064* (0.071)
BC	0.026*** (0.000)	0.214*** (0.000)	0.061*** (0.008)	-0.071*** (0.008)	-0.118*** (0.004)	-0.224*** (0.001)
GDP	0.015*** (0.005)	0.195*** (0.000)	0.012*** (0.002)	-0.087** (0.021)	0.047* (0.069)	0.113*** (0.002)
INF	-0.032** (0.030)	0.215 (0.524)	-0.054*** (0.004)	0.254** (0.019)	-0.071** (0.038)	-0.091* (0.064)
Constant	-0.324 (0.604)	-0.741** (0.059)	0.396 (0.417)	-1.196* (0.098)	0.346*** (0.009)	0.236** (0.049)
Sargan test	38.475 (0.825)	31.265 (0.698)	19.875 (0.073)	1.894 (0.896)	12.200 (0.641)	12.380 (0.930)
AR(1) test	-3.257 (0.079)	-1.692 (0.081)	-2.958 (0.023)	-1.431 (0.231)	-1.658 (0.081)	-1.514 (0.174)
AR(2) test	-0.678 (0.529)	1.214 (0.348)	-1.268 (0.623)	-0.765 (0.514)	-0.129 (0.748)	1.892 (0.635)

Notes: Dependent variable is bank stability; Log Zscore. Estimation method is the two-step GMM dynamic panel estimator. \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels, respectively. The null hypothesis of the Sargan test is that the instruments used are not correlated with residuals (over-identifying restrictions). The null hypothesis of the serial correlation test is that the errors exhibit no second-order serial correlation. Independent variables are bank size (LnTA), bank capitalization (FP), growth rate (GDP) and inflation rate.

The results for the determinants of our stability measure provide further insights that are worth emphasizing. The positive and significant coefficient of the size variable for the whole sample as for Eastern European, Western European and Northern European samples in our bank stability regressions confirms some empirical support for the economies of scale market-power hypothesis (Diamond, 1984). Larger banks might achieve efficiency gains that are reflected in higher earnings because they do not operate in very competitive markets. Therefore, the theoretical basis of the linkage between size and bank stability is mixed.

On the one hand, there are arguments in favor of a negative relationship between size and bank stability (see Saunders et al.1990). The existence of a negative relationship between size and risk is related to the justification for the existence of banks. The argument is the diversification by size. Indeed, larger banks of ten have a greater diversification capacity which implies a higher risk compared to smaller banks.

The capital ratio, which is defined as equity over total assets, has a positive and significant effect on bank stability for Eastern and Western Europe commercial

banks only. It is negatively related to bank stability for Northern, Southern and Central Europe banks. The negative coefficients show that bearing more capital has a negative impact on the bank stability. This observation reflects the fact that banks with relatively more equity are automatically less stable. As outlined above, the capital ratio is a measure of bank risk and may have an a priori ambiguous effect on bank stability. Indeed, better-capitalized banks are safer compared to those with lower capital ratios and may face lower costs of funding due to lower prospective bankruptcy costs. In concrete terms, an increase of the capital ratio by 1% leads to an increase of the bank stability of 0.026% for the whole sample. This result confirms the empirical evidence of Bourke (1989), Demircuc-Kunt and Huizinga (1999), as well as Berger and Bouwman (2013).

Considering the external factors related to the macroeconomic environment of the countries in which the banks are operating, we found that the inflation rate has a positive and significant effect on bank stability in East and North European countries. Bank management in these countries seems to forecast future inflation satisfactorily, which, in turn, implies that interest rates

have been appropriately adjusted to achieve a higher stability. Our results are consistent with the findings of Flaming et al. (2009); Olson and Zoie (2011); Ozili (2018) and Albaity et al. (2019). However, this result contradicts with Demirguç-Kunt and Detragiache (2005); Jimenez et al. (2008); Ioan nidouet al. (2009); Drakos et al. (2014) and Chen et al. (2015). They found that a higher inflation generates an increase of bank instability. The effect of GDP growth on bank stability is statistically significant and positive across different sub-samples which means that bank stability in these countries usually increases in prosperous economic times. This result is similar to that of Drakos et al. (2014) and Chen et al. (2015). Indeed, they argued that Drakos et al. (2014) showed that a higher real GDP growth rate leads to stable banks and greater returns and generates a decrease of bank failure.

Focusing on columns (2) and (3) related to Eastern and Western European banks, we achieved the same findings for the whole sample. We remarked a significant impact of macroeconomic variables on bank stability. This result can be explained by the emergence of financial crisis which influenced the banking stability and generated a high bank risk level of financial institutions in the world and especially in the European banking industry. The regression results for Central European banks are reported in column (6). We notice that the bank stability variable is negatively related to bank specific factors; however, it is positively related to the GDP growth rate. By subdividing the whole sample of commercial banks into five sub-samples, we remarked important differences in the bank stability behavior.

#### IV. CONCLUSION

Different determinants of the banks' stability have been investigated in the literature. While most of the papers focus on the individual banks and developed markets, only a few were achieved dealing with the banking sector stability in European commercial banks. Furthermore, banking stability around the world differs widely as commercial banks have to cope with different macroeconomic environments and different institutional realities. Applying the GMM estimator technique described by Arellano and Bover (1995) on a cross-country data set of commercial banks across 26 European countries over the period 2002 to 2019, this paper analyzed the main determinants of bank stability. We subdivided the whole sample of 280 banks across the 26 European countries cited above into five sub-samples (East, West, North, South and Central European countries) to show the stability determinants differences across different regions. We used the z-score for measuring the bank stability and reached sound findings. The results show that the bank capitalization influences the banks' stability.

Consequently, a positive relationship is noticeable meaning that a well-capitalized banking sector is also a stable one. Therefore, banks with a higher equity to assets ratio are relatively more stable. This result seems very interesting and of great importance, to in light of the current discussions concerning the capital adequacy ratios (Basel III). We also revealed remarkable results with respect to bank size. We pointed out that, bank size has negative and significant effects on bank stability.

Significant differences were noted in the determinants of stability between banks from East, South, North, South and Central European countries, respectively. We observed differences between different sub-samples with respect to significance, sign as well as of coefficients. We showed that the impact of bank specific factors on bank stability differs across different European regions. This may be explained by differences in bank regulation, size of the economy, institutional environment. However, we found the same relationship between bank stability, bank-specific and macroeconomic factors for the whole sample, for East and West European banks. Specifically, the estimation results indicate that the macroeconomic variables coefficients are fairly stable across different regions. We showed that the macroeconomic variables, especially the real GDP growth rate and inflation rate, have a strong effect on the bank stability (See, e.g. Laeven and Levine 2009; Barrell et al. 2010). Therefore, an increase in the GDP growth rate generates an increase in the bank stability.

Our results are relevant from several points of view. First, the variables included in our analyses confirm and complement findings from former studies on bank stability. Second, we provided evidence relying on contemporary data, including the latest financial crisis. Third, the analysis of a large sample of banks from 26 countries grouped into five sub-samples allowed us to better understand how the determinants of bank stability depend on a European country subdivision. Future research could focus on the impacts of the governmental and legal environment on bank stability. This issue will be addressed in a future work.

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# An Empirical Test of the Relationship between Exchange Rate, Interest Rate and Inflation in Five African Countries from 1980 to 2012

By Dr. Amachree, Queen Ori-Ibim

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**Abstract-** The study examines the empirical relationship between exchange rate, interest rate and inflation in the context of Sub - Sahara African countries using panel data over 1980-2012 periods. The estimated values of the pooled, fixed and random effects models reveal identical results that interest rate and inflation maintain a monotonous relationship with the exchange rate, though the relationship is insignificant for interest rate only in the random effect model based on 1% level of significance. However; the result of the Hausman Test shows that the random effect model is not appropriate rather, the fixed-effect model is preferred. Based, on the Johansen Fisher panel co integration approach, a long-run relationship is established among the specified variables. Finally, it was discovered that the interest rate is weakly exogenously determined in the selected-countries throughout the freely and managed floating exchange rate systems.

**Keywords:** *fixed effect; random effect; pooled data; panel cointegration; african countries.*

**GJMBR-C Classification:** *JEL Code: F31*



*Strictly as per the compliance and regulations of:*



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# An Empirical Test of the Relationship between Exchange Rate, Interest Rate and Inflation in Five African Countries from 1980 to 2012

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**Abstract-** The study examines the empirical relationship between exchange rate, interest rate and inflation in the context of Sub - Sahara African countries using panel data over 1980-2012 periods. The estimated values of the pooled, fixed and random effects models reveal identical results that interest rate and inflation maintain a monotonous relationship with the exchange rate, though the relationship is insignificant for interest rate only in the random effect model based on 1% level of significance. However; the result of the Hausman Test shows that the random effect model is not appropriate rather, the fixed-effect model is preferred. Based, on the Johansen Fisher panel co integration approach, a long-run relationship is established among the specified variables. Finally, it was discovered that the interest rate is weakly exogenously determined in the selected-countries throughout the freely and managed floating exchange rate systems.

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## 1. INTRODUCTION

The volatility of nature for prices is a major source of concern in all countries since the 1970s. The issue of a more serious nature in sub-Saharan African countries where inflation in foreign countries known as "imported inflation" is seen to be driving "domestic inflation", making policies to control inflation ineffective. Continuous devaluation of currency and inflation in the 1980s seems to suggest a correlation between the two variables. Kenya experienced a persistent increase in inflation from 1980 - 2012, the exchange rate depreciated in 2012 compared to 2011 and 2010, interest appreciated slightly in 2012 and 2011 compared to 2010. Inflation consistently increased in Nigeria, from 1980- 1991 creeping inflation, 1992 - 1994 walking inflation, 1995 - 1999 running inflation, 2000 - 2012 hyperinflation, the exchange rate depreciated in 2012 compared to 2011 likewise Interest rate. Botswana, the exchange rate depreciated slightly in 2012. Inflation 1980-1984 running inflation, 1985 - 2000 galloping inflation or hyperinflation i.e. inflation In Botswana persistently increased at a faster rate into hyperinflation which causes a continuous fall in the purchasing power of the Botswana National Currency - Pula. Egypt, the exchange rate appreciated slightly, inflation continued

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firmly from walking to hyperinflation and remained stubbornly, the interest rate increased at a creeping rate (IMF, country report 2012). Malawi, exchange rate continued to appreciate, inflation degenerates into hyperinflation (IMF database, 2012), interest rate increase at a creeping rate World Bank Database, 2012).

The connection between exchange rate, interest rate and inflation has long been a key focus of international economies--most standard theoretical models of exchange rates predict that exchange rate is determined by economic fundamentals, one of which is the interest rate differential! between home and abroad.

The modern exchange rate theories view exchange rate as a purely financial phenomenon, Friedman hypothesis stipulates that inflation is always and everywhere a monetary phenomenon and can be produced only by a more rapid increase in the quantity of money than output. The Neo-classical and their followers at the University of Chicago, inflation is fundamentally a monetary phenomenon. A high rate of inflation causes severe fluctuations in exchange rates. The Keynesian liquidity preference theory emphasis that rate of interest is purely a monetary phenomenon. When prices rise, the same unit of a currency can buy less. Central Banks use the interest rate to control the money supply and consequently, the inflation rate.

The relationship between exchange rate, Interest rate, and inflation has been ranging or perhaps inclusive issues for professionals /researchers since the advent of macroeconomic theory. A good number of authors have empirically and some cases theoretically examined these interrelationships over time and across Nations, but no conclusion has been reached on the effects of inflation on the exchange rate and interest rate. Therefore, diversity of the nature and duration of effects on this subject matter has attracted a lot of interest in the literature.

Evidence has shown in the study of Simon and Rajak (1999), even Lahari and He Hatrovashaska (2008) made a striking contribution to the relationship between the exchange rate and interest rate. According to them, a positive relationship exists between the exchange rate and interest rate. But Lahari and Hanatrovaska further affirmed that there was a non-monotonic relationship between changes in the level of the inflation rate and

changes in the exchange rate. Also, Furma and Stiglitz (1998) examined the effect of an increase in interest rate, inflation and some non-monetary factors on an exchange rate for developing countries and found that a high-interest rate induced appreciation of nominal exchange rate but this effect was more pronounced in low inflation countries than high inflation countries. But the study of Goldfajin and Baig (1998) reported the absence of strong co integration regarding the relationship between the interest rate and exchange rate.

In recent times, Gel and Ekinici (2006), Herwatz and Reimers (2005), Westerlund (2005), Ling, and Wafa (2010), Sathya, Sharma and Liu's study suggested a positive relationship between the interest rate and inflation. However, Summers (1983) had earlier rejected the Fisherian hypothesis that supports the long-run relationship between the interest rate and inflation. In the equal vein, the study of Hong and Phillips (2005) gave mixed results on the presence of co integration.

The absence of clear-cut empirical relationships between exchange rate and other macroeconomic variables are even more pronounced in Nigeria for example, Aigbonkhan (1991) and Omotor (2008) emphasized that inflation, exchange rate, money supply, government expenditure and real GDP are significantly related while Enoma (2011) concluded that exchange rate depreciation, money supply and real GDP are the prime determinant of inflation in Nigeria. Therefore, the discrepancies in these studies need to be further examined in the context of sub-Sahara African countries of which this study sets out to accomplish.

## II. REVIEW OF RELATED LITERATUR

Literature related to this study will be reviewed under the following subheadings, theoretical underpinning and the empirical basis of the study.

### a) *Theoretical Underpinning*

Purchasing power parity theory (PPP) propounded by David Ricardo in 1821, elaborated and brought back into use by the Swedish economist, Gustav Cassel. The PPP theory provides, the long-run framework for the monetary and asset market or portfolio balance approaches to exchange rate determination. The purchasing power parity theory has an absolute and relative version. The theory says that the equilibrium exchange rate between two currencies is equal to the ratio of the price levels she in two nations.

### b) *Absolute purchasing power parity theory*

Postulate that the equilibrium exchange rate between two currencies is equal to the ratio of the price levels in the two nations. It is misleading because it completely disregards the capital account, the existence of many non-traded goods, and it fans to take transportation cost or other obstruction to the free flow of international trade.

### c) *Relative purchasing power parity theory*

It postulates that the change in the exchange rate over some time should be proportional to the relative change in the price levels in the two nations over the same time.

The modern exchange rate theories are based on the monetary approach and the asset market or portfolio balance of payments that have been developed since the late 1960s. These theories view the exchange rate as a purely financial phenomenon, and they also seek to explain the great short-run volatility of exchange rate and their tendency to overshoot their long-run equilibrium level. These theories are different from the traditional exchange rate theories which are based on trade flows and help explain exchange rate movements only in the long-run.

### d) *Inflation*

It is a highly controversial term which has undergone modification since it was first defined by the neoclassical economists. The neo-classical economists defined inflation as a galloping rise in prices as a result of the excessive increase in the quantity of money. They regard inflation as destroying disease born out of lack of monetary control whose results undermined the rules of business, creating havoc in markets and financial ruin of even the prudent. It fundamentally a monetary phenomenon. But Keynes did not believe like the neo-classical, according to him, there being underemployment in the economy, an increase in money supply leads to an increase in aggregate demand, output and employment. Both Keynesians and monetarist believe that inflation is caused by increased in the aggregate demand (increase in the money supply).

### e) *Theories of interest Rate*

We have:

- i. The classical,
- ii. The loanable funds,
- iii. The Keynesian and
- iv. The modern theory of interest rate.

The Keynesian liquidity preference theory determines interest rate by the demand for and supply of money which is a stock theory. Its emphasis that the rate of interest is a purely monetary phenomenon. On the other hand, the loanable fund's theory is a flow theory that determines interest rate by the demand for and supply of loanable funds. Prof. Robertson criticized the loanable fund theory as a "common sense explanation" of the determination of the rate of interest. But this theory is also not free from certain defects.

According to the classical theory, the rate of interest is determined by the supply of and demand of capital the supply of capital is governed by time preference and the demand for capital by the expected-productivity of capital.

f) *Empirical Literature*

In Africa, both monetary and structural factors were considered as the root cause of inflation and exchange rate as carried by Chhibber et al. (1989) macroeconomic effects of devaluation in Zimbabwe a CGE analysis. Madesha Chidoko and Zivanomoyo (2012) looked into the empirical relationship between exchange rate and inflation in Zimbabwe during the period 1980 to 2007. Using the Granger causality test, estimated results reveal that both exchange rate and inflation have a long-run relationship. On the other hand, inflation and exchange rate are found to granger-cause each, other during the period under consideration. Hegerty (2012) carried out a study titled: Does high inflation lead to increased inflation uncertainty? Evidence from nine African countries, using monthly data beginning in January 1976 and end in early 2012.

The study proxies uncertainty for sub-Saharan Africa with exponential GRACH Models, before testing for relationships using Granger causality tests and impulse-response functions, inflation increases are shown to fuel uncertainty in all cases, while the reverse relationship holds for only half of the countries. Imimole and Enema (2011) examined the impact of exchange rate depreciation on inflation in Nigeria for the period 1986 - 2008, using an Auto-Regressive Distributed Lag (ARDL) cointegration procedure. The research found that exchange rate depreciation, money supply and real gross domestic product are the main determinants of inflation in Nigeria and that Naira depreciation is positive, and has a significant long-run effect on inflation in Nigeria. This implies that the exchange rate depreciation can bring about an increase in the inflation rate in Nigeria. However, Sowa and Kwakye (1993) claim that Chibber and Shafik (1992), emphasize monetary factors at the expense of supply factors in Gnana and conclude that the supply constraint (output) was the main force behind inflation. Goswami (2008) conducted a study on the relationship between exchange rate and Interest rate, the result reveals that there is a strong positive relationship between exchange rate and interest rate, confirming the findings of the study carried out by Simon and Razak (1999). Keminsky and Schumulkler (1998) studied the relationship between the interest rate and exchange rate in six Asian Countries, the result concludes that interest rate is not exogenously determined by the exchange rate. Adetiloye, Kehinde Adekunle (2010) study adopted techniques of correlation and find the significance of the relationship between the consumer price index and the exchange rate in Nigeria, using 1986 to 2007 data. They found out that there is a higher positive relationship between the ratio of Imports and the index than exist between the parallel and official rates. Lahlri and Hanatrovaska (2008) investigated the relationship between interest rate end exchange rate. Their findings revealed a strong positive relationship between the exchange rate and

interest rate. Kanas (2000) study on Colombia extended the works of Montiel (1989) and Dornbush, Fischer (1990) observed that exchange rates did not play an important role in explaining the variation in inflation in Colombia and that Inflation appeared to be primarily inertial concerning the exchange rate but largely determined by demand shocks.

Ndungu, (1993) estimated a six- variable VAR on money supply, domestic price level, exchange rate index, foreign price index, real output and the rate of interest. In an attempt to explain the inflation movement in Kenya, he observed that the rate of inflation and exchange rate explained each other. Canetti and Greene (1991), using vector auto regression analysis to separate the influence of money supply growth from exchange rate changes on prevailing and predicted rates of inflation in Africa, find that both exchange rate movements and monetary expansion affect consumer price changes in several sub-Sahara African Countries. In particular, the authors find a significant causal impact of exchange rates on prices in Sierra Leone, Tanzania and the Congo. Greene and Canetti (1991) evaluated the relative strength of exchange rate and monetary expansion in propagating inflation in ten African Countries, the results prove that the exchange rate explains the inflationary trend in these countries.

London (1989), examined on money supply and exchange rate, in the inflationary process of twenty-three African Countries. The application of cure monetarist model on supply, expected inflation and real income were significant determinants of inflation for the period between 1974 and 1985. The exchange rate was later Included as one of the explanatory variables in pure monetarist modal and the result shows that exchange rate movement had a remarkable influence on the inflationary process in the 1980s.

### III. METHOD OF STUDY AND DATA

a) *Model Specification*

The relationships between exchange rate and inflation using pane! data can be modelled based deed and random effect frameworks. The formal presupposes that the constant term varies cross-sectionally but is fixed overtime; the slope estimates are ail fixed both cross-sectionally and over time, interestingly, the later also ascertains the same reports, but the overt difference between the two models are in the context of the random-effect model, the constant terms in respect of each cross-sectional unit rise from a global intercept term and a random variable which in turn measures the random deviation of each cross-sectional unit constant term from the global intercept term. However, before specifying these models, let us look at the mathematical relationship between exchange rate and price changes (i.e. inflation) as specified by the purchasing power parity theory (PPP) of Ricardo (1821).

$$x_{cht} = \alpha_0 + \alpha_1 (p - p^*)t + \epsilon_t \dots \dots \dots (1)$$

Where:

Xch means the Exchange rate  
 p means the domestic price index  
 p\* means foreign price index

Therefore,  $p - p^*$  implies changes in prices which could induce inflation. Analogously, expression (1) can be restated as

$$x_{cht} = \alpha_0 + \alpha_1 \ln ft + \mu t \dots \dots \dots (2)$$

Aigbonkhan (1991) and Ornotor (2008) provided evidence in support of the influence of the exchange rate on the interest rate. Thus, in response to this, the underlying expression (2) can be expanded by including interest rate into it.

$$x_{cht} = b_0 + b_1 \ln ft + b_2 \ln it + z_t \dots \dots \dots (3)$$

A visual view reveals that equation (3) is a time series specification, but our interest is on panel data expressions. Hence, equation (3) is transformed into panel specification as follows:

$$x_{cht} = \lambda_0 + \lambda_1 \ln fit + \lambda_2 \ln it + \epsilon_{it} \dots \dots \dots (4)$$

Equation (4) is referred to as pooled data regression model. To derive the Fixed Effect Model (FEM), we can decompose the random term  $\epsilon_{it}$  into individual-specific effect and the remainder disturbance term. That is:

$$\epsilon_{it} = \mu_{it} + v_{it} \dots \dots \dots (5)$$

Where:

$\mu_{it}$  is the remainder disturbance term.

By substituting  $\mu_{it}$  and  $v_{it}$  in place of  $\epsilon_{it}$  in equation (4), the following specification can be derived:

$$x_{chit} = P_0 + P_1 \ln fit + P_2 \ln it + \mu_{it} + v_{it} \dots \dots \dots (6)$$

$\mu_{it}$  encapsulates all the variables that affect the exchange rate (xch) but remains constant over time.

The Fixed Effect Model (FEM) can be estimated using dummy variables or what is ordinarily called Least Squares Dummy Variables (LSDV) approach.

Thus:

$$x_{chit} = P_1 \ln fit + P_2 \ln it + \mu_1 \text{Dum}_1 + \mu_2 \text{Dum}_2 + \mu_3 \text{Dum}_3 + \mu_4 \text{Dum}_4 + \mu_5 \text{Dum}_5 + v_{it} \dots \dots \dots (7)$$

Where:

*Dum1 is a dummy variable for Kenya and it takes the value of 1 for all the observations of Kenya in the sample and zero value of otherwise.*

*Dum2 is a dummy variable for Nigeria and it takes the value of 1 for all the observations of Nigeria in the sample and zero value of otherwise.*

*Dum3 is a dummy variable for Botswana and it takes the value of 1 for all the observations of Botswana in the sample and zeroes otherwise.*

*Dum4 is a dummy variable for Egypt and it takes the value of 1 for all the observations of Egypt in the sample and zeroes otherwise.*

*Dum5 is a dummy variable for Malawi and it takes the value of 1 for all the observations of Malawi and zeroes otherwise.*

Bringing in the random effect case into our discussion, we can restate equation (4) to suit this purpose. Thus:

$$x_{chit} = C_0 + C_1 \ln fit + C_2 \ln it + W_{it} \dots \dots \dots (8)$$

Where:  $W_{it} = C_1 + v_{it}$

Thus:

$$x_{chit} = C_0 + C_1 \ln fit + C_2 \ln it + \epsilon_{it} + V_{it} \dots \dots \dots (9)$$

Where:

$\epsilon_{it}$  is the new cross-sectional error term.

$\nu_{it}$  is the individual observation error term.

The assumption here is  $e-t$  satisfy the ID conditions. Also, dummy variables are not required to capture the heterogeneity in the cross-sectional dimension.

b) *Data*

Inflation data in respect of the five countries is sourced from the IMF country report 2012. Exchange rates are obtained from the individual countries' Central

Banks Statistical Bulletins; while interest rates (lending rate) are collected from World Bank report 2012 for each of the five sub-Sahara African countries.

IV. DATA ANALYSIS

a) *Results*

The presentation and discussion of our findings followed sequentially, first, we present the results of the selected descriptive statistics for each economy and the aggregated economies as follows in Table 4.1.

Table 4.1: Results of the Descriptive Analysis

Currency	Shilling (Kenya)	Naira (Nigeria)	Pula (Botswana)	Pound (Egypt)	Pound (Malawi)
Mean	1.02	1.03	1.03	1.04	54.78
SD	0.10	0.13	0.13	0.09	66.55
Range	0.80 – 1.19	0.80 - 1.29	0.80 – 1.29	0.91 – 1.34	0.81 (249.11)
JB	0.87 (0.64)	1.10 (0.58)	0.84 (0.66)	29.99 (0.00) **	6.29 (0.04) *

Panel B: Annual Interest Rate for Kenya, Nigeria, Botswana, Egypt and Malawi

Country	Kenya	Nigeria	Botswana	Egypt	Malawi
Mean	18.65	17.62	13.40	14.68	29.94
SD	6.82	5.45	3.34	2.46	12.30
Range	10.60 – 36.20	8.4 – 31.70	7.70 -24.20	11.00 – 20.30	16.50 – 56.20
JB	8.12 (0.02) *	0.05 (0.98)	5.40 (0.07)	2.71 (0.26)	4.75 (0.09)

Panel C: Annual Inflation for Kenya, Nigeria, Botswana, Egypt and Malawi

Country	Kenya	Nigeria	Botswana	Egypt	Malawi
Mean	80.17	34.69	92.62	89.37	97.35
SD	69.15	39.61	72.95	70.46	117.46
Range	7.30	0.46	13.36	8.49	143
	(247.26)	(134.22)	(247.26)	(289.65)	(369.55)
JB	3.71 (0.16)	6.10 (0.05) *	3.89 (0.14)	6.05 (0.05) *	5.33 (0.07)

Panel D: Annual Exchange Rate, Interest Rate & Inflation for the aggregated Economies

Variable	Exchange Rate	Interest Rate	Inflation
Mean	11.78	18.86	78.84
SD	36.46	9.07	80.38
Range	0.80 (249.11)	7.70 (56.20)	0.46 (369)
JB	2081.78 (0.00) **	269.09 (0.00) **	52.68 (0.00) **

Source: Extracted from E-View Program Window (7)

The results in pane! A reveal the descriptive statistics of values of exchange rate series for 1980 to 2012 period. The mean values for exchange rate throughout the five countries manifest positive values.

This means that the exchange rates of these countries have, an increasing tendency. The standard deviation or volatility of the exchange rate appears to be less volatile in all the countries except Malawi where the series

deviate drastically from its mean value. Also, the spread of the series is widest in Malawi. It is equally shown that exchange rate is only normally distributed in Egypt and Malawi (see the JB Statistics and their correspondent pvs). Panel B shows the descriptive values of the interest rate for the specified countries. The results are analogous to those of panel A except that the series is only normally distributed in Kenya. Panel C centres on inflation and it is discovered that the series is only normally distributed in Nigeria and Egypt but more volatile and unstable in Malawi. Thus, Malawi is prone to inflationary spirals.

The results of the five economies are amazingly surprising as reported in panel C. The mean values of

the three variables have an increasing tendency since they are positive. The degree of volatility is less in case of interest rate but more in inflation almost approaching 100%. This reveals to us that the region under investigation is on the aggregate riddle with persistent upward changes in prices of goods and services; however, the specified variables are normally distributed over the studied period (1980-2012).

b) *Test for Maximum Lag Selection*

It is quite arbitrary to use any lag value in empirical work. Given this, we select our optimum lag length using the VAR lag order selection criteria and the results are presented in Table 4.2

Table 4.2: The Result of Lag Selection Criteria

Lag	LogL	LR	PPE	AIC	SC	HQ
0	-216.92740	NA	1333.488	15.70910	15.85104	15.75274
1	-114.40990	175.7443	1.684641	9.029280	9.600225*	9.203824*
2	-108.92890	6.221574	2.224383	9.280834	10.27979	9.586685
3	-94.05795	19.11976*	1.562734*	8.861282*	10.28864	9.297641
4	-85.75400	8.897083	1.874272	8.911000	10.76657	9.478267
5	-76.87057	7.614376	2.398889	8.919326	11.20311	9.617500

\*indicates log order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

PPE: Final prediction error

AIC: Akaike information criterion

SC: Schwartz information criterion

HQ: Hannan-Quinn information criterion

The results above give two conflicting positions. The AIC, LR and FPE select lag 3 while SC and HQ

prefer lag 2. However, our study employs SC and HQ selection.

c) *Test for Stationarity*

Table 4.3: Panel Data Unit Root Test based on ADF-Fisher and ADF-Chio z-Statistics

Series	ADF-Fisher ( $\chi^2$ )	ADF-Choi (z-stat)	Remarks
Xch (-1)	32.38 (0.00) *	-2.18 (0.01) *	Stationary
Int (-1)	24.02 (0.01) *	-2.87 (0.00) *	Stationary
Inf (-1)	28.81 (0.00) *	-2.19 (0.01) *	Stationary

Note: The figures in parenthesis are p-values & \* implies significant

Source: Extracted from E-view program window (7).

The probability values for both ADF-Fisher and ADF-Choi statistics in respect of the specified series are all less than 5% as revealed in Table 4.3. Therefore, the null hypothesis of a unit root in the series of exchange, interest rate and inflation is rejected at first deference.

This means that the series is 1(1) complaint anticipating a cointegration test. Here, Johansen Fisher Panel cointegration test under the assumption of intercept no trend is adopted. The test results are reported in Table 4.4

Table 4.4: The Results of Johansen Fisher panel Cointegration Test

Hypothesized No of [(CE(s)]	Fisher Stat (based on trace test)	Fisher Stat (based on Max-Eigen test)
No Cointegration Vector	83.17 (0.00)	65.45 (0.00)

At most one Cointegration vector	31.22 (0.00)	27.10 (0.00)
At most two integration vectors	19.37 (0.04)	19.37 (0.04)

Note: The figures in parenthesis are the R-values and the significant level is based on 1% (i.e. 0.01}  
 Source: Extracted from E-view program Window (7)

In the first row, the hypothesis of no cointegration is rejected since the probability values of both Fisher trace and Fisher max Eigen Statistics are less than 1%. The same thing is observed in the hypothesis that the system does not have at most one cointegration vector is rejected. However, In the third row, the hypothesis that there are no at most two cointegration vectors is net rejected at 1% level of

significance. Thus, there are at least two cointegrating equations in the system implying that exchange rate, interest rate and inflation are cointegrated in the specified countries.

It is now empirically imperative to evaluate the nature and significance of the relationships between the variables by estimating the pooled, fixed and random effect models which are stated in section three.

Table 4.5: Showing the Nature of the Relationship between Exchange Rate, Interest Rate and Inflation

Pooled Regression Result				Fixed Effect Regression Result			Random Regression Result		
Variable	Coeff.	t-value	p.v	Coeff.	t-value	p.v	Coeff.	t-value	pv
Constant	-39.00	-7.89	0.00	-39.00	-13.73	0.00	-11.00	-3.32	0.00
Interest	1.64	7.39	0.00	1.65	12.85	0.00	0.48	0.90	0.06
Inflation	0.25	9.93	0.00	0.25	17.27	0.00	0.25	11.16	0.00

Source: Extracted from E-View program window (7)

Table 4.5 shows the results of the pooled, fixed and random regression models. The results seem to be identical across the three models. The signs of the constant term are negative and significant; the sign of

the inflation is positive and significant while the interest rate is positive but insignificant only for the random model which effects passes the Hausman test that is uncorrelated with the independent variables.

Table 4.6: Showing the Results of the Hausman Test

Test Summary	Chi-Sq. Stat.	df	p.v
Cross-Sectional Random	16.619	2	0.0002

Source: Extracted from E-view program Window (7)

The probability value in Table 4.6 is less than 1% which implies that the random effect model is not appropriate and that the fixed model is preferred. Therefore, there are fixed effects in the relationship between exchange rate, interest rate and inflation in the sample of the specified countries.

Indeed, it is plausible to examine the direction of flow of effects between the variables under investigation. To do this, we employ the usual Granger Causality test whose results are presented in Table 4.6.

Table 4.7: Showing the Result of Granger Causality Test

Null Hypothesis	Obs	F-Statistic	Prob.
INT does not Granger Cause XCH	155	0.10247	0.9027
XCH does Granger Cause INT		2.56087	0.0806
INF does not Granger Cause XCH	155	0.14702	0.8634
XCH does not Granger Cause INF		4.37219	0.0143
INF does not Granger Cause INF	155	2.51662	0.0841
INT does not Granger Cause INF		1.30689	0.2737

Source: Extracted from E-view program Window



Looking at the probability values in the first row of Table 4.7; they are less than 5% for the hypotheses that (1) interest rate does not Granger cause exchange rate (2) exchange rate does not Granger cause interest rate.

Therefore, there is zero causality between exchange rate and interest rate. The same results are obtained in the third row in which interest rate and inflation do not Granger cause each other. But the result is quite different in the second row; when the null hypothesis that exchange rate does not Granger cause each other. But the result is quite different in the second

row; when the null hypothesis that exchange rate does not Granger cause inflation is rejected at 5% level of significance. Thus, we established that there is long-run undirecting causality between exchange rate and inflation with the direction of flow trickling down from the exchange rate.

Our final empirical analysis in this study is to ferret out whether interest rate and inflation are endogenously/exogenously determined in the selected sub-Sahara African countries. This, however, involves testing for weak and block homogeneity for the series.

**Table 4.8:** Showing the Result of Weak Exogeneity and Block Exogeneity Tests for interest rate, and inflation variables in the selected Sub-Sahara African countries.

Variable	Weak Exogeneity	Block Exogeneity
Interest Rate (-1)	0.14 (1.68)	1.77 (1.39)
Inflation (-1)	0.01 (0.98)	0.84 (3.63)

Note: The values in parenthesis are the t-values \* implies significant @ 5% level.  
Source: Extracted from E-view program Windom (7)

By the rule of thumb, the results on the test of weak exogenous show that the two variables are not statistically significant. Thus, we can infer that Interest rate and Inflation are exogenously determined; but in the case of the block exogenous, inflation is significant. Therefore, it turns out to be endogenous while the interest rate remains exogenous throughout the sampling period 1980-2012 coinciding with the regimes of freely and managed floating exchange rate in specified countries.

## V. CONCLUSION

The study investigates the relationship between the exchange rate, inflation rate and interest rate using panel data for selected sub-Sahara African countries over the period of 1980-2012. It particularly adopts the Johansen Fisher panel cointegration Approach for its long-run analysis and finds that exchange rate, interest rate and inflation are cointegrating together in the long-run horizon. This is in tandem with the findings of Goswami (2005).

Furthermore, the study concludes that there is a strong positive relationship between exchange rate and interest rate thereby confirming the empirical stance of Simon & Razak (1999), and also Lahiri & Hanatrovaska (2008). In line with the study of (Binder, 2000), we conclude that exchange rate maintains a monotonic relationship with prices.

Finally, we find that in the selected sub-Sahara African countries interest rate is weakly exogenously determined contradicting the findings of Keminsky and Schumukler, (1998) in his study of Indonesia, Korea, Malaysia, Philippine, Thailand and China.

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# GLOBAL JOURNALS GUIDELINES HANDBOOK 2020

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# MEMBERSHIPS

## FELLOWS/ASSOCIATES OF MANAGEMENT AND BUSINESS RESEARCH COUNCIL FMBRC/AMBRC MEMBERSHIPS

### INTRODUCTION



FMBRC/AMBRC is the most prestigious membership of Global Journals accredited by Open Association of Research Society, U.S.A (OARS). The credentials of Fellow and Associate designations signify that the researcher has gained the knowledge of the fundamental and high-level concepts, and is a subject matter expert, proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice. The credentials are designated only to the researchers, scientists, and professionals that have been selected by a rigorous process by our Editorial Board and Management Board.

Associates of FMBRC/AMBRC are scientists and researchers from around the world are working on projects/researches that have huge potentials. Members support Global Journals' mission to advance technology for humanity and the profession.

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The primary objective is to recognize the leaders in research and scientific fields of the current era with a global perspective and to create a channel between them and other researchers for better exposure and knowledge sharing. Members are most eminent scientists, engineers, and technologists from all across the world. Fellows are elected for life through a peer review process on the basis of excellence in the respective domain. There is no limit on the number of new nominations made in any year. Each year, the Open Association of Research Society elect up to 12 new Fellow Members.



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Credibility

Exclusive

Reputation



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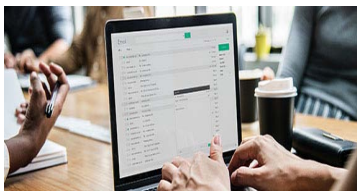
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The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

- a) A title which should be relevant to the theme of the paper.
- b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
- c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
- d) An introduction, giving fundamental background objectives.
- e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
- f) Results which should be presented concisely by well-designed tables and figures.
- g) Suitable statistical data should also be given.
- h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

- i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
- j) There should be brief acknowledgments.
- k) There ought to be references in the conventional format. Global Journals recommends APA format.

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It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

### **Numerical Methods**

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Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

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**15. Never start at the last minute:** Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

**16. Multitasking in research is not good:** Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

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**18. Go to seminars:** Attend seminars if the topic is relevant to your research area. Utilize all your resources.

**19. Refresh your mind after intervals:** Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

**20. Think technically:** Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.



**21. Adding unnecessary information:** Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

**22. Report concluded results:** Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

**23. Upon conclusion:** Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

## INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

### **Key points to remember:**

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

### **Final points:**

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

*The introduction:* This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

### **The discussion section:**

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

### **General style:**

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

**To make a paper clear:** Adhere to recommended page limits.

### *Mistakes to avoid:*

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.



- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

#### **Title page:**

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

**Abstract:** This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

*Reason for writing the article—theory, overall issue, purpose.*

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

#### **Approach:**

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

#### **Introduction:**

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

*The following approach can create a valuable beginning:*

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.



**Approach:**

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

**Procedures (methods and materials):**

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

**Materials:**

*Materials may be reported in part of a section or else they may be recognized along with your measures.*

**Methods:**

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

**Approach:**

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

**What to keep away from:**

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

**Results:**

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.



**Content:**

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

**What to stay away from:**

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

**Approach:**

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

**Figures and tables:**

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

**Discussion:**

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.



**Approach:**

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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	A-B	C-D	E-F
<i>Abstract</i>	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form  Above 200 words	No specific data with ambiguous information  Above 250 words
<i>Introduction</i>	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
<i>Methods and Procedures</i>	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
<i>Result</i>	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
<i>Discussion</i>	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring





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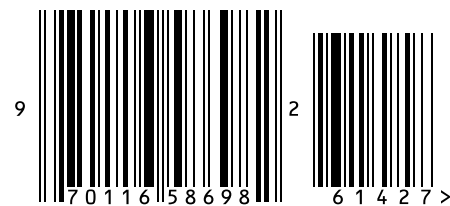
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