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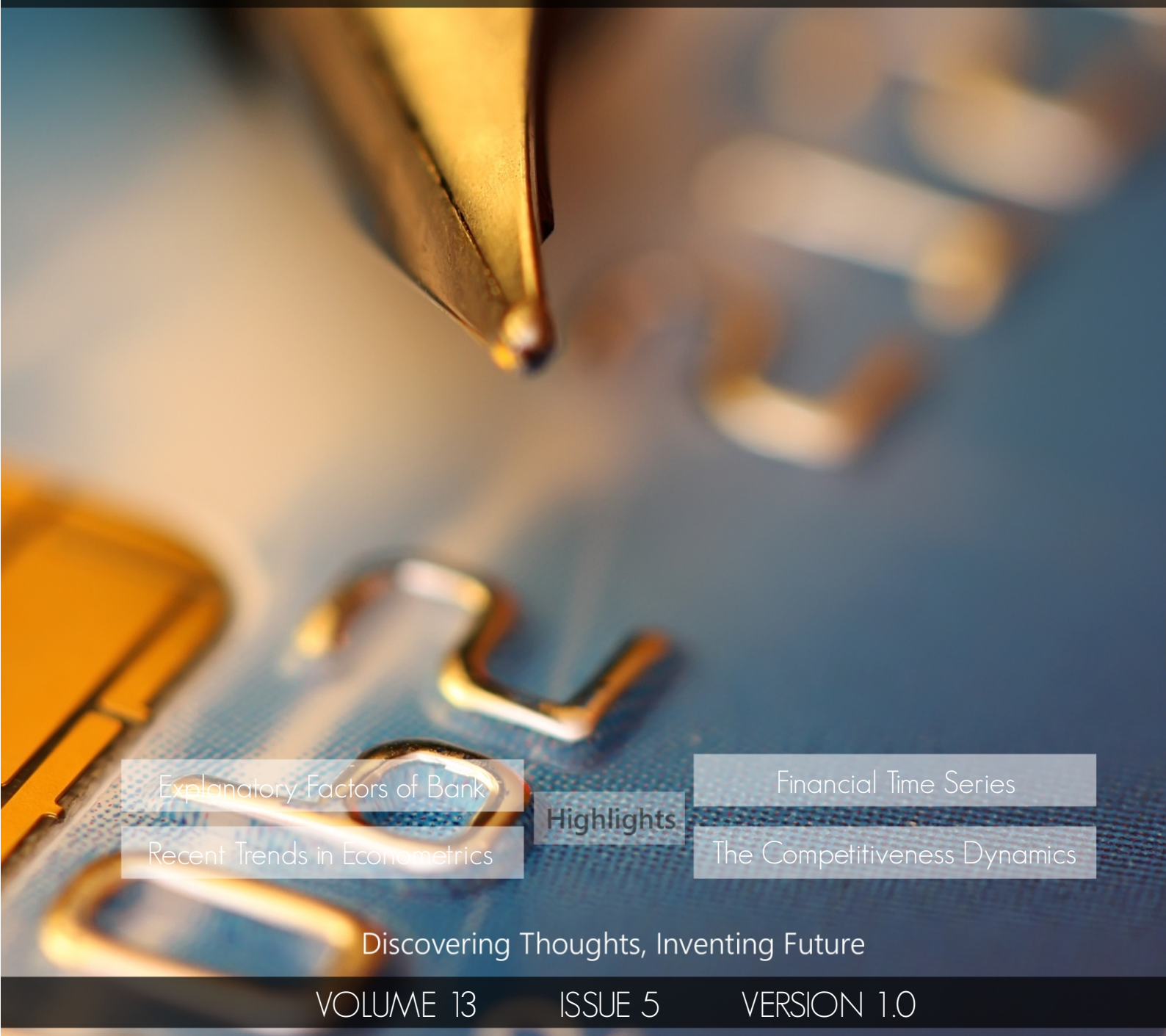

Explanatory Factors of Bank

Recent Trends in Econometrics

Highlights

Financial Time Series

The Competitiveness Dynamics

Discovering Thoughts, Inventing Future

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Explanatory Factors of Bank Performance in Tunisia: A Panel Model Approach

By Ines Ghazouani Ben Ameur & Sonia Moussa Mhiri
ISG Sousse, Tunisia

Abstract - Using the GMM estimator technique described by Blundell and Bond (1998), this paper tend to identify factors explaining Tunisian bank performance. Retaining the main 10 commercial Tunisian banks during the 1998 to 2011 period, we look at whether, for banks operating in similar macro-economic and financial structure environments, one can make judgments concerning the success of their competitive strategies and other managerial procedure by using different profitability measures. Our investigation includes bank-specific as well as industry-specific and macroeconomic factors affecting bank performance.

The empirical results reveal a high degree of persistence of bank performance. By the other hand, our findings suggest that the bank capitalization, as well as the best managerial efficiency, have a positive and significant effect on the bank performance. Private owned banks seem to be more profitable than state owned ones.

Keywords : *performance, banking industry, macroeconomic, gmm system, tunisia.*

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Explanatory Factors of Bank Performance in Tunisia: A Panel Model Approach

Ines Ghazouani Ben Ameur [α] & Sonia Moussa Mhiri [σ]

Abstract - Using the GMM estimator technique described by Blundell and Bond (1998), this paper tend to identify factors explaining Tunisian bank performance. Retaining the main 10 commercial Tunisian banks during the 1998 to 2011 period, we look at whether, for banks operating in similar macro-economic and financial structure environments, one can make judgments concerning the success of their competitive strategies and other managerial procedure by using different profitability measures. Our investigation includes bank-specific as well as industry-specific and macroeconomic factors affecting bank performance.

The empirical results reveal a high degree of persistence of bank performance. By the other hand, our findings suggest that the bank capitalization, as well as the best managerial efficiency, have a positive and significant effect on the bank performance. Private owned banks seem to be more profitable than state owned ones. That's why, privatizing state-owned Tunisian banks is recommended in order to improve their performance. Industry-specific factors, as the concentration and that of the system bank size have a negative and a significant effect on performance. As for the impact of the macroeconomic indicators, we conclude overall that the variables do not have a significant effect on bank performance. However Inflation seems to affect negatively bank's net interest margin.

Keywords : performance, banking industry, macro-economic, gmm system, tunisia.

I. Introduction

During the last two decades the worldwide financial sector has experienced most important changes. These changes have affected its structure and performance. In front of these international transformations and under the auspice of the International Monetary Fund (IMF), the Tunisian financial sector has undergone major financial reforms since 1980. However, despite the increased trend toward bank disintermediation undertaken in Tunisia, the role of banks remains fundamental in financing economic activity in general and different sectors of the market in particular. Restructuring of the Tunisian banking system was intended to enhance competition in the banking sector and lead to a more efficient allocation of resources.

The determinants of bank performance have attracted the interest of academic research as well as of bank management, financial markets and bank supervisors. While several studies on bank performance have been conducted widely for US and European markets and, to lesser extent, for large emerging markets us Brazil, China, and others, relatively little is known about bank performance among other developing countries as Tunisia. The first group of studies were carried out by Short (1979), Bourque (1989), Molyneux and Thorton (1992) and Demirguc-Kunt and Huizinga, (1999, 2001), who focused mainly on bank performance of US and European banks. More recently, the same purposes were undertaken for some emerging countries, such as Colombia (Barajas et al., 1999), Brasil (Afanasieff et al., 2002), Malaysia (Guru et al., 2002).

Added to that, the majority of investigations on bank profitability, such as Short (1979), Bourke (1989), Molyneux and Thornton (1992), Demirguc-Kunt and Huizinga (2000) and Goddard et al. (2004), use linear models to estimate the impact of various factors that may explain profits. However, some issues are not dealt with sufficiently. First, the literature principally considers determinants with the selection of variables sometimes lacking internal consistency (e.g. credit risk). Second, the econometric methodology held by major previous research, does not account for some features of bank profits (e.g. persistence), which implies that the findings may be biased and inconsistent.

The purpose of this paper is to empirically assess the main explanatory factors that might affect the banks performance in Tunisia. In this way we examine whether, for banks operating in similar macroeconomic and financial development environments, one can make judgments concerning the success of their competitive strategies and other managerial procedure by using different profitability measures. This paper investigates, in a single regression, the effect of bank-specific, industry specific and macroeconomic factors on Tunisian's bank performance. Added to that it consider several regressions with different measures of the bank performance; Return on Assets, Return on Equity, and Net Interest Margin. In view of the findings, we should be able to draw some policy implications that may be useful for bank management, shareholders, and policymakers in Tunisia.

To that end, we use data from the 10 conventional commercial banks on the longest relevant period (from 1998 to 2011). To account for performance

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persistence and potential endogeneity problems, we apply a dynamic panel data estimation approach, and address these problems by employing the generalized method of moments (GMM), following Blundell and Bond (1998), also known as GMM system estimator.

The remainder of the paper is organised as follows. Section 2 presents a review of the relevant literature regarding the explanatory factors of bank performance. Section 3 describes data, defines variables, and exposes model specification and estimation methodology. Section 4 provides the findings and major results. We conclude in Section 5.

II. Explanatory Factors of Bank Performance: Literature Review

An extensive body of literature have examined the explanatory factors of banks' performance in many countries around the world. While some studies focus on the understanding of bank performance in a particular and single country (Berger et al. (1987), Berger (1995), Neely and Wheelock (1997), Mamatzakis and Remoundos (2003), Ben Naceur and Goaied (2008), Athanasoglou et al. (2008) and García-Herrero et al. (2009)), others concentrate their studies on a panel of countries; Short (1979), Bourke (1989), Molyneux and Thornton (1992), Demirguc-Kunt and Huizinga (1999), Abreu and Mendes (2002), Staikouras and Wood (2004), Goddard et al. (2004), Athanasoglou et al. (2006), Micco et al. (2007) and Pasiouras and Kosmidou (2007).

All of the above studies examine combinations of three categories of factors effecting on bank performance, namely bank-specific, industry-specific, and macroeconomic factors. The empirical results vary significantly, since both data sets and environments differ. There exist, however, some common elements that allow a further categorization of the explanatory factors. Molyneux and Thornton (1992) is one of the first works who nicely illustrated this approach by investigating bank profitability of 18 European countries over the period 1986–1989. Demirgüç-Kunt and Huizinga (1999) underlined the internal and external determinants of profitability for banks of 80 countries over the period 1988–1995. Most researchers have measured performance using either Return on Equity (ROE) or Return on Assets (ROA).The major studies dealing with micro-specific factors employ variables such as size, risk, capital adequacy and operational efficiency.

The bank size is generally introduced to account for existing economies of scale in the market banking. The relationship between size and profitability is an important part of the firm's theory. Since larger banks are more capable to realize economies of scale and reduce the cost of gathering and processing information (Demerguç-Kunt and Huizingha (1999), Toni Uhomoibhi, (2008), Dietrich and Wanzenried (2011), the bank size should be positively associated with its performance. However, extremely large banks might illustrate a negative relationship between size and profitability. This is due to agency costs, the overhead of bureaucratic processes, and other costs related to managing large firms (e.g. Stiroh and Rumble, 2006; Pasiouras and Kosmidou, 2007).

Smirlock (1985) find a positive and significant relationship between size and bank profitability. More recently, Pasiouras and Kosmidou (2007) report the same result and argue that larger banks might have a higher degree of production and loans diversification than smaller ones. Other studies suggest that small cost saving can be achieved by increasing the size of a banking firm (Berger et al., 1987). Ayadi and Boujelbene (2012) in their banking performance study of twelve Tunisian deposit banks over the period of 1995-2005, notice a significant positive relation between size and Return on Average Assets proving the existence of economies of scale in the Tunisian banking sector. On the contrary, Ben Naceur, and Goaied (2010), show that size impact negatively on profitability which involves that Tunisian banks operating above their optimum level. Similarly, Sinkey (1991) concludes that larger banks are more profitable than smaller ones. So, the impact of bank size on its profitability cannot be theoretically anticipated.

Given by the international prudential regulation, capital ratio was considered as an important tool for assessing capital adequacy and should capture the general safety and soundness of banks. Consequently, highly capitalized banks might reduce their funding costs, which affect positively their profitability. By the other hand, highly capitalized banks usually have a reduced need to external funds, which has again a positive effect on their profitability. However, if we consider the conventional risk-return hypothesis, we have to expect banks with lower capital ratios to have higher returns in comparison to better-capitalized financial institutions. Bourke (1989) report a positive and significant relationship between capital adequacy and profitability. He concluded that the higher the capital ratio is, the more the bank's profitability is. Kosmidou et al., (2005) confirm a positive and highly significant relationship between the equity ratio to total assets and profitability, measured by Net Interest Margin (NIM). Thus, banks are seeking to slight the cost of their relatively high capital ratios by requiring higher NIM. In this vein, Molyneux and Thornton (1992) confirm the positive relationship but in only state-owned banks. Recently, Chien-Chiang Lee and Meng-Fen Hsieh (2013) examine the impacts of bank capital on profitability and risk for 42 Asian countries over the period 1994 to 2008. Their results point out a positive and significant relationship between capital adequacy and performance (proxied by ROA, NIM, and Net Result) for overall Asian banking system. However, Dietrich and

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Wanzenried (2011), find no significant effect of capital ratio on bank profitability before the crisis in Switzerland. Nevertheless, it has a negative and significant impact on bank's profitability as measured by Return on Average Assets during the financial crisis 2007–2009. Again, anticipating the net impact of changes in this ratio is complex.

While some studies considered the overall bank risk as a determinant of their performance, other studies focus on one particular and major risk affecting bank profit, such as the credit risk. In the literature on bank profitability, the bank loans over total assets ratio is mainly used as a proxy for credit risk when data do not permit the calculation of the non performing loans (Maudos and De Guevara, 2004). Delis Dietrich, and Wanzenried (2011) was the first study approximating credit risk or credit quality by the Loan loss provisions over total loans ratio. Bourke (1989) and Molyneux and Thornton (1992), among others show that the level of credit risk tend to be negatively associated with bank's profitability. Miller and Noulas (1997) suggest a negative relationship between credit risk and profitability because a higher loan to asset ratio increases the exposure of banks to bad loans and hence lowers profit margins. This result might reflect the fact that the higher the loans-to-assets ratio (as a proxy for credit risk) is, the more financial institutions are exposed to high-risk loans and by far the greater accumulation of nonperforming loans will be. However, Kosmidou at al. (2005) and Fernandez (2007) provide the evidence that credit risk affect positively the bank profitability.

In addition, many researchers include operational efficiency as a specific-bank factor affecting their profitability. Theoretically more operational efficient bank is expected to be more profitable. However, measured by the cost-income ratio or by overhead costs to total assets ratio, some empirical literature found a negative relationship between operational efficiency and bank's profitability (Athanasoglou et al., 2008; Goddard et al., 2009). Others authors, show a positive relationship between profitability and expenses. Molyneux and Thornton (1992) provide the evidence that bank's expenses affect positively the European banking profitability. Their results defend the efficiency wage theory, which states that employee's productivity increases with the wage's rate. Similarly, Guru et al.(2002) and Ben Naceur (2003), suggest that banks are able to pass their overheads to depositors and borrowers in terms of lower deposit rates and/or larger lending assets. Nevertheless, Ben Naceur and Omra (2011) on MENA countries, find the opposite results when they consider the total operating costs divided by the sum of total earning assets and total deposits as a proxy of operational efficiency.

A further bank-specific variable is the ownership of a bank. According to Micco et al. (2007), in developing countries, state-owned banks tend to have a less profitability, less important margins, and higher overhead costs than privately owned banks. Barth et al. (2004) and Iannotta et al. (2007) report a similar result; government ownership of banks is negatively related to bank efficiency. On the contrary, the results of Bourke (1989), Molyneux and Thornton (1992) suggest that ownership type is irrelevant for explaining profitability. Authors find a little evidence to support the theory that state-owned banks are less profitable than privately owned ones. However, we can notice that ownership structure is always measured in empirical literature by a dummy variable that take a value of one if bank is publicly owned and Zero otherwise.

Concerning the industry specific variables, empirical literature underline the market concentration, the ownership statue, the financial market development and the size of bank system among others as variables affecting bank profitability. Smirlock (1985), Bourke (1989) and Staikouras and Wood (2003) provide evidence that industry concentration has a positive impact on banking performance. They show that high concentrated bank system allows to a large monopolistic power of firms, and then improve profit margins of banks. Similarly, Bourke (1989) and Molyneux and Thornton (1992), find a positive and significant relationship between bank concentration ratio and bank's profitability. Thus, they confirm the structure–conduct–performance hypothesis which stipulates that higher market power submit monopoly profits. However, BenNaceur (2003) and Staikouras and Wood (2004), among others, conclude that an inverse relation exists between concentration and bank profitability.

Regarding to the bank size system, Demerguç-Kunt and Huizingha (1999) provide the evidence that small size bank system allow to high margins and profits, when they explore the bank profitability of 80 countries over the 1988-1995 period. In further study, using a larger sample of developed and developing countries over the period 1990-1997, Demerguç-Kunt and Huizingha (2001), investigate whether financial structure plays a key role in determining banking performance. They conclude that the less profitable banks are those operating in high developed bank system. This means that more competitiveness bank sectors, where bank asset-to-GDP ratio is high, allow for lower margins and less profitability. As well, BenNaceur (2003), reports that the growth of bank system does not necessary contribute to improve profitability of the banking sector in Tunisia. From their part, Eichengreen and Gibson (2001) investigate market-specific profitability determinants in Greek over the 1993–1998 period. They find, that concentration ratios and market shares, as market-specific variables, reveal positive but not significant effect on profitability proxies.

The last category of bank's factors affecting bank performance deals with macroeconomic environment. Those external factors cannot be controlled by

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bank's managerial power. They just reveal the economic and legal environments within banks operate and that might affect their procedure and then their performance. Among a number of macroeconomic variables, the growth of the gross domestic product, the long-term interest rate, and inflation are often held in previous literature.

According to the literature on the association between economic growth and financial sector profitability (e.g. Demirguc-Kunt and Huizinga, (1999); Bikker and Hu, (2002); Kosmidou and al., (2005), Pasiouras and Kosmidou, (2007) and Athanasoglou et al., (2008), GDP growth affect positively bank's profitability. However, Ben Naceur and Goaid, (2005) suggest that GDP growth does not tell any characteristic of the banking regulation and the advanced technology in the banking sector. By the other side, Staikouras and Wood (2003) find two of their three macroeconomic indicators, the variability of interest rate and the growth of GDP, have a negative impact, while the level of interest rate have a positive effect on bank performance.

Association between inflation and bank's profitability is ambiguous. Revell (1979) initiates the question of the relationship between bank performance and inflation. He highlights the fact that inflation's effect on bank profitability depends on whether banks' wages and other operating expenses increase at a similar rate than inflation. In this vein, Perry (1992) suggests that the extent to which inflation affects bank profitability depends on whether inflation expectations are fully anticipated. So, if inflation rate is appropriately anticipated by the bank's management, banks may be able to appropriately adjust interest rates, and thus increase their revenues faster than their costs, acquiring higher profits.

A large number of studies (e.g. Bourke, 1989; Molyneux and Thornton, 1992; Guru et al. (2002) and Jiang et al. (2003), although different, have revealed a positive relationship between inflation and profitability. However, Abreu and Mendes (2000), point out a negative relationship between the inflation rate and bank's profitability in European countries. Likewise Ayadi and Boujelbene (2012), report a negative effect of inflation on Tunisian bank profitability over the 1995-2005 period. In the same way, Demirguc-Kunt and Huizinga (1999) suggest that banks with high capital ratio in developing countries tend to be less profitable in inflationary environments.

III. Data, Variables and Model Specification

This section identifies the sources of our data, presents the data itself, describes the regression model we use to investigate the effects of bank specific, industry-specific and macroeconomic factors on bank profitability and summarizes the empirical results for our profitability measures. The empirical study on determinants of bank's performance can suffer from two sources of inconsistency: highly persistent profit and endogeneity bias (Poghosyan and Hesse, 2009). To correct for these potential problems, we adopt the dynamic panel model in our empirical analysis.

a) Data

To examine factors explaining bank profitability in Tunisia, we collected data related to the main deposit banks in Tunisia (10 banks) over the period 1998-2011. Micro data used in the empirical work is collected from annual reports of each selected banks. Only for non performing loans variable who's sourced from the Central Bank of Tunisia. The financial structure and macroeconomic indicators were extracted World Bank Development Indicators database. It consists of 14 years of observation on 10 banks. As all the banks in our sample are observed for the entire period, we will use in our empirical work balanced panel data. The quality of accounting in Tunisia has improved since the adoption of the new accounting reforms in 1997.

b) Variables Definition

We proxy the bank performance (BPer) by different measures commonly used in literature. We compute three standard measures of profitability for each bank throughout the period under study on the basis of annual accounting data; Both the Return on Assets (ROA), the Return on Equity (ROE), and Net Interest Margin (NIM) are considered in alternative specifications.

The first measure (ROA) reflects the ability of a bank's management to generate profits from the bank assets. As Golin (2001) points out, the ROA has emerged as the key ratio for the evaluation of bank profitability and has become the most common measure of bank profitability in the empirical literature. The ROA is defined as the ratio of net profits to total assets.

The second (ROE) reflects the return earned on the funds invested in the bank by its stockholders. ROE, on the other hand, reflects how effectively a bank management is using shareholders' funds. The ROE is defined as the ratio of net profits to total equity. Although many authors use the ROE to evaluate bank's performance, one may think that it is not the best indicator of profitability. Dietrich and Wanzenried (2011) suggest that banks with a lower leverage ratio (higher equity) usually report a higher ROA but a lower ROE. However, the ROE disregards the higher risk that is associated with a high leverage and the effect of regulation on leverage.

Finally, the NIM variable focuses on the profit earned on interest activities. It is defined as the net interest income divided by total assets. As a measure of the return on assets, the net interest margin has been used in many studies of bank performance. While the

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ROA measures the profit earned on assets and reflects how well bank management uses the bank's real investment resources, the NIM focuses on the profit earned on lending, investing and funding activities.

Thus, in our analyses, we consider the ROA and NIM as the better-quality measures of bank's profitability and use them as the main dependent variables, although we also report the results for the ROE.

We attempt to examine the bank's profitability impact of an extended number of factors with distinguishes internal determinants of bank's profitability to external ones. The internal factors include bank-specific factors (size, capital ratio, credit quality, operational efficiency, bank deposit growth ans ownership). The external ones reflect environmental variables that are expected to affect the profitability of financial institutions. External factors include both industry-specific variables (Concentration and size bank system) and macroeconomic (GDP Growth and inflation).

i. *Bank's Specific Factors*

Size (Size): is measured by the natural log of the book value of total assets as a percentage. The impact of bank size on its profitability cannot be theoretically anticipated.

Capital Adequacy (CAPAD): reflect the bank risk taking along with international prudential regulation. Capital adequacy is defined as the ratio of book value of equity to total assets. Large size of equity is expected to reduce the bank risk.

Nonperforming Loans (NPL): reflect bank's credit quality and it is measured by the proportion of nonperforming loans in total bank loans.

Cost-Income Ratio (CIR): reflect bank's operational efficiency and it is computed by total operating expenses (the sum of salaries and other operating expenses) over total generated revenues. More operational efficient bank is expected to be more profitable.

Growth Deposit (GDEP): reflect bank's growth and it is measured by the annual growth of the sum of its institutional and clientele deposits. Dietrich and Wanzenried (2011) suggest that the effect of this variable on profitability cannot be theoretically anticipated: One might anticipate that a faster growing bank would be able to increase its business and thus generate greater profits. But, the contribution of increasing deposits to profits depends upon a number of factors. The bad credit quality of those assets and bank's operating inefficiency might inverse the positive effect of deposit growth. Therefore, anticipating the sign of this variable is complex.

Ownership (OWN): measured by the percentage of bank equity hold by private sector, we use this variable to test whether privatization of banks promote their profitability.

ii. *Industry-Specific Factors*

Concentration (CONC): reflect the competitiveness among bank sector is measured by bank assets held by the three largest banks to total assets banks.

Size Bank System (SBS): reflect the importance of bank financing in the economy and it is measured by the ratio of total assets of banks to GDP.

iii. *Macroeconomic Factors*

GDP growth (GDP): this variable is used to account for economic environment and it is measured by reel GDP per capita growth. GDP growth varies over time but not among the banks.

Inflation (INF): This variable is used to represent the changes in the general price level or inflationary conditions in the economy and it is measured by annual country inflation rate.

c) Model Specification and Estimation Methodology

In order to check the bank-specific, industry-specific and macroeconomic factors affecting the Tunisian bank's profitability, we develop the following regression:

$$\boldsymbol{BPer}_{it} = \alpha_0 + \beta_{it}X_{it} + \sigma_{it}Y_{it} + \delta_{it}Z_{it} + \varepsilon_{it}$$

Where:

- i refers to an individual bank,
- t refers to the year,
- B Per is the dependent variable referring to the profitability measured by ROA, ROE and NIM,
- X is a vector of the individual-specific factors of a bank,
- Y is a vector of the industrial-specific factors,
- Z is a vector of the macroeconomic factors.

The complete model is then:

$$\boldsymbol{BPer}_{i,t} = \alpha 0 + \alpha 1\, \boldsymbol{BPer}_{i,t-1} + \alpha 2\mathrm{SIZE}i,t + \alpha 3\mathrm{CAPAD}i,t\text{-}1 + \alpha 4\mathrm{NPL}i,t + \alpha 5\mathrm{CIR}i,t + \alpha 6\mathrm{GDEP}i,t + \alpha 7\mathrm{OWN}i,t + \alpha 8\mathrm{CONC}i,t + \alpha 9\mathrm{SBS}i,t + \alpha 10\mathrm{GDP}i,t + \alpha 11\mathrm{INF}i,t + \varepsilon i,t \quad (1)$$

Given the dynamic nature of our model, least squares estimation methods are biased and inconsistent (Baltagi, 2001). Then, we have to use techniques for dynamic panel estimation that are able to deal with the biases and inconsistencies of our estimates. Further, estimation of bank profitability refers to the endogeneity problem. According to García-Herrero et al. (2009), more profitable banks, may be able to increase their equity more easily by retaining profits. Similarly, they could also pay more for advertising campaigns and

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increase their size, which in turn might affect profitability. However, the causality could also go in the opposite direction, because more profitable banks can hire more personnel, and thus reduce their operational efficiency. Another important problem is unobservable heterogeneity across banks, which might exists in the Tunisian banking industry.

To study the empirical determinants of Tunisian banks performance, we will follow the study of García-Herrero et al. (2009), and address these problems by employing the generalized method of moments (GMM), following Blundell and Bond (1998), also known as GMM system estimator.

This last methodology retains a system of two equations-the original equation as well as the transformed one-. The Arellano and Bond test for autocorrelation has a null hypothesis of no autocorrelation and is applied to the differenced residuals. The test for AR (2) in first differences is more important, because it detect autocorrelation in terms of levels. The validity of the instrumental variables is tested using Sargan test of over-identifying restrictions and over a test of the absence of serial correlation of the residuals. As our data contain a small number of banks, we use the method one-step GMM-in-System estimator. All in all, this estimator yields consistent estimations of the parameters.

IV. Findings and Major Results

This section provides empirical evidence on the determinants of bank profitability in the Tunisian Banking industry. We introduce summary statistics for all variables in Table 1. A broad description of the characteristics of the variables used in the study is given in Table 1, which reports their statistical means, standard deviation, minimal and maximal level. The correlation matrix for the independent variables can be found in Table 2. Next, we report the results of all the return on asset, return on equity and net interest margin regressions, respectively in column 2, 3 and 4.

Table 1 : Descriptive statistics for variables

Variables	Obs	Mean	Std. Dev.	Min	Max
ROA	140	0.8070952	1.342196	-10.31148	2.912641
ROE	140	315.1361	2058.555	-176.478	17000
NIM	140	2.897413	1.163921	0.7681571	7.319218
Size	140	21.61731	.5610169	20.45424	22.69988
CAPAD	140	9.349399	3.048374	-1.094332	17.48179
NPL	140	21.98929	18.07802	5.2	98
CIR	140	49.71864	11.86809	24.57	84.8
GDEP	140	818.0655	9194.508	-11.63083	104845.1
OWN	140	81.0521	23.08661	31.65	100
CONC	140	45.74847	1.521739	42.74229	47.4283
SBS	140	65.24694	5.157415	55.99841	76.53999
GDP	140	3.056032	2.113941	-2.947252	5.249388
INF	140	3.301598	.8538632	1.983333	4.920696

According to the descriptive statistics reported in Table 1, Tunisian banks have a ROA of 0.80% over the entire period from 1998 to 2011. The difference between Min and Max clearly shows that there are large differences in profitability among the Tunisian banks. The same holds true for our second main profitability measure, the NIM, which amounts to 2.89% on average. This significant amount of variation can be explained by the factors included in our analyses.

Now, let us briefly highlight a few interesting facts. Concerning bank-specific indicators, the capitalization of Tunisian banks is 9.34% on average, which largely respect the key international prudential regulation of Basel II. However, this ratio differs among banks, like the other variables as well. The best-capitalized bank in our sample, for instance, has a capital ratio of 17.48%, whereas, capital ratio is negative for some banks at some years. The non performing loans relative to total loans, which is an indicator of the credit risk, amounts to 21.98% on average, which seems very high comparing to the limit fixed by national prudential regulation (Tunisian Central Bank). But there exist again large differences among the banks in our sample.

In addition, private sector holds 80% of Tunisian banks equity with a minimum of 30% in public statue banks. The concentration, as a bank assets held by the three largest banks over total bank system assets, amounts to 45.74% on average.

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Table 2 : Correlation Matrix

	Size	CAPAD	NPL	CIR	GDEP	OWN	CONC	SBS	GDP	INF
Size	1.0000									
CAPAD	-0.2811	1.0000								
NPL	0.0270	-0.2042	1.0000							
CIR	0.0325	-0.4800	0.2642	1.0000						
GDEP	0.1180	-0.0349	-0.0507	-0.0505	1.0000					
OWN	-0.4244	0.2009	-0.1085	-0.3129	-0.1170	1.0000				
CONC	-0.4557	0.1119	0.0284	0.1508	-0.1670	-0.0582	1.0000			
SBS	0.5273	-0.1309	-0.0547	-0.1143	0.1179	0.0665	-0.6126	1.0000		
GDP	-0.3400	0.0507	0.0404	0.0896	-0.0434	-0.0373	0.5373	-0.8081	1.0000	
INF	0.4064	-0.1502	-0.0930	-0.0898	0.1101	0.0711	-0.3575	0.3091	-0.0494	1.0000

Examination of the correlation coefficients, allows us to study the null hypothesis of no correlation between explanatory variables. Following Kennedy (1985), we consider 0.8 as the limit value of the correlation coefficient to confirm the null hypothesis. So, if correlation between two variables exceeds 0.8, we have to reject the null hypothesis; it's not possible to hold the two variables in the same model.

As shown in the table 2, all correlation coefficients are smaller than 0.8 at which the pheno-menon of colinearity is pronounced. Then, there is no problem of multicollinearity.

The lagged dependent variable, which measures the degree of persistence of profitability, measured by ROA, ROE or NIM, is statistically significant across all models, indicating a high degree of persistence of bank performance and justifying the use of a dynamic model. However, we observe some significant differences between the estimation results of the different regressions.

Considering the internal factors related to the bank-specific characteristics, as to bank size, which we track by the logarithm of bank total assets, we find some empirical evidence that smaller commercial banks were more profitable than larger ones. This finding corroborate those of Smirlock (1985) and Bikker and Hu (2002) who suggest that larger banks were able to benefit from higher product and loan diversification possibilities, and economies of scales. The main reason for this negative relationship between size and profitability is that larger banks in Tunisia had relatively higher loan loss provisions during the retained period. Added to that, this negative impact implies that Tunisian banks are operation above their optimum level as reported by Bennaceur and Goaied (2010).

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Table 3 : Explanatory factors of Tunisian banks' profits

	ROA	ROE	NIM
Π_{t-1}	-0.1470469** (0.015)	.5587899*** (0.000)	0.346462*** (0.000)
Constant	5.971277 (0.530)	2385.733 (0.824)	42.19357*** (0.000)
Bank Specific Variables			
Size	-0.0165835** (0.028)	172.3497 (0.714)	-1.48617*** (0.000)
CAPAD	0.2883721*** (0.000)	-77.99849 (0.197)	0.0208083*** (0.005)
NPL	0.0022443** (0.011)	7.0688 (0.315)	0.00267 (0.291)
CIR	-0.0683811*** (0.000)	-29.23915** (0.041)	-0.0394382*** (0.000)
GDEP	-0.0000116 (0.227)	.0029982 (0.785)	-3.68e-06 (0.396)
OWN	0.0081584* (0.082)	-2.227418 (0.861)	0.0093819** (0.027)
Bank Industry Variables			
CONC	-0.1034975** (0.013)	67.48607 (0.431)	-0.1213633*** (0.001)
SBS	-0.0134696** (0.039)	-109.3861** (0.020)	-0.0253263 (0.217)
Macroeconomic Variables			
GDP	0.0139725 (0.844)	-171.466** (0.027)	-0.0651441** (0.036)
INF	-0.1224765 (0.309)	183.0932 (0.159)	-0.2104966*** (0.000)
N	130	130	130
Wald test	1.56e+08	501.79	495.54
P-value Wald test	0.000	0.000	0.000
AR (2)	61.1769	0.5432	1.2457
P-value AR (2)	0.2392	0.5870	0.2129
Sargan test	0.7014	2.83e-22	1.24e-23
P-value Sargan test	1.000	1.000	1.000

This table presents the results from regressions conducted to determine explanatory variables of Tunisian bank profitability. Estimations were performed using GMM dynamic model estimation in system. p-values in brackets; * Significance at the 10%.; ** Significance at 5%; *** Significance at 1% AR (2): test of null of zero second-order serial correlation, distributed N (0, 1) under null.; Sargan-statistics is the test of over-identifying restrictions.

Next, Consistent with the results of Buser, Chen and Kane (1981) and Bennaceur and Goïd (2008), we confirm the positive relationship between capital ratio and bank profitability, whether we use interest margin or return on assets as a proxy of bank performance. This may indicate that well-capitalized banks have higher margins and profitability, which is consistent with theories stressing that highly capitalized banks can charge more for loans and pay less on deposits because they face lower bankruptcy risks. Although, using return on equity as a proxy of bank performance we found a negative and no significant correlation. This is can be explained by the fact that some listed banks may have effectively lower their equity capital to increase the ROA.

Consider non performing loans to total loans ratio, bank risk enters positively in all the ROA, ROE and NIM regressions but only significant in ROA regression. The positive impact of credit risk on bank profitability could be explained by the fact that higher credit risk should improve bank incomes since loans are the most risky and, hence, the highest-yielding type of assets. Thus, our result confirms those found by Kosmidou et al. (2005) and Fernandez (2007).

Our operational efficiency indicator is negatively related to profitability for all regressions. It is particularly

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high significant when we profitability is measured by return on assets and net interest margin. This mean that the more efficient a bank is the higher is its profitability. This result confirms our expectation and stands in line with the results of Athanasoglou et al. (2008). However, our finding corroborates those of Bennaceur and Omra (2011) on MENA countries, when they consider the total operating costs divided by the sum of total earning assets and total deposits as a proxy of operational efficiency.

The yearly growth of deposits has no significant impact on Tunisian bank profitability and this effect is mainly driven by the crisis years. It seems that banks in Tunisia were not able to convert the increasing amount of deposit liabilities into significantly higher income earnings above all in recent time.

Added to that, table 3 shows that privatization of Tunisian banks positively and significantly affects profitability. According to the findings of Micco et al. (2007) and Iannotta et al. (2007), who's point out that government-owned banks reveal a lower profitability than privately owned ones, our results confirm the advantage of private banks in a matter of performance. The relationship between either NIM and ROA and private ownership variable (OWN) is positive and significant meaning that private owned banks generate better profit than their state counterparts. This is a clear signal to encourage the privatization policy taken by Tunisian authorities.

Turning to the external factors related to the financial structure in Tunisia, our study finds that the more the market is concentrated, the lower the banks profit is. Bank concentration is negative and significant in all the return on assets and net interest margin regressions. This fining is consistent with Berger (1995), who supports the argument that concentration is usually negatively associated with profitability once the institutional and regulation variables are controlled for. However, bank concentration enters positively and not significantly in the return on equity regression.

Turning to bank activity (SBS) and its impact on bank performance, our results show that the increase of size bank system do not contribute to enhance profitability in the Tunisian banking industry. Therefore the bank assets to GDP ratio enters negatively and significantly related in all return on assets and return on equity regressions. According to Demirguc-Kunt and Huizinga (1999), our results suggest that in countries where the banking assets largely contribute to GDP, banks are less profitable.

Regarding the external factors related to the macroeconomic environment in Tunisia, the coefficient on economic growth variable (GDP) is negative and significant in all return on equity and net interest margin regressions. Those results are contrary to our expectations and corroborate the major study relating real output to performance. Nevertheless, Staikouras and Wood (2003) found two of the three macro-economic indicators, the variability of interest rate and the growth of GDP had a negative impact, while the level of interest rate had a positive effect on bank performance.

By the other hand, our results show week significance about the impact of inflationary conditions in the economy on bank performance. It seems that only net interest margin is negatively and significantly affected by inflation. This means that Tunisian banks do not adjust their lending rates accordingly to inflation and consequently they allow the entire negative cost of inflation.

V. Conclusion

This paper has examined how bank-specific characteristics, industry-specific and macroeconomic factors affect the profitability of 10 listed commercial banks in Tunisia over the period from 1998 to 2011.

For this purpose, we used a dynamic model specification that allows for profit persistence. Our results clearly showed that differences in profitability among the Tunisian banks can be explained by the factors included in our analyses. Furthermore, our results illustrated that bank-specific and industry-specific characteristics explain a substantial part of the within-country variation in performance.

First, we found that bank profitability is mainly explained by adequate capital and operational efficiency. So, Banks that hold a relatively high amount of capital is more profitable than less capitalized ones. And efficient banks are more profitable than banks with high cost income ratio. We also found some evidence that ownership is an important determinant of profitability. Larger is the percentage of foreign-owned banks more profitable is the bank. So, at the nation level, privatizing state owned banks is recommended in order to improve bank performance.

The bank size generally had negative and significant coefficients on the bank profitability. This negative impact may simply implies that Tunisian banks are operation above their optimum level.

Concerning industry-specific characteristics and its impact on Tunisian bank performance, we found concentration and size bank system has a negative impact on bank profitability, essentially measured by return on assets and net interest margin.

Second, as for the impact of macroeconomic indicators on bank performance, we concluded that these variables have no significant impact on the return on assets. However, GDP growth and inflation are significantly related to the net interest margin. Inflation shocks seem to be passed mainly through the deposit rates, and this means that banks bear the entire negative cost of inflation.

On the whole, our findings provided some remarkable new insights into the mechanisms that determine the Tunisian commercial banks performance.

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These results are relevant for a number of reasons. First, because we considered a larger set of bank-specific, industry-specific and macroeconomic determinants of bank profitability, which extends our comprehension of bank profitability. Second, we used the GMM system estimator developed by Blundell and Bond (1998). So, we applied an advanced econometric procedure that addresses the issue of endogeneity of independent variables, which, in this type of study, can lead to inconsistent estimates. Finally, our dynamic model specification allowed for the fact that bank profits show a tendency to persist over time, reflecting impediments to market competition, informational opacity, and sensitivity to macroeconomic shocks. Further, our approach seems to be incomplete in that way that do not consider other managerial aspects that may influence Tunisian bank performance. Internal mechanism governance can be one of those managerial aspects which may be important in understanding bank profitability.

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Financial Time Series- Recent Trends in Econometrics

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Abstract - The paper points to a coverage of the latest research techniques and findings relating to the econometric analysis of financial markets. It contains a wealth of new materials reflecting the developments during the last decade or so. Particular attention is paid to the wide range of nonlinear models that are used to analyze financial data observed at high frequencies and to the long memory characteristics found in financial time series. There is also a discussion, briefly, of the treatment of volatility, chaos, the Fed model, stochastic estimation and Bayesian estimation, the Fed model and tail dependent time series models.

Keywords : *high frequency data, chaos, stochastic volatility, brownian motion, markov process, garch process.*

GJMBR-C Classification : *JEL Code: F39, B23*

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Financial Time Series- Recent Trends in Econometrics

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I. Introduction

We start off by a quote from Engel. "There is nothing in our chosen career that is as exhilarating as having a good idea. But a very close second is seeing someone develop a wonderful new application from your idea." Most of the econometric researches in recent days are about modeling financial time series. They seem to be crowding out macroeconomic data as objects of econometric research. The reasons are obvious:

- In financial time series, you can get thousands of observations, whereas with macro data, a few hundred observations is a rare luxury, and
- The data are exact; no revisions are necessary

The evolution of financial data shows a high degree of volatility of the series coupled with increasing difficulties of forecasting the shorter is the time horizon, when using standard (based on linear methods) forecasting methods. Alternative forecasting and other econometric methods for nonlinear time series based on the literature on complex dynamic systems, have recently been developed, which can be particularly useful in the analysis of financial time series. Since the nonlinear methods require the usage of very long time series, the availability of high frequency data for these variables make them the best candidates among economic and financial time series for the application of this methodology. The long financial series are particularly useful for testing recent non-linear models that do not require second-order stationarity i.e., methods that owe their roots to Granger and Engle's work long time ago.

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II. Using High Frequency Data

Although the *beta* coefficient appeared in the 70.s, a debate is still going on about whether these betas are constant or varying over time. Anderson, *et al* (2006) has eloquently shown that although individual variances and co-variances are highly persistent, the betas of some major company shares are not because of an on linear fractional co-integration between individual equity and the market. Using the mean square error as the measure of accuracy in beta estimation, Anderson *et al* (2006) obtained the optimal pair of sampling frequency and the trailing window and this is found to be as short as 1 minute and 1 week, respectively. The sampling result may be due to the low market noise resulting from its high liquidity and econometric properties of the errors-in-variables model. Moreover, the realized beta obtained from optimal pair out-performed the constant beta from the CAPM when overnight returns are excluded. The comparison further strengthens the argument that the beta is time-varying.

A non-parametric approach using high frequency data is one of the recent methods utilized to estimate financial measures, such as market volatility. The method utilizes price data with a very short term horizon, which is now widely available. By using the observed variables for calculation, the approach is very handy in that it trivializes calculation and avoids many distortive assumption necessary for parameterized modeling. The realized measures such as realized variances, for instance, are known to be efficient estimators of underlying values like variance, covariance etc Zhang *et al* (2005). The realized variance converges to integrated variance plus the jump component as the time between observations approaches zero. That is the sampling interval converges to zero.

Where $\int_{t-1}^{t} \sigma^2 (s)\, ds$ is a consistent estimator of the integrated variance and N_t is the number of jumps. Unlike the constant period-by-period beta from the CAPM, the realized beta allows continuous evaluation in the beta estimation.

Given the mass of data of the stock market, the most elusive goal of the econometricians is to find a model that forecasts the stock prices; because if these

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are known by the public, the gain would be eliminated through arbitrage. Still, people often continue to try to test their linear models against random walk forecasts only to find that the latter are hard to beat. Important advances in nonlinear time series analysis, multivariate includes ARCH and GARCH nonlinear stochastic process by Engle (1982), nonlinear deterministic chaotic dynamic model by Anderson *et al* (2001) (1995) non parametric analysis by Ebens (1999), multivariate adaptive regression splines by Lewis *et al* (1994), These works fuelled analyses on nonlinearities in financial data and opened new possibilities in forecasting and other areas.

Alt recent empirical evidences seem to suggest that financial asset returns are predictable to some degree. Thirty years ago this would have been tantamount to an outright rejection of market efficiency. However modern financial economies teach us that the fine structure of securities market and friction in the trading process can generate predictability. [1]The interest in the area of nonlinear dynamics to deal with a complex process that has been renewed during the last decade is due to the surprising finding that even a very simple deterministic model of a dynamic system can reflect a very complex 'motion' that exhibits the characteristics of chaotic behavior. A chaotic system is one in which the long-term prediction of the system's trajectory is impossible because any uncertainty on its initial state grows exponentially fast along time. The characteristic property is called sensitive dependence on initial condition and the reason of the rapid loss of prediction power in chaotic system. However chaotic system is deterministic and show a crucial difference with random process.

III. Chaos and the Nearest Neighbor

Econometrics has been concerned with complex phenomenon providing successful stochastic models that are capable of describing financial behavior. The key concept in stochastic models is again randomness assuming that the process under study is governed by chaos and probability laws. Based on a philosophy opposite to randomness, nonlinear dynamic system and chaos offer the possibility of describing a complex phenomenon by a nonlinear dynamic process. [2]Starting with a seminal work of Pallard et al (1980) the development of econometric techniques for chaotic time series were followed by Farmer and Sidorowitch (1987), Trippi (1995) and others. Based on a time series in a state space these authors proposed a forecasting technique by using delayed coordinates and looking for past patterns of the nearest neighbor (NN). In this way the NN method is a prediction technique where segments with similar dynamic behavior are detected in the series and then used to define the next term at the end of the series which is computed by some average of the actually observed terms next to the segments involved. [3]Even though several theoretical models on complex economic dynamics suggest the possibility of chaos (Pesaron and Potter (1993), detecting chaos between financial time series is often an elusive task. A few researchers have proposed the use of non-parametric locally weighted regression to detect deterministic chaos in financial markets[4].

Recently one of the most fascinating essays by Nicolas *et al* (2005) test various nonlinear models on Standard & Poor's 500 index (S & P 500) and come up with an astonishing result. Forecasting entire distribution one period ahead, they are able to beat the naïve forecast only for the right tail of the distribution. (see below the last section of this article) At the same time, it is hard to see how one can make money from this knowledge and the authors do not claim that one could. However, these are new procedures being made to test model specification and parameter estimation errors simultaneously often enriched by Kulback-Leibler Information Criterion[5].

1. In line with these considerations, special attention has been paid to testing predictable components in stock market prices, for example, Lo and Mackinlay (1988).
2. The origin of deterministic process dates back to planet dynamics and in particular the three bodies problem and its unpredictable dynamics. Even though the work on deterministic complex dynamics remained isolated of the main body of science during many years, the publication of Lorenz's work on weather prediction followed by an outburst of new research on the study of nondeterministic nonlinear systems with an irregular behavior which will be called chaotic behavior.
3. Notice that the philosophy behind the NN approach is quite different from that of the Box-Jenkins methodology. In contrast to the Box- Jenkins where extrapolation of past value into the immediate future is based on the correlation among lagged observations and error terms, The NN method select relevant prior observation based on their levels and geometric trajectories, not their location in time.
4. When we have a set of simultaneous time series, the NN predictor can be extended to a multivariate case using the simultaneous neighbor predictors (SNN). To simplify, let us consider a set of two time series:

$$X_t = (t=1,\ldots,T) \quad Y_t = (t=1\ldots,T)$$

We are interested in making predictions of one of these series (e. g., X_{T+1}) by simultaneously considering nearest neighbor in both series. To this we embed each of these series in the vector space $\Re^{2m}$ paying attention to the following vector :

$$(x_t^m \quad y_t^m) \in \Re^m \times \Re^m$$

which gives the last available m – history for each time series. In order to establish nearest neighbors to the last m-histories (x_t^m, y_t^m) we can look for the closest k-points that maximize the function

$$\rho(x_t^m, x_T^m) + \rho(y_t^m, y_T^m)$$

The predictor for x_{T+1} and y_{T+1} can be obtained from a linear autoregressive predictor with vatying coefficients obtained by OLS

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IV. Seasonal Time Series Models

Recently a new time series model incorporating a common trend component function and a seasonal component has been proposed by Cai and Chen (2006) and others The general flexible seasonal effect is as follows.

$$y_{tj} = \alpha(t_i) + \beta_j(t_j) + r_j + \varepsilon_{ij} \quad i=1....n \quad j=1....d$$

Where t= i / n, α is a function in [0, 1], { β_j (.) are smooth seasonal effect function, either fixed or random subject to a set of constraints and the error term { ε_{ij} } is to be stationary and weak dependent random variables. [6]The following constraints are needed for fixed seasonal effects

$$\sum_{j=1}^{d} \beta_j(t) = 0 \ , \nabla_t$$

The main advantage is that such a kind of dependence contains lots of pertinent examples and can be used in various situations just as the Central Limit Theorem for weak dependent variables is being studied in recent years.

Cai and Chen (2006)'s recent seasonal time series model is a locally linear factorization of trend with seasonal components. The authors use a sliding window and a kernel smoother. The method is illustrated through using simulation and is also applied to two real time series. They derived consistency and asymptotic normality of the weighted least square estimates by a local linear method, and by assuming that error terms are k– weak dependent and λ - weak dependent random variables.

The proposed methodology is illustrated with a simulated example and two economic and financial time series, which exhibit nonlinear and non stationary behavior.

Since Granger and Joyeux (1980) introduced ARFIMA (Autoregressive Fractionally Integrated Moving Average), the maximum likelihood estimation of their parameters has intrigued many researchers. Methods such as exact ML based on the Cholesky decomposition of the covariance matrix tend to be complex and even inefficient especially in small samples[7]. A procedure would be a Levinson- Durbin algorithm. But [8]But to both the estimation of autocorrelations is critical.[9]

V. The Fed Model and The Stock Market

The "Fed model" is a theory of equity valuation that has found broad application in the investment community. The model compares the stock market's ment bonds. In its strongest form the Fed model states that bond and stock markets are in equilibrium, and fairly valued, when the one- year forward looking earnings yield equals the 10-year Treasury note yield (y_{10})

$$\frac{Y}{P} = Y_{10}$$

The model is often used as a simple tool to measure attractiveness of equity, and to help allocating funds between equity and bonds. When, for example, the equity earnings yield is above the government bond yield, investors should shift funds from bonds into equity.

"…Changes in this ratio [P/E of the S & P 500 index] have often been inversely related to changes in the long-term Treasury yields, but this year's stock price gains were not matched by a significant net decline in interest rates. As a result, the yield on ten-year Treasury notes now exceeds the ratio of twelve-month-ahead earnings yield (E/P) to the yield on long-term govern- earnings to prices by the largest amount since 1991, when earnings were depressed by the economic slowdown."

5. In probability theoryand information theory, the **Kullback–Leibler divergence** (also information divergence, information gain, relative entropy, or KLIC) is a non-symmetric measure of the difference between two probability distributions Pand Q. Specifically, the Kullback–Leibler divergence of Q from P, denoted $D_{KL}(P \mid Q)$, is a measure of the information lost when Qis used to approximate P.For distributions P and Q of a continuous random variable, KL-divergence is defined to be the integral:

$$D_{KL}(P \,||\, Q) = \int_{-\infty}^{\infty} \ln\left(\frac{p(x)}{q(x)}\right) p(x)\, dx$$

wherep and q denote the densities of P and Q.

6. The concept of weak dependence makes explicit the asymptotic independence between the 'past' and the 'future'. This means that the past is progressively forgotten. Roughly speaking, for convenient function *f* and *g* they assumed Cov [(*f* ('past') , *g* ('future')] is small when the distance between the past and the future is sufficiently large.
7. The Cholesky decomposition (the lower triangular squared root) of the covariance matrix for a conditional independent normal model under is obtained under our equivariant loss functions. By introducing a special group of lower-triangular block matrices, it obtains the best equivariant estimator of the Cholesky decomposition under each of the four losses. Because both the maximum likelihood estimator and the unbiased estimator belong to the class of equivariant estimators with respect to the special group, they are all inadmissible.
8. The algorithm provides parameterizations of a model by a finite set of positive numbers. It can be used for computing the covariance structure of the process, for testing the validity of such a structure, and for stability testing.
9. Casting ARFIMA models into state-space form leads to exact ML estimates. Estimating the moving average part of time series models has always been the trickier part. Many 'quasi' ML methods have been presented, where a long AR polynomial approximates the MA side. In simulation experiments Granger and Joyeux (1980) show that all of the ML methods, exact and quasi, are about equally accurate. All have a small downward bias in the *d* estimate of the degree of differencing.

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Surprisingly, the Fed model was never officially endorsed by the Fed, but the former Fed chairman Alan Greenspan seemed to make a reference to it in his memoir: "The decline of real (inflation adjusted) long-term interest rates that has occurred in the last two decades has been associated with rising price-to-earnings ratios for stocks, real estate, and in fact all income-earnings assets." A bond yield versus equity yield comparison has been used in practice long before the model was given this name. [10]The recently proposed capital structure substitution theory argues that the Fed model indeed needs to be re-specified. It suggests that supply (company management), rather than demand (investors) drive the relationship between E/P and interest rates. Stock market earnings yield tends to be at equilibrium not with the government bond yield but with the average after-tax corporate bond yield, as companies adjust capital structure (mix of equity and bonds) to maximize earnings per share. If managements consistently optimize capital structure by substituting stocks (repurchasing shares) for bonds or vice versa, equilibrium is reached when:

$$\frac{E_x}{P_x} = R_x [1 - T]$$

Where E is the earnings-per-share of company x, P is the share price, R is the nominal interest rate on corporate bonds and T is the corporate tax rate. For a long time, the after-tax interest rate on corporate bonds was roughly equal to the 10-year Treasury rate. But during the 2008 financial crisis this relationship broke down, as Baa rated corporate bonds peaked at over 9%, and 10-year treasuries bottomed under 2.5%.

VI. Stochastic Volatitity ans Bayesian Estimation

Continuous time models are widely used in modern mathematical finance, providing the basis for option pricing, asset allocation and term structure theory. A classic example is the so-called Black-Scholes model (Black and Scholes (1973) which characterizes the log of an asset price $x^*(t)$ as the solution of the stochastic differential equation

$$dx^*(t) = [\mu + \beta\sigma^2]dt + \sigma\, dw(t)$$

Where w (t) is the standard Brownian motion. Implying that the aggregate returns are normally distributed with constant variance, well-known stylized features of financial time series such as heavy tails, skewness, volatility, clustering are not captured by this model. To improve the model, stochastic volatility has been introduced.

$$dx^*(t) = \{\mu + \beta\sigma^2(t)\}dt + \sigma(t)\, dw(t)$$

Where the volatility $\sigma^2(t)$ is allowed to change over time.[11] Fruhwirth-Schnatter (2001) proposed a Bayesian estimation of the stochastic volatility model with marginal Gamma law which results as a special case when the marginal distribution $\sigma^2(t)$ is a Gamma distribution.

$$\sigma^2(t) \sim \mathbf{g}(\alpha, \delta)$$

If the underlying asset is an integrated variable, for instance the log of foreign exchange rates, a discrete time series $(y_1 \ldots\ldots y_T)$ of aggregated returns $y_n = x^*(t_n) - x^*(t_{n-1})$ would be used to estimate the unknown parameter driving the distributional law of the underlying asset prices like $\theta = (\alpha, \theta, \lambda)$ for a process with marginal gamma law.[12]

Estimation is based on parameterization which is derived from Rosinski representation [13]and has the advantage of being a non-centered parameterization. The parameterization is based on a market point

10. The competing asset argument listed above argues that only when stocks have the same yield as government bonds, both asset classes are equally attractive to investors. But the earnings yield (*E/P*) of a stock does not describe what an investor actually receives as not all earnings are paid out to the investor. And how do corporate bonds (with a yield above the government bond yield) fit into this picture? A number of assumptions need to be made to go from the constant growth dividend discount model to the Fed model. Estrada starts with the Gordon growth model $P = \frac{D(1+G)}{R_t + RP - G}$ where *P* is the current price and *D* the current dividend, *G* the expected long term growth rate, R_f the risk free rate (10-year treasury notes) and *RP* the equity risk premium. If one now assumes that 100% of the earnings are paid as dividend (*D=E*), the growth rate is equal to zero, and the equity risk premium is also equal to zero, one gets the Fed model: $E/P = R_f$. The three assumptions seem unrealistic at best. It is also pointed out that the Fed model compares a real magnitude (*E/P*) with a nominal interest rate. Inflation should affect the bond yield, but not the earnings yield.
11. Various assumptions have been made concerning the stochastic nature of the volatility process. Most of them based on diffusion type models e.g., square root process or Orustein – Uhlenbeck (OU) process for log volatility see Anderson and Lund (1997).
12. The problem stems from the fact that the conditional distribution of the aggregated returns y_n, although being normal, depends on the latent process $\hbar(\lambda_t)$ and $\sigma^2(t)$:
$$y_n \mid \sigma^2(t) \sim N(\mu\Delta + \beta\sigma_n^2, \sigma_n^2)$$
$\Delta = (t_n - t_{n-1})$ and σ_n^2 may be expressed as where
$$\sigma_n^2 = \frac{1}{\lambda}[\hbar(\lambda t_n) - \hbar(\lambda t_{n-1}) - (\sigma^2(t_n) - \sigma^2(t_{n-1}))]$$
13. Both the Barndorff-Nielson and Shephard considered a separate Rosinski representation of the process $\sigma^2(t)$ $\hbar(\lambda t)$ for each observation interval $[(n-1)\Delta, n\Delta]$ See Rosinski (2001).

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process, living on the positive real line with uniformly distributed marks. Researchers define a Markov Chain Monte Carlo (MCMC) that enables multiple updates of the latent point process. Barndorff–Nielson and Shephard (2001) deal with superposition models when it discusses how the identifiability problem inherent in the superposition model may be avoided by the user of a Markov priors. They applied the technique to simulated as well as exchange rate data.

VII. Tail Dependent Time Series

In time series modeling, a key step is to determine a finite dimensional representation of the proposed model, i.e., to determine statistically how many parameters have to be included in the model. In linear time series models, such as AR (P) and MA (q), auto covariance functions or partial auto covariance functions are often used to determine the dimension, such as the value of p and q. but in nonlinear time series models, these techniques may no longer be applicable. In the context of the max-stable process, since the underlying distribution has no finite variance, the dimension of the model cannot be determined in the usual manner.

Danielsson (2002) and Mikosch and Straumann (2002) used the gamma test to determine the order of the lag - k tail dependence existing in financial time series. Using standardized return series, based on the test results show that jumps in returns are not transient. New time series models which combine a specific class of max – stable process, Markov process and GARCH process are proposed and used to model tail dependencies within asset returns. [14]They used the gamma test to check whether there exists tail dependence for the S & P 500 return data.

The approach is hierarchical i.e., to apply GARCH (1, 1) fitting and to get estimated standard deviations first, then based on standardized return series M3 and Markov process modeling are applied. It is also possible, perhaps, to study Markov process, GARCH process and M3 process simultaneously, But this may further additional research. Attention is restricted to M# process. This sub-class has the advantage of efficiently moeling serial tail dependent financial time series, while of course, other sub class specification are possibly also suitable.

VIII. Conclusion and Comments

Many empirical studies have uncovered significant nonlinearities in stock prices. If stock returns are governed by chaos of low complexity, we should be able to make predictions much better than using simple methods such as the random walk. The NN approach to forecasting financial time series is attractive because it means a certain mixture of technical analysis and chaotic behavior. There has been non-parametric approaches in estimating the time-varying beta with high frequency data denoted as the realized data. The market micro structure, noise, the lag of price adjustment, the true asset price is known to cause high level of distortion when price data is sampled at extremely high frequency. The Fed Model, an equity valuation model does matter because people use it. Analysts across JP Morgan, ti ING, to Prudential use the Fed model in their calcualtion. The Bayesian estimation of the stochastic volatility with marginal gamma law has much to offer in practical parameterization; Recently statistical evidence of impacts in financial time series are also observed. A new time series model is introduced combining Markov process, GARCH process and M3 process.

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Financial Structure and Economic Growth: Evidence from Nigeria

By Onwumere J.U.J, V. Onudugo & Imo G. Ibe
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Abstract - A nation's financial system is much more than just an intermediary that ensures the allocation of savings to investment. The efficiency of such a system is endogenously achieved if the financial structure of that economy promotes optimal use of the resources available for development. It is against the importance of finance in enhancing economic growth and development especially in developing economies like Nigeria, that we questioned whether financial structure has positive and significant impact on economic growth and development in Nigeria. The results revealed from our findings support existing literature that total financial structure has positive and significant impact on economic growth. However, while some sectors exert more influence (banking and market), other sectors (such as insurance) were found to have non-significant impact on economic growth. We therefore recommend that greater efforts should be made by govern-ment and the regulatory authorities at ensuring that an enabling environment is provided (through strengthening of existing laws and regulations) where all the components of the financial sector can compete favorably.

Keywords : *financial structure, economic growth, nigeria.*

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Onwumere J.U.J [α], V. Onudugo [σ] & Imo G. Ibe [ρ]

Abstract - A nation's financial system is much more than just an intermediary that ensures the allocation of savings to investment. The efficiency of such a system is endogenously achieved if the financial structure of that economy promotes optimal use of the resources available for development. It is against the importance of finance in enhancing economic growth and development especially in developing economies like Nigeria, that we questioned whether financial structure has positive and significant impact on economic growth and development in Nigeria. The results revealed from our findings support existing literature that total financial structure has positive and significant impact on economic growth. However, while some sectors exert more influence (banking and market), other sectors (such as insurance) were found to have non-significant impact on economic growth. We therefore recommend that greater efforts should be made by government and the regulatory authorities at ensuring that an enabling environment is provided (through strengthening of existing laws and regulations) where all the components of the financial sector can compete favorably.

Keywords : financial structure, economic growth, nigeria.

I. Introduction

The search for ways of bettering the standard of living of citizens through enhanced sustainable development has opened new corridors for alternative view points on paradigms of economic growth and development[1]. These alternative view points and paradigm for sustainable development have led to postulation of new developmental theories by economists all aiming at ensuring sustainable development. Sustainable growth and development entails that development which meets the needs of the present without compromising the ability of future generations to meet their own needs[2]. However, in most developing economies including Nigeria, the needs of future generations are really not adequately articulated in policies. Again, the implementation and management of these policies leave so much to be desired.

There appears to be a general consensus on the link between sustainable growth and development and finance[3]. The important role of finance in the process of economic growth and development could be traced to the works of Bagehort (1873)[4], Schumpeter (1911)[5] and Hicks (1969)[6]. Bagehort (1873) and Schumpeter (1911) have argued strongly on the promotive role of finance in the economic growth and development process. They posit that the industrial revolution in England was the result of a functioning financial system that was instrumental in mobilizing and allocating long-term capital to the productive enterprises of the country. Hick (1969) has also posited that a well functioning financial system provides intermediation services to productive entrepreneurial activities that spur technological, innovative, and productive activities which lead to growth (Hick, 1969).

A nation's financial system is much more than just an intermediary that insures the optimal allocation of savings to investment. The efficiency of such a system is endogenously achieved if the financial structure of that economy makes greater use of the resources available for development. This fact was buttressed by King and Levine (1993b)[7] when they posit that;

…better financial structures stimulate faster productivity growth and growth in per capita output by funneling society's resources to promising productivity-enhancing endeavours…

It is against the importance of finance in enhancing economic growth and development especially in developing economies, that we questioned whether financial structure has positive and significant impact on economic growth and development in Nigeria. This paper seeks to provide evidence-based answers to the question. It is divided into five sections. Section one is the introduction, section two reviews

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related literature in this area. Section three contains our methodology, while section four discusses the results of our findings. Lastly, in section five, we provided recommendations based on evidence, inclusive of our conclusion.

II. Review of Related Literature

There is no gainsaying that the financial systems, all over the world, play an important role in the development and growth of the economy. In Nigeria, the financial system comprises financial institutions, financial markets, financial instruments, rules, conventions, and norms that facilitate the flow of funds and other financial services within and outside the national economy[8]. In a nutshell, it consists of banks and non-bank financial institutions regulated by the Central Bank of Nigeria (CBN), Nigeria Deposit Insurance Corporation (NDIC), Securities and Exchange Commission (SEC), the National Insurance Commission (NIC), and the Federal Mortgage Bank of Nigeria (FMBN) as well as the Federal Ministry of Finance.

The Central Bank of Nigeria was established by Act of 1958 and commenced operations on 1st July 1959. The Act, which has undergone several amendments, was re-enacted as the CBN Act No 24 of 1991. In addition to the CBN Act, the Banks and other financial Institutions Act No 25 of 1991 was also promulgated to complement the operations of the CBN in enhancing growth of the Nigerian Banking sector. The Nigerian Deposit Insurance Corporation was established by Decree No. 22 of 15th June 1988 and took off in February 1989 with the mandate of insuring depositors' liability in Nigerian Banks. The regulatory organ of the Nigeria Capital market is the Securities and Exchange Commission, formerly called Capital Issues Commission which was established by SEC Act of 27th September 1979 and strengthened by SEC Decree of 1988 to regulate the activities of the Nigerian Capital Market. At the apex of the Insurance sub-sector is the National Insurance Commission (NAICOM), which replaced the Nigerian Insurance.

Supervisory Board, established by Decree No. 62 of 1992. This body is responsible for the regulation of activities in the Nigerian Insurance Industry. The Federal Mortgage Bank of Nigeria (FMBN) is at the apex of mortgage financial institutions in the country. The FMBN was established by Decree No. 7 of 1977 and it took over the assets and liabilities of the Nigerian Building Society, which was performing the statutory regulatory mortgage role before then.

The Nigerian financial system has undergone remarkable evolution in terms of ownership, structure of its institutions, the number of instruments traded, and the regulatory framework within which the system operates[9]. This evolution could be traced to three major periods vis-a vis the Pre-SAP Era (between 1970 and 1986), the SAP Era (between 1986 and 1993) and the Post-SAP Era (the period following the termination of SAP till date). While the Pre – Sap Era witnessed the emergence of wholly owned Nigerian financial institutions and was characterized by minimal competition and poor capitalization. The SAP Era was characterized by an economic reform package designed to liberalize the economy with emphasis on the financial system. The reforms brought about the removal of various administrative controls and ushered the country into a progressive move towards a market-oriented economy. The Post-Sap Era witnessed a brief period (1994) of renewed regulation and subsequently, the period of guided deregulation. At the outset of this era, the financial industry witnessed serious waves of distress that caused crisis of confidence in the industry. The Failed Banks (Recovery of Debts) and Financial Malpractice in Banks Decree was promulgated in 1994 to sanitize the banking industry. A further notable feature of this era was the consolidation policies introduced both in the Nigerian Banking sector as well as in the Insurance Sector in 2004 and 2005. All these changes were all aimed at ensuring a more effective and efficient financial system[10].

As stated earlier, the earliest establishment of the finance-growth nexus in literature could be traced to the earlier works of Bagehort (1873) and Schumpeter (1911) in which they contend that finance plays an important role in promoting economic growth and development. In this way, it is expected that a well functioning financial system will provide intermediation services to productive entrepreneurial activities which will spur technological, innovative, and productive activities that increase growth. Following this work of Bagehot (1873) and Schumpter (1911), Gurley and Shaw (1955)[11], Goldsmith (1969)[12] and Hicks (1969), McKinnon (1973)[13] and Shaw (1973)[14] have also emphasized the important role, financial intermediaries and financial markets play in the growth process of nations.

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Recent empirical and theoretical studies have also been conducted in several jurisdictions on the relationship between finance and economic growth. Prominent among such works is the work of King and Levine (1993a)[15]. In a study of 80 countries over the period 1960-89 in which they controlled for other factors that affect long-run growth, their results showed that initial level of financial development is a good predictor of the subsequent rates of economic growth. Benhabib and Spiegel (2000)[16], Levine, Loayza and Beck (2000)[17], Rioja and Valev (2004)[18] also point to the same same conclusion that financial development has a positive impact on economic growth, however, these studies are often conducted at aggregate and level as such are unable to account for the complexities of individual nations.

Literature examined in this study indicates that financial development is a necessary causal factor of economic growth, although the strength of the evidence varies across countries and across proxies used to measure financial development[19]. Also, it has been argued that evidence of a dampening effect from financial deepening on cyclical fluctuations in the short-run has strong effects in the long-run. However, the expected growth benefit from financial development, in the long-run is slow to materialize[20].

The determinants of financial development are thus co-integrated in the long-run suggesting that financial development, private capital stocks and the labor force exert a positive impact on economic development whereas the accumulation of public capital appears to curtail output expansion in the long-run[21]. No No wonder, measures suggested are that government policy should be geared towards strategically increasing money supply and promoting efficient capital market that will enhance overall economic efficiency, create and expand liquidity, mobilize savings, capital accumulation, transfer of resources from traditional sectors to growth inducing sectors; and also promote competent entrepreneurial response in various sectors of the economy[22].

On the impact of financial structure on economic growth, it is suggested that financial structure increases the performance of the economy, through such studies used bank-level data for a large number of developed and developing countries (Ang, 2007).

Countries that have underdeveloped financial systems tend to grow slower than developed economies; hence, financial structure per se does not have an independent effect on economic growth[23]. It is evident therefore, that in countries' with legal systems that more effectively protect the rights of outside investors, greater financial development enhances economic growth[24]. It is thus, important to develop models that not only are better able to mimic the actual relationships between economic growth determinants and financial structure but also that will allow the impact of government policies on the financial system to be explicitly analyzed[25].

Empirical evidence also exists that suggest weak evidence in support of an employment growth channel linking financial structure to subsequent economic growth, thus implying that, job creation is not consistently a major channel through which financial structure stimulates income growth[26]. The corollary therefore, is that the macroeconomic benefits of financial structure accrue primarily to those already working, rather than to new workers hence no direct evidence suggests that an expanding financial structure plays an important supporting role in economic growth [27].

For meaningful studies on the impact of financial structure and economic growth, proxies of financial structure should be positively correlated with economic growth. This will ensure that, the channels of transmission mechanism of financial development to growth are efficient in financial sector development rather than in the quantum of investment. Viewing from the perspective of discussions on the Nigerian financial system, financial development and economic growth, it is still not conclusive from empirical literature on what impact financial structure might have on economic growth and development, most especially in a developing economy like Nigeria. There is still a paucity of literature on the finance-growth nexus in the country thus, the gap which this study seeks to fill is providing an empirical study that will examine the impact of financial structure on economic growth in Nigeria.

III. Methodology

This study adopts the ex-post facto research design. The study covered the period, 1988 to 2011.

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The choice of 1988 as the base year is due to availability of data for all the model proxies, thus ensuring uniformity. The adoption of ex-post facto research design hinges on two reasons; the study relied on historic data obtained from the Central Bank of Nigeria Statistical Bulletin from 1988 – 2011, as such the event under investigation had already taken place. Also, the researcher does not intend to control or manipulate the variables[28]. This research design, also called causal comparative research, is used when the researcher intends to determine cause-effect relationship between the independent and dependent variables with a view to establishing a causal link between them[29]. Data used are, therefore, of secondary nature.

The endogenous growth theory[30] which assumes away population growth and technological change and states that growth is driven by capital accumulation formed the basis for this study. The choice of the model is based on, theoretical perspectives of the finance-growth nexus, that financial development enhances economic growth, hence, in this case the aggregate financial structure has a positive and significant effect on economic growth. Therefore, economic growth is mathematically expressed as a function of financial structure as denoted in (i):

$$Y_t = f(TFS_t) \qquad (1)$$

where:

Y_t = Economic Growth at time t

TFS_t = Total Financial structure at time t

Expanding Equation (i) to accommodate indicators of total financial structure, we have:

$$gdppcgr = \alpha + \beta_1 tfa/gdp + \beta_2 dcpbs/gdp + \beta_3 mcap/gdp + \beta\ tvst/gdp + \beta\ insp/gdp \qquad (2)$$

where;

α	=	Equation Constant
$\beta 1..\beta 5$	=	Coefficient of Total Financial Structure
gdppcgr	=	Gross domestic product per capita growth rate (%)
tfa/gdp	=	Total Financial Assets percentage of gross domestic product
dcpbs/gdp	=	Domestic credit provided by the banking sector percentage of gross domestic product
mcap/gdp	=	Market capitalization percentage of gross domestic product
tvst/gdp	=	Total value of shares traded percentage of gross domestic product
insp/gdp	=	Insurance premium percentage of gross domestic product

The specific objective of this study is to determine the impact of total financial structure on economic growth. Three (3) core sectors of the Nigerian financial sector were used to represent the total financial structure viz banking, stock market, and insurance sectors; based on available data. Following similar studies in previous literature such as Demirguc-Kunt and Levine (1999) and Guha Deb and Mukherjee (2008), the growth rate of Nigeria's gross domestic product per capita was adopted as the index of economic growth. This measures the penetration of total of goods and services produced in Nigeria that directly go into the lives of ordinary Nigerians. The bank-based indicators of the total financial structure are represented by total financial assets as a percentage of GDP and domestic credit provided by the banking sector as a percentage of GDP which measures financial opportunities available to investors. It is expected that both proxies should have positive and significant impact on economic growth. The market based indicators of total financial structure used in this study are market capitalization as a percentage of gross domestic product and the total value of shares traded as a percentage of gross domestic product. While the formal proxy assumes that the overall market size is positively correlated with the ability of the market to mobilize capital and diversify risk on an economy-wide basis[31], the latter measures the organized trading of firm equity as a share of national output and therefore should positively reflect liquidity on an economy-wide basis and complements the market capitalization ratio[32]. Again, it is expected that both proxies will have positive impact on economic growth. Insurers collect

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premium for their risk transfer and indemnification services. Thus, in this study, insurance penetration is measured by total insurance premium as percentage of GDP. This measure captures the role of insurance in an economy[33]. It is expected that, the coefficients of parameters for insurance penetration to be positive implying a positive impact on economic growth.

IV. Results and Analysis

This section presents and analyzes the results. Table 4.1 presents the descriptive statistics of the measurement indicators.

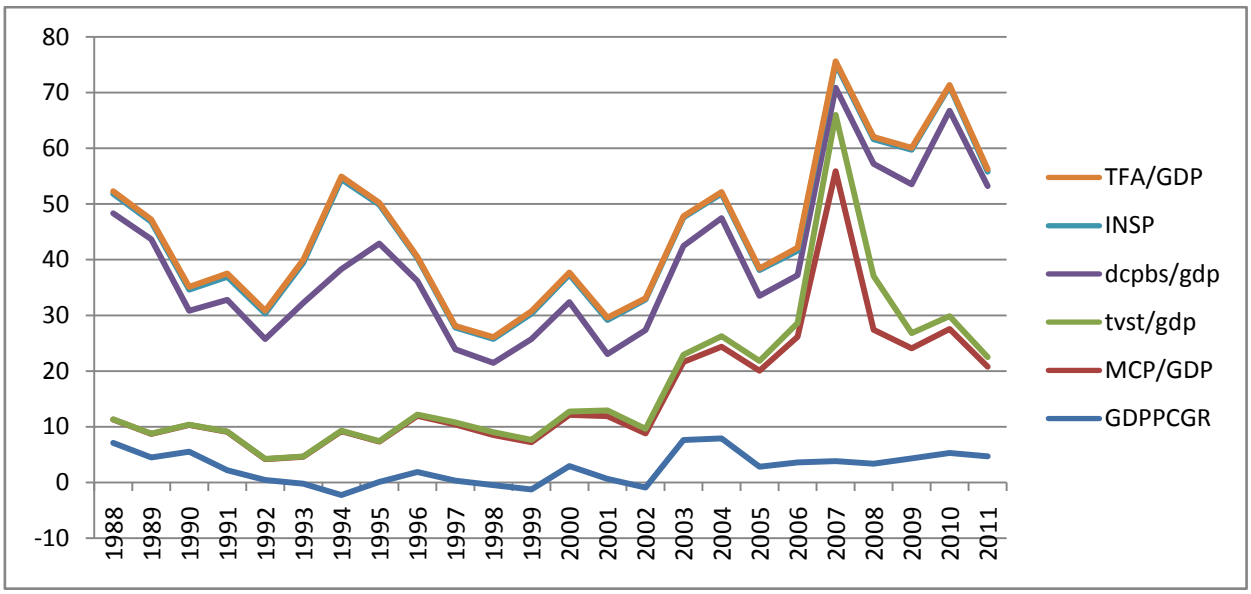
Table 4.1 : Descriptive Statistics

	GDPPCGR	MCAPGDP	TVSTGDP	DCPBSGDP	INSPGDP	TFAGDP
Mean	2.667150	13.31866	1.584228	21.89165	5.137825	0.392917
Median	2.872155	10.07444	0.534636	20.83450	4.403850	0.410000
Maximum	7.897959	52.04102	10.10976	37.02163	16.13480	0.590000
Minimum	-2.248560	3.729704	0.016776	4.909461	2.583700	0.220000
Std. Dev.	2.885401	10.29288	2.695900	9.143040	2.588442	0.106014
Skewness	0.159231	2.308351	2.504521	0.076962	3.350549	0.030214
Kurtosis	2.057489	9.356054	8.190316	2.177788	14.89147	1.913754
Jarque-Bera	0.989744	61.71337	52.02989	0.699726	186.3117	1.183582
Probability	0.609649	0.000000	0.000000	0.704785	0.000000	0.553335
Observations	24	24	24	24	24	24

Source : Authors'

As indicated in tables 4.1, the mean value of Nigeria's per capita income growth rate from 1988 to 2011 in Nigeria was 2.67%. The year with the highest per capita income growth rate was in 2004 when it grew by 7.90% per cent while the least growth in per capita income was recorded in 1994 when the gross domestic product fell by 2.25% from the previous year rate. This fall may not be unconnected with the sanctions placed on the then military regime in Nigeria by the international community due to the annulment of the historic June 12 election in 1993. Overall the growth rate of Nigeria's per capita income showed fluctuations over the period of the study. As revealed from table 4.1, there was a positive skewness of gross domestic product (0.16) indicating that the degree of departure from symmetry of the distribution was positive. Also, the kurtosis value of 2.06 reveals that the degrees of peakedness of gross domestic product within the period of this study were not normally distributed as it tended to deviate from the mean. Figure 4.2 presents the model proxies performance in a graphical format.

Figure 4.1 : Graphical Presentations of Model Proxies



Source : The Authors

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a) Unit Root Test

Time series data are prone to problems of spuriousness if the data are not stationary. Thus in other to eliminate this problem, the unit root test was carried out[34]. The first stage in the unit root test was to determine the stationarity of the variables under study. It has been asserted that if a times series data is non-stationary, all the usual regression results will suffer from spurious regression[35]. Hence, the Augmented Dickey Fuller unit root was used to test the stationarity of the time series data. Table 4.2 presents our results.

Table 4.2 : Augmented Dickey-Fuller Unit Root Test

ADF Test Statistic	-7.519565	1% Critical Value*	-3.8067
		5% Critical Value	-3.0199
		10% Critical Value	-2.6502
*MacKinnon critical values for rejection of hypothesis of a unit root.			

Source : The Authors

The result reveals that all values were stationary at 1%, 5% and 10%. This can be seen by comparing the observed values of the ADF test statistics with the critical values of the test statistics at the 1%, 5% and 10% level of significance. More results are presented in table 4.3.

Table 4.3 : Correlation Matrix

	GDPPCGR	MCAPGDP	TVSTGDP	DCPBSGDP	INSPGDP	TFAGDP
GDPPCGR	1.000000					
MCAPGDP	0.252666	1.000000				
TVSTGDP	0.233355	0.874906	1.000000			
DCPBSGDP	0.192364	-0.425249	-0.359324	1.000000		
INSPGDP	-0.490913	-0.064603	-0.136905	0.133193	1.000000	
TFAGDP	-0.176374	-0.100676	-0.011773	0.023946	0.206764	1.000000

Source : Authors'

As revealed from table 4.3, market capitalization has a positive relationship with economic growth. Thus, 1% increase in economic growth in Nigeria over the period is due to 0.26% increase in market liquidity of the Nigerian Stock Exchange, This may be attributed to increased confidence of Nigerian investors in the ability of the market to enhance liquidity. The total value of shared traded ratio which measures the organized trading of firm's equity as a share of national output on an economy-wide basis as well as complementing market capitalization indicated from the correlation results, shows there was a positive relationship between total values of shares traded ratio and economic growth. Domestic credit provided by the banking sector as revealed from the correlation matrix had a positive relationship with economic growth. This shows that Nigerian banks have been able to provide funds for investment which had translated into growth of the Nigerian economy. It was also revealed from the correlation matrix that insurance penetration and size of the financial system has negative relationship with economic growth. Table 4.4 display our regression results.

Table 4.4 : Regression Results

	Dependent Variable: GDPPCGR				
	Included observations: 24				
Variable	Expected Sign	Coefficient	Std. Error	t-Statistic	Prob.
MCAPGDP	+	0.172064	0.090680	1.897487	0.0731
TVSTGDP	+	-0.206360	0.374349	-0.551251	0.5879
DCPBSGDP	+	0.152955	0.049211	3.108148	0.0058
INSPGDP	+	-0.581659	0.200572	-2.899997	0.0092
TFAGDP	+	0.778182	3.543709	0.219595	0.8285
R-squared		0.442178	Mean dependent var		2.667150
Adjusted R-squared		0.324742	S.D. dependent var		2.885401
S.E. of regression		2.371052	Akaike info criterion		4.747596
Sum squared resid		106.8158	Schwarz criterion		4.993024
Log likelihood		-51.97115	Durbin-Watson stat		1.501953

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Model Equation:

Gdppcgr = 1.000 + 0.172Mcapgdp - 0.206tvstgdp + 0.153Dcpbsgdp - 0.582inspgdp + 0.778Tfagdp
(0.0731)* (0.5879) * (0.0058) * (0.0092) * (0.8285) *

*Note : * (p-values)*

As revealed from table 4.4, the two indicators of bank-based financial structure (domestic credit provided by the banking sector as a percentage of gross domestic product and total financial assets as a percentage of gross domestic product) had positive impact on economic growth. While domestic credit provided by the banking sector was found to be significant, total financial asset ratio was non-significant at 5% level of confidence. The impact of market-based financial structure (market capitalization ratio) was found to be positive though had non-significant impact on economy growth, while the total value of shares traded ratio (another measure of market-based financial structure) was negative and non-significant at 5% level of confidence. The insurance penetration as revealed from the regression results indicates that its impact on economic growth was negatively significant at 5% level of confidence.

V. Implications, Conclusion and Recommendations

The results from this paper reveal some interesting aspects of the Nigerian economy. While some sectors exerted greater impact on economic growth, other aspects of the Nigerian financial sector did not show any significant impact on the variable. The impact of the insurance sector on economic growth was found to be negatively significant. Unfavourable macro-economic environment; poor regulatory framework; market suspicion of insurance companies, among others[37], has been blamed as contributing to the poor state of the industry. For the industry to take its place in enhancing economic growth, government needs to create a conducive macro-economic environment for the practice of insurance and reinsurance as it is the lack of these that has led to reduced international interest in the Nigerian insurance industry[38].

Bank-based financial indicators proved to have positive impact on economic growth within the period of the study. The Nigerian banking sector has proved to contribute significantly to economic growth in Nigeria. This may be connected to the various reform policies over the years put in place by the monetary authorities most notably in 2005 through the consolidation exercise and the subsequent post-consolidation reforms all aimed at ensuring a well functioning and effective financial system. A well functioning financial system creates an enabling environment for the mobilization of household savings, allocation of resources efficiently, assisting in diversifying risk, and enhancing the flow of liquidity, reduction of information asymmetry and transaction cost as well as providing an alternative to raising funds through individual savings and retained earnings. The post-consolidation reforms in Nigeria's banking sector have increased focus on risk management procedures and healthy corporate governance among the Nigerian banking industry.

These have subsequently strengthened and repositioned the banking industry in contributing effectively and efficiently to the development of the Nigerian economy through its intermediation functions[39].

The capital market is a network of specialized financial institutions, series of mechanisms, processes and infrastructure that, in various ways, facilitate the bringing together of suppliers and users of long term capital for investment in socio-economic developmental projects[40]. It has been shown that large stock markets can decrease the cost of mobilizing savings, thus facilitating investment in most productive techno-logies[41] and at the same time the stock market liquidity enables investors to trade equity easily is crucial for growth[42]. Findings of this study reveal that, market capitalization ratio had positive though non-significant impact while the total value of shares traded ratio was negative. This indicates that the confidence level of investors on the ability of the capital market to provide the much needed liquidity which investors craved for has not been fully realized. Greater efforts should therefore, be made by regulators such as the Nigerian Stock Exchange (NSE) and the Securities and Exchange Commission (SEC) to ensure that confidence of operators as well as investors are enhanced in the system. This will encourage investor to invest in the market which will obviously lead to increased pro-ductivity by various sectors of the Nigeria economy.

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Study of the Trilemma Policies and their Impacts on Inflation, Growth and Volatility for Brazil

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Abstract - This paper finds support for the trilemma for Brazil, suggesting that the three trilemma policies are binding and constrained. Adopting an independently floating exchange rate regime, Brazil has pursued the policy combination of monetary independence and financial integration in recent years. More exchange rate stability or more financial integration reduces the inflation rate, and more financial integration reduces inflation volatility. More monetary inde-pendence reduces the growth rate. More financial integration reduces output volatility. Hence, more exchange rate stability and more financial integration produce positive benefits whereas more monetary independence yields a negative impact on the growth rate.

Keywords : *trilemma; exchange rate stability; monetary independence; financial integration; inflation; growth; volatility.*

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I. Introduction

Many countries have considered or applied exchange rate stability, monetary autonomy and free capital mobility in order to protect the value of their currency, engage in monetary tightening or easing to dampen an over-heated economy or to improve a sluggish economy, and attract foreign investments to promote economic growth. The trilemma of international economics and finance suggests that only two of these three policies can be achieved simultaneously (Ghosh, Gulde and Ostry, 1997; Edison, Klein, Ricci and Sløk, 2002; Prasad, Rogoff, Wei and Kose, 2003; Levy-Yeyati and Sturzenegger, 2003; Eichengreen and Leblang, 2003; Frankel, Schmukler and Serven, 2004; Shambaugh, 2004; Obstfeld, Shambaugh and Taylor, 2005, 2009, 2010; Henry, 2006; Kose, Prasad, Rogoff and Wei, 2006; Prasad and Rajan, 2008; Aizenman, Chinn and Ito, 2008b, 2011a; Aizenman and Ito, 2012; and others). The U.K. pursues monetary independence and free capital flows and adopts an independently floating exchange rate regime. Hong Kong has a currency board arrangement, permits free capital mobility, and allows the internal interest rate to follow the world interest rate. China pursues a crawling peg exchange rate system and independent monetary policy and imposes some controls on international capital flows.

This paper tests the trilemma hypothesis and examines potential effects of these three trilemma policies on inflation, economic growth, inflation volatility and output volatility for Brazil. The study of this subject is important. Brazil is the largest country in South America and is expected to consider whether the trilemma policies would result in low inflation, high economic growth and less volatility.

Several recent studies have examined the related subjects. Based on a sample of 155 countries including Brazil during 1973–2000, Shambaugh (2004) shows that the trilemma is a reasonable guide for policy study, that countries adopting fixed exchange rates would follow the interest rate in the base country more closely than countries pursing floating exchange rates, and that monetary autonomy would decrease due to the pursuit of a fixed exchange rate regime.

Based on a sample of 18 industrial countries and 28 developing countries, Frankel, Schmukler and Serven (2004) find that although several large advanced countries can select their own rates over the long run, most other countries with flexible exchange rates react fully to international interest rates in the long run. In the short run, countries with flexible exchange rates respond to international interest rates with slower speed, suggesting that they possess some degree of monetary autonomy.

Using a multi-country sample including Brazil in the post-Bretton Woods data, Obstfeld, Shambaugh and Taylor (2005) reveal that the trilemma can be considered as a guide for macroeconomic policy framework. Countries without pegging exchange rates and capital controls would retain sufficient amount of monetary autonomy whereas countries pegging exchange rates and not having capital controls would lose significant monetary autonomy.

Using a large sample of 179 countries including Brazil, Aizenman, Chinn and Ito (2008b) indicate that greater exchange rate stability leads to more inflation or output volatility and a lower inflation rate; greater monetary independence results in higher inflation; and more financial integration lowers the inflation rate. Aizenman, Chinn and Ito (2011a) state that those emerging market countries with more converged policies and relatively large foreign reserves would experience less output volatility whereas those countries with relatively low foreign reserves would suffer more output volatility. Aizenman and Ito (2012) find that the three macroeconomic policies in emerging economies are converging toward an intermediate ground as they

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pursue managed exchange rates backed up by large international reserves, some degree of monetary autonomy, and restrained financial integration. These emerging economies experience less output fluctuations whereas emerging economies with relatively low international reserves as a percent of GDP would suffer relatively high output fluctuations if they select policy divergence.

a) The Model

Extending Aizenman, Chinn and Ito (2008b, 2011a), Aizenman and Ito (2012) and other previous studies, we can express the trilemma equation as:

$$K = f(ES_t, MI_t, FI_t) \quad (1)$$

where

K = a constant,
ES = exchange rate stability,
MI = monetary independence, and
FI = financial integration or free capital mobility.

If the goodness of fit in equation (1) is relatively high, it suggests that these tree policies are binding and constrained. An increase in the value of one of the trilemma policies will reduce the value of one or both of the other policies. Note that equation (1) is written in the general form because different functional forms such as the linear, log-log, log-linear and linear-log relationships will be considered and tested.

We test potential impacts of exchange rate stability, monetary independence and financial integration on the inflation rate, the growth rate of real GDP, inflation volatility and output volatility:

$$Y_t = h(ES_t, MI_t, FI_t) \quad (2)$$

Where Y represents one of the following dependent variables

π = the inflation rate,
GY = the growth rate of real GDP,
VI = inflation volatility, and
VY = output volatility.

More exchange rate stability is expected to stabilize the currency value and price level, reduce uncertainty, and help economic growth. On the other hand, more exchange rate stability may increase or reduce inflation or inflation volatility, depending upon whether the pegged anchor currency would appreciate, depreciate or be volatile. Depending upon monetary easing or tightening, the timing and the magnitude, more monetary independence may increase or reduce the inflation rate, the growth rate of real GDP, inflation volatility and output volatility. More capital inflows are expected to increase aggregate demand and the supply of funds, reduce lending rates, help economic growth, and may increase or reduce the inflation rate or inflation volatility. However, large amounts of abrupt capital outflows would reduce aggregate demand, destabilize an economy, cause currency depreciation, hurt economic growth, and may increase or reduce the inflation rate or inflation volatility (Chinn and Ito, 2008b; Aizenman, Chinn and Ito, 2011a; Aizenman and Ito, 2012).

b) Empirical Results

ES, MI and FI are obtained from Aizenman, Chinn and Ito (2008b, 2010, 2011b) and Chinn and Ito (2006, 2008) and have values ranging from zero to one. A higher value of ES, MI or FI indicates more exchange rate stability, monetary independence or financial integration. Exchange rate stability is represented by:

$$ES = 0.01/[0.01 + s(\Delta \log(\varepsilon))] \quad (3)$$

Where s and ε stand for the standard deviation and the nominal exchange rate. Monetary independence is measured by:

$$MI = 0.5 - c(i, i^*)/2 \quad (4)$$

Where c, i and i* stand for the correlation coefficient, the money market rate in Brazil and the money market rate in the U.S. The index for financial integration is derived from the information regarding the requirement of the surrender of export proceeds, the presence of multiple exchange rates, and restrictions on current and capital account transactions, which are published by the International Monetary Fund. π is represented by the percent change in the consumer price index. VI is represented by the standard deviation of the inflation rate over a five-year period. GY is measured by the percent change in real GDP. VY is measured by the standard deviation of GY over a five-year period. The consumer price index and real GDP are obtained from the International Financial Statistics published by the International Monetary Fund and updated based on the data from the Central Bank of Brazil. The sample period ranges from 1970 to 2010.

In Table 1, the trilemma equation is estimated for the linear, log-log, log-linear and linear-log relationships. To avoid any negative values when a logarithmic scale is used, a value of 2 is added to ES, MI and FI, and a value of 2 is assigned to the constant K in equation (1). As shown, relatively high values of R-squared suggest that the goodness of fit is relatively high. Hence, there is support for the trilemma hypothesis, and the three trilemma policies have a tradeoff and are constrained. The coefficients are significant at the 1% level regardless of the functional forms used. The log-linear regression performs better than the linear, log-log and linear-log regressions due to smaller values of the mean absolute percent error or

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Akaike information criterion. The log-log, linear and linear-log regressions rank second, third and fourth, respectively. According to the magnitude of the estimated coefficients in the log-linear regression, Brazil places similar weights on exchange rate stability, monetary independence and financial integration.

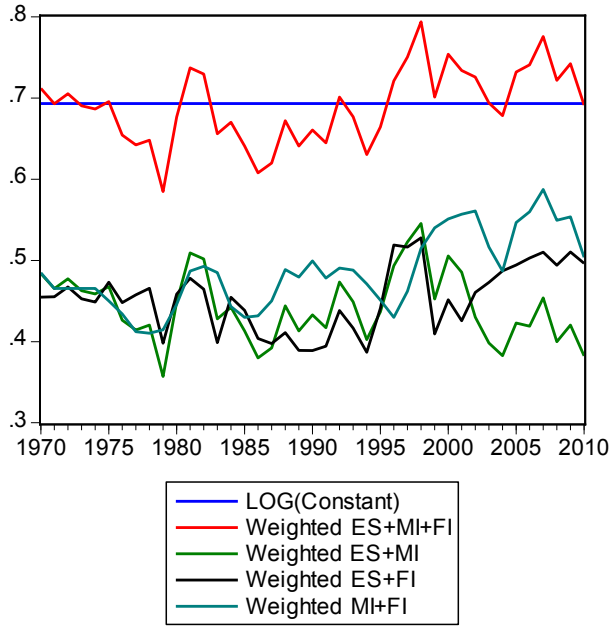
Based on the estimated coefficients in the log-linear regression, Graph 1 presents the logarithmic value of the constant, the predicted value of the regression, and three different policy combinations, namely, exchange rate stability and monetary independence, exchange rate stability and financial integration, and monetary independence and financial integration. The policy mix of exchange rate stability and monetary independence had been dominant during 1997-1998. Due to the 1997 Asian crisis and 1998 Russian crisis, the Brazilian authority switched from an adjustable band exchange rate regime to an independently floating exchange rate regime on February 1, 1999. Since 1999, the policy combination of monetary independence and financial integration has been prevalent. At present, the policy mix of exchange rate stability and financial integration ranks second whereas the policy combination of exchange rate stability and monetary independence ranks third.

Table 1 : Estimated Regressions for the Trilemma Test

Variables	Linear	Log-log	Log-linear	Linear-log
Exchange rate stability	0.438[a] (4.395)	0.629[a] (4.289)	0.152[a] (4.395)	1.816[a] (4.289)
Monetary independence	0.457[a] (4.318)	0.885[a] (6.000)	0.159[a] (4.318)	2.554[a] (6.000)
Financial integration	0.579[a] (4.392)	0.657[a] (4.615)	0.201[a] (4.392)	1.895[a] (4.615)
R^2	0.9983	0.9977	0.9983	0.9977
AIC	-1.067	-0.860	-3.187	1.259
MAPE	5.334	11.324	3.688	16.803

Notes : Figures in the parenthesis are t-statistics. Superscript letter a indicates that a coefficient is significant at the 1% level. There is no intercept in the estimated regression. In the log-linear form, the dependent variable is transformed into the logarithmic scale. In the linear-log form, the independent variables are transformed into the logarithmic scale. Sample period: 1970-2010.

Graph 1 : Analysis of Different Policy Combinations



Note: ES, MI and FI stand for exchange rate stability, monetary independence and financial integration, respectively.

As Table 2 shows, the regressions for the inflation rate and inflation volatility have higher explanatory power than the regressions for the growth rate and output volatility. The inflation rate is negatively affected by exchange rate stability and financial integration. More financial integration reduces inflation volatility. More monetary independence reduces the growth rate. Output volatility is negatively associated with financial integration.

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Table 2 : Estimated Regressions for the Inflation Rate, the Growth Rate, Inflation Volatility and Output Volatility

	Inflation Rate	Inflation Volatility	Growth Rate	Output Volatility
Constant	2265.474[a] (3.167)	983.850[c] (2.082)	9.051[a] (3.844)	4.515[a] (3.964)
Exchange rate stability	-1716.093[a] (-2.856)	558.734 (1.529)	0.057 (0.021)	-0.022 (-0.019)
Monetary independence	-675.521 (-0.867)	-561.058 (-1.503)	-8.884[a] (-2.936)	-1.033 (-0.749)
Financial integration	-2980.051[a] (-3.618)	-1526.433[b] (-2.779)	-1.846 (-0.514)	-3.916[a] (-3.244)
R^2	0.490	0.817	0.203	0.280

Notes: Figures in the parenthesis are t- statistics. The superscript a, b or c indicates that the coefficient is significant at the 1%, 5% or 10% level. Sample period: 1970-2010.

II. Summary and Conclusions

This paper has tested the trilemma hypothesis that only two of the three trilemma policies can be achieved simultaneously and studied their potential impacts on inflation, growth and volatility for Brazil. It has found support for the trilemma for Brazil, implying that the relationship among exchange rate stability, monetary independence and financial integration is constrained and binding. The policy combination of monetary independence and financial integration has been prevalent since 1999. More exchange rate stability reduces the inflation rate. More monetary independence reduces the growth rate whereas more financial integration reduces the inflation rate, inflation volatility and output volatility. In comparison, the findings that more exchange rate stability or more financial integration reduces the inflation rate are similar to that reported by Aizenman, Chinn and Ito (2008b). Other results in the paper are different from those found by Aizenman, Chinn and Ito (2008b). Therefore, a study of the trilemma and impacts of the trilemma policies for an individual country may generate different outcomes from those studies based on a pooled data with a large number of countries.

There are several policy implications. The adoption of an independently floating exchange rate policy makes it possible for Brazil to pursue the policy combination of monetary independence and financial integration. As the annual inflation rate of 5.81% and the money market rate of 10.87% in December 2011 in Brazil are higher than those in most advanced countries, there may be room for a change in monetary policy so that positive benefits would be achieved. While an independently floating exchange rate regime is expected to result in a fair value of the *real* exchange rate, large exchange rate volatility may lead to more inflation or output volatility. Brazil may continue to achieve more financial integration as it yields positive benefits. When there are more sample data, these regressions may need to be re-estimated in order to determine whether the results would remain similar.

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The Competitiveness Dynamics in the Eurozone

By Antonin Rusek
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Abstract - The goal of this paper is to analyze the long term dynamics of the competitiveness in the individual Eurozone countries and to estimate how their competitiveness is affected by the dynamics of both external (i.e. the current account) and internal (the fiscal stance and the credit dynamics) positions. It is today in creasingly recognized that the diverging competitiveness between the Eurozone members is at the root of the current crisis. But the competitiveness dynamics and how it is impacted by the crucial fiscal and financial variables during the common currency existence is seldom analyzed and compared, especially as far as the different countries are concerned. This paper aims to contribute to filling this gap.

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The Competitiveness Dynamics in the Eurozone

Antonin Rusek

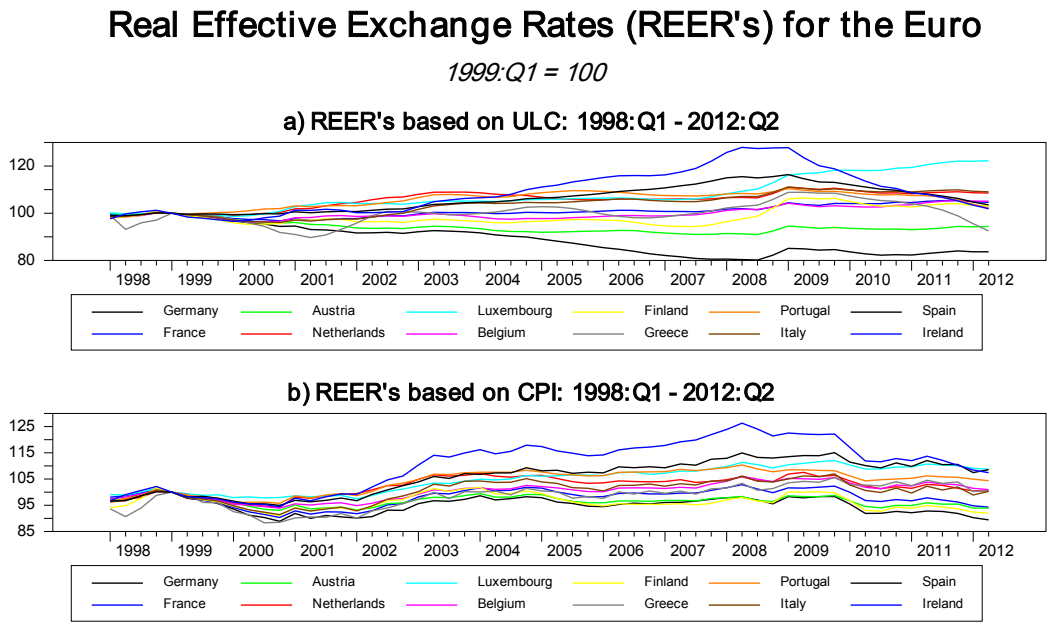
Abstract - The goal of this paper is to analyze the long term dynamics of the competitiveness in the individual Eurozone countries and to estimate how their competitiveness is affected by the dynamics of both external (i.e. the current account) and internal (the fiscal stance and the credit dynamics) positions.

It is today increasingly recognized that the diverging competitiveness between the Eurozone members is at the root of the current crisis. But the competitiveness dynamics and how it is impacted by the crucial fiscal and financial variables during the common currency existence is seldom analyzed and compared, especially as far as the different countries are concerned. This paper aims to contribute to filling this gap.

I. Introduction

In the first 10 years of its existence, the common European currency (Euro) appeared to be highly successful (DG ECOFIN, 2008). Indeed, the problems existed but were considered to be either insignificant or solvable. Most visible at the time were the divergences in competitiveness as measured by both the unit labor costs based or the CPI based real effective exchange rates – REERs. (Figure 1).

Figure 1



However, these were usually explained by pointing out that the Germany entered the Eurozone with the overvalued exchange rate, hence the observed divergencies were actually equilibriating processes. This explanation (false, as it turned out) was sometimes supplemented by pointing out at the possibility (and desirability) of the Ballasa–Samuelson phenomenon to be expected in the economically less advanced Mediterranean counties, together with possible statistical biases as a consequence of the structural changes associated with the advancing globalization processes. (For the more detailed discussion, see Rusek, 2012.)

The fastly diverging current account positions (growing deficits of countries on the Mediterranean littoral and growing surpluses especially in Germany) were attributed to the "catching up" processes and (to a lesser degree) to the observed German economic malaise (Sinn, 2007). At any case, the prevailing theory maintained that current account positions play no role within the currency union. Similarly, the persistent inflationary differentials – especially between the Mediterranean countries and Germany – were attributed to both the catching up processes and the structural inertia. Basically nothing to be concerned about as long as the overall inflation in the Eurozone remained close to the ECB target of 2% (even if this target was more often than not exceeded, causing some uneasiness).

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On the other side, the expansion (the "Europanization") of the large European banks outside their home countries, together with the development of the Eurozone-wide government and commercial bonds market and the continuous reduction in the "home bias" of financial asset holders were hailed as the common currency successes. In the opinion of many, these developments heralded the arrival of the Euro on the international scene as the equal (and perhaps, in the not so distant future, the successor) of the US dollar.

There were, indeed, the matters of concern. The sluggishness of the German economy (till 2006) was the major one. So was an increased international competition on some markets (sometimes referred to as the "impact of globalization"). It was felt that the "underperformance" of the major EU economy combined with the need to stay competitive with emerging markets may pose a threat (even if undefined) to the cherished "European" economic and social model. Finally, the Stability and Growth Pact (concluded in 1997 to provide a fiscal underpinning to the common currency arrangement) appeared to be under some pressure.

When the "problems" were recognized the effort was made to find remedies within the confines of the common currency. The German reforms of the labor markets and (to a degree) the welfare state (known as the Hartz IV and enacted in 2004) were successful. German economy re-acquired it dynamism (in the European scale and context) in 2006, mostly via an increased flexibility and global competitiveness. The globalization impact was to be addressed by adopting the so called Lisbon Agenda (March 2000 – please do not confuse with the Lisbon Treaty of 2009). This agenda aimed at "making the EU the most competitive and dynamic knowledge-driven economy by 2010". (Euractiv, 2004.) Finally, the SGP was revised (practically, watered down) in 2005.

Nevertheless, one has to distinguish between the "problems being addressed" and the "problems being solved". Whereas the German Hartz IV reforms were undoubtedly successful for Germany, the Lisbon Agenda failed and with the onset of the ongoing crisis was for all practical purposes abandoned. Revised SGP was the subject of controversy from its inception, but it mitigated tensions and incipient conflicts.

Given the above outlined dynamics – including its political and institutional elements – how did it happen that the Euro, successful in its first 11 years, is today often doubted and many analysts question its survival in its current form? To answer this question, let us look at the actual interplay of economic dynamics, institutions and politics during the first decade of the Euro's existence.

II. Economic Dynamics

The first effect of the common currency was the convergence of the nominal interest rates. This result is understandable as long as markets consider the Eurozone an area where risks between different asset issuers (member countries) are very similar. Arbitrage then imposes an uniform return on the assets of the same currency denomination and (perceived) very similar risk properties.

Inflation remained close (but often above) the ECB's target rate. However, within this overall number the persistent differences between the North and the Mediterranean littoral remained. This phenomenon requires more research, however one may surmise that the goods arbitrage remained imperfect in the spatially separated markets, supporting the price setting inertia (a tradition of higher inflation) in the South (the Mediterranean littoral countries).

The combination of those two phenomena resulted in the diverging real interest rates – the Southern (Mediterranean) ones being significantly less than the Northern ones. This, indeed, increased the "Southern" demand for credit, accelerating the economic growth and hence increasing the tax receipts. Spain and Ireland run large budget surpluses, reducing significantly their debt to GDP ratios. Italy achieved a primary surplus. After violating SGP criteria at the beginning of the 2000's, Portugal achieved a budgetary stability. Only Greece remained a significant public finance problem, but it was not known at the time (even if suspicions existed).

The increase in credit was financed by the domestic banks which in turn obtained resources on the interbank markets – i.e. basically by tapping the "Northern" savings. Statistically, this phenomenon appeared as the capital inflow – i.e. the current account deficits.

However, this dynamics had important effects which remained unnoticed (or noticed but ignored) at the time. Most of the capital inflow financed the increase in consumption, especially in housing and related consumer durables. Given the generally lower consumption and the lower quality of the housing stock of the "Southern" countries, this kind of behavior may be sociologically and psychologically understandable, nevertheless…. Capital inflows maintained the domestic demand, a significant part of which fell on the non-tradeables sector. Combined with the labor markets rigidities, this tended to increase both employment and wages. However, the growth was mostly in the low productivity sectors (construction and services). Hence the unit labor costs (ULC) increased and the REERs based on ULC tended to appreciate. Simultaneously the Hartz IV reforms in Germany led to the (statistically observed) wage restraint and increases in productivity – i.e. the German ULC based REER tended to depreciate. These two phenomena led to the increase of the competitiveness gap between the "North" and "South". Moreover, the capital inflow induced demand (and wage and credit) expansion in the South tended to perpetuate

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the inflation and hence the real interest rate differentials. This prolonged the just described processes and led to increased "North-South" divergencies.

III. REER's Determination – In Lieu of a Model

There is no generally accepted model which would formulate the determination of the REER's (or even a bilateral real exchange rate) in the context of an economic dynamics.

Recent studies (Akmal, et al. 2012, Combes et al. 2010, Mirdala, 2010) analyzed the real exchange rates (for developing and transition countries) as the function of economic fundamentals, even if the actual choice of relevant variables differed.

In this analysis we follow this approach, with the choice of the relevant economic fundamentals cum explanatory variables guided by the discussion of the Eurozone's economic dynamics above.

Eurostat reports two types of the real effective exchange rates – one based on the unit labor costs (ULC), other based on consumer prices. In our analysis we concentrate on the ULC based variable, which, in our opinion, better reflects the main interest of this paper – the competitiveness.

Real effective exchange rate (REER) is the weighted average of the bilateral exchange rates with major trading partners, with trade volumes as weights. Bilateral real exchange rate based on the ULC is the product of the nominal exchange rate and the ratio of the unit labor costs measures. Eurostat calculates the REER's for the individual countries as indexes. In their approach an increase in the relevant index indicates REER appreciation. Decrease then indicates (the real) depreciation.

Consequently, in cross-country comparisons, higher (and/or increasing) REER indicates the loss of competitiveness and vice versa.

"Fundamental" variables used in the empirical analysis are: debt to GDP ratio (Debt), unemployment (Unemp), current account to GDP ratio (CUGDP), net foreign investments to GDP ratio (NFIGDP), labor productivity per person (LPP), total labor costs (TLC) and the credit to non-financial institutions outstanding to GDP ratio (CRGDP).

This choice reflects the need to include both financial and non-financial variables and the impact of both public and private sector. (It should be noted that the choice was constrained by both the availability of variables and the need for consistency).

The debt variable (DEBT) reflects the impact of the public expenditures on the aggregate demand and hence on both the income and GDP dynamics. If the GDP impact dominates the income effect (labor costs) the ULC decline and the competitiveness improves – and vice versa. (I.e. the estimated sign can be either positive or negative.) The debt to GDP ratio was preferred to the net surplus to GDP ratio because the latter is rather unstable and volatile in the quarterly observations.

The unemployment variable (UNEMP) effects both overall labor expenditures and GDP as well. Here, if the GDP effect (negative) dominates the ULC increases and competitiveness declines and vice versa. (Again, the estimated sign can be either positive or negative).

The current account to GDP ratio (CUGDP) reflects the impact of capital flows (current account is the negative of net capital inflows) on domestic demand – hence both the labor costs and the GDP. The net impact can be again either positive or negative, depending on the relative roles of GDP and labor costs.

The net foreign investments to GDP variable (NFIGDP) most likely reflect the impact of the changing domestic savings – investment nexus.

An increase in the labor productivity per person (LPP) should reduce the unit labor costs and hence to result in a real depreciation (decline in REER). However, in the context of European economic structure it is possible that in some countries the productivity increases result in higher wages and more leisure (i.e. relatively less GDP). It is then possible that ULC actually increase, resulting in REER appreciation.

An increase in total labor costs (TLC) implies higher ULC and hence the REER appreciation.

Finally, the total credit to nonfinancial institutions as a share of GDP (CRGDP) variable reflects the impact of the private expenditures on the aggregate demand and hence on both the income and GDP dynamics. Its impact on REER is similar to the debt variable discussed above.

IV. Estimation and Results

The extensive interdependencies and feedbacks between the variables would suggest the VAR methodology as the appropriate estimation technique. However, given the quarterly frequency of variables (REER's are reported only quarterly), the potentially significant contemporaneous effects between variables cannot be excluded ex ante. That, indeed, renders the VAR approach infeasible. Hence the single equation approach was selected, specifying the REER as the function of the above elaborated variables (eq.1).

$$REER = \alpha 0 + \alpha 1\ Trend + \alpha 2\ DEBT + \alpha 3\ UNEMP + \alpha 4\ CUGDP + \alpha 5\ NFIGDP + \alpha 6\ LPP + \alpha 7\ TLC + \alpha 8\ CRGDP \quad (1)$$

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The feasibility of this approach was confirmed by testing all variables for stationarity – all variables for all estimated countries were found either stationary or trend stationary.

The adjusted form of eq.1 was applied (individually) to data for 12 Eurozone countries (Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal). (Remaining 5 countries – Slovenia, Slovakia, Malta, Greek Cyprus and Estonia – joined the Eurozone to late to provide enough data for an empirical analysis.) The data used are in the quarterly frequency, spanning the 1999:Q1 to 2012:Q2 period (the data available at the time of writing). For the each country, the REER was specified as the function of the constant, trend, 3 own lags and the contemporaneous value and two lags of the each explanatory variable.

The STWISE procedure from the RATS software was used to perform the estimation. This procedure evaluates the estimated coefficients on the cross-recursive basis and provides the result which includes the statistically significant variables only. Using the SUMMARIZE utility of RATS, the summary values and significance levels (over all observations found statistically significant by the STWISE procedure for each variable) were estimated for all explanatory variables specified above.

The results are reported in Table 1. The lack of uniformity across the countries is to be expected, however, some results are somewhat surprising, given the prevailing conventional wisdom.

Debt variable displays the positive coefficient (i.e. an increase in the debt to GDP ratio tends to appreciate REER) for Austria, Germany, Finland and Luxembourg, whereas the negative coefficient (an increase in debt to GDP ratio tends to depreciate REER) is estimated for Spain, Ireland, Italy and Netherlands. This indicates that in the latter countries an increase in public expenditures increases GDP faster than the wage bill, which tends to increase macroeconomic competitiveness. In all other countries the public debt to GDP ratio does not affect the competitiveness – the result of some significance especially for the Greece and Portugal.

Unemployment variable is negative for Belgium, Spain, Finland, France, Greece, Netherlands and Portugal, positive for Austria and no impact for Germany, Ireland, Italy and Luxembourg.

Table 1 : Estimates for the REER's based on the ULC

Variable	Con	Trend	RXULC	Debt	Unemp	CUGDP	NFIGDP	LPP	TLC	CRGDP
Country										
AT			0.966	0.023	0.170			0.007		
			(74.69)	(1.41)	(1.33)			(0.52)		
			1	2				0 2		
BE			0.924		-0.124	-0.033	0.004	0.097	-0.017	
			(35.76)		(1.47)	(1.96)	(2.20)	(3.84)	(2.83)	
			1 2		2	1	1 2	0 to 2	2	
DE			0.877	0.047		-0.108	-0.006			0.111
			(30.7)	(2.04)		(2.75)	(1.29)			(4.44)
			1 2	1			0 to 2			
ES			0.929	-0.59	-0.130			0.122		
			(29.6)	(2.57)	(4.12)			(2.94)		
			1 to 3		1			2		
FI			1.007	0.143	-0.872	0.067		0.008	0.026	-0.105
			(28.02)	(4.54)	(3.58)	(3.25)		(0.45)	(2.03)	(4.10)
			1 2	0 to 2	0 1	2		0 1	0 1	1
FR			1.009		-0.201		0.010			0.018
			(100.9)		(2.42)		(2.93)			(2.11)
			1 to 3		0 1		2			2
GR		-0.123	0.787		-0.20			0.222		0.067
		(5.15)	(22.05)		(3.32)			(6.79)		(2.10)
			1 3		0 2			0 2		
IE			0.880	-0.040			0.003	0.105		0.029
			(32.21)	(4.45)			(1.67)	(4.31)		3.48)
			1 2	0 2			0 2	2		
IT	60.16		0.729	-0.074		-0.45	-0.018	-0.285	0.061	-0.103
	(8.79)		(18.98)	(5.95)		(6.66)	(3.67)	(6.40)	(6.66)	(4.69)
			1	2		0 1	2		0 1	1
LU	21.78		0.78	0.080		0.036		-0.076	0.063	
	(3.86)		(17.54)	(2.23)		(1.70)		(2.07)	(4.27)	

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			1 2			0 to 2		0 2	0 2	
NL	68.59	0.135	0.817	-0.117	-0.048	-0.098		-0.436		
	5.44)	5.28)	(14.68)	(5.72)	(0.36)	(3.42)		(5.23)		
			1 3	0 2	1 2	2				
PT			1.023		-0.114			-0.022	0.007	
			(38.95)		(3.68)			(0.82)	(1.80)	
			1 2					0 1	1	

Note : For each country, the numbers in parenthesis in the line below the estimated coefficients are the relevant t-statistics. On the line before that are the lags included in the reported number.

Negative sign indicates that an increase in unemployment affect wage bill relatively more than output – i.e. the recession (an increase in unemployment) increases competitiveness. This result is not entirely unexpected, but it raises a question of the competitiveness dynamics if (or when) the economic growth and employment are restored.

An improvement in the current account to GDP ratio reduces the REER (i.e. it improves the competitiveness) in Belgium, Germany, Italy and Netherlands, increases REER in Finland and Luxembourg and has no impact in the rest of the countries. Indeed, some may argue that this result reflects the reverse causality – from REER to current account. However, the role of the lagged current account observations puts doubt on this argument. Alternatively, we may surmise that the current account improvements reflect the rise of domestic savings relative to domestic investments. That put a damper on the domestic demand, reducing the wage bill relative to GDP and hence reducing (depreciating) the REER. The observations for Finland and Luxembourg then may reflect the shift from domestic demand to exports, which may increase the labor income relative to GDP.

An improvement in net foreign investments to GDP positions improves the competitiveness (reduction in REER) in Germany and Italy, reduces it in Belgium, France and Ireland and leaves the other countries unaffected. Here the explanation probably lays in the causality behind the net foreign investment dynamics. The lack of domestic profitable opportunities may induce an increase in investments abroad, reducing the domestic demand for labor and the wage bill relative to GDP – hence the decline in REER. Alternatively, the raising domestic labor costs may induce the shift of investments abroad, reducing the GDP relative to labor and hence increasing the REER.

The impact of the increases in the labor productivity per person increases REER (i.e. reduces the competitiveness) in Austria, Belgium, Spain, Finland and Ireland, but reduces the REER (i.e. improve the competitiveness) in Italy, Luxembourg, Netherlands and Portugal. No impact is indicated for Germany and France. Indeed, we would expect an increase in productivity to improve the competitiveness. The positive coefficients then may reflect the peculiarities of the labor market (and public policy) functioning. In particular, it would indicate that the productivity gains are dissipated in higher wages and (probably) the reduced work hours reflected then in a lower GDP.

The total labor costs impact is positive for Finland, Italy, Luxembourg and Portugal, negative for Belgium and neutral (i.e. zero) for all other countries. This is indeed to be expected – an increase in the total labor costs should have a negative (or, at best, the neutral) impact on the competitiveness in the globalized world economy. The estimate for Belgium is an anomaly, probably to be explained by the special characteristics of the Belgium labor markets.

Finally, the total credit to nonfinancial institutions as a share of GDP variable has positive coefficients for Germany, France, Greece and Ireland, negative coefficients for Finland and Italy and zero coefficients for the rest. The positive coefficients (REER appreciation) imply that domestic credit expansion affects wages more than GDP (i.e. credit is more likely for households rather than productive investments). and indeed, the vice versa.

V. Conclusion

The discussion above indicates that REERs for the Eurozone countries are influenced by the widely differering variables. Not all variables considered influence individual REERs and the impact of the same variables is often in opposite direction for different individual countries. The only variable with the common impact (its increase reduces REER – hence it improves the competitiveness) is unemployment.

The implication of this finding is that the current stabilization policies of a fiscal restraint may improve the competitiveness via rising unemployment – which is probably behind the recent competitiveness "improvements" in the Mediterranean littoral countries (especially Greece, but Spain and Portugal as well). Debt reduction per se improves competitiveness in Spain, Ireland and Italy, but has no measurable impact for Greece and Portugal.

The other side of the coin is: what happens if (and when) the growth returns and the unemployment declines. Will the competitiveness divergencies return? And if so, what will be the impact on the long run stability and convergence on the Eurozone itself?

It appears that the structural changes basically across the board, of the sort which channels the

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improvements in productivity and the current account and the credit expansion (i.e. the basic elements of restored growth and employment) into the reduction of the unit labor costs, are absolutely necessary to address the competitiveness divergence issue.

It should always be kept in mind that unless the diverging competitiveness is addressed on the medium to long term basis, the Eurozone in its current configuration is unlikely to survive the next electoral cycle.

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Title: The title page must carry an instructive title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) wherever the work was carried out. The full postal address in addition with the e-mail address of related author must be given. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining and indexing.

Abstract, used in Original Papers and Reviews:

Optimizing Abstract for Search Engines

Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

Tables, Figures and Figure Legends

Tables: Tables should be few in number, cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g. Table 4, a self-explanatory caption and be on a separate sheet. Vertical lines should not be used.

Figures: Figures are supposed to be submitted as separate files. Always take in a citation in the text for each figure using Arabic numbers, e.g. Fig. 4. Artwork must be submitted online in electronic form by e-mailing them.

Preparation of Electronic Figures for Publication

Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs) : >350 dpi; figures containing both halftone and line images: >650 dpi.

Color Charges: It is the rule of the Global Journals Inc. (US) for authors to pay the full cost for the reproduction of their color artwork. Hence, please note that, if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a color work agreement form before your paper can be published.

Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.

6. AFTER ACCEPTANCE

Upon approval of a paper for publication, the manuscript will be forwarded to the dean, who is responsible for the publication of the Global Journals Inc. (US).

6.1 Proof Corrections

The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

Acrobat Reader will be required in order to read this file. This software can be downloaded

(Free of charge) from the following website:

www.adobe.com/products/acrobat/readstep2.html. This will facilitate the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof.

Proofs must be returned to the dean at dean@globaljournals.org within three days of receipt.

As changes to proofs are costly, we inquire that you only correct typesetting errors. All illustrations are retained by the publisher. Please note that the authors are responsible for all statements made in their work, including changes made by the copy editor.

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6.4 Author Material Archive Policy

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You must strictly follow above Author Guidelines before submitting your paper or else we will not at all be responsible for any corrections in future in any of the way.

Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. Pick a good study spot: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

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

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

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

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27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After 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 though which your research is going to be in print to 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 in 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 criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of 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 the 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 evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

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

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing 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 approach 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. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than 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 maintain the initial two items to no more than one ruling each.

- Reason of the study - 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 quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness 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 to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled 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 with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose 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 sound written Procedures segment allows a capable scientist to replacement 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 for the least amount of information that would permit another capable scientist to spare 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 object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text 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:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not 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 - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in 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 a 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. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

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Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise 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 in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to 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 part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a 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 implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly 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 with prospect, and let it drop at that.

- Make a decision if each premise is supported, 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 the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One 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 available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Administration Rules Listed Before Submitting Your Research Paper to Global Journals Inc. (US)

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Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

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Criterion for Grading a Research Paper (Compilation)
by Global Journals Inc. (US)

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	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
Introduction	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
Methods and Procedures	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
Result	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
Discussion	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
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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