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Minimizing the Impact of Forecast Error on Government Monetary and Fiscal Policy through Forecasting Software

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Abstract: Forecasting is an important part of governments' monetary and fiscal policies. Every forward-looking government uses economic forecasting as a necessary prerequisite for the success of its monetary and fiscal policies. Though economic forecasts are necessary, as they are essential underlying features of governments' monetary and fiscal policies, economic forecasting is a difficult task. The difficulty in economic forecasting arises from the interplay of variables which certainly produces forecast errors. This study focused on minimizing the impact of forecast error on government monetary and fiscal policies through the use of suitable forecasting software. Hence in this study, forecasting software are examined as necessary tools for minimizing the impact of forecast errors on governments' monetary and fiscal policies. Data is collected from both primary and secondary sources to elicit useful information from stakeholders in Forecasting Industry. The result of the study shows that there is a positive relationship between the use of forecasting software and minimizing the impact of forecast error on governments' monetary and fiscal policies. The study revealed that the use of sound software, devoid of mathematical errors and inappropriate methods, will minimize the impact of forecast error on governments' monetary and fiscal policies. The study also revealed that the major way to ensure an effective forecasting process and reduce forecast errors is to make use of intelligent forecast software that raises forecast accuracy.

Keywords: monetary and fiscal policy, economic forecasting, forecasters, forecastability, forecast error and forecast accuracy.

1 INTRODUCTION

There are no perfect forecasts; they always contain some error. Though it is a well known fact that there is no perfect forecast, it is nonetheless important to emphasize this fact at the onset. Forecasting is a process, and like any other process, it has inputs, outputs, objectives and owners. Forecasting is measurable and is applied to bring benefits to its owner(s). Better processes generally yield better results; analogously, better forecasting processes yield better forecasts. In the words of Diebold [1] "Forecasting is important - forecasts are constantly made in business, finance, economics, government, and many other fields, and they guide many important decisions. As with anything else, there are good and bad ways to forecast."

The danger of not having an effective forecasting process is that everyone is forecasting and every forecast is different. What every economy needs is one set of numbers with which every economic policy maker can operate. This set of numbers should be developed using an effective forecasting process. Forecast error is an inevitable occurrence in the forecast process. Factors like randomness, variation, uncertainty of forecast variables guarantees the inevitability of forecast error. What is important is to reduce the error, and to focus on the most effective process of reducing the error. Challenges in business forecasting, such as increasing accuracy and reducing bias, are best met through effective management of the forecasting process. Effective management, we believe, requires an understanding of the realities, limitations, and principles fundamental to the process. When management lacks a grasp of basic concepts like randomness, variation, uncertainty, and forecastability, the organization is apt to squander time and resources on expensive and unsuccessful fixes [2].

Economic forecasting as a prerequisite for a forward-looking macroeconomic policy has come to stay. Governments use economic forecasting to frame their monetary and fiscal policies. However, in producing and using economic forecasts, it is important for governments to be aware of the limitations of such forecasts mainly due to the impact of forecast errors. Such awareness will enable government to focus on the most effective process of reducing forecast error while choosing a given forecasting technique.

Therefore, the main objectives of this study among others are:

i. To identify the various techniques used in economic forecasting.

ii. To identify the causes of error in economic forecasting.

iii. To identify ways of improving forecast accuracy.

iv. To elucidate the ways of minimizing the impact of forecast error on government's monetary and fiscal policies.

This study in relevant in identifying the economic variabilities that limit forecast accuracy and in so doing, identifies ways of minimizing the impact of forecast errors on government's monetary and fiscal policies.

2. LITERATURE REVIEW

2.1 Forecasting (Definition and Evolution)

Forecasting is about predicting the future as accurately as possible given all the information available including historical data and knowledge of any future that might impact the forecasts [3]. Forecasting is estimating how the sequence of observations will continue into the future [3]. Economic forecasting is both a science and an art. It is a science in the sense that the rightful application of statistical tools will definitely improve forecasting accuracy. It is an art in the sense that empirical data seldom provide an unequivocal answer, so the user must choose between alternative relationships to select those equations that will provide the most accurate forecasts.

Forecasting is as old as man. The process of foresight has always been primary for humans. Blessed with the ability to perceive linear time, mankind has always sought to learn from the past and present to improve its lot in the future. Early forecasting by the primitive man was purely reactive or based on the assumption that whatever happened last period would pretty much happen again this period. Lacking reliable information on which to base decisions, the early man turned to drawing inferences from the natural world – identical patterns were identified, analyzed, and turned into actionable insights. This is called Naïve forecasting. Moving forward into the Renaissance and Industrial Age periods, man discovered statistical demand forecasting. This is quite a big leap forward. A time series of previous values could be used to create charts displaying aggregate demand one period after another. It projected forward what happened in the past few periods or simply added X% to the previous number. This discovery led to further advancement in forecasting - fitting curves through historical demand, creating moving averages, and trend lines. Even seasonality could be incorporated into the calculation. In the late twentieth century, predictive analytics were introduced. Demand planning helped by incorporating hierarchical and causal effects into the forecast. A forecast can statistically predict monthly or weekly demand patterns. The twenty-first century saw the emergence of Structured Quantified Forecast. This is a more complex process of forecasting. This process incorporates demand modeling and demand sensing. This system leverages more granular and downstream data to get a cleaner demand signal and reduce volatility and bullwhip effects. It includes techniques that are usually associated with short-term demand sensing to dramatically increase long-term accuracy and reduces the manual intervention to make things works. The most recent development in the forecast industry in this century is the introduction of Machine Learning. This is a form of artificial intelligence that captures and models complex patterns that shape demand signal, enabling forecasters to continuously fine tune the signal-to-noise ratio. This cutting edge technology identifies hidden patterns and trends that are extremely difficult and/or time consuming to uncover through other approaches, such as statistical analytics or human analysis. The results from this system are then used to refine future analysis, automatically making the system smarter and more accurate over time.

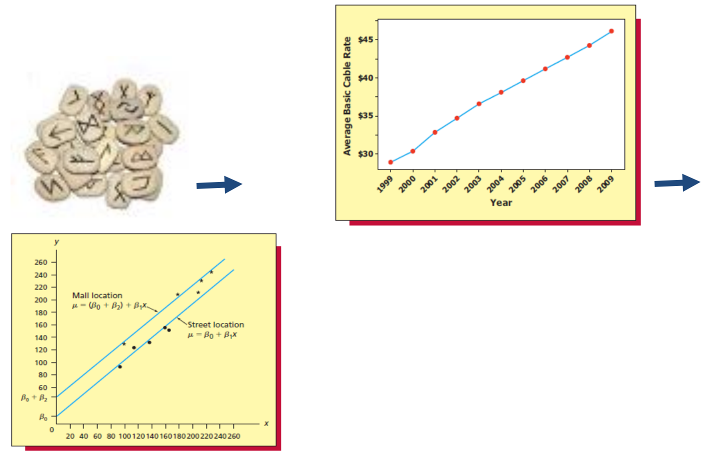


Figure 2.1. Evolution of forecasting from scrutinizing symbols through inventing statistics, predictive analytics to structured, quantified forecasts

2.2 Forecasting Techniques

All forecasting methodologies can be divided into two broad techniques: Qualitative Techniques and Quantitative Techniques. Qualitative techniques are based on expert judgments and opinions. Such techniques are usually employed when historical data on the variable being forecast are either not applied or unavailable. Judgment and opinion forecasts are largely intuitive, and historical analogy relies on comparisons. This technique incorporates soft information (e.g., human factors, personal experiences, personal opinions, hunches, and personal insights) and do not rely on rigorous mathematical computations. There are many types of qualitative forecasting methods, some informal and some structured. Regardless of how structured the process is, however, remember that these models are based on subjective opinion and are not mathematical in nature [4]. Qualitative forecasting methods include executive opinion, market research, and Delphi method. Quantitative methods involve either the projection of historical data or the development of associative models that attempt to utilize causal (explanatory) variables to make a forecast [5]. Quantitative techniques mainly analyze objective, or hard, data and usually avoid personal biases that sometimes contaminate qualitative methods.

Quantitative methods can also be divided into two categories: time series models and causal models. Although both are mathematical, the two categories differ in their assumptions and in the manner in which a forecast is generated [6].

Time series models assume that all the information needed to generate a forecast is contained in the time series of data. A time series is a series of observations taken at regular intervals over a specified period of time. Time series analysis assumes that we can generate a forecast based on patterns in the data. As a forecaster, you would look for patterns such as trend, seasonality, and cycle and use that information to generate a forecast.
Causal models, sometimes called associative models, use a very different logic to generate a forecast. They assume that the variable we wish to forecast is somehow related to other variables

in the environment. The forecaster's job is to discover how these variables are related in mathematical terms and use that information to forecast the future.
Time series models include the following:

(a) Naïve Methods. A naive forecast uses a single previous value of a time series as the basis of a forecast. The naive approach can be used with a stable series (variations around an average), with seasonal variations, or with trend. For data with trend, the forecast is equal to the last value of the series plus or minus the difference between the last two values of the series. For example, suppose the last two values were 50 and 53. The next forecast would be 56 [7]:

Table 2.1. Showing naïve method

Period	**Actual**	**Change from previous value**	**Forecast**
1	50		
2	53	+3	
3			53+3 = 56

(b) Simple Moving Average. One weakness of the naive method is that the forecast just traces the actual data, with a lag of one period; it does not smooth at all. But by expanding the amount of historical data a forecast is based on, this difficulty can be overcome. A simple moving average forecast uses a number of the most recent actual data values in generating a forecast. The simple moving average forecast can be computed using the following equation:

$$F_t = SMAn = \frac{\sum_{i=1}^{n} A_{t-i}}{n} = \frac{A_{t-n} + \dots + A_{t-i} + A_{t-1}}{n}$$

Where,

F_t = Forecast for time period t,
SMAn = n period simple moving average
A_{t-i} = Actual value in period $t-i$
n = Number of periods (data points) in the simple moving average

(c) Weighted Moving Average. A weighted average is similar to a simple moving average, except that it assigns more weight to the most recent values in a time series.

$$F_t = w_t(A_t) + w_{t-1}(A_{t-1}) + \dots + w_{t-n}(A_{t-n})$$

Where,

W_t = Weight for the period t
W_{t-1} = Weight for period $t-1$, etc
A_t = Actual value in period t
A_{t-1} = Actual value for period $t-1$, etc

(d) Exponential Smoothing. Exponential smoothing is a sophisticated weighted averaging method that is still relatively easy to use and understand. Each new forecast is based on the previous forecast plus a percentage of the difference between that forecast and the actual value of the series at that point. That is:

Next forecast = Previous forecast + α(Actual – Previous forecast)

Where (Actual – Previous forecast) represents the forecast error and α is a forecasting error. More concisely,

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

Where,

F_t = Forecast for period t
F_{t-1} = Forecast for the previous period
α = Smoothing constant (percentage)
A_{t-1} = Actual demand for the previous period

Exponential smoothing is one of the most widely used techniques in forecasting, partly because of its ease of calculation and partly because of the ease with which the weighting scheme can be altered - simply by changing the value of α [7].

(e) Trend Analysis. Analysis of trend involves developing an equation that will suitably describe trend. The trend may be linear or nonlinear. One way to describe the trend component is to fit a line visually to a set of points on a graph. Any given graph, however, There are two important techniques that can be used to develop forecasts when trend is present. One involves use of a trend equation; the other is an extension of exponential smoothing.

❖ Trend Line Equation. A linear equation has the form
$F_t = a + b_t$

Where,

F_t = Forecast for period t
a = Value of F_t at $t = 0$
b = Slope of the line
t = Specified number of time periods from $t = 0$

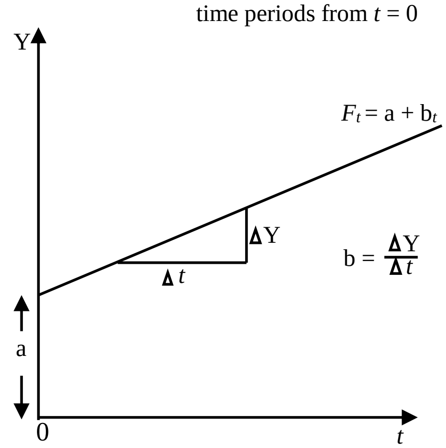


Figure 2.2. Showing trend line equation

- Trend-Adjusted Exponential Smoothing. A variation of simple exponential smoothing can be used when a time series exhibits a linear trend. It is called trend-adjusted exponential smoothing or, sometimes, double smoothing, to differentiate it from simple exponential smoothing, which is appropriate only when data vary around an average or have step or gradual changes. If a series exhibits trend, and simple smoothing is used on it, the forecasts will all lag the trend: If the data are increasing, each forecast will be too low; if decreasing, each forecast will be too high. The trend-adjusted forecast (TAF) is composed of two elements: a smoothed error and a trend factor [7].

$TAF_{t+1} = S_t + T_t$

Where,
S_t = Previous forecast plus smooth error
T_t = Current trend estimate
and,
$S_t = TAF_t = \alpha(A_t - TAF_t)$
$T_t = T_{t-1} + \beta(TAF_t - TAF_{t-1} - T_{t-1})$
Where,
α = Smoothing constant for averaging
β = Smoothing constant for trend

In order to use this method, one must select values of α and β (usually through trial and error) and make a starting forecast and an estimate of trend. Unlike a linear trend line, trend-adjusted smoothing has the ability to adjust to changes in trend. Of course, trend projections are much simpler with a trend line than with trend-adjusted forecasts, so a manager must decide which benefits are most important when choosing between these two techniques for trend.

Causal (Associative) Models include the following:

(a) Linear Regression Models. Linear regression refers to the special class of regression where the relationship between variables forms a straight line. The linear regression line is of the form Y = a + bX, where Y is the value of the dependent variable that we are solving for, a is the Y intercept, b is the slope, and X is the independent variable. (In time series analysis, X is units of time). Linear regression is useful for long-term forecasting of major occurrences and aggregate planning. The major restriction in using linear regression forecasting is, as the name implies, that past data and future projections are assumed to fall about a straight line.

(b) Multiple Regression Models. Multiple regression develops a relationship between a dependent variable and multiple independent variables. The general formula for multiple regression is as follows:

$Y = B_0 + B_1X_1 + B_2X_2 + \ldots + B_kX_k$

Where,
Y = Dependent variable
B_0 = The Y intercept
$B_1 \ldots B_k$ = Coefficients that represents the influence of the independent variables on the dependent variable.
$X_1 \ldots X_k$ = Independent variables.

Multiple regression is a powerful tool for forecasting and should be used when multiple factors influence the variable that is being forecast.

2.3 Causes of Inaccuracy in Forecasting

Accuracy and control of forecasts is a vital aspect of forecasting, so forecasters want to minimize forecast errors. However, the complex nature of most real-world variables makes it almost impossible to correctly predict future values of those variables on a regular basis. Moreover, because random variation is always present, there will always be some residual error, even if all other factors have been accounted for. Consequently, it is important to include an indication of the extent to which the forecast might deviate from the value of the variable that actually occurs. This will provide the forecast user with a better perspective on how far off a forecast might be [7]. Forecast error is the difference between the value that occurs and the value that was predicted for a given time period. Error is the difference between the value that occurs and the value that was predicted for a given time period. Hence,

Error = Actual - Forecast:
$E_t = A_t - F_t$
where
t = Any given time period.

Error can occur in two ways:

(a) BIAS: A bias is a constant deviation from the mean in one direction (high or low). In terms of forecasting bias is the tendency of the forecast to be either above or below the actual observations. With this concept, if the computed bias –ve, the forecast is consistently too low; if the computed bias is +ve, the forecast is consistently too high. Bias is calculated as the total error divided by the number of periods.

$$\text{Bias} = \frac{\sum(\text{Actual} - \text{Forecast})}{\text{No. of Periods}}$$

(b) RANDOM VARIATION: In a given period, actual demand will vary about the average demand. The differences are random variations. The variability will depend on the demand pattern of the product. Some products will have a stable demand, and the variation will not be large. Others will be unstable and will have a large variation.

2.4 Improving Forecast Accuracy

2.4.1Tracking Error Signal

When there is a difference between forecast and actual values, one problem is to identify whether the difference is caused by random variation or is due to a bias in the forecast. Forecast bias is a persistent tendency for a forecast to be over or under the actual value of the data. We cannot do anything about random variation, but bias can be corrected. One way to control forecast bias is to use a tracking signal. A tracking signal is a tool used to monitor the quality of the forecast. It is computed as the ratio of the algebraic sum of the forecast errors divided by MAD:

$$\text{Tracking Signal} = \frac{\text{Algebraic sum of forecast errors}}{\text{MAD}}$$

Or

$$\text{Tracking Signal} = \frac{\sum(\text{Actual}_t - \text{Forecast}_t)}{\text{MAD}}$$

Where MAD is the mean absolute deviation given mathematically as:

$$\frac{\sum|\text{Actual}_t - \text{Forecast}_t|}{n}$$

As the forecast errors are summed over time, they can indicate whether there is a bias in the forecast. To monitor forecast accuracy, the values of the tracking signal are compared against predetermined limits. These limits are usually based on judgment and experience and can range from ±3 to ±8.

2.5 Role of Computer and Software in Forecasting

Computers allow you to take all the vast amounts of data about the previous year(s), quarter(s) or month(s) and compile them into meaningful information that you can then use to reveal important trends in your organization. Compiling all of the data is a daunting task that can only be handled accurately by intuitive forecasting software. Such software make the processes much simpler and more manageable. Through this synthesis of data, you can find out what is and what is not working in your organization. You can also easily track and pinpoint exactly where things are beginning to go wrong. Data is only useful in as much as you can interpret and use it. To interpret and use data, the right forecasting tools and the right methods are required.

Computers play an important role in preparing forecasts based on quantitative data. Their use allows managers to develop and revise forecasts quickly, and without the burden of manual computations.

Today much commercial forecasting is performed using computer software. Many software packages can be used for forecasting. Some can handle thousands of variables and manipulate huge databases. Others specialize in one forecasting model. Consequently, it may be difficult to select the right forecasting software. Most forecasting software packages fall into one of three categories: (1) spreadsheets, (2) statistics packages, and (3) specialty forecasting packages.

3. METHODOLOGY

The study utilized survey research design to obtain relevant data. Three hypotheses were postulated to guide us in the work. The method of research involved administering of questionnaires and subsequent analysis of the results of the questionnaires using chi-squared goodness of fit tests. The results obtained from the chi-squared analysis were used to test the hypotheses.

3.1 Hypotheses

To guide our work in this study, the following hypotheses were posited.

i. There is significant relationship between use of forecasting software and minimizing the impact of forecast error on government's monetary and fiscal policies.

ii. Use of forecasting software makes computation of seasonal variations and large historical data less cumbersome.

iii. Quantitative methods of forecasting produce less error than qualitative methods of forecasting.

3.2 Source of Data

We studied the effect of software on minimizing the impact of forecast error on governments' monetary and fiscal policies with data from two main sources:

Primary sources: Questionnaires are used to obtain relevant data from stakeholders in the forecasting industry. A total of 128 questionnaires covering 10 questions were delivered by hand to the stakeholders in forecasting industry which included economic forecasters, software developers, lecturers, and university students. Out of this number, 120 questionnaires were completed and returned. The questions sought, among others, the views of the respondents on the relationship between forecasting software and minimizing the impact of forecast error on government's monetary and fiscal policies.

Secondary Source: Relevant information were drawn from articles and books written by other professionals in the IT and forecasting industry.

3.3 Data Analysis and Result Presentation

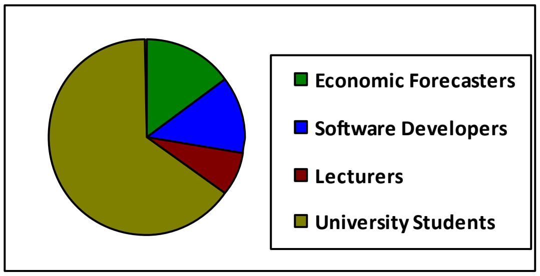
Quantitative data obtained from primary source were analyzed using the chi-squared test. Table 3.1 and figure 3.1 both show the occupational distribution of respondents.

Table 3.1. Occupational distribution of respondents

S/n	Respondents' Occupation	Number	Percentage
1.	Economic forecasters	18	15%
2.	Software Developers	15	12.5%
3.	Lecturers	9	7.5%
4.	University Students	78	65%
	Total:	**120**	**100%**

Source: Field study (2016)

Figure 3.1. Pie chart showing occupational distribution of respondents



Source: Field study (2016)

Table 3.2. Questions, responses and X2 values from the Chi-squared analysis

S/n	Questions	O_i	E_i	(O_i-E_i)	$(O_i-E_i)^2$	$(O_i-E_i)^2/E_i$	$X^2=\sum[(O_i-E_i)2/E_i]$
1.	Challenges in economic forecasting, such as increasing accuracy and reducing bias, are best met through effective management of the forecasting process. • SA • A • U • D • SD	80 22 0 12 6	24 24 24 24 24	56 -2 -24 -12 -18	3136 4 576 144 324	130.67 0.17 24 6 13.5	174.34
2.	Effective management of economic forecasting process requires an understanding of the realities, limitations, and principles fundamental to the process. • SA • A • U • D • SD	78 22 2 12 6	24 24 24 24 24	54 -2 -22 -12 -18	2916 4 484 144 324	121.5 0.17 20.17 6 13.5	161.34
3.	When management lacks a grasp of basic concepts like randomness, variation, uncertainty, and forecastability, the organization is apt to squander time and resources on expensive and unsuccessful fixes. • SA • A • U • D • SD	92 18 0 6 4	24 24 24 24 24	68 -6 -24 -18 -20	4624 36 576 324 400	192.67 1.5 24 13.5 16.67	248.34
4.	Forecast accuracy is ultimately limited by the nature of what we trying to forecast. • SA • A • U • D • SD	74 24 4 10 8	24 24 24 24 24	50 0 -20 -14 -16	2500 0 400 196 256	104.17 0 16.67 8.17 10.67	139.68
5.	Accurate forecasts improve government's chances of making the right decisions about its monetary and fiscal policies. • SA • A • U • D • SD	96 18 0 4 2	24 24 24 24 24	72 -6 -24 -20 -22	5184 36 576 400 484	216 1.5 24 16.67 20.17	278.34

6.	The "perfect forecast" is the one that has enough information to improve manage-ment's decisions under conditions of uncertainty.						
	• SA	86	24	62	3844	160.17	
	• A	22	24	-2	4	0.17	
	• U	2	24	-22	484	20.17	
	• D	7	24	-17	289	12.04	
	• SD	3	24	-21	441	18.38	210.93
7.	In order to be useful to manage-ment decision making, forecasts should be timely, reliable and accurate.						
	• SA	94	24	70	4900	204.17	
	• A	22	24	-2	4	0.17	
	• U	1	24	-23	529	22.04	
	• D	2	24	-22	484	20.17	
	• SD	1	24	-23	529	22.04	268.59
8.	Quantita-tive methods of forecasting produce less error than qualitative methods because of elimination of human bias.						
	• SA	102	24	78	6084	253.5	
	• A	4	24	-20	400	16.67	
	• U	2	24	-22	484	20.17	
	• D	8	24	-16	256	10.67	
	• SD	4	24	-20	400	16.67	317.68
9.	Manual computa-tions of seasonal variations and large historical data are a bit cumber-some, so the use of forecasting software is preferable.						
	• SA	118	24	94	8836	368.17	
	• A	2	24	-22	484	20.17	
	• U	0	24	-24	576	24	
	• D	0	24	-24	576	24	
	• SD	0	24	-24	576	24	460.34
10.	Effective manage-ment of economic forecasting process is best achieved through the use of computer software.						
	• SA	98	24	74	5476	228.17	
	• A	14	24	-10	100	4.17	
	• U	2	24	-22	484	20.17	
	• D	4	24	-20	400	16.67	
	• SD	2	24	-22	484	20.17	289.35

3.4 Test of Hypotheses

3.4.1 Hypothesis One

H_0: There is no significant relationship between use of forecasting software and minimizing the impact of forecast error on government's monetary and fiscal policies.

H_1: There is significant relationship between use of forecasting software and minimizing the impact of forecast error on government's monetary and fiscal policies.

Relevant in testing hypothesis one is question 10 of the questionnaire.

From the chi-squared analysis on table 3.2, $X^2 = \sum[(O_i-E_i)^2/E_i]$ for question 10 is 289.35.
Our degree of freedom (d. f.) = (n - 1) = (5 – 1) = 4 and our level of significance is 0.05

Decision

Tabulated value of X^2 (X^2_{Tab}) at 4 d. f. and 0.05 = 9.488
The calculated value of X_2 (X^2_{Cal}) is 289.35
$X^2_{Cal} > X^2_{Tab}$
The decision rule states that if X^2_{Cal} is greater than X^2_{Tab}, we should reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

We therefore reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

3.4.2 Hypothesis Two

H_0: Use of forecasting software does not make computation of seasonal variations and large historical data less cumbersome.

H_1: Use of forecasting software makes computation of seasonal variations and large historical data less cumbersome.

Relevant in testing hypothesis two is question 9 of the questionnaire.

From the chi-squared analysis on table 3.2, $X^2=\sum[(O_i-E_i)^2/E_i]$ for question 9 is 460.34.
Our degree of freedom (d. f.) = (n - 1) = (5 – 1) = 4 and our level of significance is 0.05

Decision
Tabulated value of X^2 (X^2_{Tab}) at 4 d. f. and 0.05 = 9.488
The calculated value of X_2 (X^2_{Cal}) is 460.34
$X^2_{Cal} > X^2_{Tab}$
The decision rule states that if X_{2Cal} is greater than X^2_{Tab}, we should reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

We therefore reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

3.4.3 Hypothesis Three

H_0: Quantitative methods of forecasting do not produce less error than qualitative methods of forecasting.

H_1: Quantitative methods of forecasting produce less error than qualitative methods of forecasting.

Relevant in testing hypothesis three is question 8 of the questionnaire.

From the chi-squared analysis on table 3.2, $X^2=\sum[(O_i-E_i)^2/E_i]$ for question 8 is 317.68.
Our degree of freedom (d. f.) = (n - 1) = (5 – 1) = 4 and our level of significance is 0.05
Decision
Tabulated value of X^2 (X^2_{Tab}) at 4 d. f. and 0.05 = 9.488
The calculated value of X_2 (X^2_{Cal}) is 317.68
$X^2_{Cal} > X^2_{Tab}$
The decision rule states that if X^2_{Cal} is greater than X^2_{Tab}, we should reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

We therefore reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

4. FINDINGS/DISCUSSION

4.1 Findings

The findings from this study, among others, reveal that:

i. Challenges in economic forecasting, such as increasing accuracy and reducing bias, are best met through effective management of the forecasting process.

ii. Effective management of economic forecasting process is best achieved through the use of computer software.

iii. Manual computations of seasonal variations and large historical data are a bit cumbersome, so the use of forecasting software is preferable.

4.2 Discussion

In order to get necessary data for this study, the survey method was used. Data obtained from the respondents were analyzed using the chi-square goodness of fit tests. To guide us in the study, three hypotheses were raised: there is significant relationship between the use of forecasting software and minimizing the impact of forecast error on government's monetary and fiscal policies; use of forecasting software makes computation of seasonal variations and large historical data less cumbersome; and quantitative methods of forecasting produce less error than qualitative methods of forecasting. The tests of the hypotheses showed that: there is significant relationship between the use of forecasting software and minimizing the impact of forecast error on government's monetary and fiscal policies; the use of forecasting software makes computation of seasonal variations and large historical data less cumbersome; and that quantitative methods of forecasting produce less error that qualitative methods.

All the questions listed in table 4 for the opinion of the respondents had calculated chi-square values greater than their corresponding table values for chi-squares for the data sets we are analyzing at 4 degree of freedom and p = 0.05 level of significance. These show that there are significant differences between the data sets that cannot be due to chances alone.

5. CONCLUSION

Forecasts are not perfect; actual results usually differ from predicted values; the presence of randomness and bias precludes a perfect forecast. As a result of this, forecasters always look for innovative ways of minimizing forecast errors. The goal of an effective forecasting system is to generate good forecasts on the average over time and to keep forecast errors as low as possible. To this end, this study was undertaken to:

i. identify the various techniques used in economic forecasting;
ii. to indentify the causes of error in economic forecasting;
iii. to identify ways of improving forecast accuracy and minimizing forecast error; and
iv. to focus on ways of minimizing the impact of forecast error on government's monetary and fiscal policies.

In conclusion therefore, producing economic forecast is necessary, as they are essential underlying features of governments' budgetary, monetary, and other fiscal policies. In doing this, policy makers should focus on ways of minimizing the impact of forecast errors on such fiscal and monetary policies. As shown in this study, an effective way of minimizing the impact of forecast error on government's monetary and fiscal policy lies in the use of effective software driven forecasting system.

6. REFERENCES

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