ANALYSIS OF THE RELATIONSHIP BETWEEN EXCHANGE RATE, INFLATION RATE AND GOLD PRICE OF SRI LANKA: CO-INTEGRATION APPROACH

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DECLARATION

I do hereby declare that the work reported in this thesis was exclusively carried out by me under the supervision of Mr. T.M.J.A. Cooray. It describes the results of my own independent research except where due reference has been made in the text. No part of this thesis has been submitted earlier or concurrently for the same or nay other degree.

Date:…….. ……...

Signature of the Candidate

Certified by:

1. Supervisor(Name):…….. Date:……...

   Signature:……..

To my beloved parents

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Completing this master work has been a wonderful chance I got in my life. Due to the limited time frame it became a challenging and a real learning experience. First I would like to thank my mother because of her affection. I greatly thank to my supervisor Mr T.M.J.A.Cooray to his patience and willingness to instruct in this research work. Also I would like to thank Head of the Department of Mathematics, University of Moratuwa for giving me a chance to carry out my work at the department. Unless support of my friends my research and thesis would have not be materialized. Their words and suggestions often boosted my courage and determination to write this thesis. Finally, I would like to thank everyone who encouraged me to finish this exciting endeavor.

Thank you.

K.M.E.M. Karunawardana.

ABSTRACT

Recent records show that the price of gold has been rising at a higher rate than in the past. This has been shown to be true for Sri Lankan gold prices as well. In this study an attempt has been made to develop a forecasting model for gold price and to examine the relationship between selected factors, that is the inflation rate, exchange rate and gold price. The data was mined from the World Gold Council and the Central Bank of Sri Lanka. The sample data of gold price were gathered from 2007 January to 2016 March in the currency of US dollars per troy ounce. It was converted into Sri Lankan rupees per 22 carat. Data until December 2015 were used to build the ARIMA model and the VEC model remainder was used to forecast the gold price and to check the accuracy of the model. Box-Jenkins, Auto Regressive Integrated Moving Average methodology (ARIMA) has been used to developed the model $D[Ln[GOLD\ PRICE]]$; with terms AR (3) and MA(3) and to forecast the future gold price. The MAPE value of fitted data in the appropriate model is 9.4%. To identify the relationship with gold price, inflation rate and exchange rate, quarter value data of all three factors were used. Two models were developed by based on the minimum AIC and the minimum SIC values. Firstly, the stationarity of the data is checked through the Augmented Dickey Fuller test and then the Johansen co-integration test and the Vector error correction model (VECM) are employed for analysis. The results of the Johansen co-integration test revealed that exchange and inflation rates are co-integrated with the gold price that led to run VECM. The VEC model developed for minimum AIC value provides evidence for the existence of long run and short run relationships between the gold prices, the exchange rate and the inflation rate and the model developed for minimum SIC value as well. The model developed based on minimum SIC value is rejected since the existence of serial correlation. The speed of adjustment to equilibrium is 12.1%, the model explains the gold price of the current quarter as 69.3% of the gold price of the previous quarter, and the exchange and inflation rates in the VEC model developed based on minimum AIC value. The MAPE value of fitted data from appropriate VEC model is 6.36%. When forecasting time period is increasing the percentage error in ARIMA model is higher than the percentage error increasing in appropriate VEC model. According to the mean absolute percentage error as forecasting accuracy measure the study concluded that the VEC model is more appropriate fitted model to forecast the gold price in Sri Lanka than the fitted ARIMA model.

Key Words: Auto Regressive Integrated Moving Average (ARIMA), Regression Analysis, Co-integration, Vector Error Correction Model, Granger Causality

TABLE OF CONTENTS

		Page
DECLARATION		i
DEDICATION		ii
ACKNOWLEDGEMENT		iii
ABSTRACT		iv
TABLE OF CONTENTS		v
LIST OF FIGURES		xi
LIST OF TABLES		xiii
ABBRIVATIONS		xiv
1. INTRODUCTION		**01**
1.1	History of Gold	01
1.2	Background of the Study	02
1.3	Determining Price of Gold	04
1.4	Significance of the Study	05
1.5	Objectives of the Study	06
1.6	Data Collection of the Study	06
1.7	Limitations of the Study	07
1.8	Period of the Study	07
1.9	Forecasting	07
1.10	Content of Thesis	08

2. LITERATURE REVIEW **09**

2.1 Background 09

2.2 Exertion in India 09

2.3 Exertion in Malaysia 10

2.4 Gold Price in the World 11

2.5 Statistical Methods and Models Used to Analysis the Gold Price 12

3. METHODLOGY **15**

3.1 Definition of Time Series 15

3.2 Time Series Analysis 15

3.3 Components of a Time Series 16

3.4 Stationary and Non Stationary 17

3.4.1 Transforming Non -Stationary to Stationary 18

3.4.2 Unit Root Test 19

3.4.2.1 ADF test and PP test 19

3.5. Kruskal- Wallis Test for Seasonality 20

3.6 The Covariance 20

3.6.1 The Autocorrelation Coefficient 21

3.6.2 The Partial Autocorrelation Function 22

3.7 Autoregressive Model of Order p-AR(p) 22

3.8 Moving Average Model of order q-MA(q) 22

3.9 Autoregressive Moving Average Model of Order p, q-ARMA(p, q) 23

3.10 Autoregressive Integrating Moving Average Model (ARIMA) 23

3.10.1 Assumptions 24

3.10.2 Limitations 24

3.10.3 Identify the Order of Differencing ARIMA Models 25

3.11 Error Forecasting 25

3.11.1 Mean Absolute Percentage Error 25

3.12 Time Series Model Building 25

3.13 Model Selection Criteria 26

3.13.1 Akaike's Information Criteria (AIC) 26

3.13.2 Schwarz Information Criteria (SIC) 27

3.13.3 Coefficient of Determination 27

3.14 Model Diagnostic Checking 27

3.14.1 Normality of Residuals 27

3.14.2 Lagrange's Multiplier Test 28

3.14.3 White's General Test 28

3.14.4 Anderson- Darling Test 28

3.15 Forecasting Accuracy 29

3.16 Regression Analysis 29

3.16.1 Correlation 29

3.16.2 Pearson Correlation Coefficient 30

3.16.3 Linear Regression Model 31

3.17 Spurious Regression 31

3.17.1 Durbin-Watson Statistic 32

3.18 Granger Causality 32

3.18.1 Best Lag Selection for Testing Linear Granger Causality 34

3.19 Integrated Order p or $I(p)$ 35

3.20 Co-integrated Order(d,p) or $CI(d,p)$ 35

3.21 Background for Co-integration 35

3.22 Definition for Co-integration 36

3.22.1 Importance of Co-integration 36

3.22.2 Testing for Co-integration 36

3.22.3 Pre Condition to Johansen Test 37

3.22.4 Johansen Test 37

3.22.5 Johansen Maximum Likelihood Co-integration Test 38

3.22.5.1 Trace Test 38

3.22.5.2 Maximum Eigen Value Test 39

3.23 VAR Models and Co-integration 39

3.24 Error Correction Models 40

3.25 Vector Error Correction Model 40

3.26 Procedures for Testing Co-integration and VECM 41

3.27 Wald Test 42

3.27.1 Hypothesis Check to Joint Significance of Parameters 42

4. TIME SERIES MODELS TO FORECAST GOLD PRICE 43

4.1 Preliminary Analysis 43

4.2 First Difference Series of Monthly Gold Price 45

4.3 Model Identification and Coefficient Estimation $D[GOLD\ PRICE]$ 47

4.4 Box-Cox Transformation 48

4.5 Model Identification and Coefficient Estimation $D[Ln\ [GOLD\ PRICE]]$ 51

4.6 Residual Analysis $D[Ln[GOLD\ PRICE]]$ −Model 2 53

4.7 Forecasting and Accuracy of the Model 57

4.8 Summary of Findings 58

5. INFLUENCE OF INLATION RATE AND EXCHANGE RATE ON THE GOLD PRICE 59

5.1 Introduction 59

5.2 Descriptive Analysis 59

5.2.1 Regression Model 60

5.3 Co-integration Equation 62

5.3.1 Lag Selection Criteria 62

5.3.2 Pre condition for Johansen Co-integration Test 63

5.4 The Development of a VEC Model Based on Minimum AIC value 64

5.4.1 Johansen Co-integration Test 64

5.4.2 Vector Error Correction Model (VECM) 65

5.4.3 Wald Test Results for Short Run Causalities 67

5.4.4 Residual Analysis for the Model 69

5.5 The Development of a VEC Model Based on Minimum SIC Value 72

5.5.1 Johansen Co-integration Test 72

5.5.2 Vector Error Correction Model (VECM) 73

5.5.3 Wald Test Results for Short Run Causalities 75

5.5.4 Residual Analysis for the Model 77

5.6 Appropriate Final VEC Model 78

5.7 Forecasting and Accuracy of the Model 79

5.8 Summary of Findings 79

6. DISCUSION **81**

6.1 Summary in Chapter 4 81

6.2 Summary in Chapter 5 82

6.3 Model Comparison 84

7. CONCLUSIONS AND RECOMMENDATIONS **85**

7.1 Conclusions 85

7.2 Recommendations 86

LIST OF REFERENCES 87

APPENDIX A 91

APPENDIX B 94

APPENDIX C 96

List of Figures

Figure 1.1	Percentages of gold use in different areas (pie chart)	02
Figure 1.2	The Plot of world gold price	04
Figure 3.1	Granger causes effect between two variables	33
Figure 4.1	Time series plot of monthly gold price	43
Figure 4.2	The correlogram of monthly gold price	44
Figure 4.3	The graph of first difference of gold price	46
Figure 4.4	The correlogram of first difference of gold price	47
Figure 4.5	Box-Cox transformation plot	49
Figure 4.6	The time series plot of $D[Ln[GOLD\ PRICE]]$	49
Figure 4.7	The correlogram of $D[Ln[GOLD\ PRICE]]$	51
Figure 4.8	The *E-views* output for AR(2) and MA(2) terms	52
Figure 4.9	The *E-views* output for AR(3) and MA(3) terms	52
Figure 4.10	The correlogram of residuals of model 2 $D[Ln[GOLD\ PRICE]]$	53
Figure 4.11	The histogram of residuals of model 2 $D[Ln[GOLD\ PRICE]]$	54
Figure 4.12	The normal probability plot of residuals of model 2 $D[Ln[GOLD\ PRICE]]$	55
Figure 4.13	The serial correlation of residuals of model 2 $D[Ln[GOLD\ PRICE]]$	55
Figure 4.14	The heteroscedasticity of residuals of model 2 $D[Ln[GOLD\ PRICE]]$	56
Figure 5.1	Lag selection criteria for VAR model	62
Figure 5.2	Johansen co-integration test for minimum AIC value	64

Figure 5.3	Co-integration output by *E-views*	65
Figure 5.4	The probability values of coefficients of model	66
Figure 5.5	Wald test results for coefficients of C(2), C(3) and C(4)	67
Figure 5.6	Wald test results for coefficients for C(5), C(6) and C(7)	68
Figure 5.7	Wald test results for coefficients for C(8), C(9) and C(10)	68
Figure 5.8	The correlogram of the residuals of the model	70
Figure 5.9	The histogram of the residuals of the model	70
Figure 5.10	The serial correlation of the residuals of the model	71
Figure 5.11	The heteroscedasticity of the residuals of the model	71
Figure 5.12	Comparison of the actual and fitted values of *GOLD*	72
Figure 5.13	Johansen co-integration test for minimum SIC value	72
Figure 5.14	The co-integration output by *E-views*	73
Figure 5.15	The probability values of coefficients of model	74
Figure 5.16	Wald test results for coefficients of C(2) and C(3)	75
Figure 5.17	Wald test results for coefficients of C(4) and C(5)	76
Figure 5.18	Wald test results for coefficients of C(6) and C(7)	76
Figure 5.19	The correlogram of the residuals of the model	77
Figure 5.20	The histogram of the residuals of the model	77
Figure 5.21	The serial correlation of the residuals of the model	78
Figure 5.22	The heteroscedasticity of the residuals of the model	78
Figure 6.1	Granger causality test	82

List of Tables

Table 1.1	The sample daily gold prices in Sri Lanka	05
Table 3.1	Transformations for lambda value	18
Table 3.2	Theoretical ACF and PACF	23
Table 3.3	Interpretation of r values	30
Table 4.1	Kruskal- Waillis test results for monthly gold price	45
Table 4.2	P-values for the Unit Root test	45
Table 4.3	ADF and PP test values for first difference	46
Table 4.4	Coefficient and probability values for AR(p) and MA(q) terms	48
Table 4.5	AIC, R^2 and S.E. regression values $D[GOLD\ PRICE]$	48
Table 4.6	ADF and PP test values for $D[Ln[GOLD\ PRICE]]$	50
Table 4.7	Possible combinations and probability values $D[Ln[GOLD\ PRICE]]$	52
Table 4.8	R^2, S.E. regression and AIC values for model 1 and model 2	52
Table 4.9	The forecast gold prices for appropriate model	58
Table 5.1	Correlation values	60
Table 5.2	Regression analysis	61
Table 5.3	Model summary	61
Table 5.4	ADF test results for three variables on level	63
Table 5.5	ADF test results for first difference of three variables	63
Table 5.6:	Forecasting gold price for VEC model	79
Table 6.1	Forecast gold prices for appropriate ARIMA model	84
Table 6.2	Forecast gold prices for appropriate VEC model	84

ABBREVIATIONS

ACF	Auto Correlation Function
AD	Anderson Darling
ADF	Augmented Dickey Fuller
AIC	Akaike Information Criteria
AR	Autoregressive
ARMA	Autoregressive and Moving Average
ARIMA	Autoregressive Integrated Moving Average
ECM	Error Correction Model
LM	Lagrange's Multiplier
Ln	Logarithm
MAPE	Mean Absolute Percentage Error
PACF	Partial Auto Correction Function
PP	Phillips-Perron
SIC	Swartz Information Criteria
VACM	Vector Error Correction Model
VAR	Vector Auto Regressive