MODELLING CATEGORY WISE TEA EXPORT EARNINGS IN SRI LANKA: VECTOR ERROR CORRECTION MODEL (VECM) APPROACH

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Degree of Master of Science

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Dissertation submitted in partial fulfillment of the requirements for the degree Master of Science in Financial Mathematics

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DECLARATION

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Masters Dissertation under my supervision.

Name of the supervisor: Mr. Rohana Dissanayake

Signature of the supervisor: …… Date: ……

ABSTRACT

Tea industry is a strong pillar in Sri Lankan economy in terms of foreign earnings and employment. Millions of people are employed directly and indirectly in the tea industry. Therefore, it is important to study about the behavior of tea export earnings and forecast tea export earnings for several months. This study is an attempt to identify predictive models to forecast category wise tea export earnings namely Bulk tea, Tea bags, Tea packets and Total exports using monthly data obtained from Sri Lanka Tea Board covering the period January 2003 to October 2017. The study employed the conventional augmented dickey fuller (ADF) test to test for stationarity among the four variables and Johensen co-integration technique to determine the co-integrating equation. All the series were found to be I(1) and two co-integrating relationships among these series were evident. Hence Vector Error Correction (VEC) model was fitted. For the validation of the VEC model, residual analysis was carried out using Residual plot, Correlogram, Residual portmanteau test for autocorrelation and Serial Correlation LM Test. The results indicated that model was satisfactory. Finally, Impulse Response Function (IRF) and Variance Decomposition (VDC) were employed in order to illustrate the importance of each variable to tea export earnings when a shock is imposed to the system. The analysis revealed that bulk tea earnings positively relate to tea packets earnings but negatively relate to total export earnings whereas tea bags earnings negative relate to tea packets earnings in long run. The results showed that tea packets earnings significantly and directly affect both bulk tea and tea bags earnings in the short run. The study also generated an out-of-sample forecast to analyze and compare the statistical results in order to determine the accuracy of the fitted model. The accuracy of the forecasts was tested using MAPE. Therefore, it can be concluded that the developed VEC model can be used to forecast tea export earnings in Sri Lanka with considerable accuracy.

Keywords: Co-integration, Impulse Response Function, Tea Export Earnings, Variance Decomposition, Vector Error Correction Model (VECM)

Dedicated to my parents

for their love, endless support

and encouragement…

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LIST OF ABBREVIATIONS

ACF	Autocorrelation Function
ADF	Augmented Dickey Fuller
AIC	Akaike's Information Criterion
AR	Autoregressive
ARIMA	Autoregressive Integrated Moving Average
ARMA	Autoregressive Moving Average
BT	Bulk Tea
BTV	Bulk Tea Value
FPE	Final Prediction Error
HQC	Hannan-Quinn Criterion
IRF	Impulse Response Function
LM	Lagrange's Multiplier
MA	Moving Average
MAPE	Mean Absolute Percentage Error
PACF	Partial Auto Correlation Function
SARIMA	Seasonal Autoregressive Integrated Moving Average
SBC	Schwartz's Bayesian Criterion
SLTB	Sri Lanka Tea Board
TB	Tea Bags
TBV	Tea Bags Value
TEV	Total Export Value
TP	Tea Packets
TPV	Tea Packets Value
VAR	Vector Autoregressive
VDC	Variance Decompositions
VECM	Vector Error Correction Model