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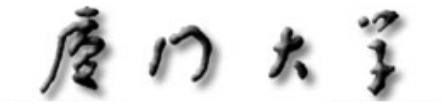

硕 士 学 位 论 文

基于多元 GARCH 模型的斯里南卡股市与汇率波动率建模分析。

Modeling Sri Lankan Stock Market and Exchange Rate Volatility: A Multivariate GARCH Approach

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论文提交日期：　2012 年 4 月

论文答辩日期：　2012 年 5 月

学位授予日期：　2012 年　　月

答辩委员会主席：_____

评　　阅　　人：_____

2012 年 4 月

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摘 要

国际金融市场的全球一体化带动了许多实证研究来检验不同市场之间的相互影响，其中，对金融资产波动传递方式的研究尤为重要，其研究结果有助于金融从业人员做出投资决策，并有利于金融监管者来监控金融危机的蔓延。

本文旨在探讨在斯里兰卡金融市场中是否存在股票价格和 USD/LKR 汇率之间的波动传递。本研究采用自 1992 年 5 月到 2011 年 9 月的日度数据，通过对股票价格和汇率价格取自然对数并差来定义日回报率。我们利用 M-GARCH 模型，即 BEKK 模型(Engle and Kroner, 1995)来捕捉金融时间序列的尖峰和自相关特性。我们的结果表明，汇率市场的波动性占据主导地位，然而自身波动性一般比交叉波动性更大。换句话说，在股票收益和汇率收益之间的波动溢出效应的主要驱动机制是外汇市场。此外，随时间变化的相对关系的估计值比绝对关系估计值要大。

关键词：股票收益；股票收益；外汇市场; 汇率; 斯里兰卡; 波动性

Abstract

The increasing integration of international financial markets has driven many empirical studies to examine the co-movements among different markets. The knowledge of this interrelationship and volatility transmission between financial assets would help financial practitioners to make their investment decisions and financial regulators to control the financial contagion.

This paper examined whether there is a volatility transmission between stock prices and USD/LKR exchange rate in the Sri Lankan financial market. There are many empirical studies conducted in different countries to disclose this relationship under various methodologies for different time periods. This study employed daily data spanning from the period of May 1992 to September 2011. Daily returns of each series were computed by taking the first difference of the natural logarithm of price and exchange rate. Multivariate Generalized Autoregressive Conditional Heteroskedasticity (MGARCH) model, namely BEKK (Engle and Kroner, 1995) has been adopted because of its ability to capture the leptokurtic, autocorrelation features of financial time series. Past research shows that volatility shocks in individual markets have a greater effect on their own future volatility than past volatility shocks arising from other markets. According to the magnitudes of the estimated cross-volatility coefficient, volatility of exchange rate market affects the stock market. However, the own-volatility shocks are generally larger than the cross-volatility shocks. The main transmitter of volatility spillover effects between stock return and exchange rate return is the exchange rate market. In addition the time-varying conditional correlation is larger than unconditional correlation.

Key words: Stock Returns; Foreign Exchange Markets; Exchange Rate; Sri Lanka; Multivariate GARCH (BEKK); Volatility.

List of Abbreviations

AOI	-	Australian Ordinaries Index
ARCH	-	Autoregressive Conditional Heteroskedasticity
ASPI	-	All Share Price Index
BEKK	-	Baba-Engle-Kraft-Kroner
CSE	-	Colombo Stock Exchange
GARCH	-	Generalized Autoregressive Conditional Heteroscedasticity
LKR	-	Sri Lanka Rupee
MGARCH	-	Multivariate Generalized Autoregressive Conditional Heteroskedasticity
USD	-	United State Dollar
VAR	-	Value at Risk
WFE	-	World Federation of Exchanges

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Chapter One

Introduction

Chapter One

Introduction

Globalization of International trade and finance made a significant increase of integration across domestic markets and interdependence of International financial markets in all nations. Interactions between such markets determine the overall profitability and value of multinational firm's which then affected the overall economy of the country. The recent emergence of new capital markets, the relaxation of foreign capital regulations, adoption of more flexible exchange rate regimes[1], increase of international diversification and cross-market return correlations made stock market and exchange rate markets interdependent. These changes have rapidly increased the variety of investment opportunities as well as the volatility of exchange rates and risk of investment decisions and portfolio diversification process.

However in the past few years there has been considerable volatility in both mature and emerging financial markets worldwide. Number of literature concludes that volatility decrease trade especially in imperfect market situations in developing countries. This affects the domestic as well as International investors in hedging and diversifying their portfolio for higher returns. Also, fundamentalist investors have taken into account these relationships to predict the future trends for each other (Phylaktis, Kate et al. 2005). However, these reasons have increased the interest of academics and practitioners in studying the interactions between the stock and foreign exchange markets.

The motivations to undertake this research arise from the following reasons. The foremost reason is the Sri Lankan stock market, named as Colombo Stock Exchange (CSE), and has reached one of its greatest heights in 2009. CSE which is one of the emerging market in the world, has achieved a remarkable success in year 2009

[1] Exchange rate regime refers to the policy imposed on a currency by its issuing country or by a trading bloc. In other words the way a country manages its foreign exchange policy.

recording the highest ever; All share price index (ASPI) of 3.3856 points, All share price index growth 136% for a year, annual turnover US$.1.26bn and market capitalization of US$9.591bn. Moreover, it was named the second best performing stock exchange in the world from amongst the 52 member exchanges of the World by the Federation of Exchanges (WFE) and the Best Performing stock market in Asia by (Bloomberg News) in same year 2009.

Besides, there are few other general reasons that led to perform this study. This relationship may affect decisions about monetary and fiscal policy. According to Gavin (1989) a booming stock market has a positive effect on aggregate demand. Also the link between two markets may be used to predict the path of the exchange rate. Moreover, currency is more often being included as an asset in investment funds' portfolios. Knowledge about the link between currency rates and other assets in a portfolio is vital for the performance of the fund. Finally, the understanding of the stock price-exchange rate relationship may prove helpful to foresee a future crisis. Some scholars claim that the link between the stock and currency markets helped to propagate the Asian Financial Crisis in 1997. It is believed that the sharp depreciation of the Thai baht triggered depreciation of other currencies in the region, which led to the collapse of the stock markets as well (Aydemir and Demirhan 2009). Awareness about such a relationship between the two markets would trigger preventive action before the spread of a crisis.

To examine the association between stock prices and exchange rate returns various scholars used different estimation models. Some researchers have used simple regressions to capture the degree of relationship while some have analyzed the long-run relationship between stock prices and exchange rates using co-integration as well as the casual relationship between the two by using Granger causality test. Ong and Izan (1997) used Nonlinear Least Square method to examine the association between stock prices and exchange rates. However Dark at el., 2007 used the unrestricted bivariate VAR BEKK GARCH(1,1) model to demonstrate the significant

unidirectional return and volatility spillover effects from the US Dollar/Australian Dollar exchange rate to the Australian Ordinaries Index (AOI) (Dark, Raghavan et al. 2007). The study employed by Karolyi (1995) has used multivariate GARCH techniques to capture the mechanism by which stock-returns innovations in one market have an impact on not only the conditional market returns but also the conditional market volatility of the other market. Karolyi examined the dynamic relationship between the U.S. and Canadian daily stock-market returns and return volatilities using a bivariate generalized autoregressive conditional heteroscedastic (GARCH) model for his research. He has tested how rapidly stock-return innovations originating in the U.S. and Canadian markets is transmitted to the other markets and also how rapidly the volatility of these innovations transmits to the other markets by simulating the impulse responses of the estimated bivariate GARCH model.

The main fact is that the prominent features of financial asset prices are well-recognized and documented by economists using different models result in obstacles to policy makers obtaining an accurate estimation of financial co-movement and correlations. Some of these important features include volatility clustering, leptokurtosis and time-varying characteristics. Therefore there is a need to investigate the volatility spillovers and dynamic conditional correlations by using advanced and improved econometric approaches one such model is the MGARCH model. This thesis attempts to examine the relationship between USD/LKR exchange rate return to all share price index in Sri Lanka using MGARCH model to employ this relationship.

1.1. Research Objectives

Sri Lankan financial market is an emerging and competitive financial market in Asia. The main objective of this study is to; examine the interactive relations between the stock market return and exchange rate return in the financial markets of Sri Lanka. In order to capture the dynamic relationship Multivariate Generalized Autoregressive Conditional Heteroskedasticity (MGARCH) model has been used on both returns and volatilities of two markets. The study only examines the volatility of stock market

return and exchange rate return in the predefined market.

1.2. Scope of the Research

The study is focused on examining the relationship between USD/LKR exchange rate return and stock return of all share price index in Sri Lankan financial market. Rates for the past twenty years in terms of local currency were used for the study. As it examine the volatility it's important to get daily figures instead of weekly or monthly data to go for a detail analysis. Due to the availability of data the study focused only to the period from May 1992 to September 2011. There are slight difference of stock market trading days of each year, especially the end of each month and the public holidays. Therefore, the research selects data from common trading days of the stock indices and respective exchange rate of the same day and deletes the date when there is some non trading days. Accordingly the final sample consists of 4606 data items. Daily returns of each series were computed by taking the first difference of the natural logarithm of price.

1.3. Outline of Thesis

The presentation of this research study is divided into five chapters.

Chapter 1 provides the general introduction of the topic, background and rationale for the research, research objectives scope and limitation of the research and an outline of what is in the thesis.

Chapter 2 is an extensive literature review on modeling the stock market return and exchange rate return. Related studies identified from literature were comprehensively put together to conduct a standard MGARCH model using VAR BEKK model to examine the relationship between predefined financial markets.

Chapter 3 outlines the research methodology, research design, sample, data collection, data description and MGARCH model. Data analysis methods and associated statistical tests are also explained.

Chapter 4 presents and describes the outcomes and discussion of the study in detail. This chapter consists of two parts. Part one describes basic descriptive statistics of each dataset separately and part two presents the results of BEKK model for data set as a whole. Graphical representation of the analysis will also be presented where appropriately. Comparing empirical results of previous studies and outcomes of this research will be comprehensively discussed in this chapter.

Chapter 5 presents summary and conclusion of the research. It explains the usage of the findings in detail. Research implications on relationship of stock market and exchange rate market also discussed. Finally limitation of the study and future research opportunities will be presented at the end of the chapter

Chapter Two

Literature Review

Chapter Two

Literature Review

2.1. Introduction

This chapter is a review of literature. As the previous chapter provided the background information of the research study this chapter provides evidence from the literature.

Many scholars have proved that, for any type of economy, establishing the relationship between stock prices and exchange rates is indeed important for short term and long term decision making for governments and potential investors. It directly affects the investment funds' portfolios. The link is also used to predict the path of the exchange rate and stock indices.

2.2. Empirical Studies

Large numbers of studies have been conducted in order to examine the relationship between stock prices and exchange rates. Among them, most of the empirical literature has focused on examining this association for the developed countries with very little attention on the developing countries. Nevertheless, the results of these studies are inconclusive. Some studies have found a significant positive relationship between stock prices and exchange rates ((Smith 1992), (Solnik 1987), and (Aggarwal 1981)) while others have stated a significant negative relationship between the two (Soenen and Hennigar 1988). Besides that, some studies have found very weak or no association between stock prices and exchange rates ((Bartov and Bodnar 1994), (Muhammad and Rasheed 2001))

According to the review of literature, various scholars have used different tests and models to find the relationship between stock prices and exchange rates. Aggarwal (1981) used simple regressions to explore the relationship between changes in the dollar exchange rates and change in indices of stock prices. He used monthly U.S.