The Determinants of the Real Exchange Rate and the Role of These Fundamental Factors in New Zealand's Economy

Siroos Khadem Alomoom

Submitted to the
Institute of Graduate Studies and Research
in partial fulfillment of the requirements for the Degree of

Master of Science
in
Banking and Finance

Eastern Mediterranean University
June 2010
Gazimağusa, North Cyprus

Approval of the Institute of Graduate Studies and Research

Prof. Dr. Elvan Yılmaz
Director (a)

I certify that this thesis satisfies the requirements as a thesis for the degree of Master of Science in Banking and Finance.

Assoc. Prof. Dr. Hatice Jenkins
Chair, Department of Banking and Finance

We certify that we have read this thesis and that in our opinion it is fully adequate in scope and quality as a thesis for the degree of Master of Science in Banking and Finance.

Assoc. Prof. Dr. Sami Fethi
Supervisor

Examining Committee

1. Assoc. Prof. Dr. Mustafa Besim _____
2. Assoc. Prof. Dr. Salih Katircioglu _____
3. Assoc. Prof. Dr. Sami Fethi _____

ABSTRACT

The aim of this study is to empirically investigate the determinants of the real exchange rate and the role of these fundamental factors in New Zealand economy. Following the framework introduced by Edwards (1989) and Domac and Shabsigh (1999), some additional variables are modified within their model to find out whether there is a relationship between real exchange rate and its economic determinants.

Multivariate cointegration, Granger causality and unit root techniques are applied to identify this relationship using a sample of quarterly data covering the period of 1974Q1 - 2009Q3. This thesis also checked the validity of the model and the relative importance of different variables which may have an impact on the real exchange rate policy of New Zealand economy.

In the light of the empirical evidence, there exists a relationship between real exchange rate and independent variables – openness, the growth of nominal exchange rate, relative productivity, government consumption, and domestic credit. These variables have an impact on the real exchange rate and the real exchange rate increase when the degree of openness and growth of the nominal exchange rate rise while, relative productivity, the government consumption and domestic credit decrease. However, capital inflows and terms of trade are insignificant in explaining the movement in the equilibrium of real exchange rate.

Based on the findings estimated, the New Zealand's government could consider following issues for policymaking in case of the real exchange rate: (i) there are more significant variables exist in the fixed exchange rate regime therefore, a much wider range of tools are available for policymaking, (ii) in the long-run; openness, growth of nominal exchange rate, relative productivity, government consumption and domestic credit play an important role in keeping the real exchange rate in an appropriate level while, for the short-run, only openness, growth of nominal exchange rate and relative productivity are significant, and (iii) openness explain the greatest component of the variation in the real exchange rate in long-run while, relative productivity is the most significant variable in short-run.

Keywords: New Zealand Economy, Real Exchange Rate, Unit Root, Granger Causality, Co integration.

ÖZ

Yapılan bu tez ampirik olarak Yeni Zelanda ekonomisindeki reel döviz kuru'nun belirleyicilerini ve buna bağlı olan diğer ekonomik faktörlerin rolünü ölçer. Bu ilişki teorik olarak Edward (1989) ve Domac-Shabsigh (1999) modelleri kullanılarak belirlenmiştir.

Bu çalışmada, çok değişkenli eş-bütünleşme, Granger nedensellik ve birim kök teknikleri ile üç aylık zaman serileri kullanılıp (1974Q1-2009Q3) belirleyicilerin reel dövüz kuru üzerindeki etkisi ölçülmeye çalışılmıştır. Çalışma, ayni zamanda kullanılan ilgili modelin doğruluğunuda ortaya koymaya çalışmaktadır.

Elde edilen ampirik sonuçlar ışığında, reel döviz kuru ile açıklık politikası, nominal döviz kuru, nisbi verimlilik ve yurtiçi kredi hacmi arasında ilişki belirlenmiştir. Bu değişkenlerin reel döviz kuru üzerinde önemli rol oynadığı tespit edilmiştir. Açıklık politikası, nominal döviz kuru artarken reel döviz kuru değer kaybettiği belirlenmiştir. Ayni zamanda nisbi verimlilik, iç kredi hacmi ve devlet harcamakları azalırken, reel döviz kuru değer kaymektedir. Sermaye akışı ve ticaret hadleri reel döviz kurunu açıklayıcı bağlamda anlamsız bulunmuştur.

Ampirik Bulgular bağlamında, Yeni Zelanda hükümeti aşağıdaki bazı politikaları uygulayabilir; (i) Reel döviz kurunun belirleyicileri sabit kur rejimlerinde daha fazla anlamlı çıkmıştır. Dolayısıyla politika yapıcıları bu rejim dönemini baz alırken, daha geniş bilgilerle politikalarını üretme imkanına sahiptir. (ii) uzun dönemde, açıklık politikası, nominal döviz kuru büyümesi, nisbi verimlilik, devlet harcamaları ve yurtiçi kredi hacmi reel döviz kurunun uygun saviyelerde tutulmasında önemli rol

oynamaktatır. Kısa dönemde ise açıklık politikası, nominal döviz kuru büyümesi, nisbi verimlilik anlam taşımaktadır. (iii) açıklık politikası reel döviz kurundaki değişiklikleri yada dalgalanmaları uzun dönemde açıklayan en iyi belirleyicidir. Kısa dönemde ise nisbi verimlilik en önemli belirleyici olarak bulunmuştur.

Anahtar kelimeler: Yeni Zelanda Ekonomisi, Reel Döviz Kuru, Birim kök, Granger Nedensellik, Eş bütünleşme analizi.

ACKNOWLEDGMENTS

I would like to express my sincere gratitude and deepest appreciation to my supervisor Assoc. Prof. Dr. Sami Fethi, for his continuous support, invaluable advice and encouragement throughout this study.

My gratitude is also importantly extended to the Chairman of the Department of Banking and Finance, Eastern Mediterranean University, Assoc. Prof. Dr. Hatice Jenkins and all other members of the faculty, for providing helpful means and situation throughout this research.

Finally, I would like to dedicate this paper to my family and my love.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ADF:	Augmented Dickey-Fuller
BBC:	British Broadcasting Corporation
CIA:	Central Intelligence Agency
DGP:	Data Generating Process
DEER:	Desired Equilibrium Exchange Rate
ERER:	Equilibrium Real Exchange Rate
ECM:	Error Correction Mechanism
FPE:	Final Prediction Error
FIML:	Full Information Maximum Likelihood
GRT:	Granger Representation Theorem
G-C:	Granger-Causality
GDP:	Gross Domestic Product
IFS:	International Financial Statistics
IMF:	International Monetary Fund
MADF:	Multivariate Augmented Dickey Fuller
NATREX:	Natural Equilibrium Real Exchange Rate
OLS:	Ordinary Least Square
OECD:	Organization for Economic Cooperative and Development
PPP:	Purchasing Power Parity
REER:	Real Effective Exchange Rate
RER:	Real Exchange Rate
RBNZ:	Reserve Bank of New Zealand
SBC:	Schwarz Bayesian Criterion
VAR:	Vector Auto-Regression
WB:	World Bank
WTO:	World Trade Organization

Chapter 1

INTRODUCTION

1.1 Background, Context and Rationale of the Research

One of the topics in international finance which draws more attention than others is the determination of real exchange rate. There are various definitions for Real Exchange Rate (RER) but the most common one is; “RER between two countries is calculated as the product of the nominal exchange rate and relative price levels in each country” (Luci Ellis, 2001:70). The real exchange rate has been one of the most debated topics both in theory and practice since it plays a significant role in the economy.

The importance of real exchange rate especially in developing countries, has been examined by many economists such as Sebastian Edwards (1989), Ibrahim A. Elbadawi (1989), Miguel A. Kiguel (1992), Ahmet N. Kıpıcı and Mehtap Kesriyeli (1997), Luci Ellis (2001), Menzie D. Chinn (2006) and Luis A.V. Catão (2007). The existing empirical literature generally considers both developed and developing countries and has been shown that best performers are countries that can align an appropriate real exchange rate sufficiently close to the equilibrium real exchange rate (ERER) (John Williamson, 1985; Arnold C. Harberger, 1986; Ofair Razin & Susan M. Collins, 1997, and Richaud et al., 2000). Some economists mentioned that many cases of the economic failures, particularly in developing countries, have been the result of inappropriate exchange rate policies. For example, the January 1994

devaluation of the CFA Francs in West and Central Africa, the Mexican currency crisis at the end of 1994, the Asian crisis in mid-1997, and the Brazilian devaluation in January 1999 are reminders of the macroeconomic disruptions that can be caused by RER misalignment. Therefore, the issue of how to choose a proper value for the nominal exchange rate has remained a key concern in developing countries in case of macroeconomic policy.

1.2 Scope and Objectives of the Study

The purpose of this study is to estimate the determinants of the real exchange rate and the role of these fundamental factors in New Zealand economy. After a number of years of strong growth, the economy entered a recession in early 2008. New Zealand has been chosen for this study in order to identify the effects of this recession on RER and its determinants by comparing this parameter with previous ones in the economic growth periods of this country. Also by overviewing the exchange rate regime and investigating the real exchange rate evolution during the study period in those different regimes[1], structural breaks in the data can be explained. Several similar works has been done for different countries such as South Africa, Thailand and Turkey. The main motivation in writing this paper lies in the fact that this is the first research of this topic in the oceanic region with the advantage of comparing the empirical results in both fixed and floated exchange rate regimes.

[1] According to Reserve Bank of New Zealand (RBNZ), on March 4, 1985 RBNZ changed the exchange rate regime from fixed to float.

1.3 Methodology

This paper theoretically follows the framework introduced by Sebastian Edwards (1989) and Ilker Domac and Ghiath Shabsigh (1999). The study is trying to find out whether there is a relationship between real exchange rate and its economic determinants. Edwards' Model (1989) is an inter-temporal general equilibrium model of a small open economy which both tradable and non-tradable can be exchanged. The core of Edwards' experimental investigation is to verify the equilibrium real exchange rate by disentangling basic changes in the level of the real rate from momentary influences brought on by shifts in nominal exchange rate as well as fiscal and monetary policy. The estimation of the model will be done by using Microfit 4.0 (Pesaran and Pesaran, 1997) on quarterly data mainly collected from International Monetary Fund (IMF) and also World Bank (WB) covering the period of first quarter of 1974 to third quarter of 2009.

Multivariate cointegration technique applied to identify the relationship between real exchange rate and its determinants. This technique also investigates the validity of our model and the relative importance of different variables which may have an impact on both the long-run and the short-run exchange rate policy of the New Zealand's Economy.

1.4 Structure of the Study

In general, the primary goal of this study was to investigate the determinants of the real exchange rate and their relationships with RER. Secondly, based on findings, the study tries to recommend some possible policies that the government of New Zealand could follow in case of Real Exchange Rate.

This thesis consists of seven chapters; chapter one presents the introduction then chapter two contains relevant literature review on the Real Exchange Rate. Chapter three represents New Zealand's exchange rate policy. Chapter four describes the data set and the theoretical modeling. The empirical methodology and regression model are described in fifth chapter. Empirical results, interpretations on the outcomes and comparison of two periods are given in chapter six and finally, conclusions and recommendations of this study presented in chapter seven.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

The primary objective of this chapter is to describe the importance of the Real Exchange Rate and also to investigate the potential determinants of the RER which have been examined by many economists during the past three decades such as; Edwards (1989), Miyakoshi (2003), Kiguel (1992), MacDonald (1998), Elbadawi (1989), Kempa (2005), and Catão (2007). A proper alignment of the RER is one the main determinants of economic performance. Therefore understanding of this issue, which leads us to Equilibrium Real Exchange Rate (ERER) in long term, is essential. On the other hand, disequilibria in macroeconomic and balance of payment crisis are cited as the direct outcome of RER misalignment (Edwards, 1989; Dornbusch, 1982). As an example, overvalued domestic currency in Sub-Saharan Africa[2] which led to dramatic fall down of the agricultural sectors because this overrated currency tended to weaken overall export and agricultural performance (World Bank, 1984).

According to the importance of the RER and since there are several theoretical and empirical studies focused on ERER, this chapter is classified into three categories. The first section covers the researches on the determinants of the ERER in developing countries, while the second part focuses on findings on this subject in

[2] Six African countries are not geographically a part of Sub-Saharan Africa: Algeria, Egypt, Libya, Morocco, Tunisia, and Western Sahara (claimed by Morocco).

developed economies. The last section investigates the relationship between real exchange rate and its determinants.

2.2 Equilibrium Real Exchange Rate in Developing Economies

Previous studies in developing counties generally used purchasing power parity (PPP) as a measurement of the equilibrium real exchange rate. The rest of empirical literature on developing economies can be categorized into two different approaches. First one is traditional reduced-form version and second approach which is a more recent version based on the estimation of a cointegration equation. Both of these methods link the RER to a set of fundamentals.

Edwards (1994) used a panel data for twelve developing countries between 1962-1984 to obtain a regression where the actual real exchange rate is the dependent variable and the set of independent variables like growth rate of total factor productivity, terms of trade, proportion of government spending to GDP, openness, and also some other variables which interpreted as not affecting the RER but potentially causing it to deviate from the equilibrium.

Froot and Rogoff (1994) explore the behavior of ERER in developing countries by detecting a cointegration between real exchange rate and a series of underlying fundamentals. Simplified version of Edwards' model developed by Elbadawi (1994) for Chile, Ghana and India which requires a smaller set of fundamental variables, including net capital inflows to GDP, terms of trade, openness, government consumption to GDP and growth rate of export.

Many other different studies consider this issue in samples of developing countries. Krumm (1993) finds terms of trade as a structural determinant of ERER in the

medium-term for Philippines and Tanzania. Khan and Ostry (1991) provide panel estimates of the elasticity of terms of trade shocks and changes in commercial policies to the equilibrium real exchange rate in a static model. More recently, Coricelli and Jazbec (2004) discuss the appreciation which has characterized 19 transitional economies, including nine eastern and central European countries, three Baltic and also seven former Soviet Union countries. Ordinary Least Square (OLS) regression provides evidences that productivity differential, proportion of non-tradable consumption to total private spending and also real government consumption negatively affects the real exchange rate.

2.3 Equilibrium Real Exchange Rate in Advanced Economies

Empirical researches on the determinants of the ERER in developed countries have been preceded on different tracks.

Reduce-form model of estimating the ERER focuses on testing the validity of the Purchasing Power Parity (PPP) hypothesis and some simple variants using a single-equation methodology. This model has expanded to explain the potential role of changes in fundamentals and the equilibrium level behavior that deviates from PPP. Among fundamentals, the most interesting factor is a supply side phenomenon, the Balassa-Samuelson effect, which discusses that the countries with faster productivity growth in comparison with their trading partners will experience a decline in their real exchange rate (Faruqee, 1995).

MacDonald (1998) shows this reduced form model of the real exchange rate by combining supply and demand side factors to explain the real effective exchange rates of the Yen, U.S. dollar, and the Deutschmark over the period of 1974 to 1993.

Evidences showed that differential productivity growth, the terms of trade, fiscal policy, and the stock of net foreign assets are explaining the level of equilibrium real exchange rate for advance economies.

Antonopoulos (1999) checks the “Shaikh hypothesis” which explains that the real exchange rate is determined by the ratio of relative real unit labor costs, as a proxy for productivity differentials, of tradable goods between two countries. He uses cointegration methodology on Greece’s data for the period of 1960 to 1990. The study provides evidences that there is a less significant role of net capital inflows and also movements of the RER cannot be clarified by the PPP hypothesis. However it suggests that improvement in export sector can appreciate the country’s real exchange rate.

A different research has been done by Kempa (2005), the study expands the Dornbusch model of exchange rate determination and identifies two sources driving exchange rate, one arising in financial market and the other one in the real economy. The research proposes that exchange rate variations seem to be mainly equilibrium responses to real shocks, rather than instability in financial markets.

Some policy oriented researches have focused on structural approaches to calculate ERER by using macroeconomic models. In this branch of literature estimation of ERER has been derived from two alternative methodologies: a partial equilibrium specification based on estimated trade equations and a general equilibrium one based on simulations form empirical macroeconomic models. The partial equilibrium approach has been applied for the G-7 countries for years (Wren-Lewis and Driver, 1998; Bayoumi et al., 1994). On the other hand, for the general equilibrium

framework, there are three applications: Fundamental Equilibrium Exchange Rate (FEER) by Williamson (1994); Desired Equilibrium Exchange Rate (DEER) by the IMF's research department, Bayoumi et al. (1994) and Clark et al. (1994); and the Natural Equilibrium Real Exchange Rate (NATREX) by Stein and Allen (1995).

2.4 Real Exchange Rate and Its Determinants

The relationship between RER and its determinants can be examined by the effect of explanatory variables on this issue. Empirical literature on RER in the 1970s and 1980s mostly focuses on the short-run movements of exchange rates while more recently studies shift to the long-run modification of real exchange rate. A number of researches consider whether real interest rate differentials clarify RER movements. Meese and Rogoff (1988), Edison and Pauls (1993), and Coughlin and Koedijk (1990) could not find a relationship between RER and expected real interest rate differentials while Bagchi et al. (2003) examined the effect of terms of trade and the expected real interest rate differentials on the RER by employing cointegration analysis to investigate possible long-term linkage and they concluded that both of these variables affect the real exchange rate in the long run.

Hinkle and Montiel (1999) explain the relationship between the real exchange rate and a set of domestic side factors such as; increasing in government spending causes trade deficit which depreciates the equilibrium level RER. In addition, increasing the trade balance caused by improvement of productivity leads to the excess demand for non-traded goods, which can appreciate the real exchange rate. In the same manner, an improvement in terms of trade also causes similar effect. However, a reduction in export subsidies is associated with the RER depreciation.

2.5 Conclusion

All these different debates promoted analysts to develop the set of explanatory variables. Some considers foreign and domestic productivity proxies (Huizinga, 1987; Edwards, 1989; Zhou, 1995; Meese, 1990; Stein, 1994; Williamson, 1994; Coughlin and Koedijk, 1990; and Strauss, 1996) while others worked on the level and composition of government consumption (Edwards, 1989; Meltzer, 1993; and Zhou, 1995) or terms of trade (Edwards, 1989; Gruen and Wilkinson, 1994; Amano and Van Norden, 1995; and Faruqee, 1995) and many other determinants such as; investment rate, capital inflows, public expenditures, openness, domestic credit, and technology progress.

The main problem in such analysis is to find a suitable set of variables which can offer useful information on dynamic effects on the real exchange rate. After reviewing the literature this study tries to select most effective factors that affect the real exchange rate by choosing the most significant variables from previous researches with considering the availability of data. Table 2.1 illustrate different explanatory variables affecting the real exchange rate gathered by Takaendesa (2006) which provides a rapid check list for choosing variables to be tested in experimental analysis.

Table 2.1: Selected Empirical Literature on the Determinants of the Real Exchange Rate

Study	Countries	Methodology	Determinants
Kempa (2005)	**Britain, U.S., German, Japan**	**Variance decomposition**	**Nominal shocks (financial market shocks), aggregate supply and aggregate demand shocks.**
Coricelli and Jazbec (2004)	**19 Transitional economies**	**Classical regression**	**Productivity differential, share of non-tradable consumption in total private consumption and real government consumption.**
Miyakoshi (2003)	**6 East-Asian countries**	**Multivariate cointegration**	**Real interest rate differential, productivity differential.**
Joyce and Kamas (2003)	**Argentina, Colombia, Mexico**	**Cointegration, variance decomposition and impulse response**	**Terms of trade, capital flows, productivity, government share of GDP, nominal exchange rate, broad money.**
MacDonald and Ricci (2003)	**South Africa**	**Multivariate cointegration**	**Real interest rate differential, productivity, terms of trade, trade openness, fiscal balance, net foreign assets.**
Mkenda (2001)	**Zambia**	**Multivariate cointegration**	**Terms of trade, government consumption, investment share in GDP, central bank reserves, trade taxes, technical progress, openness, aid.**
Aron *et al*. (2000)	**South Africa**	**Multivariate cointegration**	**Terms of trade, price of gold, tariffs, capital flows, central bank reserves, openness, nominal depreciation, domestic credit, technical progress, government expenditure.**
Antonopoulos (1999)	**Greece**	**Multivariate cointegration**	**Productivity differential, capital flows.**
MacDonald (1998)	**U.S., German, Japan**	**Multivariate cointegration**	**Productivity differential, terms of trade, fiscal balance, net foreign assets, real interest rate differential.**
Elbadawi (1994)	**Chile, Ghana, India**	**Multivariate cointegration**	**Terms of trade, openness, ratio of net capital inflows to GDP, share of government spending in GDP, rate of export growth (productivity).**
Obadan (1994)	**Nigeria**	**Two-stage least squares regression**	**Terms of trade, net capital inflow, nominal exchange rate policy, monetary policy.**
Ghura and Grennes (1993)	**33 Sub-Saharan African countries**	**Classical regression**	**Terms of trade, capital flows, openness, excess domestic credit, technical progress, nominal devaluation.**
Edwards (1989)	**12 Developing countries**	**Multivariate cointegration**	**Terms of trade, level and composition of government spending, capital flows, openness, foreign exchange control, technical progress, nominal devaluation.**

Chapter 3

EXCHANGE RATE POLICY IN THE NEW ZEALAND'S ECONOMY

3.1 Introduction

The aim of this chapter is to offer a brief overview of the exchange rate policies that New Zealand has had during the study period and the development of the real exchange rate in those different regimes. Knowledge of exchange rate policy shifts can be helpful in explaining the structural breaks that may be detected in the data and therefore it shows the importance of this issue for modeling the real exchange rate. Although the study period actually starts from first quarter of 1974, this very brief review of New Zealand's exchange rate system tries to cover the whole past century for completeness. This chapter contains four sections; country profile, economic background, exchange rate regime, and macroeconomic indicators and economic performance.

3.2 Country Profile

New Zealand is located to the southeast of Australia, consists of two main components; the north and the south island. According to CIA fact book, the country has total area of 267,710 square kilometers with the population about 4.2 million (July 2009) where almost 90% of the population lives in cities and the capital, Wellington is the southernmost national capital in the world. The British

Broadcasting Corporation (BBC) one of the largest media organization in the world[3] described this country as a wealthy pacific country which is dominated by two cultural groups; New Zealanders of European decent and the minority Maoris who were the first inhabitants of New Zealand, arriving on the islands around one thousand years ago. Although manufacturing and tourism were important sectors, the mainstay of their economy was infact agriculture. After they have diversified their export markets and expanded a strong trade links with Australia, Japan, United States and China, manufacturing and services industries such as finance insurance and business services became most vital sectors of the economy.

As a developed country New Zealand ranks highly in worldwide comparisons on ease of doing business, human development, economic freedom, life expectancy, public education, peace, press freedom, and public rights. Also cities of this country rank among most livable of the world.

3.3 Economic Background

New Zealand has a small open economy which functions on free market principles with extensive manufacturing sectors. Over the past two decades, the government has transformed the country from a dependent British market access economy to an industrialized free market which can compete globally.

The New Zealand economy had expanded by an average of 3.5% growth each year from 2000 to 2007 when private consumption and residential investment grew strongly. The following table shows the Gross Domestic Product (GDP) by major

[3] See http://news.bbc.co.uk/2/hi/americas/country_profiles/1136253.stm for more datails.

industries at constant 1995/96 prices, extracted from 2010 Economic Overview of Treasury department of New Zealand.

Table 3.1: GDP by Major Industries (2005 - 2009)

Year ended 31 March						
	2005	2006	2007	2008	2009	2009
(dollar amounts in millions)						% of Total
Finance Insurance & Business Services, etc	32,615	33,996	35,025	36,228	36,793	27.60%
Manufacturing	19,573	19,684	18,597	18,597	17,612	13.20%
Personal & Community Services	14,822	15,124	15,216	15,504	15,947	11.90%
Transport & Communication	12,903	13,387	13,536	14,304	14,334	10.70%
Retail, Accommodati on, Restaurants	9,406	9,826	10,098	10,410	10,042	7.50%
Wholesale Trade	9,824	10,077	10,090	10,523	9,973	7.50%
Govt Administration & Defence	5,201	5,492	5,954	6,374	6,673	5.00%
Agriculture	6,143	6,504	6,647	6,472	6,310	4.70%
Construction	6,190	6,501	6,331	6,592	6,010	4.50%
Fishing, Forestry, Mining	2,634	2,755	2,709	3,419	3,335	2.50%
Electricity Gas & Water	2,526	2,441	2,602	2,509	2,522	1.90%
Gross Domestic Product	**126,393**	**130,383**	**131,500**	**135,367**	**133,486**	**100.00%**
Annual Average % change	3.70%	3.20%	0.90%	2.90%	-1.40%	
Primary Industries	8,866	9,359	9,451	10,051	9,801	7.30%
Goods Producing Industries	28,323	28,651	27,679	27,833	26,305	19.70%
Services Industries	84,370	87,505	89,609	92,898	93,504	70.00%

In early 2008, the economy entered recession, domestic activities slowed sharply while high interest rates and dropping of house prices caused a quick decline in residential investment. Tourism continued to weaken because of decline in incomes both locally and globally. Therefore all these reductions in manufacturing, construction, trade and other sectors affected GDP dramatically. The following graph demonstrates the changes in real gross domestic product between 1974 and 2009. (Source: International Financial Statistic - The base year is 1974)

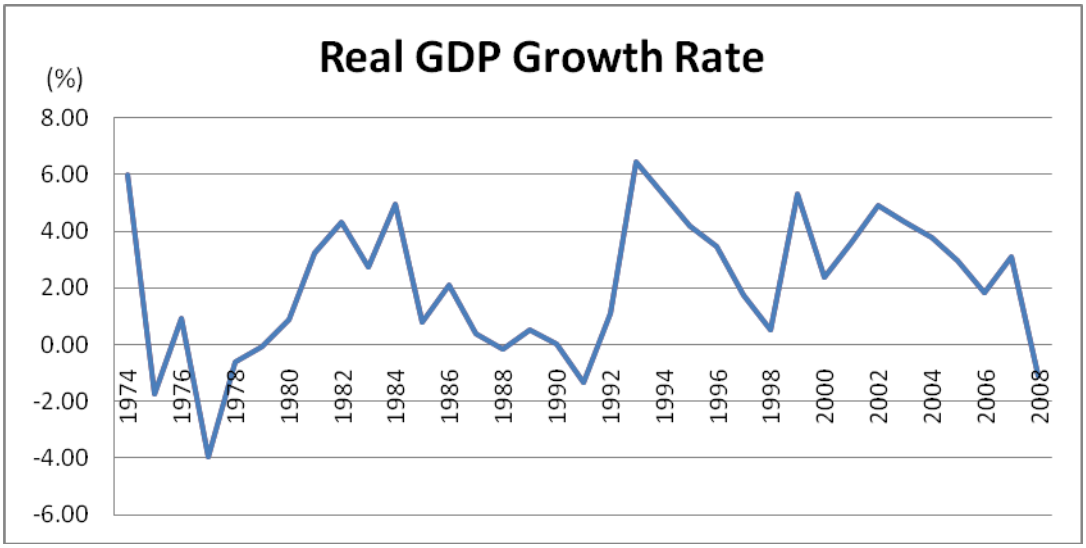

Figure 3.1: Growth Rate in Real Gross Domestic Product

The economy grew modestly in September 2009 when GDP increased by 0.2% due to improvement of primary production specially mining which covered declines in manufacturing and construction. International Monetary Fund (IMF) in its October 2009 World Economic Outlook, projected a growth of 2.2% in 2010 which increasing to 3.3% for 2014.

3.4 Exchange Rate Regime

As an advanced small open economy, New Zealand benefits from a high degree of integration into global financial markets. Nevertheless, thinking about changes to an optimal exchange rate policy has been one of the main concerns of the Reserve Bank of New Zealand (RBNZ) which has had the role of managing monetary policy in this country since its establishment, 1934.

According to Reserve Bank Bulletin (1985); during the period prior to the foundation of RBNZ, country's exchange rate was set against sterling by the Associated Banks of New Zealand and maintained as far as possible at £NZ100=£Stg100. In 1914, banks decided not to maintain the exchange rate to parity with sterling in order to

preserve the level of their sterling reserves which led to depreciation of New Zealand pound against sterling. By transferring decisions about credit control and the exchange rate to RBNZ in 1934, it was decided to establish a fixed exchange rate. Until 1961 a formal link existed among New Zealand pound and sterling which was backed up by a commitment to use official external reserves to maintain convertibility at the defined level. In 1961, New Zealand became a member of International Monetary Fund (IMF) where each member was required to set up a par value for its currency expressed in terms of gold or the USD in order to promote a stable international monetary system. Following the devaluation of sterling against USD in 1967, New Zealand took the opportunity to move formally to a peg to the US dollar in 1971. New Zealand terminated the link with the United States dollar in July 1973 and instead shifted to a system whereby the value of the NZ$ was fixed against a basket of currencies. In 1979 after a series of discrete devaluations, the ‘crawling peg’ approach was implemented for exchange rate system. But this approach ended in June 1982 since it led to a depreciation of NZ$ against the basket of currencies. From 1982-1985 the Reserve Bank reverted to fixing the exchange rate with occasional discrete adjustment. In order to facilitate structural adjustment in the New Zealand economy in response to changing external circumstances, the New Zealand dollar was finally floated on March 4, 1985.

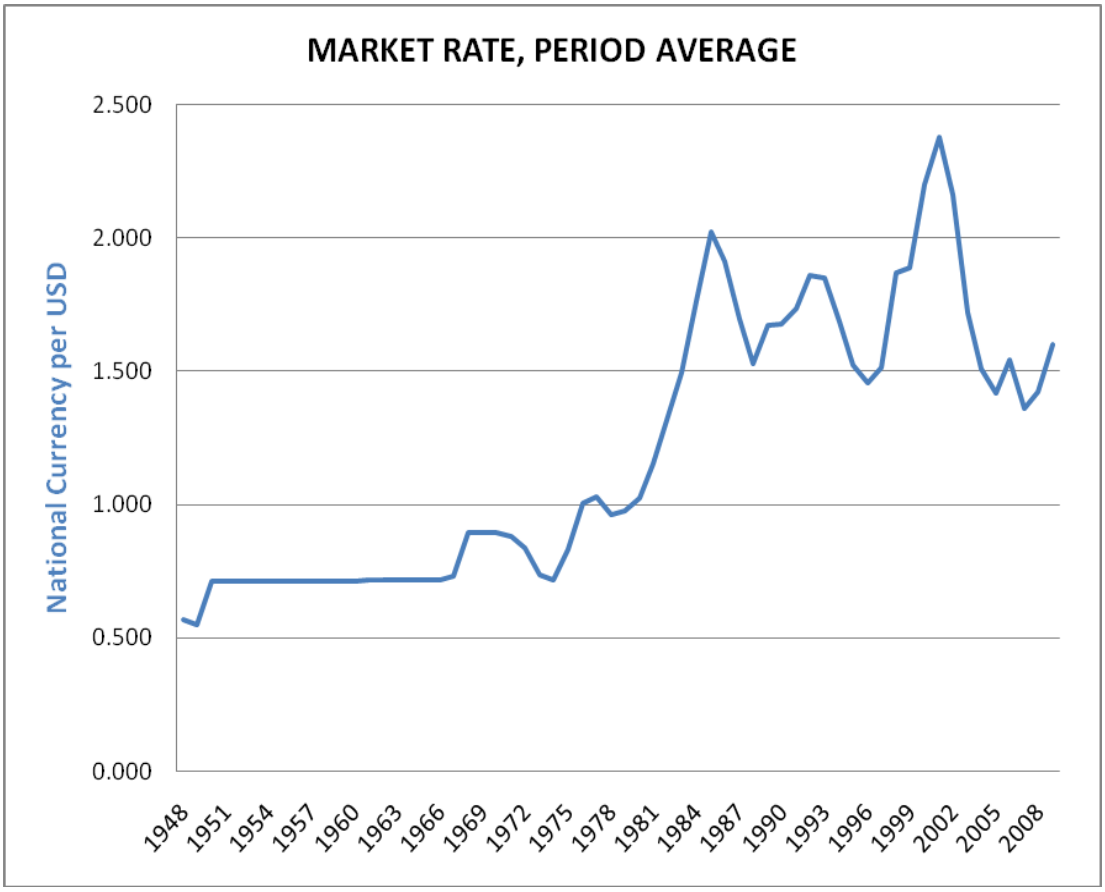

Figure 3.2: The Evolution of the Market Exchange Rate of the NZ Currency against USD, 1948-2009

Figure 3.2 displays the evolution of the nominal exchange rate of the New Zealand currency against United State dollar between 1948 and 2009 as described partly in this short history. (Source: International Financial Statistic)

3.5 Macroeconomic Indicators and Economic Performance

Over the last three decades, the New Zealand's economy has transformed from being one of the most regulated and protected one in Organization for Economic Cooperative and Development (OECD) to one of the most open and liberalized.[4] New Zealand's economy has been based on agricultural exports including meat, dairy products, wool, fruit and vegetables. After changing the exchange rate policy in 1985, the government subsidies for agriculture was removed and liberalized regulations have been assigned for imports. In 1990s government's position in the economy reduced by restructuring and sale of government-owned enterprises. Due to negative effects of the Asian financial crisis in 1997 and 1998, economic growth had slowed but it rebounded one year later after showing 2.5% economic growth in 2000. The economy entered recession in early 2008 due to global financial crisis therefore, domestic activities such as dairy products and residential investments slowed sharply. In September 2009, economy recovered by showing 0.2% improvement in both production and expenditure GDP.[5]

In this part of the research, some of the main macroeconomic indicators especially those which used in this study as explanatory variables are examined. Figure 3.3 shows the evolution of the real exchange rate during the study period.

[4] http://www.wikipedia.org described OECD as an international economic organization of 31 countries. It defines itself as a forum of countries committed to democracy and the market economy, providing a setting to compare policy experiences, seeking answers to common problems, identifying good practices, and coordinating domestic and international policies of its members.

[5] See New Zealand Economic and Financial Overview 2010, Treasury Department of New Zealand. http://www.treasury.govt.nz/economy/overview/2010

(Source: International Financial Statistic)

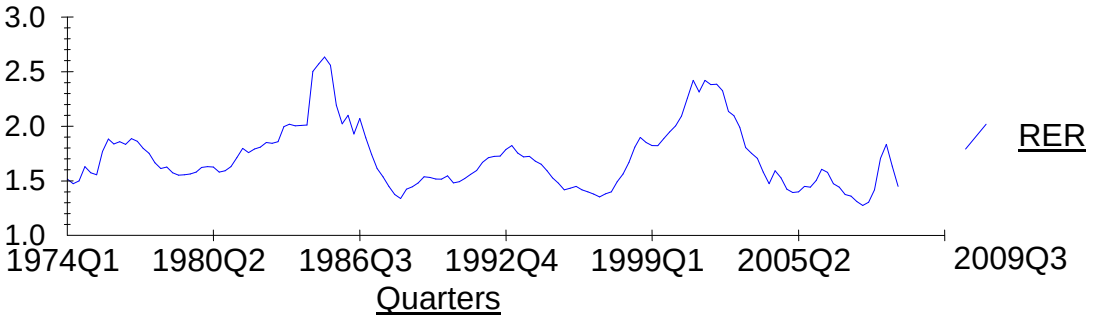

Figure 3.3: The evolution of the real exchange rate against USD

The following table illustrates some of the variables used in the study as economic indicators for every five years from 1974Q3 – 2009Q3.

Table 3.2: Economic Indicators (1974 - 2009)[6]

Year	RER	TOT	OPENNESS	CI	RP	GCON	GNER	DC
1974Q3	1.499	0.555	0.421	-0.104	0.975	0.144	0.015	0.803
1979Q3	1.580	0.908	0.426	-0.007	0.894	0.168	0.029	1.040
1984Q3	2.502	0.744	0.546	-0.092	0.852	0.161	0.413	1.051
1989Q3	1.529	0.862	0.410	-0.024	0.983	0.185	0.034	3.178
1994Q3	1.591	0.907	0.469	0.001	0.993	0.176	-0.058	3.505
1999Q3	1.886	0.843	0.475	-0.055	1.039	0.177	0.060	4.359
2004Q3	1.527	0.769	0.435	-0.079	1.012	0.176	-0.059	4.679
2009Q3	1.449	0.857	0.408	-0.055	0.961	0.204	-0.177	6.109

Sudden changes in these variables can be explained by policy changes and other events such as; liberating the imports regulation after changing of exchange rate

[6] These ratios extracted from International Financial Statistics (IFS). Descriptions of variables are available in table 4.1.

regime in 1985, financial crisis in 1997, 1998 and also 2008. For instance, real exchange rate of 2.502 in 1984, decrease in relative productivity in third quarter of 2009, recovery of terms of trade in 2009, sudden change in openness ratio in 1984 and many other evidences can explain the effects of these events on New Zealand's economy.

Chapter 4

MODELING FRAMEWORK AND DATA DESCRIPTION

4.1 Introduction

The review of literature on the determinants of real exchange rate and also examining the exchange rate regime in New Zealand can help to clarifying the relationship between real exchange rate and its possible determinants. This chapter explains the analytical framework used in this study in three sections. First part is theoretical modeling; second section is the econometric model and data description while the last one is a priori rationale of explanatory variables.

4.2 Theoretical modeling

This research follows Edwards (1989), by adopting the framework used in his study. Therefore, in this section we are going to have a brief review of his study.

Edwards' Model (1989) is an inter-temporal general equilibrium model for a small open economy where both tradable and non-tradable can be exchanged. The base of this experimental study is to verify the equilibrium real exchange rate by disentangling basic changes in the level of the real rate from temporary influences brought on, by nominal exchange rate movements, fiscal and monetary policy. From the theoretical model, two equations are derived to describe; first one shows the fundamental factors affecting the real exchange rate while the second equation illustrate the dynamics of the real exchange rate.

The structural equation for the equilibrium real exchange rate is:

$$\log (RER_t^*) = \beta_0 + \beta i \log (FUND_{it}) + u_t, \quad (4.2.1)$$

Where; RER_t^* is the equilibrium real exchange rate,

$FUND_{it}$ is the vector of fundamental variables (discussed later).

Edwards' model also believes that in the short-run the real exchange rate changes towards the equilibrium rate at a speed given by the parameter θ. The equation describing these dynamics is given by:

$$\log (\Delta RER_t) = \theta [\log (RER_t^*) - \log (RER_{t-1})] - \lambda [Z_t - Z_t^*] + \Phi [\log (E_t) - \log (E_{t-1})] \quad (4.2.2)$$

Where;

RER_t is the real exchange rate,

Z_t is a vector measuring fiscal and monetary policy,

Z_t^* is a vector of policy measures consistent with the equilibrium rate,

λ is the speed of adjustment to the policy gap $(Z_t - Z_t^*)$,

E_t is the nominal exchange rate, and

Φ is the speed of adjustment to depreciations.

The real exchange rate level adjusts between today and tomorrow in the path of the equilibrium rate with some resistance showed by the adjustment speed θ, which is

the time needed for relative prices in the economy to adjust, where changes in both policy variables and nominal rate can disturb this adjustment in either direction. This equation declares that RER has a mean decline property in long run where the mean is equilibrium rate.

By substituting these two equations, a new equation can be derived for the real exchange rate:

$$\text{Log}\,(RER_t) = \gamma_0 + \gamma_i \log\,(FUND_{it}) + (1-\theta)\log\,(RER_{t-1}) - \lambda\,(Z_t - Z_t^*)_t + \Phi NDEP_t + v_t, \quad (4.2.3)$$

Where; γ_i is a combination of the respective β_i and θ, and

$\Phi NDEP_t$ is the nominal depreciation.

This equation can be estimated empirically. In order to perform this estimation, the fundamental variables affecting the equilibrium real exchange rate need to be identified. Edwards' study on 12 developing countries identified the following set of primary variables affecting the ERER:

External Terms of Trade

It is defined as the ratio of the world price of a country's exports over its import where, increases in TOT have a positive effect on the current account and therefore can lead to a decline of the ERER.

Government Consumption of Non-Tradable

Improvements in government consumption of non-tradable lead to an increase in their relative price in order to maintain equilibrium in non-tradable goods market. "An increase in the relative price of nontradable goods, in turn, appreciates the real exchange rate". (Edwards, 1994:70)

Controls over Capital Flows

Depending on the interest rate differential between the world and domestic economy, a removal of capital flows could either increase or decrease the capital account. Therefore ERER could move in either direction.

Severity of Trade Restrictions and Exchange Controls

Trade liberalization leads to an increase in trade volume which might be resulted from the rise in import, export or both. This can move the current account in both directions which lead the ERER in the same manner.

Technological Progress

This progress increases the productivity of the economy which leads to an appreciation of the ERER. (Balassa Samuelson effect)[7]

[7] "The Balassa–Samuelson effect, also known as Harrod–Balassa–Samuelson effect, depends on inter-country differences in the relative productivity of the tradable and non-tradable sectors." (http://en.wikipedia.org/wiki/Balassa-Samuelson_effect)

The following two proxies used by Edwards for monetary and fiscal policy:

Excess Supply of Domestic Credit

Afridi (1995) defined the excess supply of domestic credit (EXDC):

> Domestic credit creation in excess of devaluation, foreign inflation, and real GDP growth which has an inflationary impact because if it is positive, then the increase in domestic credit or money supply is out of proportion to real output and the prevailing price level. The excess money is spent on both non-tradable and tradable. With the price of tradable being exogenous to the system, the price of non-tradable is driven up, which causes appreciation of real exchange rate. (p.269)

Ratio of Fiscal deficit to Legged High Powered Money

Negative sign of coefficient is expected for this ratio. Afridi (1995) and Edwards (1989) note that an increase in this variable would cause appreciation of the real exchange rate.

Edwards' model applied by many economists, including Domac and Shabsigh (1999) which follow their model by presenting a formal econometric model of ERER determination as below:

$$RER_{it} = \alpha_0 + \alpha_1 TOT_t + \alpha_2 CLOSE_t + \alpha_3 CAPFY_t + \alpha_4 EXCR_t + \alpha_5 NDEV_t + \alpha_6 t + \varepsilon_t \quad (4.2.3)$$

Where;

RER is the actual real exchange rate, as measured above,

TOT is the terms of trade measured as the ratio of the index of dollar value of export prices to the index of dollar values of import prices,

CLOSE, defined as [Y/(X+M)], is the ratio of GDP over the sum of imports (M) and exports (X),

CAPFY is the capital inflow measured as the difference between net change in reserves and trade balance scaled by GDP,

EXCR is the excess domestic credit, measured as the difference between growth in domestic credit and real GDP growth,

NDEV is the growth in the official nominal exchange rate,

t is time index, and ε is the error term.

4.3 Econometric model and Data Description

This study modified the framework developed by Edwards (1989) and Domac and Shabsigh (1999) by omitting term (*t*) and also by adjusting some independent variables to inspect the relationship between real exchange rate and its determinants for the economy of New Zealand as follow:

$$RER = c_0 + c_1 TOT + c_2 OPEN + c_3 CI + c_4 RP + c_5 GCON + c_6 GNER + c_7 DC + \varepsilon_t \quad (4.3.1)$$

Where;

- ***RER*** is Real Exchange Rate,
- ***TOT*** is Terms of Trade,
- ***OPEN*** is OPENNESS,
- ***CI*** is Capital Inflow,
- ***RP*** is Relative Productivity,
- ***GCON*** is composition of Government Consumption,
- ***GNER*** is the Growth in Nominal Exchange Rate,
- ***DC*** is Domestic Credit ratio,
- ε_t is serially uncorrelated random disturbance term and c0, c1, c2, c3, … c7 are estimated parameters for each explanatory variable respectively.

The data set acquired from International Financial Statistics (IFS) covering the first quarter of 1974 to third quarter of 2009, totally 143 observations. Table 4.1 illustrate the description and the source of the data.

Table 4.1: Descriptions and Source of Data

Variables	**Definition**	**Raw Data Used***	**Source**
Real Exchange Rate (RER)	Nominal exchange rate multiplies the proportion of consumer price index in the US to consumer price index in New Zealand		
Terms of Trade (TOT)	Annual export price divided by annual import price	Exports (70) Imports (71)	IFS
Openness (OPEN)	The sum of annual import and export price divided by GDP	GDP (99B) Exports (70) Imports (71)	IFS
Capital Inflow (CI)	Subtraction of net change in annual reserves from trade balance scaled by GDP	Total Reserve minus Gold (11.D) Trade Balance (78ACD)	IFS
Relative Productivity (RP)	Consumer price index divided by wholesale price index	Consumer Price Index (64) Wholesale Price Index (63)	IFS
Government Consumption (GCON)	*Proportion of the government consumption to GDP*	Gov. Consumption (91F) GDP (99B)	IFS
Domestic Credit Ratio (DC)	The Ratio of Domestic credit to GDP	Domestic Credit (32) GDP (99B)	IFS
The growth in the official nominal exchange rate (GNER)	Comparison of the change of the official nominal exchange rate between the present and the previous year	Market Rate (RF)	IFS

* Note: a figure in parentheses in 'Raw Data Used' column indicates the data code used in IFS.

4.4 A Priori Rationale of Explanatory Variables

Theoretically, the sign of coefficient of the *Terms of Trade (TOT)* is ambiguous. It can be negative or positive. It depends on whether the substitution or income dominates. The impact of TOT argued by Edwards (1989) and Hinkle and Montiel (1999), where both agreed with the negative sign for the coefficient of terms of trade based on the assumption that the income effect dominates the substitution effect since improving TOT tend to decrease the equilibrium real exchange rate by increasing the trade balance and creating excess demand for non-tradable goods. Thus, the opposite is true when the substitution effect dominates the income effect.

The *Openness* of the economy influences changes in the real exchange rate. An increase in openness is resulted from an improvement of the sum of import and export prices compared to gross domestic product. According to Elbadawi (1994) increased openness resulted in equilibrium real exchange rate depreciation in every case. The higher degree of openness leads to higher demand for foreign currency and depreciate the real exchange. Therefore the expected sign of coefficient would be positive.

Edwards (1989) predicts the sign of coefficient for the *Capital Inflows (CI)* to be negative since the structure of capital inflows is a combination of foreign direct investment and capital inflows in stock market therefore; an increase in capital inflows reduces the demand for foreign currency which decreases the real exchange rate.

Improvement of *Relative Productivity (RP)* can decrease the cost of production and according to Balassa-Samuelson effect; it can result in an appreciation of real

exchange rate. Thus, the negative coefficient sign is expected for relative productivity.

Several recent studies investigated the relationship between *Government Consumption (GCON)* and real exchange rate including Frenkel and Razin (1996). They all noted that the coefficient sign can be either positive or negative. It depends on whether the consumption is directed towards the tradable or non-tradable goods sector. If it towards the non-tradable, a positive sign will appear and vice versa.

For *Domestic Credit (DC)* variable, greater amount of domestic credit increases the gross domestic product insufficiently which can cause inflation in the economy and therefore appreciation of real exchange rate. The coefficient of this variable is expected to be negative.

Finally, the *Growth of Nominal Exchange Rate (GNER)* will depreciate the real exchange rate in any case. Thus, the positive sign of coefficient is expected.

Chapter 5

THE EMPIRICAL METHODOLOGY AND REGRESSION MODEL

5.1 Regression Model

Using quarterly data[8] for New Zealand over the period of 1974Q1-2009Q3, we investigate the determinants of the real exchange rate and the role of these fundamental factors by employing appropriate estimation methods.

Multivariate co-integration techniques applied to highlight both the long-run and the short-run influences on the determinants of real exchange rate of the New Zealand economy in the model for which the steady-state is represented by Equation (5.1.1).

$$\mathbf{LRER = c_0 + c_1\, LTOT + c_2\, LOPEN + c_3\, LCI + c_4\, LRP + c_5\, LGCON + c_6\, LGNER + c_7\, LDC + \varepsilon_t} \quad (5.1.1)$$

Where[9]

- *RER* is Real Exchange Rate,
- *TOT* is Terms of Trade,

[8] We estimate the matrices of correlation coefficients of the relevant variables which are based on each model used in this thesis (see next section for details).

[9] The data set obtained from International Financial Statistics (IFS) covering the first quarter of 1974 to third quarter of 2009, totally 143 observations.

- *OPEN* is OPENNESS,
- *CI* is Capital Inflow,
- *RP* is Relative Productivity,
- *GCON* is composition of Government Consumption,
- *GNER* is the Growth in Nominal Exchange Rate,
- *DC* is Domestic Credit ratio,
- L denotes the natural logarithm, ε_t is serially uncorrelated random disturbance term and c_0, c_1, c_2, $c_3 \ldots c_7$ are estimated parameters for each explanatory variable respectively.

5.2 The Empirical Methodology

In the next step, we first examine the stationary properties[10] of our data using the Augmented Dickey-Fuller (ADF)[11] and the Multivariate Augmented Dickey Fuller (MADF)[12] unit root tests proposed by Dickey and Fuller (1979; 1981) and Johansen and Juselius (1992) respectively.

On the basis of the results obtained from both the ADF and the MADF unit root tests, we test equation (5.1.1) by utilizing the Engle-Granger (1987) and the Johansen (1988) co integration procedures in order to estimate a long-run relation among the variables. Co-integrating analysis by Engle-Granger (1987) assumes only one co-

[10] Nelson and Plosser (1982) point out that the data generating process (DGP) for most macroeconomic time series data consist of a unit root, which is commonly accepted in the relevant literature. However, the counterpart of this assumption argues that non-linear or segmented trend stationary might be a better alternative for the traditional one (See Kwiatkowski et al. 1992 and Lau and Sin 1997). In addition, Jones (1995) mentions that DGP with unit root still a useful hypothesis in applied studies.

[11] The 'ADF' command in Microfit includes the intercept term in the ADF equation. Therefore the corresponding critical values should take the intercept term into account. In addition to this, we included trend in levels, but we excluded it in first difference (Pesaran and Pesaran, 1997).

[12] See Coe and Moghadam (1993) for more details about the application of MADF.

integrating vector whereas the Johansen full information maximum likelihood (FIML) method provides (P-1) co-integration vectors[13].

Having constructed our model(s) for the variables in hand, the long-run OLS estimates may still be biased if the explanatory variables are not weakly exogenous. This means that if the variables are not weakly exogenous, they cannot enter on the right side of the model as explanatory variables. In order to test for weak exogeneity[14], we use the Johansen procedure (1992).

In order to establish the short-run relations among the variables embodied within equations (5.1.1), we utilize an error correction mechanism (ECM) estimated by ordinary least square (OLS), and derive the ECM using the residuals from the estimated co-integrating regressions for equation (5.2.1)[15].

Thus,

$$\Delta LRER_t = a_0 + a_1 u_{t-1} + \sum_{i=0}^{m} a_i \Delta LTOT_{t-i} + \sum_{k=0}^{r} a_k \Delta LOPEN_{t-k} + \sum_{j=0}^{n} a_j \Delta LCI_{t-j} + \sum_{l=0}^{m} a_j \Delta LRP_{t-l} + \sum_{h=0}^{c} a_j \Delta LGCON_{t-h} + \sum_{d=0}^{p} a_j \Delta LGNER_{t-d} + \sum_{c=0}^{s} a_j \Delta LDC_{t-c} + \varepsilon_t \qquad (5.2.1)$$

[13] P is the number of parameters used in a model (see Johansen (1988) for more details for this).

[14] In both the Johansen and the EHR procedures, models are considered closed-form where all variables depend on one another (i.e. all variables are considered as endogenous). However, some certain variables can be treated as weakly exogenous for the estimation of the long-run relationship.

[15] According to the information given in the theoretical part, we first construct a short-run ECM with one lag of each variable and eliminate those lags with insignificant parameter estimates. Then, we estimate restricted one to find out the most suitable model.

Where u_{t-1} and v_{t-1} are the lagged estimated residual from Equation (5.2.1), other variables under inspection are already defined in Equation (5.1.1) and (Δ) denotes the first differences.

It is worthwhile noting that the estimated error correction terms (i.e. u_{t-1} and v_{t-1}) should be negative and statistically significant in the short-run equation (5.2.1) with respect to the Granger Representation Theorem (GRT). Hence, negative and statistically significant error correction coefficients are a needed condition for the variables in question to be co-integrated.

Finally, having applied the Final Prediction Error (FPE) criterion to determine the optimal lag length for the variables, we employ the Granger-Causality (G-C) testing procedure to see whether there is a pattern to causal relationships among the variables[16].

[16] It is noteworthy that we discuss the cost and benefits of all different methods why we use more than one for the same purpose.

Chapter 6

EMPIRICAL RESULTS AND BRIEF COMPARISON OF THE TWO PERIODS

6.1 Empirical Results

Multicollinearity is the existence of strong relation among some or all explanatory variables of regression. For this purpose, we estimated correlation matrix of dependant variable and the explanatory variables as can be seen in Table 1[17]: It is expected to have low correlation between explanatory variables and high correlation between the dependent variables. Results estimated in Table 1 indicate that the correlation of these variables does not matter in terms of multicollinearity for the equation under this study.

The relationship between RER and TOT as well as RER and CI shows that there is lower correlation than expected. However, this situation does not create any problem when the model is constructed.

In order to construct long-run relationship among the variables, the EG and the Johansen cointegration procedure are employed[18]. Prior to modeling the relationships between the variables, the univariate time series properties are established. The results of the Augmented Dickey-Fuller (ADF) and the Multivariate Augmented

[17] See Appendix (A).

[18] All our estimations are carried out by Microfit 4.0 (Pesaran and Pesaran, 1997).

Dickey-Fuller (MADF) test indicate that the variables in question – LRER, LTOT, LOPEN, LCI, LRP, LGCON, LGNER and LDC – are all non-stationary in levels but stationary in first differences (see Table 2). In other words, the ADF and the MADF tests results for unit roots confirm that all variables are integrated of order one, I (1) in levels but integrated of order zero in first differences (i.e. stationary in first differences). This situation is denoted as LRER ~ I(1), LTOT ~ I(1), LOPEN ~ I(1), LCI ~ I(1), LRP ~ I(1), LGCON ~ I(1), LGNER ~ I(1), and LDC ~ I(1) (see Table 3).

Before going a step further to analyze long-run relationship, we apply the Johansen procedure to test for 'weak exogeneity' of the explanatory variables. Table 4 shows that the hypothesis of weak exogeneity cannot be rejected at 5% level according to the test statistics of $x^2(k)$. It should be noted that the Johansen weak exogeneity test for the explanatory variables are implemented separately rather than investigated in a system based framework[19] (see Table 4).

The next step is to test for co-integration between the relevant variables which are all I(1). We employ a residual-based[20] cointegration technique to test the existence of a long-run relationship among the variables. A sufficient condition for joint co-integration among the variables in a long-run regression is that the error term should be stationary. The residual based ADF test statistics for the error term ensure that we reject the null hypothesis of non-stationary (or no co-integration) at 5% significant level for the model used (5.2.1). The estimation results from the co integration tests

[19] Boswijk and Franses (1992) investigate different techniques based on exogeneity assumption and they find that the Johansen procedure have higher power than the others used in the relevant literature which are based on single equation system.

[20] Haug (1993) suggests that Engle-Granger's residual-based ADF test indicates the least size distortion among seven different residual-based cointegration tests based on Monte Carlo analysis.

indicate that there is evidence of a long-run relationship between Real exchange rate (RER) and its determinants (the explanatory variables) (see Table 5).

As regards the co integration regression equation for model 1, we can conclude that the corresponding critical values as a whole show that the underlying model is correctly specified. This means that the coefficients estimated for this model are consistent with the prediction of the exchange rate model which is presented in Table 6. In addition, based on the diagnostic test results, model 1 has no problem.

Due to an insignificant constant estimated coefficient, we dropped constant term from the model and run another model as model 2. In other words, we need to observe whether any significant change on the variables when this parsimonious application is conducted. We realized that RP (relative productivity) and GCON (government consumption) became significant where the constant term was dropped from the model[21].

To confirm the uniqueness of the co-integrating vectors, we adopt the Maximum likelihood ML test (Johansen, 1988; Johansen and Juselius, 1990)[22]. The VAR model is estimated with three lag which minimizes Schwarz Bayesian Criterion (SBC), and is used with unrestricted intercepts and restricted trends.

---

[21] It is important to note that we include two kinds of dummy variables into the regression model to check whether the structural breaks exist or not. However we found that the t-values of both estimated dummies were insignificant, therefore, the output results with dummy variables is not displayed.

[22] It is worth emphasizing that the residual-based tests of a single co-integrating regression and system-based tests are grounded in different econometric methodologies. Charemza and Deadman (1997: 178) suggest that the Johansen method can be used for single equation modeling as a supplementary tool (or auxiliary tool). In this case, as pointed out by Charemza and Deadman, this could be regarded as a confirmation of the single equation method to which the Engle-Granger method is employed.

Table 7 confirms the unique co-integration vector among the variables for both models 1 and 2. In this table, the maximum Eigen value statistics and trace statistics are conducted in finding number of co integration vector.

Since the existence of joint co-integration among the variables in long-run regression such as Equation 5.1.1 is confirmed, the next step is to model the short-run dynamics with the use of ECM[23]. In order to model output (RER) movements according to the framework introduced by Edwards (1989) and Domac and Shabsigh (1999), we can obtain an ECM adding the residuals from equation (5.1.1).

In fact, the original model does not take into account the short-run modules. However, short-run components are at hand, and their exclusion in applied econometric studies would create a misspecification, leading to biased estimates. Thus, "short-run components" [24] must be explicitly accounted for, in applied research.

With respect to the specification of the short-run dynamics, we prefer to follow an unrestricted ECM proposed by Banerjee et al. (1986) using the idea that we should start with a sufficiently large number of lags and progressively simplify it, suggested by Hendry (see also Gilbert (1986) and Miller (1991)).

[23] Note that if two or more time series variables are co-integrated, then there exists an error-correction mechanism (ECM). Empirically, in small samples, statistically significant error-correction terms provide further evidence in favor of the presence of a 'genuine' long-run relationship.

[24] In this study, in order to save some degrees of freedom due to small sample size, we use Hendry's general to specific modeling strategy. We then first estimated a short-run ECM with one lag of each variable and eliminated those lags with insignificant parameters. Secondly, we re-estimated the simpler model to find out the most suitable model. In addition to this, we apply the instrumental variable (IV) method to ensure OLS short-run estimates are not jeopardized by the presence of some contemporaneous effects. These results are available and they can be provided on request.

We therefore employ an ECM to test for short-run adjustment towards long-run equilibrium, and to explore the relationship between real exchange rate and its determinants (if any) for the model in the short-run. The results of the parsimonious dynamic model, using the error terms from OLS regressions are in Table 8.

The model presented in Table 8 shows that the error correction term's coefficient is negative and significant at the 1% level. The magnitude of the corresponding coefficients shows that 69 percent of the variation in the real exchange rate from its equilibrium level is corrected after each quarter. In other words, real exchange rate adjusts to its equilibrium level, reasonably at high level, and the error correction term gives further evidence that the variables in the equilibrium regression are co-integrated.

The appropriately signed and significant error correction term for the model confirms the earlier findings that relative productivity (RP), growth rate of nominal exchange rate (GNER) and openness have a long-term effect as well as a short-term effect on RER. It is worth noting that the model estimated explains 49% of total variation of real exchange rate for the short-run period whilst the same model explains 51% of total variation of RER in the long-run period.

Finally, we conduct two different techniques to see whether there is a causal relationship between the relevant variables, especially, those found significant. (i.e. LRER-LOPENNESS, LRER-LGNER, LRER-LDC, LRER-LRP) in both level and differences. This refers to the earlier evidence of co integration among the variables in a sense that if they are co integrated so causality should exist at least in one

direction[25]. In brief, the estimated results show that there exists an evidence of unidirectional causality from LGNER, LOPENNESS and LDC to LRER in the long-run. There is also unidirectional causality from LGNER, LOPENNESS and LRP to LRER in short-run period (see Table 9).

6.2 A Brief Comparison of Fixed (1974Q1 to 1985Q1) and Floating Exchange Rate Regime (1985Q2 to 2009Q3)

In this section, we used the concept of fixed and floating exchange regime to compare the estimated results separately in both the long-run and short-run models which are presented in Tables 10 and 11 respectively. As regards the co integration regression equations for model 1 (fixed) and 2 (floating), we can conclude that the corresponding critical values as a whole show that the underlying model is correctly specified. This means that the coefficients estimated for these models are consistent with the prediction of the Exchange rate model which is presented in Tables 10 and 11. In addition, based on the diagnostic test results, the models do not have any problem. The long-run results displayed in Table 10 show that RP, GNER, GCON and CI are significant under the regime of fixed whilst GNER, OPENNESS and DC are significant in floating exchange rate regime. The short-run results illustrated in Table 11 show that GNER and OPENNESS are significant under fixed regime whilst RP and OPENNESS are significant in floating exchange rate regime. This means that OPENNESS in short-run and GNER in long-run are the indicators which have an impact on real exchange rate factor in both regimes in New Zealand economy.

[25] In our application, we do not take into account the error correction term when we determine the direction of the causality. We just follow the standard causality test in a bivariate context.

Table 12 confirms that there is a unique co-integration vector among the variables for both fixed and floating exchange regimes. This also indicates that there is no difference between the two regimes in terms of existing of a long-run relationship.

Overall, comparison of these two different regimes (fixed and floating) indicates that there are more significant variables exist in fixed exchange rate regime therefore; policy makers have a much wider range of tools for decision making in case of real exchange rate.

Chapter 7

CONCLUSION AND POLICY RECOMMENDATIONS

7.1 Summary of the Study and Conclusion

This research developed the framework introduced by Edwards (1989) and Domac and Shabsigh (1999) to investigate the real exchange rate factor and its fundamental determinants for the New Zealand economy by using multivariate time series techniques. Quarterly data were used for the case of New Zealand over the period of 1974Q1-2009Q3. Given the small sample size, our results are indicative rather than definitive. Employing this quarterly data set, the series were found to be non-stationary in levels, but stationary in difference. Then, the models were found to be co-integrated because co-integration is essential for a valid test of the models in the long-run.

Furthermore, the Johansen method was employed to test for weak exogeneity. The results indicate that the explanatory variables used in the models are weakly exogenous. The next step was to confirm the uniqueness of the co-integration vector amongst the variables by conducting the Johansen and Juselius method. One co-integrating vector was found for both models in the fixed and floating regimes. For the short-run relation between real exchange rate and its determinants, ECM was applied. This provides further evidence regarding both the static long-run and the dynamic short-run components of the RER model used in this study.

Overall, the empirical findings obtained, show that terms of trade, relative productivity, capital inflows and government consumption, are insignificant whilst the domestic credit, the growth in the official nominal exchange rate and openness are significant indicators in the long-run period. In the short-run period, relative productivity, the growth in the official nominal exchange rate and openness are the variables which may an impact on the real exchange rate of New Zealand economy. Openness and growth rate of nominal exchange rate are the determinants which influence real exchange rate factor of the economy in both fixed and floating exchange rate regimes.

7.2 Policy Implications and Recommendations

Currency crises in Asian countries in 1997 and small extent to 2008 obviously attracted a lot of attention from economists and researchers to focus on the effect of the real exchange rate on the economy. Previous literature reviews of real exchange rate determinants provided a lot of theoretical background for further studies in this area.

Based on the empirical evidence, there exists a relationship between real exchange rate and independent variables – openness, the growth of nominal exchange rate, relative productivity, government consumption, and domestic credit. These variables have an impact on the real exchange rate and the real exchange rate depreciates when the degree of openness and growth of the nominal exchange rate increases, while, relative productivity, the government consumption and domestic credit decreases. However, capital inflows and terms of trade are insignificant in explaining the movement in the equilibrium of real exchange rate.

Comparison of these two different regimes (fixed and floating) indicates that there are more significant variables exist in fixed exchange rate regime therefore; the government of the New Zealand could have a much wider range of tools for decision making in case of real exchange rate.

Some points can be deducted from this study. First, due to the influences of macroeconomic policies, particularly, increasing government consumption causes the real exchange rate appreciation. This means that the consumption is directed towards the tradable goods sector. Secondly, the degree of openness of the economy influences changes in the real exchange rate so increasing openness results in depreciation of real exchange rate. Although more export creates surplus in current account and leads to excess demand for domestic currency so domestic currency is likely to appreciate, high level of imported goods make deficit in current account which cause excess supply of domestic currency, as a result the domestic currency is likely to depreciate. Therefore, in order to put a pressure on current account[26] and balance of payment imbalances and since narrowing the import volume through limitations, tariffs and quotas are against the policies of World Trade Organization (WTO) and IMF so the government could follow alternative approaches like; elasticity approach, national income approach, foreign trade balance and total consumption approach or monetary approach for foreign balance. Third, reducing the cost of production and more productive activities in the tradable sector, cause real exchange rate to decrease. Therefore, government may consider more investment in the industrial sectors to raise the country's productivity. In addition to this, the

[26] One of the basic aims of countries is to arrive at a zero balance in their balance of payment (BOP). Current account as one of the most liquid and important parts of BOP, plays an important role in this issue.

government also should develop the policy concerning capital inflows as well as domestic credit to increasing the proportion of foreign direct investment, which is more beneficial to the economy. Finally, increase in domestic credit or money supply leads to more spending on both non-tradable and tradable goods. With the price of tradable being exogenous to the system, the price of non-tradable is driven up which discourage the production of non-tradable and cause a movement of factors of production to the tradable sector and as a result real exchange rate will decrease.

Based on the findings estimated, the New Zealand's government could consider following issues for policymaking in case of the real exchange rate:

- There are more significant variables exist in the fixed exchange rate regime therefore, a much wider range of tools are available for policymaking.
- In the long-run; openness, growth of nominal exchange rate, relative productivity, government consumption and domestic credit play an important role in keeping the real exchange rate in an appropriate level while, for the short-run, only openness, growth of nominal exchange rate and relative productivity are significant.
- Openness explain the greatest component of the variation in the real exchange rate in the long-run while, relative productivity is the most significant variable in the short-run.

7.3 Areas for Further Research

The areas for further research that come into sight, which can cover the gaps that has been left by this study are; firstly, there still exists an additional unstated policy implications and recommendations which can be applied by the government of New Zealand in case of real exchange rate. Secondly, the behaviors of the explanatory variables under different exchange rate regimes can be examined in order to realize the reasons behind these various responses.

REFERENCES

Afridi, U. (1995), *Determining Real Exchange Rate.* The Pakistan Development Review, autumn 1995; 34(3): pp. 263-276.

Antonopoulos, R. (1999). *A classical approach to real exchange rate determination with an application for the case of Greece,* Review of Radical Political Economics, September 1, 1999; 31(3): 53 – 65.

Amano R. A. and S. van Norden (1995), *Terms of Trade and Real Exchange Rates: the Canadian Evidence.* Journal of International Money and Finance, Vol. 14, No. 1, pp. 83-104.

Bagchi et al. (2003), *The Real Exchange rate in Small Open Developed Economies: Evidence from Cointegration Analysis*. University of Connecticut Working paper, 2003-27, June.

Banerjee, et al. (1986), *Exploring equilibrium relationship in econometrics through static model: Some Monte Carlo evidence*, Oxford Bulletin of Economics and Statistics, 48, 253-277.

Bayoumi, T. et al. (1994), The Robustness of Equilibrium Exchange Rate Calculations to Alternative Assumptions and Methodologies, in Williamson, J. ed. (1994) *Estimating Equilibrium Exchange Rates*, Institute of International Economics, Washington, DC.

Boswijk, H.P. and Frances, P.H. (1992), *Dynamic specification and cointegration*, Oxford Bulletin of Economics and Statistics, 54,369-381

British Broadcasting Corporation (BBC), Retrieved (2010, April 05) from http://news.bbc.co.uk/2/hi/americas/country_profiles/1136253.stm

Catão, L. A. V. (2007). Why Real Exchange Rate? *International monetary fund*, Retrieved (2009, September 10) from www.imf.org/external/pubs/ft/fandd/2007/09/pdf/basics.pdf

Charemza, W.W. and Deadman, D.F. (1997), *New Directions in Econometric Practice*, Edward Elgar, London.

Chinn, M. D. (2006). *Real exchange rate*, Madison: University of Wisconsin.

Clark, P. et al. (1994), *Exchange Rates and Economic Fundamentals: A Framework for Analysis*, IMF Occasional Paper, No. 115, December. Washington DC: International Monetary Fund.

Coe, D.T. and Moghadam, R. (1993), *Capital and trade as engines of growth in France: an application of Johansen's cointegration methodology*, IMF Staff Papers, 40, 3, 542-566.

Coricelli, F. and Jazbec, B. (2004), *Real Exchange Rate Dynamics in Transition Economies*, Structural Change and Economic Dynamics, 15: 83-100

Coughlin, C. C. and Koedijk, K. (1990), *what do we know about the Long-Run Real Exchange Rate?* Federal Reserve Bank of St. Louis Review, January /February, pp.36-48.

Dickey, D.A. and Fuller, W.A. (1979), *Distribution of the estimators for autoregressive time-series with a unit-root*, Journal of the American Statistical Association, 79, 355-367

Dickey, D.A. and Fuller, W.A. (1981), *Likelihood ratio statistics for autoregressive time series with a unit root*, Econometrica, 49, 1057-72.

Domac, I. and Shabsigh, G. (1999), *Real Exchange Rate Behaviour and Economic Growth: Evidence from Egypt, Jordan, Morocco, and Tunisia*. IMF Working Paper, WP/99/40, March

Dornbusch, R. (1982). *PPP exchange rate rules and macroeconomic stability*, Journal of Political Economy, Vol. 90 pp. 158-165.

Edison, H. J. and D. B. Pauls (1993), "A Re-Assessment of the Relationship between Real Exchange Rates and Real Interest Rates: 1974-1990," Journal of Monetary Economics, Vol. 31, pp. 165-187.

Edwards, S. (1989). *Real exchange rates, devaluation, and adjustment: exchange rate policy in developing countries*. London: The MIT Press.

Edwards, S. (1989a). *Exchange Rate Misalignment in Developing Countries*, Maryland: The John Hopkins University Press.

Edwards, S. (1994). Real and Monetary Determinants of Real Exchange Rate Behaviour: Theory and Evidence from Developing Countries, in Williamson, J. ed. (1994) *Estimating Equilibrium Exchange Rates*, Institute of International Economics, Washington, DC.

Elbadawi, I. A. (1989), *Terms of trade, commercial policy, and the black market for foreign exchange: An empirical model of real exchange rate determination*. Economic Growth Centre, Discussion Paper No. 570, Yale University

Elbadawi, I. A. (1994), Estimating long-run equilibrium real exchange rates, in Williamson, J. (ed.) *Estimating Equilibrium Exchange Rates*, Institute of International Economics, Washington DC.

Ellis, L. (2001), *Measuring the real exchange rate: pitfalls and practicalities*, Economic Research Department, Reserve Bank of Australia, Discussion Paper 2001-04.

Engle, R.F. and Granger, C.W.J. (1987), *Cointegration and error correction: representation estimation and testing*, Econometrica, 55, 251-76.

Faruqee, H. (1995). *Long-Run Determinants of the Real Exchange Rate: A Stock-Flow Perspective*. IMF Staff Papers, 42(1), pp 80-107.

Frenkel and Razin A. (1996), Fiscal policies and the world economy, third edition, unpublished.

Froot, K.A. and Rogoff, K. (1994), *Perspectives on PPP and Long-Run Real Exchange Rates*, National Bureau of Economic Research Working Paper 4952 (December). Cambridge.

Gilbert, C.L. (1986), *Professor Hendry's Econometric Methodology*, Oxford Bulletin of Economics and Statistics, 48, 283-303

Gruen, D. W. R. and J. Wilkinson (1994), *Australia's Real Exchange Rate-Is It Explained by the Terms of Trade or by Real Interest Differentials?* Economic Record, pp. 204-219.

Harberger, A. (1986), Economic adjustment and the real exchange rate, in Edwards, S. and Ahamed, L. (ed.) *Economic Adjustment Exchange Rates*, Institute of International Economics, Washington DC.

Haug, A.A. (1993), *Residual based tests for cointegration: a Monte Carlo study of size distortions*, Economics Letters, 41, 345-51.

Hinkle, L.E. and Montiel, P.J. (1999), *Exchange Rate Misalignment: Concepts and Measurement for Developing Countries*. Oxford: Oxford University Press.

Huizinga, J. (1987), *An Empirical Investigation of the Long-Run Behavior of Real Exchange Rates*, Carnegie-Rochester Conference Series on Public Policy, Vol. 27, pp. 149-214.

International financial statistics (IFS), Retrieved (2010, March 10) from http://www.imfstatistics.org/imf/

International Monetary Fund (2009), World Economic Outlook, October, International Monetary Fund, Washington D.C.

Johansen, S. (1988), *Statistical analysis of co integrating vectors*, Journal of Economic Dynamics and Control, 12, 231-254.

Johansen, S. (1992), *Testing weak exogenity and the order of cointegration in UK money demand data*, Journal of Policy Modeling, 14, 313-334.

Johansen, S. and Juselius, K. (1990), *Maximum likelihood estimation and inference on cointegration with application to the demand for money*, Oxford Bulletin of Economics and Statistics, 52, 169-21

Johansen, S. and Juselius, K. (1992), *Some structural hypothesis in a multivariate cointegration analysis of the purchasing power parity and uncovered interest parity for UK*, Journal of Econometrics, 53, 211-244.

Jones, C.I. (1995), *Time series of endogenous growth models*, Quarterly Journal of Economics, 110, 495-525.

Kempa, B. (2005). *An over simplified Inquiry into the Sources of Exchange Rate Variability*. Economic Modeling, 22: 439-458.

Khan, M.S. and Ostry, J. (1991), *Response of the Equilibrium Real Exchange Rate to Real Disturbances in Developing Countries*, IMF Working Paper, WP/91/3, January. Washington: International Monetary Fund.

Kiguel, M. A. (1992), *Exchange rate policy, the real exchange rate, and inflation: Lessons from Latin America*, World Bank Working Paper Series, No. 880, April.

Kıpıcı, A. N. & Kesriyeli, M. (1997), *The Real Exchange Rate definitions and calculations*. Research Department, Central Bank of the Republic of Turkey, 97/1

Krumm, K. L. (1993), *A Medium-Term Framework for Analyzing the Real Exchange Rate, with Applications to the Philippines and Tanzania*, The World Bank Economic Review, Vol. 7, no 2, pp. 219-245.

Kwiatkowski, et al. (1992), *Testing the Null Hypothesis of Stationary Against the Alternative of a Unit Root*, Journal of Econometrics, 54, 159-178.

Lau, S.H.P. and Sin, C.Y. (1997), *Public infrastructure and economic growth: time series properties and evidence*, Economic Record, 73, 125-135.

MacDonald R. (1998). *What Determines Real Exchange Rates? The long and Short for it*, Journal of International Financial Markets, Institutions and Money, 8: 117-153.

Meese, R. A. (1990), *Currency Fluctuations in the Post-Bretton Woods Era*, Journal of Economic Perspectives, 4: 117-134.

Meese, R. A. and K. Rogoff (1988), *Was It Real? The Exchange Rate-Interest Differential Relation over the Modern Floating-Rate Period*, Journal of Finance, Vol. XLIII, No 4, September, pp. 933.

Meltzer, A. (1993), *Real Exchange Rates: Some Evidence for the Post-war Years*, in: Dimensions of Monetary Policy. Proceedings of the Seventeenth Annual Economic Policy Conference of the Federal Reserve Bank of St. Louis, Federal Reserve Bank of St. Louis Review (March/April).

Miller, S.M. (1991), *Monetary Dynamics: an application of cointegration and EC modeling*, Journal of Money, Credit and Banking, 23, 139-154.

Miyakoshi T. (2003). *Real exchange rate determination: empirical observations from East-Asian countries*. Empirical Economics, 28: 173-180.

Nelson, C.R. and Plosser, C.I. (1982), *Trends and random walks in macroeconomic time series: Some evidence and implication*, Journal of Monetary Economics, 10, 139-162.

Pesaran, M.H. and Pesaran, B. (1997), *working with Microfit 4.0: interactive econometric analysis: [DOS version]*. Oxford: Oxford University Press.

Razin, O. and Collins, S.M.A. (1997), *Real Exchange ate misalignments and growth*, NBER Working Paper, No. 6174 September.

Reserve Bank Bulletin, (1985), Exchange Rate Policy Developments, Reserve bank of New Zealand Bulletin Vol. 48 No. 5, Retrieved (2009, December 22) from http://www.reservebank.govt.nz/research/bulletin/1980_1986/may1985.html

Richaud, C. Varoudakis, A. and Veganzones, M. (2000), *Real Exchange Rate and openness in emerging economies: Argentina in the long run*, Applied Economics, Vol. 32 pp1-11.

Stein, J.L. and Allen, P.R. (1995), *Fundamental Determinants of Exchange Rates*, Oxford: Clarendon Press.

Stein, J. (1994), The Natural Real Exchange Rate of the US-dollar and Determinants of Capital Flows, in: J. Williamson: *Estimating Equilibrium Exchange Rates*. Washington, D. C.

Strauss, J. (1996), *The Co integrating Relationship between Productivity, Real Exchange Rates and Purchasing Power Parity*, Journal of Macroeconomics, Vol. 18, No. 2, pp. 299-313

Takaendesa, P. (2006). *The Behavior and Fundamental Determinants of the Real Exchange Rate in South Africa*, Grahamstown: Rhodes University.

The Treasury Department of New Zealand (2010), Economic and Financial Overview, April, Retrieved (2010, May 08) from http://www.treasury.govt.nz/economy/overview/2010

Williamson, J. (1985), *The Exchange Rate System*, Policy Analyses in International Economics, No. 5 Institute of International Economics, Washington DC.

Williamson, J. ed. (1994), *Estimating Equilibrium Exchange Rates*, Washington: Institute for International Economics.

World Bank (1984), *Towards Sustained Development in Sub-Saharan Africa*, Washington DC.

Wren - Lewis, S. and Driver, R. (1998), *Real Exchange Rates for the Year 2000*, Institute for International Economics, Washington D.C.

Zhou, S. (1995), *The Response of the Real Exchange Rates to Various Economic Shocks*, Southern Economic Journal, Vol. 61, No. 4, pp. 936-954.

APPENDICES

Appendix A: Empirical Results

Table 1: Estimated Correlation Matrix of Variables

	LRER	LTOT	LOPEN	LCI	LRP	LGCON	LGNER	LDC
LRER	**1.00**							
LTOT	**-0.004**	**1.00**						
LOPEN	**0.58**	**-0.05**	**1.00**					
LCI	**0.03**	**-0.37**	**0.04**	**1.00**				
LRP	**-0.37**	**-0.001**	**-0.34**	**0.02**	**1.00**			
LGCON	**-0.24**	**0.34**	**0.03**	**-0.14**	**0.23**	**1.00**		
LGNER	**0.35**	**-0.09**	**0.24**	**0.10**	**-0.06**	**0.15**	**1.00**	
LDC	**-0.22**	**-0.03**	**0.19**	**-0.02**	**0.58**	**0.57**	**0.21**	**1.00**

Correlation matrix prepared in order to investigate the relationship between the relevant variables as well as Check if the multicollinearity problem exists or not. Multicollinearity is the existence of a strong relation among some or all explanatory variables of a regression.

Table 2: The ADF (Augmented Dickey-Fuller) Test for Unit Roots

Variables	Test statistics & Critical Values				Integration levels
	Levels		1st differences		
	ADF	C.V. (5%)	ADF	C.V. (5%)	
RER	**-2.72(1)**	**-2.88**	**-8.00(0)**	**-2.88**	**I(1)**
TOT	**-2.83(8)**	**-2.88**	**-5.83(5)**	**-2.88**	**I(1)**
OPEN	**-2.85(8)**	**-2.88**	**-6.12(5)**	**-2.88**	**I(1)**
CI	**-3.40(7)**	**-3.44**	**-8.22(5)**	**-2.88**	**I(1)**
RP	**-2.46(2)**	**-3.44**	**-7.51(0)**	**-2.88**	**I(1)**
GCON	**-2.53(1)**	**-3.44**	**-14.90(0)**	**-2.88**	**I(1)**
GNER	**-2.83(3)**	**-2.88**	**-7.69(5)**	**-2.88**	**I(1)**
DC	**-2.43 (3)**	**-3.44**	**-6.03(3)**	**-2.88**	**I(1)**

The corresponding critical values for 143 numbers of observations at the 5% significance levels are obtained from Mackinnon (1991) and reported by MFIT 4.0. It is worth noting that the intercept and trend terms are in the ADF equations. The numbers in the parenthesis indicate the number of augmentations which are necessary to be sufficient to secure lack of auto-correlation of the error terms with regard to the variables. We chose the Akaike Information Criterion to determine ADF values.

Table 3: The Johansen Maximum Likelihood Tests for the Order of Integration MADF (Multivariate form of Augmented Dickey-Fuller)

Variables	Test statistics & Critical Values				Integration levels
	Levels		1st differences		
	MADF	C.V. (5%)	MADF	C.V. (5%)	
RER	**0.28**	**4.16**	**29.00**	**4.16**	**I(1)**
TOT	**0.12**	**4.16**	**119.75**	**4.16**	**I(1)**
OPEN	**0.14**	**4.16**	**68.84**	**4.16**	**I(1)**
CI	**3.35**	**4.16**	**98.29**	**4.16**	**I(1)**
RP	**0.22**	**4.16**	**23.27**	**4.16**	**I(1)**
GCON	**1.09**	**4.16**	**33.97**	**4.16**	**I(1)**
GNER	**1.29**	**4.16**	**68.39**	**4.16**	**I(1)**
DC	**3.99**	**4.16**	**55.85**	**4.16**	**I(1)**

The corresponding critical values at the 5% significance levels are obtained from Osterwald-Lenum (1992). It is worth noting that unrestricted intercept and unrestricted trend are included for the variables in levels and in differences respectively. VAR 3 based on AIC is used in the Johansen procedure. The MADF stands for the multivariate form of the Augmented Dickey-Fuller unit root test.

Table 4: Testing for Weak Exogeneity using the Johansen Approach

Variable	Test For Weak exogeneity (Johansen Approach)	
	Test statistics	**Conclusion**
LTOT	**$\chi^2(1)=1.78(.182)$**	**Accept**
LOPEN	**$\chi^2(1)=2.25(.133)$**	**Accept**
LCI	**$\chi^2(1)=2.33(.126)$**	**Accept**
LRP	**$\chi^2(1)=3.04(.081)$**	**Accept**
LGCON	**$\chi^2(1)=1.10(.294)$**	**Accept**
LGNER	**$\chi^2(1)=2.98(.084)$**	**Accept**
LDC	**$\chi^2(1) = 3.76\ (.052)$**	**Accept**

This table shows the results that the hypothesis of weak exogeneity cannot be rejected at the conventional level for all explanatory variables under the study. The results in the Table also indicate that the hypothesis of weak exogeneity cannot be rejected at the 5% or 10% level for the explanatory variables. The tabulated test statistics of $\chi^2(1)$ is 3.84 for the Johansen Approach.

Table 5: The Residual-based ADF Test for Cointegration

Cointegration Regression	R2	$\bar{R}2$	CRDW	Calculated ADF residuals	Critical Value
					Mackinnon (5%)
MODEL 1	**0.51**	**0.49**	**1.67**	**-3.61(0)**	**-3.58**
MODEL 2	**0.55**	**0.53**	**1.74**	**-3.63(0)**	**-3.58**

This residual-based cointegration technique employed in order to test for co-integration (long-run relationship) among the relevant variables.

The reported critical value is obtained from Mackinnon (1991) and reported by MFIT 4.0. The numbers in parentheses indicate number of lags, which are chosen by the Schwarz Bayesian criterion (SBC). This means that zero augmentation is necessary to be sufficient to secure lack of autocorrelation of the error terms for the relevant cointegration regressions.

Table 6: Engle Granger Static Long-run Regressions

Explanatory Variables	Dependent Variable: LRER	Dependent Variable: LRER
	MODEL 1	MODEL 2
C	-0.77 (-0.28)	-
LTOT	-0.09 (-1.45)	-0.16 (-1.26)
LRP	-0.38 (-1.43)	-0.47 (-2.33)
LCI	-0.02 (-1.15)	-0.30 (-0.51)
LGCON	-0.16 (-0.93)	-0.22 (-2.39)
LGNER	0.05 (5.15)	0.50 (5.30)
LDC	-0.11 (-3.69)	-0.06 (-5.46)
LOPENNESS	0.99 (7.99)	0.90 (12.55)
R2	0.51	0.55
$\bar{R}2$	0.49	0.53
CRDW	1.67	1.74
ADF*	-3.61	-3.63
CV	-3.58	-3.58
SER	0.011	0.099
X^2_{SC} (4)	9.45 (Prob=0.048)	9.47 (Prob=0.049)
X^2_{FF} (1)	0.11 (Prob=0.740)	0.21 (Prob=0.648)
X^2_{NORM} (2)	3.31 (Prob=0.190)	3.41 (Prob=0.181)
X^2_{HET} (1)	3.78 (Prob=0.046)	3.68 (Prob=0.045)

Notes: t-statistics are in parentheses and all diagnostic pass at 5% level of significance for models 1 and 2. It is worth emphasising that the star (*) indicates no augmentation is necessary to remove autocorrelation from the error terms.

Table 7: The Johansen Maximum Likelihood (ML) procedure

Cointegration Regression	H0	H1	λmax	C.V. at 5%	λTrace	C.V. at 5%
MODEL 1[27]	r = 0	r = 1	74.56	47.94	201.28	141.24
	r <= 1	r = 2	39.06	42.30	110.10	126.72
	r <= 2	r = 3	33.74	36.27	83.18	87.65
	r <= 3	r = 4	25.82	29.95	53.92	59.33
MODEL 2	r = 0	r = 1	76.60	47.94	211.28	141.24
	r <= 1	r = 2	38.36	42.30	113.10	126.72
	r <= 2	r = 3	34.65	36.27	84.17	87.65
	r <= 3	r = 4	25.94	29.95	54.81	59.33

Cointegration likelihood Ratio (LR) Test to determine the number of cointegration vectors (r) based on Maximal Eigen Value of Stochastic Matrix and Trace of the stochastic matrix.

r indicates the number of co integrating relationships, λ_{max} is the maximum Eigen value statistics and λ_{trace} is the trace statistics. Var3, based on SBC is used in the Johansen procedure and unrestricted intercepts and restricted trends in the VAR model are not rejected in all cases. The critical values are obtained from Osterwald-Lenum (1992).

[27] Unrestricted intercepts and restricted trends applied in MODEL (1), while restricted intercepts and restricted trends used in MODEL (2).

Table 8: Error Correction Modeling (Short-run Dynamics)

Explanatory Variables	**Dependent Variable: DLRER**
	MODEL
C	**-0.001** **(-0.33)**
ER (-1)	**-0.69** **(-3.22)**
DLTOT	**-0.005** **(-0.21)**
DLRP	**-0.93** **(-2.57)**
DLCI	**-0.95** **(-0.35)**
DLGCON	**-0.19** **(-1.54)**
DLGNER	**0.006** **(2.10)**
DLDC(-3)	**0.06** **(1.44)**
DOPENNESS	**0.24** **(3.93)**
R2	**0.49**
$\bar{R}$2	**0.45**
DW	**1.61**
SER	**0.044**
X^2_{SC} (4)	**9.47 (Prob=0.492)**
X^2_{FF} (1)	**0.02 (Prob=0.962)**
X^2_{NORM} (2)	**2.95 (Prob=0.37)**
X^2_{HET} (1)	**3.45 (Prob=0.063)**

Notes: t-statistics are in parentheses and all diagnostic pass at the 5% or 1% level of significance for the model.

Table 9: Summary of Granger Causality Results (The Wald and FPE tests)

Dependent Variable	Independent Variable	Degrees Of freedom[a]	Wald Test	m^* (b)	n^* (b)	FPE (m^*)	FPE (m^*, n^*)	Causal Inference
LRER	LTOT	2	4.24	2	2	2.71×10^{-3}	2.74×10^{-3}	NC
DLRER	DLTOT	1	0.51	3	1	1.08×10^{-2}	1.19×10^{-2}	NC
LRER	LRP	1	1.26	5	1	$6.78X10^{-2}$	7.15×10^{-2}	NC
DLRER	DLRP	3	12.7*	1	3	2.81×10^{-3}	2.24×10^{-3}	RP → RER
LRER	LCI	2	1.81	1	2	2.56×10^{-3}	2.94×10^{-3}	NC
DLRER	DLCI	1	2.46	1	1	2.03×10^{-1}	2.02×10^{-1}	NC
LRER	LGCON	1	0.19	1	1	2.34×10^{-3}	3.21×10^{-3}	NC
DLRER	DLGCON	1	2.85	1	1	2.8×10^{-1}	3.11×10^{-1}	NC
LRER	LGNER	1	4.48*	1	1	2.69×10^{-3}	2.53×10^{-3}	GNER → RER
DLRER	DLGNER	1	3.86*	1	1	2.03×10^{-1}	2.05×10^{-1}	GNER → RER
LRER	LOPENNESS	2	7.19*	2	2	2.94×10^{-3}	3.11×10^{-3}	OPENNESS → RER
DLRER	DLOPENNESS	2	15.6*	1	2	2.96×10^{-2}	2.01×10^{-2}	OPENNESS → RER
LRER	LDC	3	14.2*	1	3	2.91×10^{-3}	2.57×10^{-3}	DC → RER
DLRER	DLDC	2	2.83	2	2	8.72×10^{-1}	9.41×10^{-1}	NC

Notes: If FPE (m^*, n^*) < FPE (m^*), Y Granger-causes X.

m^* Denotes maximum lag on dependent variable

n^* Stands for minimum lag on independent variable

[a] χ^2 degrees of freedom for the Wald test

[b] Degrees of freedom for FPE

NC No causality

L and D show long-run and short-run periods respectively.

Critical values for the Wald test: $\chi^2(1) = 3.84$, $\chi^2(2) = 5.99$, and $\chi^2(3) = 7.81$

Table 10: Engle Granger Static Long-run Regressions

Explanatory Variables	Dependent Variable: LRER Fixed Regime 1974Q1-1985Q1	Dependent Variable: LRER Floating Regime 1985Q2-2009Q3
	MODEL 1	**MODEL 2**
C	**0.79** **(4.88)**	**0.46** **(0.59)**
LTOT	**-0.11** **(-0.69)**	**-0.16** **(-0.98)**
LRP	**-0.65** **(-4.33)**	**-0.19** **(-0.33)**
LCI	**-0.75** **(-2.29)**	**-0.93** **(-1.21)**
LGCON	**-0.67** **(-4.80)**	**-0.48** **(-1.35)**
LGNER	**0.38** **(3.77)**	**0.58** **(2.84)**
LDC	**-0.28** **(-1.05)**	**-0.10** **(-4.80)**
LOPENNESS	**0.16** **(0.21)**	**0.70** **(8.12)**
R2	**0.76**	**0.58**
$\bar{R}$**2**	**0.72**	**0.55**
CRDW	**1.75**	**1.70**
ADF*	**-3.65**	**-3.67**
CV	**-3.58**	**-3.58**
SER	**0.077**	**0.081**
X^2_{SC} (4)	2.45 (Prob=0.148)	2.17 (Prob=0.178)
X^2_{FF} (1)	3.32 (Prob=0.082)	0.23 (Prob=0.525)
X^2_{NORM} (2)	2.35 (Prob=0.308)	0.07 (Prob=0.962)
X^2_{HET} (1)	2.85 (Prob=0.091)	3.59 (Prob=0.043)

Notes: t-statistics are in parentheses and all diagnostic pass at 5% level of significance for models 1 and 2. It is worth emphasising that the star (*) indicates no augmentation is necessary to remove autocorrelation from the error terms.

Table 11: Error Correction Modeling (Short-run Dynamics)

Explanatory Variables	**Dependent Variable: DLRER Fixed Regime 1974Q1-1985Q1**	**Dependent Variable: DLRER Floating Regime 1985Q2-2009Q3**
	MODEL 1	**MODEL 2**
C	**-0.008 (-1.47)**	**-0.002 (-0.50)**
ER (-1)	**-0.82 (-3.34)**	**-0.79 (-3.25)**
DLTOT	**-0.061 (-1.64)**	**-0.031 (-0.99)**
DLRP	**-0.78 (-1.27)**	**-0.88 (-2.04)**
DLCI	**-0.32 (-0.82)**	**-0.17 (-0.49)**
DLGCON	**-0.34 (-1.36)**	**-0.11 (-0.78)**
DLGNER	**0.014 (3.38)**	**0.002 (0.61)**
DLDC	**-0.07 (-1.01)**	**-0.024 (-0.42)**
DOPENNESS	**0.17 (2.28)**	**0.27 (3.32)**
R2	**0.45**	**0.39**
$\bar{R}$**2**	**0.35**	**0.29**
DW	**1.65**	**1.71**
SER	**0.037**	**0.046**
X^2_{SC} (4)	**5.11 (Prob=0.276)**	**7.58 (Prob=0.092)**
X^2_{FF} (1)	**0.04 (Prob=0.963)**	**0.75 (Prob=0.386)**
X^2_{NORM} (2)	**1.74 (Prob=0.417)**	**4.95 (Prob=0.084)**
X^2_{HET} (1)	**3.48 (Prob=0.067)**	**1.30 (Prob=0.253)**

Notes: t-statistics are in parentheses and all diagnostic pass at the 5% or 1% level of significance for the model.

Table 12: The Johansen Maximum Likelihood (ML) procedure

Cointegration Regression	H0	H1	λmax	C.V. at 5%	λTrace	C.V. at 5%
MODEL 1 Fixed Regime 1974Q1-1985Q1	r = 0	r = 1	83.28	47.94	229.28	141.24
	r <= 1	r = 2	41.06	42.30	115.15	126.72
	r <= 2	r = 3	35.74	36.27	86.87	87.65
	r <= 3	r = 4	22.82	29.95	58.52	59.33
MODEL 2 Floating Regime 1985Q2-2009Q3	r = 0	r = 1	60.38	47.94	185.54	141.24
	r <= 1	r = 2	40.61	42.30	125.15	126.72
	r <= 2	r = 3	31.55	36.27	84.54	87.65
	r <= 3	r = 4	26.18	29.95	52.88	59.33

Cointegration likelihood Ratio (LR) Test to determine the number of cointegration vectors (r) based on Maximal Eigen Value of Stochastic Matrix and Trace of the stochastic matrix.

r indicates the number of co integrating relationships, λ_{max} is the maximum Eigen value statistics and λ_{trace} is the trace statistics. Var3, based on SBC is used in the Johansen procedure and unrestricted intercepts and restricted trends in the VAR model are not rejected in all cases. The critical values are obtained from Osterwald-Lenum (1992).

Appendix B: New Zealand's Data Used in the Regressions

Year	RER	TOT	OPEN	CI	RP	GCON	GNER	DC
1974Q1	1.517	0.979	0.412	-0.005	0.951	0.139	0.022	0.677
1974Q2	1.474	0.740	0.437	0.056	0.963	0.142	-0.023	0.777
1974Q3	1.499	0.555	0.421	-0.104	0.975	0.144	0.015	0.803
1974Q4	1.631	0.498	0.451	-0.129	0.990	0.146	0.065	0.863
1975Q1	1.572	0.560	0.374	-0.122	0.999	0.150	-0.017	0.801
1975Q2	1.556	0.777	0.372	-0.022	0.991	0.149	0.008	0.849
1975Q3	1.768	0.716	0.342	-0.006	0.976	0.148	0.115	0.845
1975Q4	1.882	0.701	0.423	-0.065	0.959	0.147	0.082	0.969
1976Q1	1.838	0.723	0.419	-0.114	0.958	0.136	0.008	0.849
1976Q2	1.859	1.084	0.448	0.059	0.942	0.136	0.043	0.914
1976Q3	1.834	0.805	0.407	-0.046	0.924	0.137	0.000	0.916
1976Q4	1.888	0.845	0.452	-0.052	0.922	0.140	0.048	1.020
1977Q1	1.860	0.973	0.478	-0.025	0.912	0.151	-0.004	1.003
1977Q2	1.799	1.086	0.496	0.031	0.917	0.156	-0.009	1.029
1977Q3	1.751	0.823	0.434	-0.049	0.918	0.160	-0.008	1.053
1977Q4	1.667	0.924	0.401	0.011	0.934	0.164	-0.024	1.162
1978Q1	1.614	1.155	0.408	-0.070	0.928	0.168	-0.028	0.945
1978Q2	1.627	1.180	0.419	0.042	0.927	0.170	0.007	1.019
1978Q3	1.573	0.970	0.372	0.035	0.926	0.171	-0.030	1.064
1978Q4	1.551	1.007	0.445	0.041	0.916	0.171	-0.010	1.238
1979Q1	1.556	1.206	0.440	0.007	0.909	0.165	0.004	1.067
1979Q2	1.561	1.064	0.465	-0.005	0.893	0.166	0.012	1.033
1979Q3	1.580	0.908	0.426	-0.007	0.894	0.168	0.029	1.040
1979Q4	1.623	0.990	0.502	0.032	0.876	0.170	0.034	1.210
1980Q1	1.631	1.020	0.523	0.001	0.857	0.178	0.005	1.107
1980Q2	1.627	1.083	0.483	0.045	0.854	0.179	0.003	1.129
1980Q3	1.582	0.892	0.464	-0.031	0.847	0.181	-0.012	1.087
1980Q4	1.590	0.981	0.480	-0.004	0.844	0.181	0.016	1.141
1981Q1	1.631	1.170	0.446	0.025	0.845	0.179	0.031	0.995
1981Q2	1.712	1.011	0.498	0.012	0.842	0.179	0.070	1.040
1981Q3	1.799	0.871	0.449	-0.031	0.834	0.179	0.071	1.044
1981Q4	1.760	0.900	0.485	-0.071	0.837	0.178	0.002	1.102
1982Q1	1.791	1.000	0.484	0.036	0.838	0.179	0.051	1.097
1982Q2	1.807	0.946	0.516	-0.013	0.844	0.178	0.054	1.094
1982Q3	1.849	0.864	0.459	-0.046	0.846	0.177	0.053	1.036
1982Q4	1.845	1.057	0.466	-0.004	0.860	0.175	0.031	1.146
1983Q1	1.859	1.111	0.464	-0.029	0.864	0.171	0.024	1.003
1983Q2	1.996	1.146	0.461	0.054	0.861	0.169	0.099	0.988
1983Q3	2.017	0.915	0.462	0.006	0.861	0.167	0.011	0.879
1983Q4	2.003	0.919	0.462	-0.035	0.864	0.165	-0.010	1.102
1984Q1	2.008	0.970	0.503	-0.006	0.865	0.162	0.000	1.044
1984Q2	2.012	1.013	0.482	-0.004	0.866	0.161	0.017	1.086

1984Q3	2.502	0.744	0.546	-0.092	0.852	0.161	0.413	1.051
1984Q4	2.571	0.836	0.552	-0.132	0.839	0.160	0.100	0.928
1985Q1	2.632	1.053	0.603	0.100	0.842	0.156	0.127	1.098
1985Q2	2.557	0.999	0.566	-0.016	0.844	0.160	0.020	1.112
1985Q3	2.193	0.845	0.494	-0.066	0.855	0.164	-0.275	1.155
1985Q4	2.022	0.947	0.441	-0.031	0.880	0.169	-0.126	1.240
1986Q1	2.101	0.816	0.432	-0.029	0.882	0.185	0.108	1.132
1986Q2	1.930	1.117	0.388	0.012	0.897	0.188	-0.103	1.059
1986Q3	2.072	0.963	0.420	-0.064	0.912	0.190	0.181	1.038
1986Q4	1.893	0.994	0.397	-0.099	0.971	0.191	-0.020	1.272
1987Q1	1.740	1.022	0.384	-0.030	0.971	0.186	-0.137	1.264
1987Q2	1.611	1.126	0.416	0.058	0.981	0.183	-0.103	1.317
1987Q3	1.538	0.926	0.395	0.010	0.983	0.184	-0.070	1.366
1987Q4	1.448	0.909	0.392	-0.012	0.993	0.184	-0.079	1.388
1988Q1	1.373	1.205	0.353	0.013	1.001	0.185	-0.065	1.302
1988Q2	1.337	1.329	0.360	0.087	0.994	0.184	-0.047	1.403
1988Q3	1.424	1.107	0.365	0.064	0.988	0.184	0.089	3.104
1988Q4	1.446	1.155	0.383	-0.009	0.987	0.182	0.026	3.138
1989Q1	1.479	1.216	0.393	0.059	0.980	0.184	0.036	3.064
1989Q2	1.539	1.254	0.424	0.026	0.975	0.187	0.058	3.076
1989Q3	1.529	0.862	0.410	-0.024	0.983	0.185	0.034	3.178
1989Q4	1.515	0.801	0.432	-0.063	0.982	0.184	-0.011	3.143
1990Q1	1.518	1.078	0.417	0.003	0.984	0.178	-0.010	3.129
1990Q2	1.545	1.152	0.448	0.033	0.992	0.187	0.043	3.053
1990Q3	1.480	0.901	0.425	-0.090	1.002	0.193	-0.085	3.009
1990Q4	1.491	0.897	0.432	-0.004	0.998	0.189	0.004	3.158
1991Q1	1.519	1.110	0.415	0.035	1.010	0.193	0.027	3.268
1991Q2	1.560	1.281	0.425	0.078	1.012	0.198	0.037	3.410
1991Q3	1.596	1.054	0.423	0.010	1.014	0.191	0.032	3.368
1991Q4	1.668	1.143	0.443	0.055	1.007	0.193	0.064	3.433
1992Q1	1.712	1.080	0.456	0.006	1.006	0.196	0.042	3.508
1992Q2	1.724	1.343	0.476	0.080	1.003	0.198	0.003	3.473
1992Q3	1.725	0.894	0.487	-0.036	1.000	0.201	-0.007	3.703
1992Q4	1.786	1.002	0.479	0.004	0.993	0.196	0.057	3.662
1993Q1	1.822	1.235	0.444	0.036	0.990	0.190	0.023	3.481
1993Q2	1.753	1.295	0.485	0.060	0.992	0.185	-0.076	3.542
1993Q3	1.719	0.914	0.468	-0.035	0.988	0.187	-0.034	3.454
1993Q4	1.724	0.995	0.457	0.012	0.986	0.183	-0.004	3.487
1994Q1	1.680	1.186	0.434	0.011	0.987	0.181	-0.057	3.501
1994Q2	1.651	1.222	0.477	0.042	0.987	0.171	-0.035	3.531
1994Q3	1.591	0.907	0.469	0.001	0.993	0.176	-0.058	3.505
1994Q4	1.528	0.869	0.497	-0.044	1.004	0.176	-0.054	3.535
1995Q1	1.478	1.111	0.457	0.007	1.015	0.175	-0.047	3.512
1995Q2	1.416	1.074	0.472	0.031	1.023	0.175	-0.065	3.609
1995Q3	1.432	0.873	0.453	-0.042	1.022	0.175	0.014	3.626
1995Q4	1.449	0.903	0.454	-0.039	1.027	0.175	0.019	3.667

1996Q1	1.416	0.998	0.418	-0.007	1.028	0.174	-0.041	3.621
1996Q2	1.400	1.089	0.446	-0.018	1.037	0.173	-0.021	3.729
1996Q3	1.379	0.867	0.441	-0.072	1.043	0.170	-0.021	3.729
1996Q4	1.352	0.962	0.431	0.013	1.049	0.175	-0.029	3.724
1997Q1	1.381	1.011	0.398	0.061	1.045	0.173	0.017	3.900
1997Q2	1.399	1.120	0.439	0.036	1.048	0.195	0.014	3.935
1997Q3	1.492	0.866	0.440	-0.040	1.048	0.174	0.098	3.980
1997Q4	1.562	0.935	0.444	-0.015	1.048	0.175	0.074	4.095
1998Q1	1.668	1.028	0.424	0.016	1.054	0.178	0.110	4.155
1998Q2	1.809	1.072	0.445	0.019	1.052	0.182	0.145	4.229
1998Q3	1.896	0.913	0.447	-0.023	1.058	0.179	0.093	4.271
1998Q4	1.852	0.857	0.470	-0.038	1.051	0.177	-0.067	4.277
1999Q1	1.822	0.977	0.427	0.008	1.055	0.184	-0.043	4.361
1999Q2	1.823	0.990	0.443	0.002	1.050	0.180	-0.014	4.306
1999Q3	1.886	0.843	0.475	-0.055	1.039	0.177	0.060	4.359
1999Q4	1.946	0.736	0.536	-0.093	1.025	0.202	0.052	4.486
2000Q1	2.003	1.014	0.461	0.021	1.018	0.174	0.051	4.379
2000Q2	2.091	1.023	0.519	0.017	1.012	0.175	0.081	4.474
2000Q3	2.257	0.869	0.536	-0.035	0.987	0.176	0.178	4.390
2000Q4	2.420	0.926	0.577	-0.036	0.963	0.174	0.179	4.399
2001Q1	2.314	1.089	0.508	0.038	0.971	0.176	-0.134	4.390
2001Q2	2.421	1.152	0.537	0.039	0.966	0.173	0.102	4.314
2001Q3	2.381	0.977	0.531	-0.011	0.952	0.181	-0.030	4.404
2001Q4	2.384	0.927	0.524	-0.019	0.963	0.172	0.023	4.324
2002Q1	2.325	1.071	0.477	0.023	0.969	0.173	-0.054	4.374
2002Q2	2.134	1.107	0.507	0.016	0.978	0.178	-0.195	4.422
2002Q3	2.095	0.861	0.489	-0.039	0.998	0.175	-0.038	4.352
2002Q4	1.989	0.834	0.493	-0.081	1.003	0.175	-0.101	4.524
2003Q1	1.805	0.990	0.429	-0.004	1.006	0.173	-0.199	4.521
2003Q2	1.750	0.980	0.454	-0.024	1.012	0.175	-0.062	4.570
2003Q3	1.705	0.816	0.441	-0.029	1.012	0.175	-0.046	4.545
2003Q4	1.581	0.811	0.445	-0.073	1.019	0.175	-0.114	4.797
2004Q1	1.472	0.943	0.419	-0.027	1.029	0.176	-0.117	4.751
2004Q2	1.591	1.010	0.476	0.058	1.020	0.174	0.109	4.854
2004Q3	1.527	0.769	0.435	-0.079	1.012	0.176	-0.059	4.679
2004Q4	1.425	0.814	0.453	-0.088	1.011	0.176	-0.099	4.819
2005Q1	1.392	0.928	0.424	0.003	1.013	0.178	-0.035	4.945
2005Q2	1.399	0.919	0.446	-0.045	1.003	0.179	0.001	4.963
2005Q3	1.449	0.726	0.434	-0.072	0.987	0.180	0.049	5.084
2005Q4	1.440	0.759	0.455	-0.101	0.980	0.184	-0.007	5.253
2006Q1	1.503	0.869	0.431	-0.035	0.985	0.184	0.064	5.247
2006Q2	1.606	0.972	0.485	-0.027	0.971	0.188	0.100	5.297
2006Q3	1.576	0.791	0.468	-0.107	0.965	0.185	-0.027	5.301
2006Q4	1.472	0.791	0.468	-0.103	0.965	0.185	-0.091	5.565
2007Q1	1.442	0.783	0.460	-0.067	0.973	0.186	-0.048	5.608
2007Q2	1.374	0.906	0.429	-0.059	0.985	0.186	-0.087	5.737

2007Q3	1.361	0.927	0.441	-0.033	0.982	0.186	-0.003	5.695
2007Q4	1.311	0.884	0.504	-0.040	0.963	0.188	-0.037	5.858
2008Q1	1.273	0.989	0.455	-0.052	0.949	0.186	-0.044	5.785
2008Q2	1.304	0.943	0.509	-0.016	0.910	0.190	0.024	5.922
2008Q3	1.416	0.778	0.519	0.052	0.891	0.195	0.115	6.191
2008Q4	1.704	0.855	0.557	0.028	0.907	0.200	0.327	6.437
2009Q1	1.834	1.083	0.454	0.009	0.934	0.200	0.147	6.226
2009Q2	1.632	1.090	0.450	-0.017	0.939	0.203	-0.215	6.085
2009Q3	1.449	0.857	0.408	-0.055	0.961	0.204	-0.177	6.109

Source: IFS