FINANCIAL CRISES AND MALAYSIA TRADE: IMPACT AND FORECASTING

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UNIVERSITI UTARA MALAYSIA

2011

FINANCIAL CRISES AND MALAYSIA TRADE: IMPACT AND FORECASTING

A master thesis submitted to the Graduate Studies Unit,

Academic Affairs Department in partial fulfillment of the requirements for the degree of

Master of Economics,

Universiti Utara Malaysia.

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ABSTRACT

Financial crises are an ongoing challenge in the modern world with much complicated global economics. Malaysia itself has gone through severe crises in about once in a decade started in late 20th century. Many economy sectors had been affected by the crises, but the highlight in this study is focused on the impacts of financial crises on the trade of Malaysia. The objective is to forecast the trend of Malaysia trade when influenced by the shocks in the economy. This study applies Granger causality test and ARIMA model into the data of Malaysian trade from 1947 to 2009. It is very crucial to analyze and forecast these impacts since Malaysia is one developing country with a growing-open market economy and mostly dependent to the exports. The importance of export in boosting Malaysia economy was supported by the findings of this study in which it shows export does Granger cause total trades for before and after the crises. Due to the impacts of financial crises on Malaysia trade, Malaysia could focus on domestic demand, build the country's comparative advantage in manufactured exports, or expand the export prospects. Nevertheless, the policy implication highlighted the importance to stimulate exports considering it is the major growth-key for Malaysia economy.

ABSTRAK

Krisis kewangan adalah cabaran berterusan dalam dunia moden dengan ekonomi global yang lebih rumit. Malaysia sendiri telah melalui krisis-krisis yang teruk lebih kurang sekali dalam setiap dekad bermula abad ke-20. Banyak sektor ekonomi yang terjejas oleh krisis tersebut, namun sorotan dalam kajian ini tertumpu pada kesan krisis kewangan tersebut terhadap perdagangan Malaysia. Tujuannya adalah untuk meramal trend perdagangan Malaysia apabila dipengaruhi oleh kejutan dalam ekonomi. Kajian ini mengaplikasikan ujian kausaliti Granger dan model ARIMA terhadap data perdagangan Malaysia dari tahun 1947 hingga 2009. Adalah sangat penting untuk menganalisis dan meramalkan impaknya memandangkan Malaysia adalah sebuah negara sedang membangun dengan ekonomi pasaran terbuka yang sedang berkembang dan amat bergantung kepada eksport. Kepentingan eksport dalam mempertingkat ekonomi Malaysia adalah disokong oleh penemuan kajian ini yang menunjukkan eksport penyebab Granger bagi jumlah perdagangan untuk sebelum dan selepas krisis. Akibat daripada impak krisis-krisis kewangan terhadap perdagangan Malaysia, Malaysia boleh menumpukan pada permintaan domestik, membangunkan faedah berbanding negara dalam eksport pembuatan, atau mengembangkan prospek eksport. Walau bagaimanapun, implikasi polisi menekankan kepentingan untuk merangsang eksport memandangkan ia adalah kunci pertumbuhan utama bagi ekonomi Malaysia.

ACKNOWLEDGEMENT

Firstly and foremost, thank you Allah for granted me determination so I can complete my thesis within the timeframe given. I would like to dedicate my thankful thought to my loving and supportive family especially my mother, Yong Oi Yin; for having an endless faith in me, my husband, Mohd Bakri; for always be there for me, my sisters, Atiqah and Zulaikha; for sharing the laughs and the tears, and the rest of the family; for providing me an unbreakable strength to go through my long journey as a student.

I owe a great debt of gratitude to Dr. Lim Hock Eam, my supervisor. This thesis would not have been possible without the guidance, assistance and consideration he has given to me. Special thanks to Dr. Norehan Abdullah for the moral support and loving care she has never failed to provides. My intellectual debts are also dedicated to all lecturers who had taught me economics knowledge.

No journey can be finished without the friends and colleagues for their help, encouragement and suggestion. Special thanks should go to Nor Ermawati Hussain for the assistance and major helps she has given me. Also thousand thanks to my unforgettable friends; Mohd Shahidan Shaari, Nur Hafizah Ramli, Surianti Mat Fiah, Ainul Latifah, Nor Hidayah Harun, Ahmad Sazali Zakaria, Muhammad Baqir, Nur Hazirah, Salwa Hashim, Lynda Daud, Naimatul Husna, Noor Aida Noh, Muhd Sufiyan, Mohd Yahya, Kalai Vani, Vinothiny Subramaniam, Nour El-Eslam Zeroual, Ngabonziza Elie, Habibu Muhammed, Adesiyan Olusegun, Muhyadin Abdi Hasen, and all my master friends for their endless cheering and friendship. Thank you.

CONTENTS

LIST OF ABBREVIATION

GDP	Gross Domestic Product
AFTA	ASEAN free trade area
FTA	Free Trade Agreement
ASEAN	Association of Southeast Asian Nations
IMF	International Monetary Fund
FDI	Foreign Direct Investment
BNM	Bank Negara Malaysia
ARM	adjustable-rate mortgages
MBS	mortgage-backed securities
CDO	collateralized debt obligation
ARIMA	Autoregressive Integrated Moving Average
ADF	Augmented Dickey-Fuller
ACF	autocorrelation function
PACF	partial autocorrelation function

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CHAPTER ONE

INTRODUCTION

1.1 Background

Malaysia is very well-known as a growing open-market economy. During 2007, Malaysia was declared as the 3rd largest economy in South-East Asia and ranked as the 29th largest economy in the world. Malaysia purchasing power parity with Gross Domestic Product (GDP) for 2007 estimated to be $222 billion[1] with a growth rate of 5% to 7% since 2007.[2]

Significant trading had been given a kick-start in the 17th century, started by trading porcelain and spices. Later, tin was discovered and when British came, rubber and palm oil trees were commercialized. Strait of Malacca was a very strategic location which gave much help in boosting the international trade back then. In the 1970s, Malaysia began the era of transition by moving on from totally depending on mining and agriculture economy to the new economy activity of manufacturing. Manufacturing sectors produced mainly electronic components such as semiconductor devices.

[1.] World Development Indicators, World Bank
[2.] The Edge, http://web.archive.org

Japanese investment had attributed the heavy industries and later leading to the boosting of Malaysia export. GDP per capita grew 31% in the 60's and an amazing 358% in the 70's, but it later proved unsustainable and rescaled to 36% in the 80's. The GDP later increased to 59% in the 90's attributed by export-oriented industries.[3]

As Malaysia economy growing, trade also broadened to global level. Malaysia became an important trading partner for many countries such as the United States (U.S). In 2010, two-way bilateral trade between the U.S. and Malaysia totaled U.S. $40 billion with Malaysia imports from U.S. increased to U.S. $14 billion and the exports to U.S. increased to U.S. $26 billion.[4]

Malaysia has been proactive in involving with international trade by became the member of the ASEAN Free Trade Area (AFTA) which established in 1992 with the aim to promote trade among the members. First generation member countries had remove most tariffs by 2007.

On 8 November 2007, Malaysian and Pakistan signed a bilateral free trade agreements (FTA) and agreed to cut tariffs on 140 lines while Pakistan will cut 124 lines while most tariffs and duty is expected to be fully removed by 2012.[5]

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[3]. Earth Trends, http://earthtrends.wri.org

[4]. U.S. Census Bureau, Foreign Trade Statistics, http://www.census.gov

[5]. The Star, http://biz.thestar.com.my

On 26 October 2009, Malaysia and New Zealand signed a bilateral FTA. In the agreement, New Zealand agreed to cut tariffs on 99.5 percent of the export to Malaysia beginning 2010. This agreement is an extension of the ASEAN-Australia-New Zealand Free Trade Agreement.[6]

Malaysia has signed a Japan-Malaysia Economic Partnership Agreement with Japan on 13 December 2005 and expected to be fully imposed in 2016.[7] The agreement is actually an extension of an FTA between ASEAN and Japan, which is called Asean-Japan Comprehensive Economic Partnership.[8]

Currently, Malaysia has negotiating free trade deals with Australia, Chile and India. The agreement with Chile is going to help Malaysia's exports to penetrate into the Latin American market which has total market imports worth US$298 billion.[9]

Malaysia also had seek for membership in Trans Pacific Partnership and has been successfully became the member in October 2010. Other countries showing an interest in establishing FTA with Malaysia are the European Union and Hong Kong. Malaysia is also interested for FTA with Singapore and Thailand. This is because FTA is potentially going to increase trade, investment, and economic cooperation between the involved countries.

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6. The Star, http://biz.thestar.com.my
7. http://www.ftamalaysia.org
8. Business Times, http://www.btimes.com.my
9. New Straits Times

According to study of 178 countries in all aspect of doing business conducted by World Bank, Malaysia ranks 24th in ease of doing business and ranks 21st in doing trade across borders.[10] The Government aims to be in the top 10 in the ease of doing business survey before 2010 in order to attract even more foreign investors.[11]

The present financial crisis of 2007 is very different from the one Malaysia experienced in 1998. In 1998, Malaysia suffered a contraction in GDP growth due to the Asian financial crisis which originated from Thailand. In contrast, the present crisis did not start in Asia or Malaysia but is due to the weaknesses in the U.S. financial industry which soon turned into a severe international financial crisis and trade deterioration, ultimately became a global recession by late 2008. Malaysia as a small open and export-dependent economy was not an exception from the impacts. The negative shock was transmitted to the Malaysian economy in the fourth quarter of 2008 which led to exports and industrial output to deteriorate severely.

[10] World Bank, http://rru.worldbank.org
[11] www.mida.gov.my

1.2 Problem Statement

The crises had significant aggregate effects, including sharp reductions in values of currency, commodities and other asset prices which indirectly affected the GDP of the country. Many businesses collapsed and millions of people fell below the poverty line. There are more long-term consequences included the reversal of the relative gains made in the boom years just before the crisis.

Because of the contagious characteristic of the crises, various economy sectors had been negatively affected including trade. Trade in Malaysia significantly affected few years after the crises when the impacts finally reached Malaysia shore. This was because Malaysia been closely-tied to the economies that been affected the worst during the crises. We believed that the impact of the crises been transmitted through trade channel the most.

Trade especially manufacturing products of Malaysia is the key that boosting Malaysia economy growth, so due to the collapse in exports caused by the crises, government's plan to achieve vision 2020 seems doubtable now. It is important to forecast the changes of the pattern of Malaysia trade due to the shocks of the crises, so it could be the base for determining compatible policies to overwhelm the impacts and thus preserve the sustainability of Malaysia economic-driven key.

I am determined to conduct this study because financial crises are an ongoing process in the business cycles. Global economy has faced a series of crises as early as 1923 and the

impacts had hit Malaysia's shores as well. We could see many of the crises has impacted the country's economy especially the trade sector in which the crises been transmitted the most. The crises affected all export, import, total trades and balance of trades. Since Malaysia economy has been boosted by trade the most, it is important for us to study and understand the impacts of the crises so it could be a base for policy making to preserve the economics.

1.3 Research objectives

Looking at the trend of trades for various countries, it is obvious that trades show significant changes after impacted by severe crises. This study was conducted to examine whether similar phenomenon imposed on Malaysia trade as well.

1.3.1 General objectives

The general objective of this study is to examine the changes in the pattern of trade in Malaysia when been exposed to the economic shock, i.e. the financial crises of 1997 and of 2007.

1.3.2 Specific objectives

The specific objectives of this study are:

(i) to describe the trend of export, import, total trades and balance of trades from 1997 to 2009 in chapter five,

(ii) to examine the impact of financial crises on causality relationship of export and import, of export and total trades, of import and total trades, of balance of trades and total trades, of export and balance of trades and of import and balance of trades in chapter six,

(iii) and to forecast the trend of Malaysia export and import after the financial crisis of 1997 in chapter seven.

1.4 Scope and limitation of the study

This study focused on the Asian financial crisis of 1997 and the latest crisis a decade later, i.e. the global financial crisis which first started in 2007. This study also discussed the flow of both crises in terms of the triggering causes, the severity of the crises, and the overall impacts it brought to the world economy, but most highlight is on a narrower look at the effects of the crises on Malaysia economy environment and how severe was Malaysia trade been affected by the once in a decade crises. The study would going to determine either the trend of Malaysia trade show changes of it pattern or otherwise. Time series data of external trades since 1947 up to 2009 has been obtained from Malaysia statistic department. However, this study will focused on only four variables, which are total trades, export, import and balance of trades.

1.5 Significance of research

This research is so important since the crises are an ongoing or revolving process around world economies. The crises had even exploded as early as the 1929 Great Depression and many of similar-but-less severe crises had occurred since then. But this study would only include the crisis of 1997 and 2007 because they were the latest crises and hence data availability is higher.

Ma and Cheng (2003) had also done similar study for the National Bureau of Economic Research. They studied empirically the effects of financial crises on international trade. Their major findings are that banking crises had a negative impact on imports but a positive impact on exports in the short term, whereas currency crises decreased imports in the short term and stimulated exports in the longer term. It could be concluded that their research proved that there was relationship between the impact of the crises and the pattern of external trades. Since Malaysia also indulged in external trades, it is very important for policy makers and the government to know that financial crises could affect the most important driven key of the country's economy and thus relevant policies could be imposed to shelter the economy.

This research is very important for a base to predict the pattern of the impacts due to the crises and hopefully it would benefit the government in designing policies to shelter the economy with some kind of safety net or shock absorber. This is because it is so likely

that such crises will occurs again considering the inevitable characteristic of the crises in which we found out in the empirical study.

1.6 Contribution to policy and theory

The crisis has been intensively analyzed by economists for its breadth, speed, and dynamism. The crises have affected dozens of countries, had a direct impact on the livelihood of millions, and burst within only few months. However, economists seem a step behind of the crises of every time. Many critiques have been made on the failure of conduct of the IMF in the crisis. Politically there were some benefits such as in South Korea and Indonesia, there was renewed push for improved corporate governance.

As we know now that Malaysia trade especially the exports, has collapsed due to the financial crises, policies has been taken by the government to reverse the effects. The government approached the crises by imposed the public sector to take a dominant role in reviving the economy. The government introduced stimulus package to absorb retrenchment and the destabilization shocks faced by the people. The aim is to accelerate development expenditure to offset a fall in aggregate demand because of significantly reduced exports.

This study has been conducted for a better understanding of the factors that might have affected the trade of Malaysia and how it worked in such way. Hopefully the findings of

this study would inspire other researchers to examine about the issue and come out with a better explanation leading to more efficient policy-makings.

1.7 Structure of the study

This paper intends to examine the impacts of both crises on Malaysia trade. Chapter one discusses a brief background of Malaysia economy structure. Chapter two presents an overview of the flow of both Asian financial crisis and also the global financial crisis. This chapter elaborates the triggering causes, the effects from the crises and its impacts on Malaysia in general. Chapter three presents the literature review regarding to the topic, of which including the relevant review for both crises. Chapter four presents the data, graphical descriptive analysis and also the methodology been used, i.e. the unit root test, Granger causality test, and ARIMA model. Chapter five, six and seven are the separate data analysis of every each of the result retrieved from the three methods used as mentioned above. Chapter eight concludes the remarks and explains about the government policies adopted in response to the global crises and ultimately listing down few recommendations for further study of relevant field of research.

CHAPTER TWO

FLOW OF THE CRISES

2.1 Introduction

This chapter dedicated to study the flow of the crises, both of the Asian financial crisis 1997 and the global financial crisis of 2007. This chapter is an extensive causality study done empirically. This study will first examine the triggering cause, the effects of the crises and the action taken to off-set the negative impacts. The two crises been explained separately so they could be assessed independently of each other.

2.2 The crisis of 1997: Asian financial crisis

The Asian financial crisis first triggered on July 1997 in Thailand of when the Thai Baht collapsed caused by the decision of the Thai government to stop pegging the Baht to the USD and instead float the Baht. However, excessive foreign debt had actually caused Thailand to leading to bankruptcy even before the currency crisis. Indonesia, South Korea and Thailand were most affected by the crisis.

Hong Kong, Malaysia, Laos, and Philippines were also hurt significantly while the rest of ASEAN countries were less affected. Foreign debt-to-GDP ratio shot up beyond 180% during the worst of the crisis.[12]

After several months of failed efforts to restore confidence to the region through structural reforms and contractionary monetary and fiscal policies, the International Monetary Fund (IMF) - together with the U.S. government - finally did help to arrange what was really needed: a roll-over of the short-term debt into longer-term loans. Unfortunately for Indonesia, the help arrived much later than in Thailand and Korea, which greatly extended the economic damage in Indonesia (Weisbrot, 2007).

The severity of the crisis caused IMF to bring in a US$40 billion program to stabilize the currencies of the worst affected countries. This short-term capital flow or usually referred as 'hot money' was given with high condition and high interest rates for quick profit. While ASEAN countries dealing with large current account deficits, the U.S. Federal Reserve Bank raised U.S. interest rates to deal with the inflation. This attracted Foreign Direct Investment (FDI) to U.S. rather than Southeast Asian countries and thus U.S. dollar appreciated because demand for U.S. dollar is higher now. Countries that pegged their currencies to U.S. dollar facing their exports became more expensive thus the export of Southeast Asia plunged dramatically and deteriorates the current account condition.

[12.] Key Indicators of Developing Asian and Pacific Countries, External Debt and Debt Service Payments, World Bank.

Exports from Southeast Asia also threaten by a competition from the growth of China's exports after China implemented export-oriented policy attributed by the boost in its manufacturing sector. China exports were flooding the markets because they are relatively cheaper since China has many labors with inexpensive salary and leading high technology in manufacturing.

Before the crisis, Malaysia was a very popular investment attraction. The continuous growth rate was expected to speeding Malaysia to developed status by year 2020. However, year 1997 became the turning point of Malaysia economy. Within days of the Thai Baht devaluation caused by speculation, the Malaysian ringgit followed the suit sooner than expected. By the end of 1997, the ringgit had lost 50% of its value, falling from 2.50 to 4.80 to the U.S. dollar and real output also declined leading to recession.

Malaysia government had quickly taking action before the crisis get any worst by forming the National Economic Action Council to deal with the impacts. Bank Negara Malaysia (BNM) imposed capital controls and pegged the Malaysian ringgit at 3.80 to the US dollar. By pegging means the Ringgit could not been traded internationally, a traveler needs to declare to the central bank if taking out more than RM10,000 out of the country. This policy has been done to control the outflows of the currency from the mother country. Malaysia took surprising decision by refusing any economic aid packages from the IMF and the World Bank. The good from it was that Malaysia is not tied to any condition attached with the aid, so we were not affected to the same degree as some Asian countries such as the Indonesia, Thailand and the Philippines.

Various other agencies were formed to deal with the recession, such as The Corporate Debt Restructuring Committee which dealt with corporate loans, Danaharta discounted and bought bad loans from banks, and Danamodal recapitalized banks. Large government spending was made as an injection to boost the economy. However, the utmost reason to the economy recovery was actually the exports role especially in electronics and electrical manufactured products. BNM also imposed low interest rate policy so Malaysia get to enjoyed faster economic recovery compared to the neighboring countries.

Growth has been given a kick-start, and started to develop slowly but steady. By 2005, Malaysia was estimated to have a US$14.06 billion surplus. Then the fixed exchange system was later replaced with a managed float. The ringgit strengthened and was expected to appreciate further. As of 21 May 2007, the ringgit touched a nine-year high record at 3.39 against the US dollar. However, the government continues to not internationalized the ringgit and will only do so once it is ready.[13]

Recently on September 2010, Dato' Seri Najib Tun Razak, the Prime Minister of Malaysia said that the government is going to trades the ringgit internationally to help

[13.] Reuters, http://www.reuters.com

boosting the economy, but first government has to impose rules and regulation to protect the currency.[14]

After 1997, net exports consistently recorded about 20% of GDP, making Malaysia one of the most open economy but dependent on international trade. Malaysia is the second most trade-dependent country after Singapore, in the ASEAN (Khoon and Mah-Hui, 2010).

Manufactured exports played a leading role in the expansion of the export sector and the main source of this export expansion came from the electronics sector, dominated by foreign investors. The upsurge in the world electronics cycle, the big depreciation of the ringgit against most major currencies especially the US dollar, and strong external demand from US, Europe and Japan, were among the factors accounted for the expansion of output in the export-oriented manufacturing sector (Athukorala, 2001).

According to the StarBizWeek, 2009, manufactured products accounted for more than 80% of the country's total gross exports. Of the manufactured products, more than 65% are electronics and electrical components, the bulk of which are highly dependent on imported intermediate products and therefore have little domestic value-added contribution.

[14.] Business Times, http://www.btimes.com.my

2.3 The crisis of 2007: Global financial crisis

The root cause of the global financial crisis of 2007 was actually the burst of the U.S. housing bubble which peaked in 2006. Between 1997 and 2006, the price of the typical American house increased by 124%.[15] From 2000 to 2003, the Federal Reserve lowered the federal funds rate target from 6.5% to 1.0%[16] so lower interest rate could encourage borrowing and thus would reduce the risk of deflation caused mostly by the tragedy of September 11, 2001.

FDI flooded to the U.S. with the selling of U.S Treasury Bonds. Because more funds made available, easy credit conditions was invented to encourage borrowing. Since everyone got an easy access to funds and could afford to buy houses based on loans, housing construction boomed and this is what referred as the housing bubble. Another financial innovation is the adjustable-rate mortgages (ARM), which allowing loans to subprime borrowers in the form of lower interest rate at first but get higher by the end of the day. Subprime borrowers refer to households with weak credit histories and a greater risk of loan default. Other triggering factor of the crisis was predatory lending such as classic bait-and-switch method which advertising low interest rates for home refinancing and then it been swapped for more expensive loan products on the day of closing. Some lenders also involved with mortgage fraud by falsify mortgage documents to make fast profits.

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15. The Economicst, http://www.economist.com
16. Federal Reserve Board, http://www.federalreserve.gov

Because interest rates is now lower and mortgage conditions were loosen, many homeowners refinancing their homes or took second mortgages secured by the price appreciation. Banks issued more loans and this increased households' capability of buying more houses thus lead to a spiked-up in housing prices. Households used the borrowed funds to spend even more while financial institutions invested foreign funds in mortgage-backed securities (MBS) and collateralized debt obligation (CDO) which soon became greatly increased attributed by the safe ratings given by the credit rating agencies. The bubble became larger and larger, mostly attributed by households and financial institutions behavior.

In mid 2007, the interest rates started to rise and caused the housing prices to drop significantly. Borrowers with ARM conditions started to delinquent because refinancing became more difficult as interest rates now higher. The plunging housing prices caused homes to worth less than the mortgage loan and lead to more foreclosure. For 2007, recorded foreclosure was involving 1.3 million properties, an increment of 79% compared to 2006.[17] Major global financial institutions that had borrowed from foreign funds and invested heavily in subprime MBS and CDO suffered significant losses. Government policy that emphasized deregulation to encourage business leading to the shadow banking system that loosely regulated. These institutions also suffered significant losses and government had to provide funds to restore people's faith and stabilize the institutions. Total losses are estimated in the trillions of U.S. dollars globally.[18]

[17.] RealtyTrac, http://www.realtytrac.com
[18.] Global financial stability report, IMF.

The contagious character of the crisis caused it to widespread to the other sectors instead of housing sector alone. After the housing bubble collapsed, people diverted their investments from housing sector into commodities which caused rapid increases in some commodity prices and thus caused commodity bubble. Oil prices nearly tripled from $50 to $147 from early 2007 to 2008. Households had to spend more on gasoline and caused wealth flows from oil-importing countries to oil-producing states. Copper prices also increased at the same time as the oil prices while nickel prices boomed in late 1990s. Nickel prices slumped later and only just starting to recover as of January 2010, but most of Australia's nickel mines had gone bankrupt by then.[19]

In U.S., real GDP decreased at an annual rate of approximately 6% in the fourth quarter of 2008 and first quarter of 2009. [20] The unemployment rate in the U.S. increased to 10.1% by October 2009, the highest rate since 1983.[21] The major banks collapsed in Iceland is the largest suffered by any country in economic history. Arab countries were least affected by the crisis, they could absorb the economic shocks because of the good balance of payments came from remittances and FDI.[22]

Governments took immediate actions to off-set the collapsed economies by using economics tools such as systemically injected capital and cut interest rates. These actions

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[19.] BBC News, http://news.bbc.co.uk
[20.] U.S. Department of Commerce, Bureau of Economic Analysis, http://www.bea.gov
[21.] U.S. Department of Labor, Bureau of Labor Statistic, http://data.bls.gov
[22.] The Economist, http://www.economist.com

were taken to stimulate demand because higher unemployment and lower wages lead to reduction in global consumption. It started with the actions of world's central banks by cutting interest rates and expanded money supplies to avoid deflation. Bank of England and the European Central Bank reduced their interest rates while other countries launched large fiscal stimulus package to help the economies. The U.S. launched stimulus package totaling nearly US$1 trillion during 2008 and 2009.[23] Central banks purchased large government debt and troubled private assets from banks and also bailed out many troubled firms to protect the economies.

The impact of the global financial crisis on the global economy is far broader and more severe than anticipated. While global efforts have been intensified to counter the effects of the economic slowdown, recovery is still likely to be slow. Under these circumstances, the Asian economies have been adversely affected. The impact is already evident in export performance of several of the regional countries. As exports declined, growth has increasingly relied on domestic demand, particularly private consumption and government spending. The implementation of the fiscal stimulus and necessary policy support to strengthen the domestic sources of growth is vital to supporting the overall growth (Bank Negara Malaysia, 2009).

[23.] BBC News, http://news.bbc.co.uk

In the case of Malaysia, when the financial crisis started in U.S. in 2007, it had little effects on Malaysia but when it began to affect the western countries' productions and incomes, it has been increasingly transmitted to Malaysia particularly through trade channel by affecting export prices and volumes.[24]

The impacts of the crises could be seen at Malaysia GDP, exports and balance of payments. According to the data released by Bank Negara and Malaysia Statistics Department, production and income have been hit because of the plunging exports by 15% by February 26, 2009, combined from the declines in the export of manufacturing, oil and agricultural products. Malaysia real GDP was RM131.3 billion in the last quarter of 2008, a sharp drop of 3.6% when compared to the third quarter of 2008.

Malaysia's gross exports fell 18% from RM185 billion in third-quarter 2008 to RM151 billion in the fourth quarter. The fall was particularly in the exports of manufacturing products particularly electronics, electrical machinery and appliances. Total manufacturing exports dropped 20% from RM138 billion in third-quarter 2008 to RM110 billion in the fourth quarter. The negative trend believed was caused by the global crisis since the trade sector has been the worst hit.

[24.] Khor, M., http://www.twnside.org.sg

The data from Monthly Statistical Bulletin by BNM shows that other export declines in the same period were in petroleum (from RM12.4 to RM8.3 billion), palm oil (RM15.5 to RM9.3 billion) and rubber (RM2.5 to RM1.3 billion). Fortunately these were to some extent offset by a rise in LNG exports (from RM9.3 to 14.7 billion).

However, Malaysia seems to be resilient against the global financial crisis because Malaysia's fundamentals and foreign reserves were still strong. Domestic banks were not directly exposed to the crisis because of outflow of foreign investment was limited due to regulation.[25] Government also has took measures to off-set the negative impacts due to the global crisis shock. Large stimulus packages has been launched up to RM67 billion until March 2009[26].

2.4 Conclusion

The root causes of the crises were different, as for the Asian financial crisis of 1997, the cause was the wild speculation on currency while for the global financial crisis of 2007, it triggering cause was the burst of the housing bubble. Many economic sectors collapsed especially in trade sector. However, governments of the affected countries took immediate actions by imposing proper fiscal and monetary expansionary policies.

[25.] The Star, http://biz.thestar.com.my
[26.] Khoon, G.S. & Mah-Hui, M.L. (2010)

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter contributes to the literature by providing an understanding of the impact of financial crises and the channel of crises transmitted, which is through trade. The estimated results of the impact can be used to predict the impact of financial crises on trade in Malaysia case, thus providing useful information for risk management to policy makers.

Financial crises actually could be specified into two categories, i.e. the currency crises such as and the banking crises. Eichengreen and Bordo (2002) have provided detailed definitions of currency crises and banking crises:

> For an episode to qualify as a currency crisis, we must observe a forced change in parity, abandonment of a pegged exchange rate, or an international rescue. For an episode to qualify as a banking crisis, we must observe either bank runs, widespread bank failures and suspension of convertibility of deposits into currency such that the latter circulates at a premium relative to deposits (a banking panic), or significant banking sector problems (including but not limited to bank failures) resulting in the erosion of most or all of banking system collateral that are resolved by a fiscally-underwritten bank restructuring.

According to the definition, we definitely could categorize Asian financial crisis of 1997 as currency crisis, and the recent global financial crisis of 2007 as banking crisis.

3.2 Theoretical framework

3.2.1 International trade theory

International trade theory tries to identify conditions, causes and effects of international trade among countries. It deals with an impact of international trade on a country's economic growth within a country and an international allocation of production factors as well.

3.2.1.1 Protectionism theory

Protectionism theory is based on mercantilism school of thought. Mercantilists urged for a balance of trade surplus to ensure influx of gold to a country and thus generated the growth of wealth of the country. To create a balance of trade surplus, mercantilists stressed on the importance of country's foreign trade and thus create a trade policy that led to protectionism. Due to protectionism, they limit imports and subsidize exports by imposing various trade barriers such as high import tariff rates, exports subsidies, and export monopolies.

However the mercantilist, Thomas Mun, refused the strict prohibition of gold export from a country. He argued that the gold export is good when it guarantees larger influx of gold than the volume of primary efflux.

Nevertheless, on the other hand, Alexander Hamilton favors the protectionist theory. His approach focused on the importance of grants and subsidies to support the infant industry. He encouraged governments to ensure temporary protection of a domestic industry from foreign competition, hence they may increase the volume of production and consequently produce as cheap as foreign competitors.

Friedrich List also supports protectionism because when an industry is situated on the infant industry level, it cannot be exposed to foreign competition because it would be driven out by more advanced foreign producers thus it would never has a chance to become mature. According to List, it is more necessary to build a large market first to achieve economies of scale, so they finally can compete in open market.

3.2.1.2 Classical international trade theory

The classical international trade theories started as a reaction on the mercantilist approach to international trade. Classical economists criticized mercantilist protectionism because

according to the classical opinion, both parties concerned on international trade gain due to specialization and better utilization of resources.

David Hume had critique the mercantilist concept of trade balance surplus. With his theory of specie flow mechanism, he argued that it is not possible to increase the relative share of a country on world precious metal reserves without raising the share on world's production.

Adam Smith also stressed that international trade allows each country to participate on labor specialization and will increase all participant countries' welfare regardless of their trade balance. His theory of absolute advantage argued that each country should focus on production with absolutely lowest labor costs. However, the limitation is only on country with absolute advantage and if none, then it is not possible for international trade.

David Ricardo came up with his theory of comparative advantage that creates more possibilities for international trade formation. A less developed country is not behind in all products in the same way, and a country specializes right on the basis of the relative difference in labor costs. Then, a less effective country specializes on production and export of goods where its absolute disadvantage is smallest.

3.2.1.3 Modern trade theory

New trade theory is linked to many economists but among the most important modern economists are Paul Krugman and Jagdish Bhagwati. Krugman's view is that imperfect competition in international trade is a consequence of economies of scale. This is due to the fact that large firms have an advantage in face of smaller ones when profits increase. Hence markets direct to the situation when one or a few large firms control a market. Monopoly behavior in international trade leads to charging different prices for the same product in home and foreign market, or also known by the term "dumping". Antidumping measurements often work as a form of protectionism.

Strategic trade policy later came up which justify the using of industrial policies for the benefit of high-technology industries. In the case of infant industry, strategic trade theory asking for protectionism via government intervention so it can help domestic firms achieve economies of scale and experience in order to become efficient and competitive in global markets.

Jagdish Bhagwati has defended free trade by refused the opinion of environmentalists that trade harms the environment. Bhagwati supports international trade because, in his view, current bilateral and regional free trade agreements put chaos into world trade system. However, Bhagwati stressed that free trade would have a positive effect only in case when price mechanism works correctly and prices reflect real social costs. But if not, then invisible hand will mislead the economy and free trade cannot be supposed as the best policy.

Although the conclusions of international trade theory are unambiguous, real international trade faces new challenges from many interest groups. Most of trade policy instruments are primary aimed at protection of profits for certain interest groups, so it does not reflect costs and benefits from the social view.

3.2.1.4 Free trade theory

Free trade is a system of trade policy that allows traders to trade across national boundaries without interference from the governments. Under a free trade policy, prices are a reflection of true supply and demand, and also the only determinant of resource allocation. The allocation of goods and services among trading countries are determined by artificial prices which are the result of protectionist trade policies, whereby governments intervene in the market through price adjustments and supply restrictions. Interventions include subsidies, taxes and tariffs, non-tariff barriers, such as regulatory legislation and quotas, and even inter-government managed trade agreements such as the North American Free Trade Agreement (NAFTA) and Central America Free Trade Agreement (CAFTA) or any governmental market intervention resulting in artificial prices.

3.2.1.5 Heckscher-Ohlin theory

In the early 1900s, an international trade theory called ‘factor proportions theory’ emerged by Eli Heckscher and Bertil Ohlin. This theory is also called the Heckscher-Ohlin theory. The Heckscher-Ohlin theory stresses that countries should produce and export goods that require resources (factors) that are abundant and import goods that require resources in short supply. This theory differs from the theories of comparative advantage and absolute advantage since those theories focus on the productivity of the production process for a particular good. On the contrary, the Heckscher-Ohlin theory states that a country should specialized production and export using the factors that are most abundant, and thus the cheapest.

The theory argues that the pattern of international trade is determined by differences in factor endowments. It predicts that countries will export those goods that make intensive use of locally abundant factors and will import goods that make intensive use of factors that are locally scarce. Empirical problems with the H-O model, known as the Leontief paradox, were exposed in empirical tests by Wassily Leontief who found that the United States tended to export labor intensive goods despite having capital abundance.

3.2.2. Business Cycle

Business cycles refer to the recurring and fluctuating levels of economic activity that an economy experiences over a long period of time. The five stages of the business cycle are

growth, peak, recession, trough and recovery. Business cycles were thought to be extremely regular with predictable durations, but today they are varying in frequency, magnitude and duration.

In 1946, economists Arthur F. Burns and Wesley C. Mitchell provided the now standard definition of business cycles in their book *Measuring Business Cycles*. They stressed that business cycles fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises. A cycle consists of expansions, followed by general recessions, contractions, and revivals which merge into the expansion phase of the next cycle. In duration, business cycles vary from more than one year to ten or twelve years.

3.3 Empirical Study

3.3.1 The crisis of 1997: Asian financial crisis

Zhuang and Dowling (2002) used an early warning system (EWS) model to study on the causes of the 1997 Asian financial crisis, with a view to discriminating between the two hypotheses of "weak fundamentals" and "investors' panic." The results show that the overall composite leading index of the EWS model issued persistent warning signals prior to the 1997 crisis in all five countries most affected by the crisis. The finding appears not to square well with the "investor panic, market overreaction and regional

contagion" postulate. Instead, it lends support to the hypothesis that weaknesses in economic and financial fundamentals in these countries triggered the crisis.

On the other hand for the case of Malaysia, Hasan (2002) argues that the 1997 financial crisis did not hit Malaysia because the economic fundamentals of the country were weak. The study discovered that the prime cause of financial crisis in Malaysia was not the weak economic fundamentals of the country but rather the crisis threatened these fundamental. It was the uncontrolled speculation on portfolio investment from the country that caused the turmoil which pushed almost overnight a flourishing economy of Malaysia in the mire.

The research done by MacEachin et.al (2006) revealed that the Asian financial crisis of 1997 sparked by a sudden decline in the currencies of several Asian states with global financial interdependence which prompted widespread economic recession and also political and security implications. However, the root problems were badly managed and insolvent companies and banks, weak supervision of the financial sector, and governance issues including corruption, cronyism, and lack of public accountability.

Bordo and Schwartz (2000) found out that the causes for the massive currency and banking crises are overvalued currency pegs, original sin (liability dollarization,) the drying up of Japanese lending after its banking crisis, corporate malfeasance and corruption. The study also proved that the Asian crisis had impact across many emerging countries but did not seriously impact the advanced countries. However the generous

rescue packages provided by the IMF bring up the economy but the rescues were largely bailouts which would engender future moral hazard.

Karunatilleka (1999) revealed that the slowdown of exports and large current account deficits highlighted some structural issues, which caused by high private inflows rather than low domestic savings and ultimately reflect a short-run vulnerability. However, the risks of loss of confidence in banking systems would be easy to overstate since most East Asian countries have a more robust external and fiscal position.

3.3.2 The crisis of 2007: Global financial crisis

Bordo and Landon-Lane (2010) compare the recent crisis to earlier financial crises by comparing the five global banking crises and found that they were quite similar in average loss to the recent crisis. Some possible factor of global financial crises is U.S. involvement because US banking system has long been crisis prone. Other factors are financial globalization, the international monetary regime, and asset booms fueled by capital inflows.

Allen et.al (2009) found out that the crisis of 2007 was caused by the two main factors which are the very low interest rates set by the Federal Reserve in 2003 and hence it led to a bubble in property prices, and other factor is that global imbalances triggered an abundance of credit.

Reavis (2009) urged that the collapse of the U.S. housing market was what triggered the financial crisis because the erosion of the housing market led to an erosion of wealth. That has implications for how much households were willing to consume and if they were firms how much they were willing to invest.

Arner and Schou-Zibell (2010) found out that the global financial crisis resulted from an unprecedented period of excessive borrowing, lending, and investment incentivized by a series of significant economic and regulatory factors. However, the G20 financial reform process had made implications for Asia in the forms of financial regulation and infrastructure, financial supervision and implementation of international standards.

Guillén and Suárez (2009) examine the different causal chains leading to the crisis in the U.S. by emphasizing that it were a series of political, regulatory and organizational decisions that led to the financial and economic meltdown. The study proposed that solutions to the crisis will need to be tailored to the specific ways in which countries experienced the meltdown and the political preferences of interest groups and citizens.

3.3.3 Impacts of financial crises on trade

Trade could be proved to play a significant role in channeling the financial crises for two reasons. First, trade imbalance has been shown to be one of the important factors that trigger financial crises. Current deficits may decrease foreign reserves and increase the

vulnerability of the economy towards crises shocks. Krugman (1979) has stated that a currency crisis is more likely to happen in an economy which does not have enough foreign reserves.

Second, financial crises may be transmitted through trade linkages from an affected country to other countries because of its contagious characteristic. In explaining such contagion effects, economists have tried to identify the channels through which contagion was spread. Trade is the most obvious economic linkage between countries and thus this chapter is dedicated to examine the relationship between the crises and the trade channel. The importance of trade imbalance has been accepted as the factor that triggered crises but there is an argument on the importance of trade in transmitting financial crises.

Eichengreen and Rose (1999) examined whether bilateral trade linkages transmitted crises between industrial countries between 1959 and 1993. They found that the probability of a financial crisis most probable to occur in a country if the country had high bilateral trade linkages with countries in crises. So trade was determined as an important channel of the crises. Glick and Rose (1999) conducted a similar analysis with more countries between 1971 and 1997 and obtained a similar result. Forbes (2001) also study the importance of trade in financial crises transmission and the study also found that trade did play an important role.

However, other studies had denied that trade could be the factor which triggered financial crises. For instance, Goldfajn and Baig (1998) thought that trade was unimportant in the

East Asian Crisis because the direct bilateral trade volumes between these economies were very small. Masson (1998), analyzing the Mexican crisis and the Asian crisis, obtained similar results.

Nevertheless, financial crises could also affect trade as well. Reinhart and Calvo (1999) pointed out that financial crises usually caused capital account reversal (also known as the sudden stops) and triggered an economic recession. Mendoza (2001) showed that in an economy with imperfect credit markets, these sudden stops could be an equilibrium outcome. The economic recession reduces not only domestic demand, but also total output and export capability, whereas capital outflow forces the country to increase export.

Ma and Cheng (2003) use bilateral trade data to isolate external effects that vary across countries. For example, if a country and its main trading partner fall into financial crises at the same time, the country's exports and imports are affected by both internal and external shocks. Their major findings are that banking crises had a negative impact on imports but a positive impact on exports in the short term, whereas currency crises decreased imports in the short term and stimulated exports in the longer term.

Ngiam Kee Jin (2000) research lead to a discovered that the Asian financial crisis which been transmitted via several channels has adversely affected Singapore. Their finding is that Singapore’s exports to the crisis-hit economies were badly affected as a result of severely diminished regional demand because of the collapse of their currencies.

Singapore's exports also became less competitive against these economies in third-country markets.

Dungey et.al (2010) investigates whether financial crises are alike by considering whether a single modeling framework can fit multiple distinct crises in which contagion effect link markets across national borders. The empirical results show that financial crises are indeed alike, as all linkages are statistically important across all crises. However, the strength of these linkages does vary across crises.

As a conclusion, we could summarize that trades could caused financial crises and so financial crises could impacted trades. There is bilateral relationship between these two variables.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter will discuss the econometric model used to study the impacts of financial crisis on Malaysia trade. This chapter explains the variables used in this study and the measurement of every of them. In this chapter, the econometric procedures been used are consisting of several methodology namely Unit Root Test, Granger Causality Test, and Autoregressive Integrated Moving Average ARIMA model or popularly known as Box-Jenkins (B-J) method.

4.2 Measurements of variables

The variables that been tested in this study are export, import, balance of trades or net export and also total trades. This is because this study dedicated to focused on the impacts of financial crises on trade, especially the external trades which been closely related to the transmitting channels or generally known as the major base of relationship between countries. When examining external trades, the most important variables are export and import, and also the difference between those two variables, i.e. the balance of trades. Ultimately, they all could be summed as the total trades.

4.2.1 Total trades

Trade is referring to the transfer of ownership of goods and services from one person to another. A medium or place that allows the transaction or exchange to happen is called a market. The original form of trade was barter which refers to the direct exchange of goods and services. However, modern traders are generally negotiates through a medium of exchange, such as money. The invention of money greatly simplified and promoted trade. Later, credit, paper money and non-physical money were invented to promote easier trade especially across nations. Trade between two traders is called bilateral trade, while trade between more than two traders is called multilateral trade.

Trade exists among individuals because of the specialization and division of labor in which most people concentrate on a certain production and have to trade to get other products. Trade exists between regions because different regions have a comparative advantage in the production of certain commodity, or because the different size of the regions allows large scale of production.

International trade refers to the exchange of goods and services across national borders. In most countries, it represents a significant part of GDP. International trade has been present since a long time ago such as the Silk Road. Nevertheless, its importance have increased in recent centuries mainly because of the industrialization, advancement in transportation, globalization, multinational corporations, and outsourcing.

Empirical evidence for the success of trade can be seen in the contrast between several countries as an example such as South Korea which has a policy of export-oriented industrialization, and India, which had a more closed policy before (although it has begun to open its economy in 2005). South Korea has achieved greater economy than India over the past fifty years, and the openness policy of international trade is one of the factors that triggered the boost of South Korea economy.

4.2.2 Export

The term export means the shipping of the goods and services out of the port of a country. In International trade, "exports" refers to selling goods and services produced in home country to other markets. Export of goods or services are usually provided to foreign consumers by domestic producers. The seller is referred to as an "exporter" who is based in the country of export whereas the overseas based buyer is referred to as an "importer". Export of commercial quantities of goods is usually requires involvement of the customs authorities in both the exporter country and the importer country. Exporting is a major component of international trade, and there are macroeconomic risks and also benefits of exporting. There are two different perspectives concerning international trade. There is recognition of the benefits of international trade but on the other hand, there is concern of the possibility that certain domestic industries (or laborers, or culture) could be harmed by foreign competition.

4.2.3 Import

The term "import" is referring to the activities of to bring in the goods and services into the port of a country. The buyer of such goods and services is referred to an "importer" who is based in the country of import whereas the overseas based seller is referred to as an "exporter". Import of goods or services are provided to domestic consumers by foreign producers. An import in the receiving country is an export to the sending country. Import of goods are also normally requires involvement of the customs authorities in both the importer country and the exporter country and are often subject to import quotas, tariffs and trade agreements.

There are two basic types of import which is the industrial and consumer goods and also intermediate goods and services. Firms import goods and services that are not available in the local market to supply to the domestic market at a cheaper price and better quality than the competing goods manufactured locally.

4.2.4 Balance of trades (Net Export)

Balance of trade refers to the difference in value for import and export of a country. A country demand for an import when domestic quantity demanded exceeding domestic quantity supplied (shortage in supply), or when the price of the products on the world market is cheaper than the price on the domestic market.

The balance of trade, usually denoted net export, is the difference between the value of the goods (and services) a country exports and the value of the goods the country imports. A trade deficit occurs when imports are large relative to exports. Imports are dependent to the country's income and its productive resources.

4.3 Econometric procedures

The objective of this section is to explain the relevant econometric procedures used to test the time series data. The most appropriate estimation procedure will be discussed under various conditions to achieve the most accurate results.

4.3.1 Unit root Test

The main requirement in estimating time series model is that the variables must be stationary. One of the classical unit root tests namely the Augmented Dickey-Fuller or ADF test (Dickey and Fuller, 1981; Said and Dickey, 1984) which provides convenient procedures to determine the univariate time series properties of time series data. This test is based on the null hypothesis that a unit root exists in the time series.

The inference process of unit root is an important step in data analysis. We tested the existence of unit root using the ADF statistic where a null hypothesis is non-stationary. Many researchers believe this is a wise step to examine unit root in each time series used to form a model. There exist several differences in the unit root test. ADF is the extended version of Dickey-Fuller (DF) test by allowing a higher order of autoregressive process and the common approach uses the ADF equation shown here with time trend:

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \sum \beta_i \Delta Y_{t-i-1} \tag{4.1}$$

$$\Delta Y_t = \delta_0 + \delta_1 t + \delta_2 Y_{t-1} + \sum \delta_i \Delta Y_{t-i-1} \tag{4.2}$$

where $\Delta y_t = y_t - y_{t-1}$ and t shows time (as an example see, Campbell and Perron, 1991 and Enders, 1995). The null hypothesis of the ADF test is $\beta_1 = 0$ (or non-stationary), against its alternative of $\beta_1 < 0$ (or stationary). If the null hypothesis is rejected, we conclude that the series is stationary.

4.3.2 Granger Causality Test

Given the two different sources of causality, we can perform three different causality tests i.e. short-run Granger non-causality test, weak exogeneity and strong exogeneity tests. To test ΔGt does not cause t ΔF in the short-run, we examine the significance of the lagged dynamic terms by testing the null H_0 : all Θ_{1j} = 0 using the Wald test. Non-rejection of the null implies growth does not Granger-cause finance in the short-run. The

weak exogeneity test, which is a notion of long-run non-causality test, requires satisfying the null $H_0: \alpha_{11} = 0$. It is based on a likelihood ratio test which follows a $\chi 2$ distribution. Finally, we can also perform the strong exogeneity test which imposes stronger restrictions by testing the joint significance of both the lagged dynamic terms and ECT due to Charemza and Deadman (1992, p.267) and Engle et al. (1983). That is, the strong exogeneity test requires Granger non-causality and weak exogeneity. In particular, ΔGt does not cause ΔFt if the null H_0: all $\theta_{1j} = \alpha_{11} = 0$ is not rejected.

The strong exogeneity test does not distinguish between the short-run and long-run causality but it is a more restrictive test which indicates the overall causality in the system. This study uses the concept of causality in the probabilistic rather than in the deterministic sense.

4.3.3 ARIMA model

Autoregressive Integrated Moving Average (ARIMA) model or popularly known as the Box-Jenkins Method (B-J) emphasis on analyzing the probabilistic or stochastic properties of economic time series. B-J type of time series model of Y_t may be explained by past, or lagged, values of Y itself and stochastic error terms. For this reason, ARIMA models are sometime called *a-theoretic* models because they cannot be derive from any econometric theory, and economic theories are often the basis of simultaneous-equation models.

The time series model that (weakly) stationary referring to the constant mean and variance and its covariance is time-invariant. But many economic time series are nonstationary, that is, they are integrated. To use the B-J methodology, we must have either a stationary time series or a time series that is stationary after one or more differencings. The reason for assuming stationarity is because the B-J method objective is to identify and estimate a statistical model which can be interpreted as having generated the sample data. If we are going to use this model for forecasting, we must assume that the features of this model are constant through time, and particularly over future time periods. So the simple reason for requiring stationary data is that any model which is inferred from these data can be interpreted as stationary or stable, so it can provide valid basis for forecasting.

The B-J method consisting four steps as follows:

First step is identification in which we are going to find the appropriate values of p, d, and q . The chief tools are the autocorrelation function (ACF) and partial autocorrelation function (PACF), and the resulting correlograms which are simply the plots of ACFs and PACFs against the lag length.

Second step is estimation in which we are going to estimate the parameters of the autoregressive and moving average terms included in the model. Sometime this can be done by simple least squares but sometime we will have to resort to nonlinear (in parameter) estimation methods.

Third step is diagnostic checking to see whether the chosen model fits the data reasonably well, for it is possible that another ARIMA model might do it as well. Simple test of the chosen model can be done to see if the residuals estimated from this model are white noise, and if they are, we can accept the particular fit.

Fourth step is forecasting. ARIMA is very popular because of its success in forecasting. The forecasts obtained by this method are more reliable than those obtained from the traditional econometric modeling, particularly for short-term forecasts.

4.4 Data

The general system of recording is adopted in compiling Malaysian external trade statistics. Under this system, the national boundary of the country is used as the statistical frontier. All goods entering or leaving the country (except specific exclusions goods) are recorded, regardless whether the goods are subject to clearance. Accordingly, goods entering or leaving customs bonded warehouses, Free Industrial Zones, Free Commercial Zones and Free Zones are recorded in the statistics. The compilation of Malaysia's external trade statistics provided information on Malaysia's trade performance in terms of volume, value and average unit value of merchandise goods. In this section however, only the value of external trade is presented. The time series data used in this study is the external trade statistics including the data of exports, imports, total trades, and balance of trades for year 1947 to 2009.

4.5 Conclusion

By using the time series data for year 1947 to 2009 retrieved from Malaysia Statistic Department, there are four variables been tested which are the export, import, balance of trades and total trades of Malaysia during that timeframe. The methodology been used are Unit Root Test to prove that the time series data is stationary, the Granger Causality Test to examine whether there are relationship between those variables, and ARIMA model to forecast the impacts of the crises on trades.

CHAPTER FIVE

DATA ANALYSIS 1: DESCRIPTIVE ANALYSIS

5.1 Introduction

This chapter study on the impact of financial crises on Malaysia trade involving the data of 63 years from year 1947 to 2009. There were four variables been analyzed in this research, i.e. total trades, export, import and balance of trades. This chapter focused on descriptive analysis of the data based on the graphs generated for each of the variables.

5.2 Graphical descriptive analysis

There are four variables been included in this chapter, which are the export, import, balance of trades and total trades. The data for all of these variables are respectively been transformed into a graph and the pattern are explained descriptively.

5.2.1 Graphical descriptive analysis for total trade variable

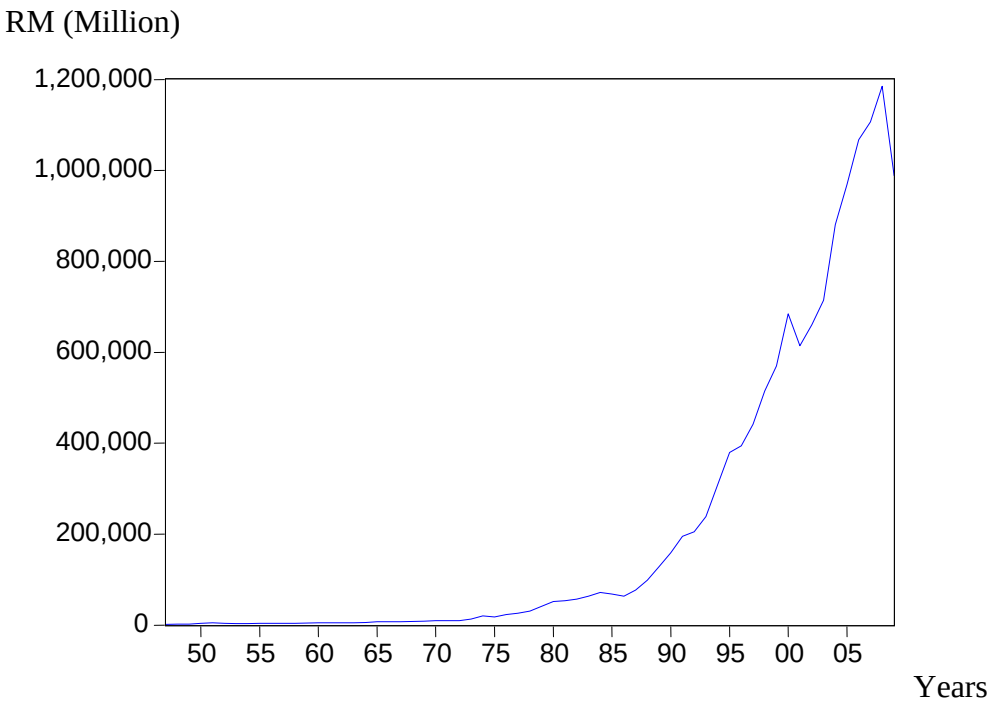

Figure 5.2.1 Total trades from 1947 to 2009

Figure 5.2.1 show that total trades facing fluctuation within year 1947 to 2009. Between year 1947 and 1973, the fluctuation trend was relatively small but the total trades increased significantly after 1985. Asian faced financial crisis in 1997, and its impact caused Malaysia to face a little reduction in the total trades later in 2001. Meanwhile, global financial crisis triggered in 2007 and arrived at Malaysia shore during 2008. Malaysia total trades declined in 2009 subject to the impact of that financial crisis.

5.2.2 Graphical descriptive analysis for export variable

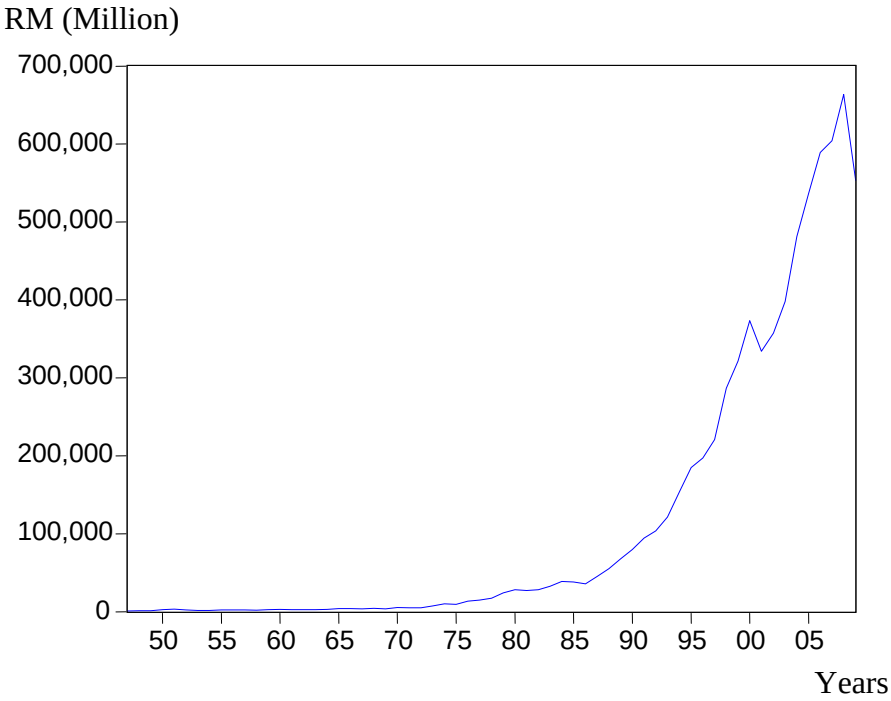

Figure 5.2.2 Export from 1947 to 2009

Figure 5.2.2 shows export also had been in fluctuation between 1947 to the year of 2009. From year 1947 to 1973, there was a small fluctuation for Malaysia export, but the total export increased significantly after 1985. Due to the Asian financial crisis of 1997, total export declined in 2001, and Malaysia export once again declined during 2009 subject to the impact of the global financial crisis. The graphs trend for total trade and export are similar, this is because export has positive relationship with total trade, so they moved to the same direction.

5.2.3 Graphical descriptive analysis for import variable

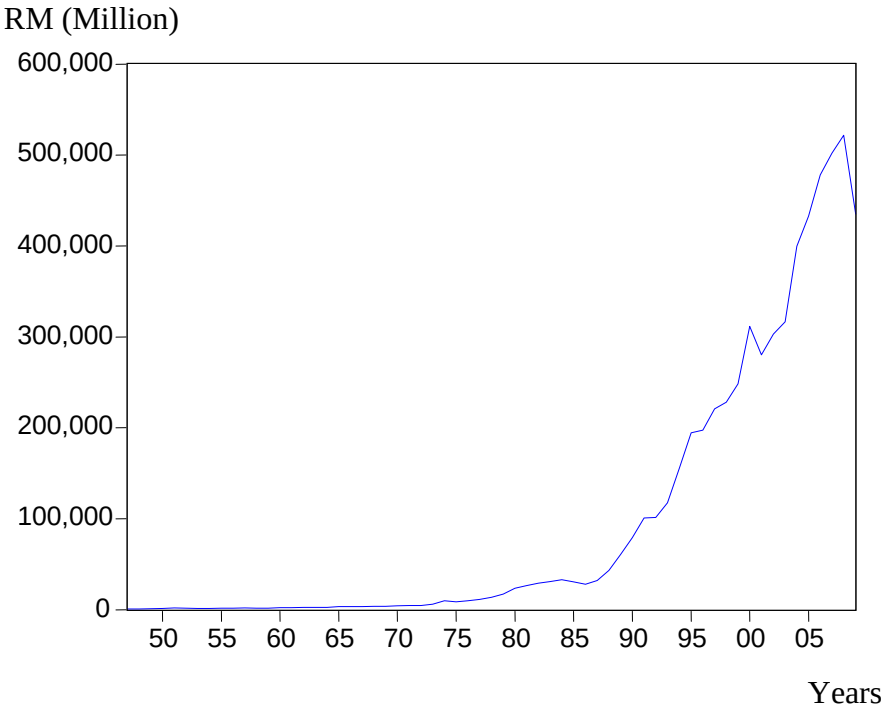

Figure 5.2.3 Import from 1947 to 2009

Figure 5.2.3 shows that import fluctuated in the timeframe of 1947 to 2009. Between 1947 and 1973, import fluctuated a little but the increment in import was so significant after 1985. It declined in 2001 because of the Asian financial crisis of 1997 and declined once again in 2009, this time caused by the global financial crisis. The graph for import is similar to the movement of the graphs for total trades and export, clearly because it also affected by the financial crises as they were.

5.2.4 Graphical descriptive analysis for balance of trade variable

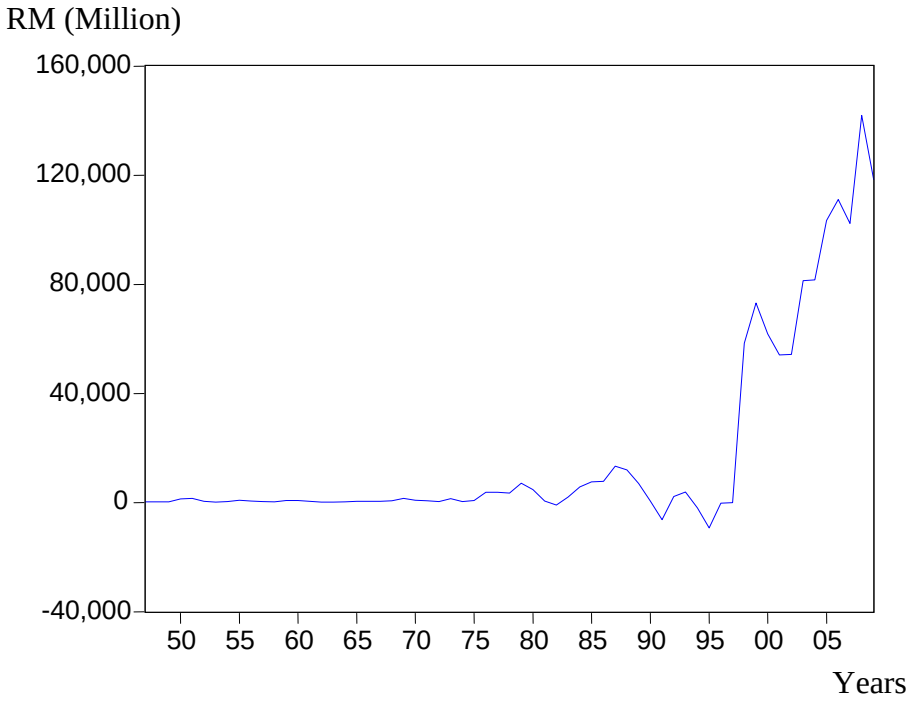

Figure 5.2.4 Balance of trades from 1947 to 2009

Figure 5.2.4 shows the fluctuation of the balance of trades between 1947 and 2009. It fluctuated a bit between 1947 to 1973, but the balance of trades started to fluctuated a lot after 1983 caused by the negative balance of trades such as in year 2001 mainly triggered by 1997's Asian financial crisis, and also in year 2009 attributed by the global financial crisis of 2007.

5.3 Conclusion

This research focused on the year of 1997 of when Asian financial crisis occurred and also 2007 of when the global financial crisis had burst out. All of the graphs above show the trend of total trades, export, import and balance of trades of which they were facing fluctuation along the period included in the study. The finding concluded that Malaysia trade also been hit by the impacts of the financial crises and the impacts took several years to arrived at Malaysia shore.

During 1997 Asian financial crisis, Malaysia trade had not been affected yet, but it only been affected in 2001. It was similar for the global financial crisis of 2007, the effects on Malaysia trade could only be seen during 2009. As a conclusion, impacts of the financial crisis to Malaysia trade took years before it took effects.

CHAPTER SIX

DATA ANALYSIS II: UNIT ROOT TEST AND GRANGER CAUSALITY TEST

6.1 Introduction

This chapter will focus on the method of unit root test and Granger causality test that been used to test the data of trades. For unit root test, stationary time series data is necessary to have a valid t-statistics and F-statistics. Therefore, it is a preliminary condition to test for unit root before we proceed with other econometric analysis. Meanwhile, Granger causality test is very important to perform to examine the causality between two variables that are being analyzed.

6.2 Result of Unit Root Test

The results for the unit root test are presented in Table 6.1.

Table 6.1: Result of the Unit Root Test

	INTERCEPT		**INTERCEPT + TREND**	
	LEVEL	**1st DIFFERENT**	**LEVEL**	**1st DIFFERENT**
Total Trades	0.711196 [3]	-3.223357 [3]**	-0.163231 [3]	-3.865649 [3]**

	(0.9915)	(0.0235)	(0.9925)	(0.0198)
Export	-0.379440 [2]	-3.417658 [2]**	0.370536 [3]	4.301403[3]***
	(0.9056)	(0.0142)	(0.9986)	(0.0060)
Import	1.724143 [3]	-2.885661 [3]*	-0.652327 [3]	-3.740239 [3]**
	(0.9996)	(0.0530)	(0.9720)	(0.0272)
Balance	0.408307 [3]	-8.040102 [3]***	-0.916242 [3]	-5.682239 [3]***
of Trades	(0.9818)	(0.0000)	(0.9473)	(0.0001)

Note: ***, ** and * indicates the rejection of the null hypothesis of non-stationary at 1%, 5% and 10% significance level. [ ] indicates the lag specification and ( ) indicates the t-statistic value.

Table 6.1 represents the unit root result based on Augmented Dicky-Fuller (ADF) approach which categorized its analysis into two parts, i.e., at level and first differentiation. The interest is to get the variables, i.e. the total trades, export, import and balance of trades, to be non-stationary at level while it shows stationary at first differentiation.

Based on Table 6.1, the t-statistics for all variables are statistically insignificant to reject the null hypothesis of non-stationary at any significance level, i.e. at 1%, 5% and 10% significance level. The result indicates that these series are non-stationary at level. Therefore, these variables contain a unit root. When the ADF test conducted at first

difference, the null hypothesis of non-stationary is rejected at 1% significance level for balance of trade variable, total trades and export variables are rejected at 5% significance level and import variable is rejected at 10% significance level. Therefore, it can be concluded that all of the series are integrated of order one, I(1).

6.3 Result of Granger Causality Test

Granger Causality Test had been performed to see the direction of the causality and identify which variable that Granger Cause the other variable. The test been conducted by dividing the time series data to three categories, i.e. from 1947 to 2009 time series to test the overall data, before financial crisis from 1947 to 1996, and after the financial crisis of 1997, i.e. the time series data of 1998 to 2009. This is to examine if the relationship between the variables changed after the financial crisis, and if so, we could say that the changes are maybe due to the shock of the crisis. The result presented in the Table 6.2.

Table 6.2: Granger Causality Test

Null Hypotesis	**Overall (1947-2009)**		**Before Financial Crisis of 1997 (1947-1996)**		**After Financial Crisis of 1997 (1998-2009)**	
	F-statistik[3]	**Prob.**	**F-statistic[2]**	**Prob.**	**F-statistic[1]**	**Prob.**
EX does not Granger Cause TT	5.10267***	0.0036	6.97824***	0.0024	0.31727	0.5887
TT does not Granger Cause EX	5.29218***	0.0029	3.34590***	0.0446	0.73042	0.4176
IM does not Granger Cause TT	5.12521***	0.0035	7.13237***	0.0021	0.31727	0.5887
TT does not Granger Cause IM	5.85872***	0.0016	10.0340***	0.0003	0.04928	0.8299

BOT does not Granger Cause TT TT does not Granger Cause BOT	5.12520*** 8.29383***	0.0035 0.0001	7.13238*** 3.7969***	0.0021 0.0303	0.31727 6.35859***	0.5887 0.0357
IM does not Granger Cause EX EX does not Granger Cause IM	5.30623*** 5.85193***	0.0028 0.0016	3.49044*** 9.93312***	0.0394 0.0003	0.73041 0.04928	0.4176 0.8299
BOT does not Granger Cause EX EX does not Granger Cause BOT	5.31307*** 8.29177***	0.0028 0.0001	3.59715*** 3.74299***	0.0359 0.0317	0.73042 6.35859***	0.4176 0.0357
BOT does not Granger Cause IM IM does not Granger Cause BOT	5.85872*** 8.29383***	0.0016 0.0001	10.0340*** 3.79699***	0.0003 0.0303	0.04928 6.35859***	0.8299 0.0357

Note: *** indicates the rejection of the null hypothesis of non-stationary at 1% significance level.

Table 6.2 shows the Granger causality test between export and total trades, between import and total trades, between balance of trades and total trades, between import and export, between balance of trades and export, and between balance of trades and import. It has been tested for three time frame.

The first test was for overall data from 1947 to 2009. The null hypothesis for all variables is as below;

i. export does not Granger cause total trades and total trades does not Granger cause export

ii. import does not Granger cause total trades and total trades does not Granger cause export

iii. balance of trades does not Granger cause total trades and total trades does not Granger cause balance of trades

iv. import does not Granger cause export and export does not Granger cause import

v. balance of trades does not Granger cause export and export does not Granger cause balance of trades

vi. balance of trade does not Granger cause import and import does not Granger cause balance of trades

Result shows that the null hypothesis for all variables is rejected at 1% significance level.

That concluded that export does Granger cause total trades and total trades does Granger cause export, import does Granger cause total trades and total trades does Granger cause export, balance of trades does Granger cause total trades and total trades does Granger cause balance of trades, import does Granger cause export and export does Granger cause import, balance of trades does Granger cause export and export does Granger cause balance of trades, and also balance of trade does Granger cause import and import does Granger cause balance of trades. That means that there are no external factors that influenced the changes of those variables over time, hence the changes are purely caused by the changes of other related variables among them.

The second test performed for the timeframe of 1947 to 1996, before the financial crisis. The null hypothesis for all variables is as below;

i. export does not Granger cause total trades and total trades does not Granger cause export

ii. import does not Granger cause total trades and total trades does not Granger cause export

iii. balance of trades does not Granger cause total trades and total trades does not Granger cause balance of trades

iv. import does not Granger cause export and export does not Granger cause import

v. balance of trades does not Granger cause export and export does not Granger cause balance of trades

vi. balance of trade does not Granger cause import and import does not Granger cause balance of trades

The test shows similar results as the overall test, that the null hypothesis for all variables is rejected at 1% significance level.

That concluded that export does Granger cause total trades and total trades does Granger cause export, import does Granger cause total trades and total trades does Granger cause export, balance of trades does Granger cause total trades and total trades does Granger cause balance of trades, import does Granger cause export and export does Granger cause import, balance of trades does Granger cause export and export does Granger cause balance of trades, and also balance of trade does Granger cause import and import does Granger cause balance of trades. That means that there are also no external factors that influenced the changes of those variables from 1947 to 1996, before the financial crisis

hit, hence the changes are purely caused by the changes of other related variables among them.

The third test performed for the timeframe of 1998 to 2009, after the financial crisis. The findings were null hypothesis for only three variables;

i. total trades does not Granger cause balance of trades

ii. export does not Granger cause total trades

iii. import does not Granger cause balance of trades)

is rejected at 1% significance level.

That concluded that only total trades does Granger cause balance of trades, export does Granger cause total trades, and also import does Granger cause balance of trades. Other variables does not Granger cause other variables. So the changes in other variables might not caused by the changes in other related variables, but the changes were caused by the shock of the crises. For example, import does not Granger cause export, so the changes in export was not caused by the changes in import, but caused by the crises which reduced the nation's capability of exporting.

6.4 Conclusion

By using unit root test method, the time series data of trades been proven as stationary. This is due to the result of which export, import, balance of trades and total trades are

non-stationary at level and thus it contain a unit root. Those four variables' null hypothesis been rejected at first difference and once again proved that the time series data are stationary. That means the data are fits for other test such as the Granger causality test which proved that all variables are Granger cause other variables among them before the financial crisis, however after the financial crisis of 1997, there are only relationship between total trades and balance of trades, export and total trades, and also import and balance of trades. That means the changes of the data in other variables are not caused by the variables among them, but due to the external shock i.e. the Asian financial crisis of 1997.

CHAPTER SEVEN

DATA ANALYSIS III: ARIMA

7.1 Introduction

This chapter dedicated to focus on Autoregressive Integrated Moving Average (ARIMA) analysis which emphasized on analyzing the probabilistic properties of economic time series. It is a must to have either a stationary time series or a time series that is stationary after one or more differencings. The reason for requiring stationary data is that any model which is inferred from these data can be interpreted as stationary or stable, so it can provide valid basis for forecasting. In this chapter, total of trades and balance of trades were not included for forecasting purposes because they are identity, they could easily been discovered from export and import analysis.

$$EX + IM = TT \qquad (7.1)$$

$$EX\text{-}IM = BOT \qquad (7.2)$$

7.2 ARIMA on export

Export variable was tested by using export time series data of 63 years, from year 1947 to year 2009. The data had been retrieved from Malaysia Statistic Department and could be referred at Appendix A.

7.2.1 Model building

The first step is to identify the appropriate values of *p, d,* and *q* for export variable. We tried for four combinations to find the most appropriate values for *p, d,* and *q*. The four models are ARIMA(2,1,3), ARIMA(3,1,2), ARIMA(3,1,3) and ARIMA(3,1,4). The model we chose is ARIMA(3,1,3) as the equation below:

$$X_t = \theta + \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \alpha_3 Y_{t-3} + \beta_0 u_t + \beta_1 u_{t-1} + \beta_2 u_{t-2} + \beta_3 u_{t-3} \qquad (7.3)$$

Second step is to estimate the parameters of the autoregressive and moving average for export variable. Based on the export data that had been collected, four sets of ARIMA model were prepared to choose the best ARIMA model that would fit for forecasting purposes as been presented in Table7.1.

Table 7.1: The combination of ARIMA models for export

	ARIMA (2,1,3)	**ARIMA (3,1,2)**	**ARIMA (3,1,3)**	**ARIMA (3,1,4)**
Degree of Freedom	55	54	53	52
SSR	2.62E+10	2.58E+10	2.09E+10	2.37E+10
AR(1)	0.216254	0.317152	0.105792	0.594703
	(0.475732)	(0.761336)	(0.364179)	(2.653278)
AR(2)	0.725731	1.305492	0.598203	0.761428
	(2.165365)	(6.069509)	(1.892635)	(2.738945)
AR(3)	-	-0.643371	0.204082	-0.422513
		(-1.699572)	(0.608694)	(-1.830276)
MA(1)	0.057450	0.021119	-0.116751	-0.738173
	(0.110894)	(0.055975)	(-1.248048)	(-12.14102)
MA(2)	0.051919	-0.900973	-0.152090	-0.046137
	(0.100801)	(-2.441084)	(-1.396664)	(-0.596337)
MA(3)	-0.819284		-1.088964	-0.717907
	(-1.584977)	-	(-8.988893)	(-12.83158)

MA(4)	-	-	-	0.854480 (17.49161)
AIC/SIC	22.89733/ 23.07186	22.90427/ 23.08033	22.72515/ 22.93642	22.88836/ 23.13485
Adj-R^2	0.290011	0.296993	0.421156	0.328577

For export, the combination of ARIMA (3,1,3) was chosen because the highest value of Adj-R^2 rather than the other three models, i.e. 0.421156. The Akaike info criterion (AIC) and Schwarz criterion (SIC) values for ARIMA (3,1,3) show the smallest value compared to other model combinations, i.e. 22.72515 and 22.93642 respectively.

Then a diagnostic checking was performed to see whether the chosen model fits the data reasonably well. To do so, a normality test been conducted and Figure 7.1 showed the residuals for export normality test of ARIMA (3,1,3).

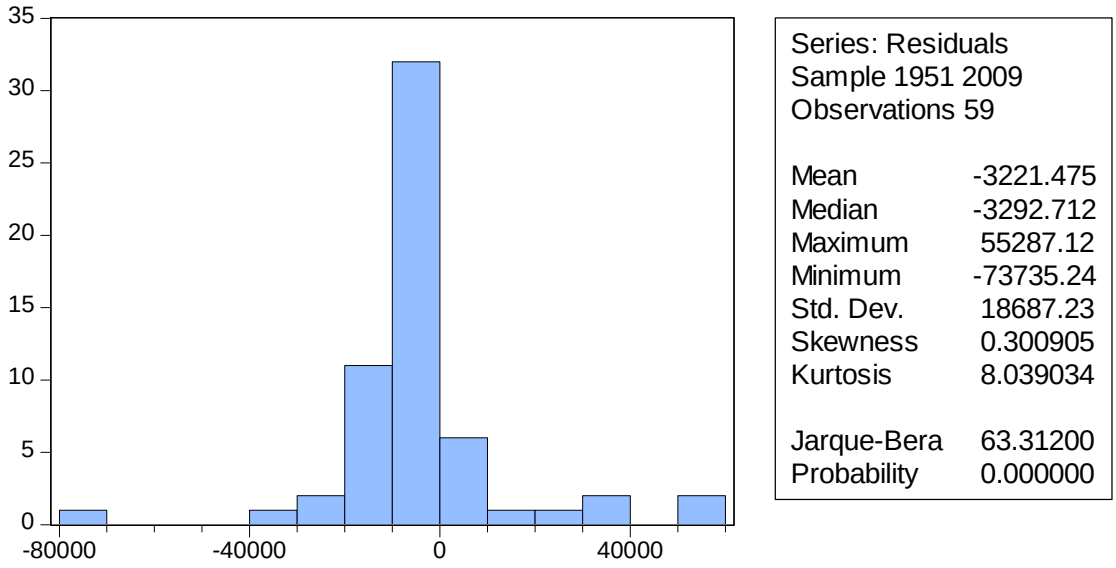

Figure 7.1: Export Normality Test, ARIMA (3,1,3)

Normality test on export has been conducted for model ARIMA(3,1,3) for sample for year 1951 to year 2009. This is a diagnostic checking to ensure that the chosen model of ARIMA(3,1,3) fits the data reasonably well.

7.2.2 Forecasting

After ARIMA (3,1,3) was selected from export variable, it has been used to do a forecasting. However, the forecasting for export had been done for only the time frame after the financial crisis of 1997, becaused the granger causality test had detected the changes for only the time frame of 1998 to 2009. Forecasting for ARIMA (3,1,3) is showed in Figure 7.2.

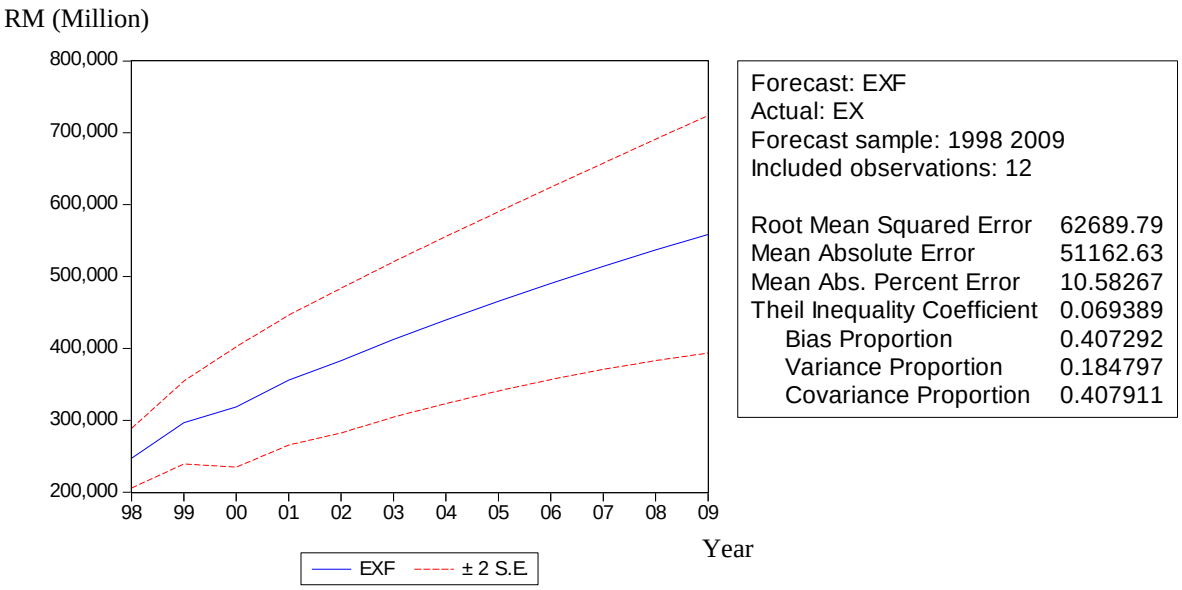

Figure 7.2: Forecasting for export, 1998-2009, ARIMA (3,1,3)

The forecasting for export had been done for only the time frame after the financial crisis of 1997 due to the granger causality result which show significant changes of the relationships among variables only after 1997. The ARIMA (3,1,3) on export is a good forecasting because the gap of the upper limit and the lower limit were not too wide, means the forecast fits the trend.

Table 7.2: Forecast value of export, upper and lower limit, and the gap between the limits, 1998-2009

Year	Actual value of export	Forecast value of export (RM Million)	Upper limit (RM Million)	Lower limit (RM Million)	Gap between limits (RM Million)

	(RM Million)				
1998	286,563.1	328,023.7	245,102.5	286,563.1	41,460.6
1999	321,559.5	379,271.1	263,847.9	321,559.5	57,711.6
2000	373,270.3	457,052.5	289,488.1	373,270.3	83,782.2
2001	334,283.8	424,694.4	243,873.2	334,283.8	90,410.6
2002	357,430.0	458,060.8	256,799.2	357,430.0	100,483.8
2003	397,884.4	505,823.9	289,944.9	397,884.4	107,939.5
2004	481,253.0	597,600.6	364,905.4	481,253.0	116,347.6
2005	536,233.7	660,888.9	411,578.5	536,233.7	124,655.2
2006	589,240.3	723,114.6	455,366.0	589,240.3	133874.3
2007	604,299.6	747,876.5	460,722.7	604,299.6	143,576.9
2008	663,494.0	817,574.0	509,414.0	663,494.0	154,080
2009	553,295.3	718,513.8	388,076.8	553,295.3	164,218.5
2010	-	570,504.1	523,893.3	617,114.8	93,221.5
2011	-	501,640.3	430,234.6	573,045.9	142,811.3
2012	-	554,777.8	449,117.7	660,437.8	211,320.1
2013	-	500,793.6	375,040.3	626,546.9	251,506.6
2014	-	560,099.5	408,479.8	711,719.1	303,239.3
2015	-	508,678.3	340,890.8	676,465.7	335,574.9
2016	-	569,053.3	380,075.1	758,031.5	377,956.4
2017	-	518,082.5	315,345.6	720,819.4	405,473.8
2018	-	578,650.3	357,589.2	799,711.4	442,122.2
2019	-	527,765.2	294,534.2	760,996.2	466,462.0
2020	-	588,373.0	338,772.3	837,973.8	499,201.5

In 1998, the forecast value of export is RM328,023.7 million, value of the upper limit is RM245,102.5 million and value of the lower limit is RM286563.1 million. The gap between the values for upper and lower limit is RM41460.6 million. The gap between the upper and lower limit is larger up to year 2009, where the gap recorded is RM164,218.5 million.

Meanwhile, the forecast value of export was fluctuating. It first increase from year 1998 to year 2000 with the value of RM457,052.5 million in 2000, but the forecast value drop to RM424,694.4 million in 2001. In 2002, forecast value increase to RM458,060.8 million and keep on increasing to RM817,574 million in 2008. However, the forecast value of export once again decline in 2009 by RM99,060.2 million, became RM718,512.8 million in 2009. These declinations in 2001 and 2009 were relevant to the pattern of the impacts of financial crises on trade which can only be seen in 2001 for the Asian financial crisis of 1997 and in 2009 for the global financial crisis of 2007.

By using SAS (appendix E), the further forecast for export been done up to year 2020. The forecast value for export fall sharply from RM718,513.8 million in 2009 to RM570,504.1 million in 2010. From that, the forecast value of export keeps fluctuating and ultimately arrived at RM588,373.0 million in 2020.

7.3 ARIMA on import

Import variable was tested by using time series import data of 63 years, from year 1947 to year 2009. The data had been retrieved from Malaysia Statistic Department and could be referred at appendix A.

7.3.1 Model building

First step is to identify the appropriate values of *p*, *d*, and *q* for import variable. We tried for four combinations to find the most appropriate values for *p*, *d*, and *q*. The four models are ARIMA(2,1,3), ARIMA(3,1,2), ARIMA(3,1,3) and ARIMA(3,1,4). The model we chose is ARIMA(3,1,4) as the equation below:

$$M_t = \theta + \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \alpha_3 Y_{t-3} + \beta_0 u_t + \beta_1 u_{t-1} + \beta_2 u_{t-2} + \beta_3 u_{t-3} + \beta_4 u_{t-4} \quad (7.4)$$

Second step is to estimate the parameters of the autoregressive and moving average for import variable. Based on the import data that had been collected, four sets of ARIMA model were prepared to choose the best ARIMA model that would fit for forecasting purposes as been presented in Table 7.3.

Table 7.3: The combination of ARIMA models for import

	ARIMA (2,1,3)	**ARIMA (3,1,2)**	**ARIMA (3,1,3)**	**ARIMA (3,1,4)**
Degree of Freedom	55	54	53	52
SSR	2.24E+10	1.34E+10	2.24E+10	1.03E+10
AR(1)	-0.152435	0.145446	0.121617	0.554719
	(-0.648550)	(0.670910)	(0.095351)	(3.509012)
AR(2)	1.099026	1.085485	1.145854	0.359579
	(3.750965)	(9.343055)	(2.726935)	(1.211107)
AR(3)	-	-0.483785	-0.302843	-1.011614
		(-2.360203)	(-0.243566)	(-4.202292)
MA(1)	0.316131	-0.299867	0.066378	-0.579472
	(0.885623)	(-1.729868)	(0.052277)	(-2.203573)
MA(2)	-0.811108	-1.322971	-0.858999	-0.013711
	(-1.542888)	(-7.076814)	(-1.319679)	(-0.038673)
MA(3)	-0.207627	-	-0.011167	1.251943

	(-0.838794)		(-0.014819)	(3.758340)
MA(4)	-	-	-	0.583661 (2.045767)
AIC/SIC	22.74258/ 22.91711	22.24646/ 22.42252	22.79422/ 23.00549	22.05697/ 22.30345
Adj-R^2	0.098574	0.460163	0.080513	0.566575

For import, ARIMA (3,1,4) was selected for highest Adj-R^2 value among the four models generated, with the value of 0.566575. Akaike info criterion (AIC) and Schwarz criterion (SIC) ARIMA (3,1,4) are the highest compared to the other three other models, i.e. 22.05697 and 22.30345 respectively.

Then a diagnostic checking was performed to see whether the chosen model fits the data reasonably well. To do so, a normality test was performed and figure 7.3 showed the residuals for export normality test of ARIMA (3,1,4).

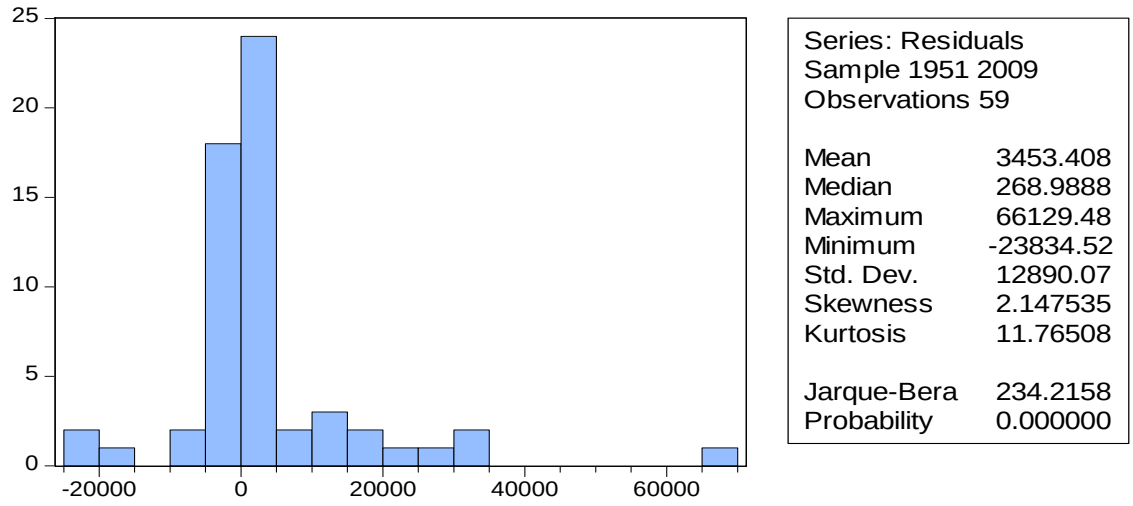

Figure 7.3: Import Normality Test, ARIMA (3,1,4)

Normality test on import has been conducted for model ARIMA(3,1,4) for sample for year 1951 to year 2009. This is a diagnostic checking to ensure that the chosen model of ARIMA(3,1,4) fits the data reasonably well.

7.3.2 Forecasting

After ARIMA (3,1,4) was selected for import variable, it has been used to do a forecasting. However, the forecasting for import had been done for only the timeframe after the financial crisis of 1997, becaused when we did our granger causality test, we could detect the changes for only the timeframe of 1998 to 2009. Forecasting for ARIMA (3,1,4) showed in Figure 7.4.

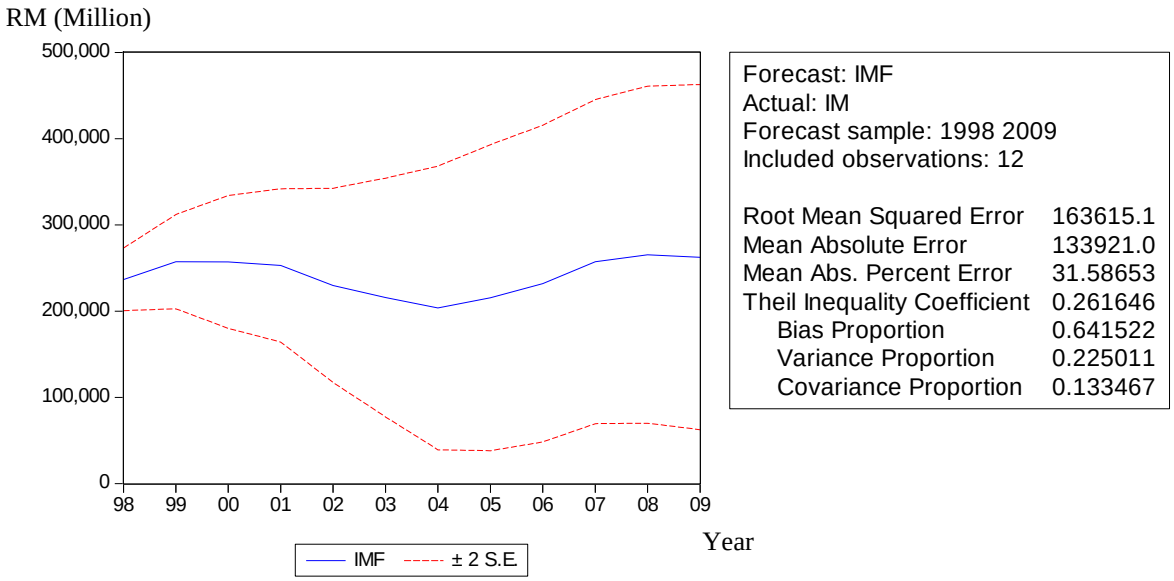

Figure 7.4: Forecasting for import, 1998-2009, ARIMA (3,1,4)

The forecasting for import had been done for only the time frame after the financial crisis of 1997 due to the granger causality result which show significant changes of the relationships among variables only after 1997. The ARIMA (3,1,4) on import is a good forecasting because the gap of the upper limit and the lower limit were not too wide, means the forecast fits the trend.

Table 7.4: Forecast value of import, upper and lower limit, and the gap between limits, 1998-2009

Year	Actual value of import (RM Million)	Forecast value of import (RM Million)	Upper limit (RM Million)	Lower limit (RM Million)	Gap between limits (RM Million)
1998	228,124.5	264,451.3	191,797.7	228,124.5	36,326.8
1999	248,476.8	303,097.6	193,856.0	248,476.8	54,620.8
2000	311,458.9	388,529.9	234,387.9	311,458.9	77,071
2001	280,229.1	369,091.9	191,366.3	280,229.1	88,862.8
2002	303,090.5	415,802.0	190,379.0	303,090.5	112,711.5
2003	316,537.9	454,929.0	178,146.8	316,537.9	138,391.1
2004	399,632.2	564,064.6	235,199.8	399,632.2	164,432.4
2005	432,870.8	610,307.2	255,434.4	432,870.8	177,436.4
2006	478,147.9	661,900.3	294,395.5	478,147.9	183,752.4
2007	502,044.6	689,931.0	314,158.2	502,044.6	187,886.4
2008	521,610.8	717,020.6	326,201.0	521,610.8	195,409.8
2009	434,940.4	635,178.4	234,702.4	434,940.4	200,238
2010	-	445,744.6	404,267.3	487,221.9	82,954.6
2011	-	418,963.9	357,196.1	480,731.7	123,535.6
2012	-	445,421.8	360,656.5	530,187.1	169,530.6
2013	-	420,586.5	320,925.9	520,247.1	199,321.2
2014	-	457,522.2	338,842.6	576,201.9	237,359.3
2015	-	435,357.7	305,098.9	565,616.6	260,517.7
2016	-	472,329.2	327,033.9	617,624.3	290,590.4
2017	-	450,002.2	295,140.0	604,864.3	309,724.3
2018	-	486,927.5	319,229.1	654,625.8	335,396.7

2019	-	464,599.1	288,546.8	640,651.3
2020	-	501,526.6	314,083.1	688,970.0

The forecast value of import for 1998 is RM 264,451.3 million, with the upper limit RM191,797.7 million and the lower limit of RM 228,124.5 million. The gap between those two limits for year 1998 was RM 36,326.8 million. The gap values keep increasing up to year 2009 where the gap became RM 200,238 million.

Meanwhile, the forecast value of import was fluctuated. It first increased up to RM 717,020.6 million in 2008. In 2001, tandem with the impacts of Asian financial crisis of 1997 arrived at Malaysian shores, the forecast value of import decreased to RM191,366.3 million. It started to increased again in the next year, but at the slower rate. It only came back to the previous condition in 2004, when the forecast value of import hit RM 235,199.8 million. It keep increasing since then, but it plunged again in 2009 by RM 81,842.2 million, recorded the forecast value of import of RM 635,178.4 million in 2009.

These declinations in 2001 and 2009 were relevant to the pattern of the impacts of financial crises on trade which can only be seen in 2001 for the Asian financial crisis of 1997 and in 2009 for the global financial crisis of 2007. However, the difference between the forecast value of export and the forecast value of import is that export healed quickly the very next year after it dropped in 2001, but import took three years from 2001 to 2004, to restored it condition.

By using SAS (appendix E), the further forecast for import been done up to year 2020. The forecast value for import fall sharply from RM635,178.4 million in 2009 to RM445,744.6 million in 2010. From that, the forecast value of import keeps fluctuating and ultimately arrived at RM501,526.6 million in 2020.

7.4 Conclusion

The ARIMA analysis was focused only on export and import data because the balance of trades and total trades are redundant or easily could be discovered by manipulating these two variables.

ARIMA analysis for export resulting in the chosen model of ARIMA(3,1,3) because the AIC and SIC of this model are the smallest value respectively is 22.72515 and 22.93642 and the highest value of Adj-R^2 (0.421156).

ARIMA analysis for import resulting in chosen model of ARIMA(3,1,4) because the AIC and SIC of this model are the smallest value respectively is 22.05697 and 22.30345 and the highest value of Adj-R^2 (0.566575).

CHAPTER EIGHT

DISCUSSION AND POLICY IMPLICATION

8.1 Conclusion remarks

The data analysis of the study presents the trend of Malaysia external trade since 1947 up to 2009, and we could see the declining trend of export, import, total trade, and balance of trades in around 2001 and also 2009, estimated caused by the crisis of 1997 and 2007 respectively. It is obvious that the crises were not started from Malaysia but elsewhere, yet the impacts has came hit our country's shore in the following few years.

The result proved that the data has unit root and thus enable Granger causality test to be performed, in which it shows causality between all variables before the financial crises. That means any changes in the variables were caused by the changes in other variables. However, after the financial crisis timeframe, only three variables left to have causality, i.e. only total trades does Granger cause balance of trades, export does Granger cause total trades, and also import does Granger cause balance of trades. Meanwhile, the rest of the variables were not having causality anymore, which we simply can conclude as any changes happened was caused by other factors than the other variables, and perhaps significantly related to the shock of the financial crises which affected the variables. The

ARIMA model also shown good forecasting, because the gap of the upper limit and the lower limit were not too wide, means our forecast fit the trend closely.

The findings show that Malaysia trade indicators were in increasing trend but fluctuating following the crises. Malaysia is a middle-income country which has transformed from a producer of raw materials into an emerging multi-sector economy. Exports, particularly of electronics, remain a significant driver of Malaysia economy. This is relevant to the findings of this study, in which the forecasting of export shows an increasing trend.

The crises had lead to decreasing worldwide demand for consumer goods and hurt Malaysia's exports, although both began showing signs of recovery lately. The biggest impact of the crises on Malaysia could be seen in the collapse of exports and also imports. Related to the forecasting result, it shows import facing fluctuation during the aftermath of both financial crises.

8.2 Policy implications

Due to the affected trade caused by the crises, there are three options available to the nations of how to response to such situation. The first is to accept the situation passively but do some economy-adjusting to a lower-growth trend which led more by domestic demand. That means Malaysia has to deal with the fact that the country is not going to led among the exporter country since our export is not quite strong to compete with other

production countries, particularly in depressed economy environment. Hence, the production will be focused on satisfying only the domestic demand. However, the economics growth of the country will be slower since we abandoned the growth driven key, i.e. export sectors. This is because the productivity will decreased as well since the country will need no excessive production because the country is not going to market it globally. Ultimately, it will lead to the slower growth of the country's GDP.

The second option we have is to aggressively build on the country's comparative advantage in manufactured exports and become more competitive. Although there are other countries enjoyed absolute advantage in manufacturing such as China, it is still cheaper for Malaysia to produce manufactured products, rather than some other countries which equipped with less technology or resources. Malaysia still could enjoy advantages in producing manufactured products, hence we should focused on producing more of it for export purposes. To aggressively compete in the global market, Malaysia should adopt technology advancement and fully optimized all resources that made available in manufacturing sector.

The third alternative is to advance the nation's technological capability and diversify into new goods and services that have better productivity and export prospects. This is because this study supported that export is a very important growth-driven of the country. Hence the country should generate mass production for any other products with export prospects rather than to utterly dependent on manufacturing sectors alone that narrowly focused on the production of electronic components. By focused on the advancement of

technology, Malaysia could develop new products from the abandoned resources in the country such as palm oil. Ultimately, Malaysia will enjoy higher exports and bigger economic growth due to the expansion in export.

Export sector remain an important driver of growth. Hence, Malaysia has to impose the right policies to increase productivity so the country can return a significant portion of the productivity increase to labor by raising wages. If this can be performed, the nation can provide better social services and will have stronger safety nets in probability to face any more crisis shock. This also could strengthened Malaysia's domestic markets even it is still limited in size. Such policies are more likely to focus on policy to increase productivity, policy to expand the export sectors by providing export incentives and encouragement, policy of adapting technology advancement, policy of expanding exhaustive research and development (R&D), and policy to an export-oriented country.

The challenge is to reduce export dependence on current market of U.S., Europe and Japan, and turn the orientation towards Asian intra-regional markets. This means Malaysia must cooperate with other Asian countries by multiplying the efforts to promote regional cooperation and integration particularly in terms of currency arrangements, monetary policies, and trade policies.

There are many lessons that can be learned from Malaysia's experience with the crises. We realized now that besides the impact of the crisis on the economy especially Malaysia trade, the various government policy responses also have an equally significant effect on

the economy. It is very important as a base for formulating policies in the future to maintain a consistent policy-making. Otherwise, investors will hesitate to bet on Malaysia because of policy concerns and uncertainties.

8.3 Recommendation for further study

The results are all significant and the data is quite satisfying for the big sample gathered. However, the analysis was only limited on the four variables, i.e. export, import, total trades, and balance of trades. Hence for further analysis, it is suggested to broadened the variables and involve other indicators such as unit value index and volume index for trade data, term of trade, balance of payment, and GDP.

This study also had focused on the value of trade, but an alternative measure would be the volume of trade. In addition, the impact of financial crises on different tradable goods may be different. It would be interesting to explore whether the relationships between financial crises and trade would be varied systematically across different products. As a suggestion, we can compare the impacts on products that enjoyed a comparative advantage versus those that suffered a comparative disadvantage.

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APPENDIX A

Table 3.4.1: Statistics of External Trade of Malaysia for year 1947 to 2009

RM (Million)

Year	Total Trade	Exports	Imports	Balance of Trade
1947	1,459.3	834.7	624.6	210.1
1948	1,978.6	1,116.5	862.1	254.4
1949	2,112.2	1,175.8	936.4	239.4
1950	3,933.8	2,609.7	1,324.1	1,285.6
1951	5,247.5	3,379.0	1,868.5	1,510.5
1952	3,797.8	2,136.2	1,661.6	474.6
1953	3,051.3	1,599.9	1,451.4	148.5
1954	2,945.0	1,626.9	1,318.1	308.8
1955	3,902.9	2,360.0	1,542.9	817.1
1956	4,015.2	2,264.1	1,751.1	513.0
1957	3,988.9	2,182.2	1,806.7	375.5
1958	3,539.0	1,882.9	1,656.1	226.8
1959	4,215.3	2,476.0	1,739.3	736.7
1960	5,078.0	2,927.4	2,150.6	776.8
1961	4,856.6	2,626.1	2,230.5	395.6
1962	5,073.3	2,625.9	2,447.4	178.5
1963	5,221.5	2,704.6	2,516.9	187.7
1964	5,302.3	2,780.9	2,521.4	259.5
1965	7,138.8	3,782.6	3,356.2	426.4
1966	7,224.5	3,845.8	3,378.7	467.1
1967	7,041.8	3,722.8	3,319.0	403.8
1968	7,646.6	4,122.5	3,524.1	598.4
1969	8,633.5	3,581.9	3,581.9	1,469.7
1970	9,451.5	5,163.1	4,288.4	874.7
1971	9,433.0	5,016.8	4,416.2	600.6
1972	9,397.2	4,854.0	4,543.2	310.8
1973	13,306.0	7,372.1	5,933.9	1,438.2
1974	20,085.9	10,194.7	9,891.2	303.5
1975	17,761.3	9,230.9	8,530.4	700.5
1976	23,155.3	13,442.0	9,713.3	3,728.7
1977	26,123.9	14,959.2	11,164.7	3,794.5
1978	30,719.8	17,073.9	13,645.9	3,428.0
1979	41,383.1	24,222.0	17,161.1	7,060.9
1980	51,622.6	28,171.6	23,451.0	4,720.6

1981	53,713.2	27,109.4	26,603.8	505.6
1982	57,131.2	28,108.2	29,023.0	-914.8
1983	63,566.4	32,771.2	30,795.2	1,976.0
1984	71,572.8	38,646.9	32,925.9	5,721.0
1985	68,454.5	38,016.7	30,437.8	7,578.9
1986	63,642.3	35,720.9	27,921.4	7,799.5
1987	77,158.8	45,224.9	31,933.9	13,291.0
1988	98,553.4	55,260.0	43,293.4	11,966.7
1989	128,682.6	67,824.5	60,858.1	6,966.4
1990	158,764.9	79,646.4	79,118.6	527.8
1991	195,327.7	94,496.6	100,831.1	-6,334.4
1992	205,097.2	103,656.7	101,440.5	2,216.2
1993	238,642.2	121,237.5	117,404.7	3,832.8
1994	309,842.2	153,921.2	155,921.0	-1,999.8
1995	379,331.0	184,986.5	194,344.5	-9,358.0
1996	394,305.9	197,026.1	197,279.8	-253.7
1997	441,825.9	220,890.4	220,935.5	-45.0
1998	514,687.6	286,563.1	228,124.5	58,438.6
1999	570,036.4	321,559.5	248,476.8	73,082.7
2000	684,729.2	373,270.3	311,458.9	61,811.4
2001	614,512.9	334,283.8	280,229.1	54,054.7
2002	660,520.5	357,430.0	303,090.5	54,339.6
2003	714,422.2	397,884.4	316,537.9	81,346.5
2004	880,885.2	481,253.0	399,632.2	81,620.8
2005	969,104.5	536,233.7	432,870.8	103,362.9
2006	1,067,388.3	589,240.3	478,147.9	111,092.4
2007	1,106,344.3	604,299.6	502,044.6	102,255.0
2008	1,185,104.8	663,494.0	521,610.8	141,883.2
2009	988,235.6	553,295.3	434,940.4	118,354.9

APPENDIX B

UNIT ROOT TEST (ADF)

1) Balance Of Trade

Intercept, level

Null Hypothesis: BOT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.408307	0.9818
Test critical values:	1% level	-3.540198	
	5% level	-2.909206	
	10% level	-2.592215	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BOT)
Method: Least Squares
Date: 02/12/11 Time: 11:15
Sample (adjusted): 1948 2009
Included observations: 62 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOT(-1)	0.017291	0.042349	0.408307	0.6845
C	1624.999	1578.558	1.029420	0.3074

R-squared	0.002771	Mean dependent var	1905.561
Adjusted R-squared	-0.013850	S.D. dependent var	11113.51
S.E. of regression	11190.21	Akaike info criterion	21.51519
Sum squared resid	7.51E+09	Schwarz criterion	21.58381
Log likelihood	-664.9709	Hannan-Quinn criter.	21.54213
F-statistic	0.166715	Durbin-Watson stat	2.120824
Prob(F-statistic)	0.684502		

Intercept, 1st different

Null Hypothesis: D(BOT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.040102	0.0000
Test critical values:	1% level	-3.542097	
	5% level	-2.910019	
	10% level	-2.592645	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BOT,2)
Method: Least Squares
Date: 02/12/11 Time: 11:15
Sample (adjusted): 1949 2009
Included observations: 61 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BOT(-1))	-1.091206	0.135720	-8.040102	0.0000
C	2147.900	1475.086	1.456119	0.1507

R-squared	0.522821	Mean dependent var	-386.4361
Adjusted R-squared	0.514733	S.D. dependent var	16156.32
S.E. of regression	11254.67	Akaike info criterion	21.52719
Sum squared resid	7.47E+09	Schwarz criterion	21.59640
Log likelihood	-654.5794	Hannan-Quinn criter.	21.55432
F-statistic	64.64324	Durbin-Watson stat	1.932788
Prob(F-statistic)	0.000000		

Intercept + trend, level

Null Hypothesis: BOT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.916242	0.9473
Test critical values:	1% level	-4.113017	
	5% level	-3.483970	
	10% level	-3.170071	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BOT)
Method: Least Squares
Date: 02/12/11 Time: 11:16
Sample (adjusted): 1948 2009
Included observations: 62 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOT(-1)	-0.050355	0.054959	-0.916242	0.3633
C	-3369.720	3078.162	-1.094718	0.2781
@TREND(1947)	193.4073	103.0608	1.876634	0.0655

R-squared	0.058943	Mean dependent var	1905.561
Adjusted R-squared	0.027043	S.D. dependent var	11113.51
S.E. of regression	10962.21	Akaike info criterion	21.48947
Sum squared resid	7.09E+09	Schwarz criterion	21.59240
Log likelihood	-663.1736	Hannan-Quinn criter.	21.52988
F-statistic	1.847739	Durbin-Watson stat	2.106675
Prob(F-statistic)	0.166597		

Intercept + trend, 1st different

Null Hypothesis: D(BOT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.682239	0.0001
Test critical values:	1% level	-4.124265	
	5% level	-3.489228	
	10% level	-3.173114	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BOT,2)
Method: Least Squares
Date: 02/12/11 Time: 11:16
Sample (adjusted): 1952 2009
Included observations: 58 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BOT(-1))	-1.844262	0.324566	-5.682239	0.0000
D(BOT(-1),2)	0.601123	0.270484	2.222394	0.0306
D(BOT(-2),2)	0.512160	0.214468	2.388048	0.0206
D(BOT(-3),2)	0.343255	0.159115	2.157281	0.0356
C	-5868.931	3390.813	-1.730833	0.0894
@TREND(1947)	285.4511	100.1318	2.850754	0.0062

R-squared	0.603575	Mean dependent var	-409.5379
Adjusted R-squared	0.565457	S.D. dependent var	16574.75
S.E. of regression	10926.06	Akaike info criterion	21.53339
Sum squared resid	6.21E+09	Schwarz criterion	21.74653
Log likelihood	-618.4682	Hannan-Quinn criter.	21.61641
F-statistic	15.83446	Durbin-Watson stat	1.774063
Prob(F-statistic)	0.000000		

2) Import

Intercept, level

Null Hypothesis: IM has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.724143	0.9996
Test critical values:	1% level	-3.540198	
	5% level	-2.909206	
	10% level	-2.592215	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IM)
Method: Least Squares
Date: 02/12/11 Time: 11:17
Sample (adjusted): 1948 2009
Included observations: 62 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IM(-1)	0.031564	0.018307	1.724143	0.0898
C	4121.741	3106.360	1.326872	0.1896

R-squared	0.047206	Mean dependent var	7005.094
Adjusted R-squared	0.031326	S.D. dependent var	20943.03
S.E. of regression	20612.39	Akaike info criterion	22.73690
Sum squared resid	2.55E+10	Schwarz criterion	22.80552
Log likelihood	-702.8439	Hannan-Quinn criter.	22.76384
F-statistic	2.972669	Durbin-Watson stat	1.468973
Prob(F-statistic)	0.089831		

Intercept, 1st different

Null Hypothesis: D(IM) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.885661	0.0530
Test critical values:	1% level	-3.544063	
	5% level	-2.910860	
	10% level	-2.593090	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IM,2)
Method: Least Squares
Date: 02/12/11 Time: 11:18
Sample (adjusted): 1950 2009
Included observations: 60 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IM(-1))	-0.556409	0.192819	-2.885661	0.0055
D(IM(-1),2)	-0.305562	0.161844	-1.888007	0.0641
C	3481.845	3128.080	1.113093	0.2703

R-squared	0.333968	Mean dependent var	-1445.745
Adjusted R-squared	0.310599	S.D. dependent var	24833.16
S.E. of regression	20619.02	Akaike info criterion	22.75452
Sum squared resid	2.42E+10	Schwarz criterion	22.85924
Log likelihood	-679.6357	Hannan-Quinn criter.	22.79548
F-statistic	14.29075	Durbin-Watson stat	1.505068
Prob(F-statistic)	0.000009		

Intercept + trend, level

Null Hypothesis: IM has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.652327	0.9720
Test critical values:	1% level	-4.113017	
	5% level	-3.483970	
	10% level	-3.170071	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IM)
Method: Least Squares
Date: 02/12/11 Time: 11:18
Sample (adjusted): 1948 2009
Included observations: 62 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IM(-1)	-0.019400	0.029739	-0.652327	0.5167
C	-7227.808	6105.893	-1.183743	0.2413
@TREND(1947)	508.0967	237.6276	2.138206	0.0367

R-squared	0.115728	Mean dependent var	7005.094
Adjusted R-squared	0.085753	S.D. dependent var	20943.03
S.E. of regression	20024.94	Akaike info criterion	22.69452
Sum squared resid	2.37E+10	Schwarz criterion	22.79745
Log likelihood	-700.5302	Hannan-Quinn criter.	22.73493
F-statistic	3.860781	Durbin-Watson stat	1.523719
Prob(F-statistic)	0.026563		

Intercept + trend, 1st different

Null Hypothesis: D(IM) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.740239	0.0272
Test critical values:	1% level	-4.121303	
	5% level	-3.487845	
	10% level	-3.172314	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IM,2)
Method: Least Squares
Date: 02/12/11 Time: 11:19
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IM(-1))	-1.180417	0.315599	-3.740239	0.0004
D(IM(-1),2)	0.242272	0.268038	0.903872	0.3701
D(IM(-2),2)	0.391891	0.185806	2.109146	0.0396
C	-8065.104	6596.758	-1.222586	0.2268
@TREND(1947)	508.1673	238.2408	2.132998	0.0375

R-squared	0.405348	Mean dependent var	-1475.561
Adjusted R-squared	0.361300	S.D. dependent var	25045.24
S.E. of regression	20015.83	Akaike info criterion	22.72737
Sum squared resid	2.16E+10	Schwarz criterion	22.90344
Log likelihood	-665.4575	Hannan-Quinn criter.	22.79610
F-statistic	9.202359	Durbin-Watson stat	1.554770
Prob(F-statistic)	0.000010		

3) Export

Intercept, level

Null Hypothesis: EX has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on AIC, MAXLAG=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.379440	0.9056
Test critical values:	1% level	-3.544063	
	5% level	-2.910860	
	10% level	-2.593090	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EX)
Method: Least Squares
Date: 02/11/11 Time: 16:21
Sample (adjusted): 1950 2009
Included observations: 60 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX(-1)	-0.012768	0.033649	-0.379440	0.7058
D(EX(-1))	0.081536	0.235438	0.346316	0.7304
D(EX(-2))	0.534725	0.235691	2.268759	0.0272
C	4342.285	3771.660	1.151293	0.2545

R-squared	0.145341	Mean dependent var	9201.992
Adjusted R-squared	0.099556	S.D. dependent var	25878.12
S.E. of regression	24556.20	Akaike info criterion	23.11966
Sum squared resid	3.38E+10	Schwarz criterion	23.25928
Log likelihood	-689.5897	Hannan-Quinn criter.	23.17427
F-statistic	3.174402	Durbin-Watson stat	1.397865
Prob(F-statistic)	0.031044		

Intercept, 1st different

Null Hypothesis: D(EX) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on AIC, MAXLAG=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.417658	0.0142
Test critical values:	1% level	-3.546099	
	5% level	-2.911730	
	10% level	-2.593551	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EX,2)
Method: Least Squares
Date: 02/11/11 Time: 16:22
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EX(-1))	-0.639524	0.187123	-3.417658	0.0012
D(EX(-1),2)	-0.211149	0.220231	-0.958759	0.3419
D(EX(-2),2)	0.446408	0.196410	2.272839	0.0270
C	5386.864	3658.604	1.472382	0.1466

R-squared	0.394109	Mean dependent var	-1892.078
Adjusted R-squared	0.361061	S.D. dependent var	29672.73
S.E. of regression	23718.51	Akaike info criterion	23.05129
Sum squared resid	3.09E+10	Schwarz criterion	23.19214
Log likelihood	-676.0130	Hannan-Quinn criter.	23.10627
F-statistic	11.92514	Durbin-Watson stat	1.491405
Prob(F-statistic)	0.000004		

Intercept + trend, level

Null Hypothesis: EX has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.370536	0.9986
Test critical values:	1% level	-4.121303	
	5% level	-3.487845	
	10% level	-3.172314	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EX)
Method: Least Squares
Date: 02/12/11 Time: 11:21
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX(-1)	0.016155	0.043599	0.370536	0.7125
D(EX(-1))	-0.090681	0.223857	-0.405083	0.6870
D(EX(-2))	0.468069	0.219694	2.130554	0.0378
D(EX(-3))	-0.674797	0.241597	-2.793073	0.0072
C	-10713.47	7871.185	-1.361100	0.1792
@TREND(1947)	641.9570	291.5010	2.202246	0.0320

R-squared	0.303856	Mean dependent var	9333.654
Adjusted R-squared	0.238182	S.D. dependent var	26079.97
S.E. of regression	22763.18	Akaike info criterion	22.99982
Sum squared resid	2.75E+10	Schwarz criterion	23.21110
Log likelihood	-672.4947	Hannan-Quinn criter.	23.08229
F-statistic	4.626728	Durbin-Watson stat	1.497298
Prob(F-statistic)	0.001412		

Intercept + trend, 1st different

Null Hypothesis: D(EX) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.301403	0.0060
Test critical values:	1% level	-4.121303	
	5% level	-3.487845	
	10% level	-3.172314	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EX,2)
Method: Least Squares
Date: 02/12/11 Time: 11:22
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EX(-1))	-1.174337	0.273013	-4.301403	0.0001
D(EX(-1),2)	0.125190	0.246753	0.507347	0.6140
D(EX(-2),2)	0.625111	0.199356	3.135654	0.0028
C	-11601.29	7437.506	-1.559836	0.1246
@TREND(1947)	685.1502	265.0357	2.585124	0.0125

R-squared	0.460835	Mean dependent var	-1892.078
Adjusted R-squared	0.420896	S.D. dependent var	29672.73
S.E. of regression	22580.61	Akaike info criterion	22.96851
Sum squared resid	2.75E+10	Schwarz criterion	23.14457
Log likelihood	-672.5710	Hannan-Quinn criter.	23.03724
F-statistic	11.53869	Durbin-Watson stat	1.499353
Prob(F-statistic)	0.000001		

4) Total Trade

Intercept, level

Null Hypothesis: TT has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.711196	0.9915
Test critical values:	1% level	-3.546099	
	5% level	-2.911730	
	10% level	-2.593551	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TT)
Method: Least Squares
Date: 02/12/11 Time: 11:22
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TT(-1)	0.029840	0.041958	0.711196	0.4800
D(TT(-1))	0.142331	0.228717	0.622302	0.5364
D(TT(-2))	0.420121	0.231734	1.812947	0.0754
D(TT(-3))	-0.484325	0.242991	-1.993177	0.0513
C	8480.601	6738.057	1.258612	0.2136

R-squared	0.197737	Mean dependent var	16683.08
Adjusted R-squared	0.138310	S.D. dependent var	46347.77
S.E. of regression	43023.37	Akaike info criterion	24.25781
Sum squared resid	1.00E+11	Schwarz criterion	24.43388
Log likelihood	-710.6055	Hannan-Quinn criter.	24.32654
F-statistic	3.327394	Durbin-Watson stat	1.447590
Prob(F-statistic)	0.016541		

Intercept, 1st different

Null Hypothesis: D(TT) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.223357	0.0235
Test critical values:	1% level	-3.546099	
	5% level	-2.911730	
	10% level	-2.593551	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TT,2)
Method: Least Squares
Date: 02/12/11 Time: 11:23
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TT(-1))	-0.620503	0.192502	-3.223357	0.0021
D(TT(-1),2)	-0.143321	0.222416	-0.644382	0.5220
D(TT(-2),2)	0.377141	0.189750	1.987567	0.0518
C	9019.197	6665.216	1.353174	0.1815

R-squared	0.366356	Mean dependent var	-3367.641
Adjusted R-squared	0.331794	S.D. dependent var	52394.91
S.E. of regression	42829.64	Akaike info criterion	24.23324
Sum squared resid	1.01E+11	Schwarz criterion	24.37409
Log likelihood	-710.8805	Hannan-Quinn criter.	24.28822
F-statistic	10.59984	Durbin-Watson stat	1.486159
Prob(F-statistic)	0.000013		

Intercept + trend, level

Null Hypothesis: TT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.163231	0.9925
Test critical values:	1% level	-4.121303	
	5% level	-3.487845	
	10% level	-3.172314	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TT)
Method: Least Squares
Date: 02/12/11 Time: 11:23
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TT(-1)	-0.007227	0.044276	-0.163231	0.8710
D(TT(-1))	0.078094	0.223749	0.349023	0.7285
D(TT(-2))	0.363072	0.226217	1.604972	0.1144
D(TT(-3))	-0.512211	0.235886	-2.171436	0.0344
C	-19042.02	14549.03	-1.308817	0.1962
@TREND(1947)	1155.371	545.7636	2.116982	0.0390

R-squared	0.260286	Mean dependent var	16683.08
Adjusted R-squared	0.190502	S.D. dependent var	46347.77
S.E. of regression	41700.08	Akaike info criterion	24.21054
Sum squared resid	9.22E+10	Schwarz criterion	24.42181
Log likelihood	-708.2109	Hannan-Quinn criter.	24.29301
F-statistic	3.729862	Durbin-Watson stat	1.475219
Prob(F-statistic)	0.005754		

Intercept + trend, 1st different

Null Hypothesis: D(TT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on AIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.865649	0.0198
Test critical values:	1% level	-4.121303	
	5% level	-3.487845	
	10% level	-3.172314	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TT,2)
Method: Least Squares
Date: 02/12/11 Time: 11:24
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TT(-1))	-1.128073	0.291820	-3.865649	0.0003
D(TT(-1),2)	0.188951	0.260309	0.725872	0.4711
D(TT(-2),2)	0.533260	0.195727	2.724517	0.0087
C	-18312.85	13720.91	-1.334668	0.1876
@TREND(1947)	1120.142	496.7364	2.255002	0.0282

R-squared	0.420889	Mean dependent var	-3367.641
Adjusted R-squared	0.377992	S.D. dependent var	52394.91
S.E. of regression	41322.54	Akaike info criterion	24.17714
Sum squared resid	9.22E+10	Schwarz criterion	24.35320
Log likelihood	-708.2257	Hannan-Quinn criter.	24.24587
F-statistic	9.811604	Durbin-Watson stat	1.470272
Prob(F-statistic)	0.000005		

APPENDIX C

GRANGER CAUSALITY

1947-2009

Pairwise Granger Causality Tests
Date: 02/12/11 Time: 11:13
Sample: 1947 2009
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
EX does not Granger Cause TT	60	5.10267	0.0036
TT does not Granger Cause EX		5.29218	0.0029
IM does not Granger Cause TT	60	5.12521	0.0035
TT does not Granger Cause IM		5.85872	0.0016
BOT does not Granger Cause TT	60	5.12520	0.0035
TT does not Granger Cause BOT		8.29383	0.0001
IM does not Granger Cause EX	60	5.30623	0.0028
EX does not Granger Cause IM		5.85193	0.0016
BOT does not Granger Cause EX	60	5.31307	0.0028
EX does not Granger Cause BOT		8.29177	0.0001
BOT does not Granger Cause IM	60	5.85872	0.0016
IM does not Granger Cause BOT		8.29383	0.0001

1947-1996

Pairwise Granger Causality Tests
Date: 02/10/11 Time: 11:39
Sample: 1947 1996
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
TT does not Granger Cause BOT	48	3.79699	0.0303
BOT does not Granger Cause TT		7.13238	0.0021
EX does not Granger Cause BOT	48	3.74299	0.0317
BOT does not Granger Cause EX		3.59715	0.0359
IM does not Granger Cause BOT	48	3.79699	0.0303
BOT does not Granger Cause IM		10.0340	0.0003
EX does not Granger Cause TT	48	6.97824	0.0024
TT does not Granger Cause EX		3.34590	0.0446
IM does not Granger Cause TT	48	7.13237	0.0021
TT does not Granger Cause IM		10.0340	0.0003
IM does not Granger Cause EX	48	3.49044	0.0394
EX does not Granger Cause IM		9.93312	0.0003

1998-2009

Pairwise Granger Causality Tests
Date: 02/10/11 Time: 11:35
Sample: 1998 2009
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
IM does not Granger Cause TT	11	0.31727	0.5887
TT does not Granger Cause IM		0.04928	0.8299
EX does not Granger Cause TT	11	0.31727	0.5887
TT does not Granger Cause EX		0.73042	0.4176
BOT does not Granger Cause TT	11	0.31727	0.5887
TT does not Granger Cause BOT		6.35859	0.0357
EX does not Granger Cause IM	11	0.04928	0.8299
IM does not Granger Cause EX		0.73041	0.4176
BOT does not Granger Cause IM	11	0.04928	0.8299
IM does not Granger Cause BOT		6.35859	0.0357
BOT does not Granger Cause EX	11	0.73042	0.4176
EX does not Granger Cause BOT		6.35859	0.0357

APPENDIX D

ARIMA MODEL

EXPORT

ARIMA (2,1,3)

Dependent Variable: D(EX)
Method: Least Squares
Date: 02/14/11 Time: 01:01
Sample (adjusted): 1950 2009
Included observations: 60 after adjustments
Convergence achieved after 21 iterations
MA Backcast: 1947 1949

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	0.216254	0.454571	0.475732	0.6361
AR(2)	0.725731	0.335154	2.165365	0.0347
MA(1)	0.057450	0.518065	0.110894	0.9121
MA(2)	0.051919	0.515066	0.100801	0.9201
MA(3)	-0.819284	0.516906	-1.584977	0.1187

R-squared	0.338145	Mean dependent var	9201.992
Adjusted R-squared	0.290011	S.D. dependent var	25878.12
S.E. of regression	21805.13	Akaike info criterion	22.89733
Sum squared resid	2.62E+10	Schwarz criterion	23.07186
Log likelihood	-681.9200	Hannan-Quinn criter.	22.96560
Durbin-Watson stat	1.654285		

Inverted AR Roots	.97	-.75	
Inverted MA Roots	.90	-.48-.83i	-.48+.83i

ARIMA (3,1,2)

Dependent Variable: D(EX)
Method: Least Squares
Date: 02/14/11 Time: 01:02
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments
Convergence achieved after 35 iterations
MA Backcast: 1949 1950

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	0.317152	0.416573	0.761336	0.4498
AR(2)	1.305492	0.215090	6.069509	0.0000
AR(3)	-0.643371	0.378549	-1.699572	0.0950
MA(1)	0.021119	0.377304	0.055975	0.9556
MA(2)	-0.900973	0.369087	-2.441084	0.0180

R-squared	0.345477	Mean dependent var	9333.654
Adjusted R-squared	0.296993	S.D. dependent var	26079.97
S.E. of regression	21866.88	Akaike info criterion	22.90427
Sum squared resid	2.58E+10	Schwarz criterion	23.08033
Log likelihood	-670.6760	Hannan-Quinn criter.	22.97300
Durbin-Watson stat	1.607452		

Inverted AR Roots	.98	.54	-1.21
	Estimated AR process is nonstationary		
Inverted MA Roots	.94	-.96	

ARIMA (3,1,3)

Dependent Variable: D(EX)
Method: Least Squares
Date: 02/14/11 Time: 01:02
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments
Convergence achieved after 26 iterations
MA Backcast: OFF (Roots of MA process too large)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	0.105792	0.290495	0.364179	0.7172
AR(2)	0.598203	0.316069	1.892635	0.0639
AR(3)	0.204082	0.335278	0.608694	0.5453
MA(1)	-0.116751	0.093547	-1.248048	0.2175
MA(2)	-0.152090	0.108895	-1.396664	0.1683
MA(3)	-1.088964	0.121145	-8.988893	0.0000

R-squared	0.471056	Mean dependent var	9333.654
Adjusted R-squared	0.421156	S.D. dependent var	26079.97
S.E. of regression	19842.12	Akaike info criterion	22.72515
Sum squared resid	2.09E+10	Schwarz criterion	22.93642
Log likelihood	-664.3918	Hannan-Quinn criter.	22.80762
Durbin-Watson stat	1.666079		

Inverted AR Roots	.96	-.42-.18i	-.42+.18i
Inverted MA Roots	1.12	-.50+.85i	-.50-.85i
	Estimated MA process is noninvertible		

ARIMA (3,1,4)

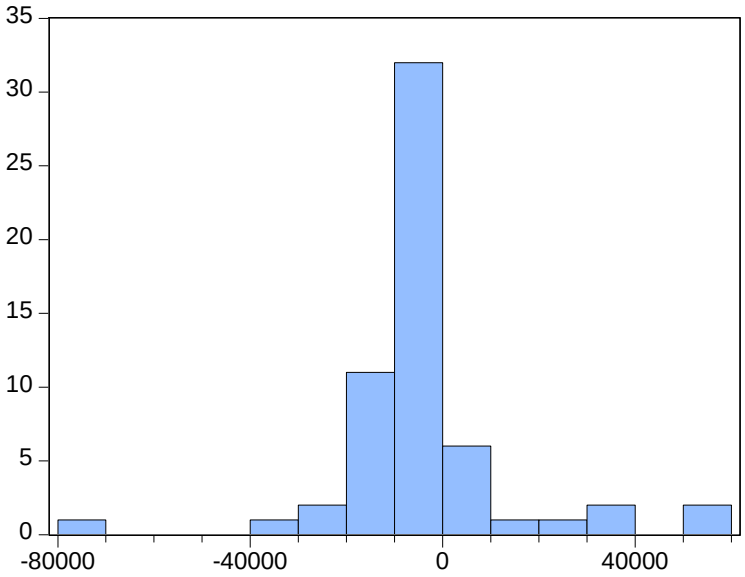
Dependent Variable: D(EX)
Method: Least Squares
Date: 02/14/11 Time: 01:03
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments
Convergence achieved after 52 iterations
MA Backcast: 1947 1950

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	0.594703	0.224139	2.653278	0.0105
AR(2)	0.761428	0.278000	2.738945	0.0084
AR(3)	-0.422513	0.230847	-1.830276	0.0729
MA(1)	-0.738173	0.060800	-12.14102	0.0000
MA(2)	-0.046137	0.077367	-0.596337	0.5535
MA(3)	-0.717907	0.055948	-12.83158	0.0000
MA(4)	0.854480	0.048851	17.49161	0.0000

R-squared	0.398035	Mean dependent var	9333.654
Adjusted R-squared	0.328577	S.D. dependent var	26079.97
S.E. of regression	21370.03	Akaike info criterion	22.88836
Sum squared resid	2.37E+10	Schwarz criterion	23.13485
Log likelihood	-668.2067	Hannan-Quinn criter.	22.98458
Durbin-Watson stat	1.563313		

Inverted AR Roots	.92	.53	-.86	
Inverted MA Roots	.90-.33i	.90+.33i	-.53-.81i	-.53+.81i

Normality Test

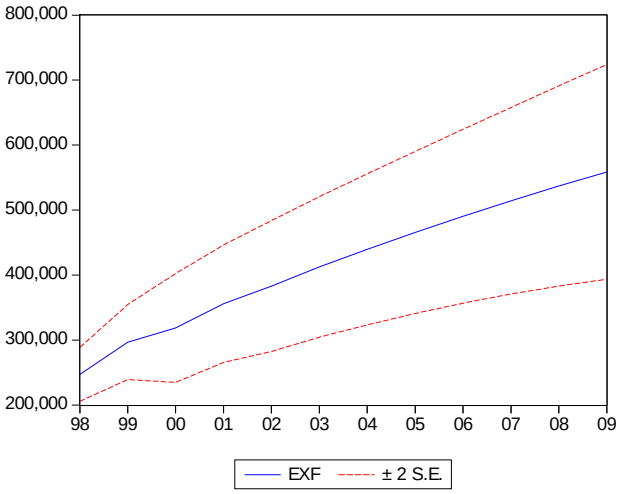


Series: Residuals	
Sample 1951 2009	
Observations 59	
Mean	-3221.475
Median	-3292.712
Maximum	55287.12
Minimum	-73735.24
Std. Dev.	18687.23
Skewness	0.300905
Kurtosis	8.039034
Jarque-Bera	63.31200
Probability	0.000000

Forecast test

a) By graph

After financial crisis 1997



Forecast: EXF	
Actual: EX	
Forecast sample: 1998 2009	
Included observations: 12	
Root Mean Squared Error	62689.79
Mean Absolute Error	51162.63
Mean Abs. Percent Error	10.58267
Theil Inequality Coefficient	0.069389
Bias Proportion	0.407292
Variance Proportion	0.184797
Covariance Proportion	0.407911

b) By table

Obs (year)	EX+2*EX_SE (Forecast value of export)	EX-2*EX_SE (Upper limit)	EX (Lower limit)
1947	NA	NA	834.7000
1948	NA	NA	1116.500
1949	NA	NA	1175.800
1950	NA	NA	2609.700
1951	NA	NA	3379.000
1952	NA	NA	2136.200
1953	NA	NA	1599.900
1954	NA	NA	1626.900
1955	NA	NA	2360.000
1956	NA	NA	2264.100
1957	NA	NA	2182.200
1958	NA	NA	1882.900
1959	NA	NA	2476.000
1960	NA	NA	2927.400
1961	NA	NA	2626.100
1962	NA	NA	2625.900
1963	NA	NA	2704.600
1964	NA	NA	2780.900
1965	NA	NA	3782.600
1966	NA	NA	3845.800
1967	NA	NA	3722.800
1968	NA	NA	4122.500
1969	NA	NA	3581.900
1970	NA	NA	5163.100
1971	NA	NA	5016.800
1972	NA	NA	4854.000
1973	NA	NA	7372.100
1974	NA	NA	10194.70
1975	NA	NA	9230.900
1976	NA	NA	13442.00
1977	NA	NA	14959.20
1978	NA	NA	17073.90
1979	NA	NA	24222.00
1980	NA	NA	28171.60
1981	NA	NA	27109.40
1982	NA	NA	28108.20
1983	NA	NA	32771.20
1984	NA	NA	38646.90
1985	NA	NA	38016.70

1986	NA	NA	35720.90
1987	NA	NA	45224.90
1988	NA	NA	55260.00
1989	NA	NA	67824.50
1990	NA	NA	79646.40
1991	NA	NA	94496.60
1992	NA	NA	103656.7
1993	NA	NA	121237.5
1994	NA	NA	153921.2
1995	NA	NA	184986.5
1996	NA	NA	197026.1
1997	NA	NA	220890.4
1998	328023.7	245102.5	286563.1
1999	379271.1	263847.9	321559.5
2000	457052.5	289488.1	373270.3
2001	424694.4	243873.2	334283.8
2002	458060.8	256799.2	357430.0
2003	505823.9	289944.9	397884.4
2004	597600.6	364905.4	481253.0
2005	660888.9	411578.5	536233.7
2006	723114.6	455366.0	589240.3
2007	747876.5	460722.7	604299.6
2008	817574.0	509414.0	663494.0
2009	718513.8	388076.8	553295.3

IMPORT

ARIMA (2,1,3)

Dependent Variable: D(IM)
Method: Least Squares
Date: 02/14/11 Time: 01:09
Sample (adjusted): 1950 2009
Included observations: 60 after adjustments
Convergence achieved after 16 iterations
MA Backcast: 1947 1949

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	-0.152435	0.235039	-0.648550	0.5193
AR(2)	1.099026	0.292998	3.750965	0.0004
MA(1)	0.316131	0.356959	0.885623	0.3797
MA(2)	-0.811108	0.525708	-1.542888	0.1286
MA(3)	-0.207627	0.247530	-0.838794	0.4052

R-squared	0.159687	Mean dependent var	7233.400
Adjusted R-squared	0.098574	S.D. dependent var	21256.41
S.E. of regression	20181.58	Akaike info criterion	22.74258
Sum squared resid	2.24E+10	Schwarz criterion	22.91711
Log likelihood	-677.2775	Hannan-Quinn criter.	22.81085
Durbin-Watson stat	1.701045		

Inverted AR Roots	.97	-1.13	
	Estimated AR process is nonstationary		
Inverted MA Roots	.88	-.25	-.94

ARIMA (3,1,2)

Dependent Variable: D(IM)
Method: Least Squares
Date: 02/14/11 Time: 01:12
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments
Convergence achieved after 309 iterations
MA Backcast: OFF (Roots of MA process too large)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	0.145446	0.216789	0.670910	0.5051
AR(2)	1.085485	0.116181	9.343055	0.0000
AR(3)	-0.483785	0.204976	-2.360203	0.0219
MA(1)	-0.299867	0.173347	-1.729868	0.0894
MA(2)	-1.322971	0.186944	-7.076814	0.0000

R-squared	0.497393	Mean dependent var	7349.429
Adjusted R-squared	0.460163	S.D. dependent var	21419.70
S.E. of regression	15737.83	Akaike info criterion	22.24646
Sum squared resid	1.34E+10	Schwarz criterion	22.42252
Log likelihood	-651.2706	Hannan-Quinn criter.	22.31519
Durbin-Watson stat	2.087678		

Inverted AR Roots	.72	.58	-1.16
	Estimated AR process is nonstationary		
Inverted MA Roots	1.31	-1.01	
	Estimated MA process is noninvertible		

ARIMA (3,1,3)

Dependent Variable: D(IM)
Method: Least Squares
Date: 02/14/11 Time: 01:10
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments
Convergence achieved after 29 iterations
MA Backcast: 1948 1950

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	0.121617	1.275464	0.095351	0.9244
AR(2)	1.145854	0.420199	2.726935	0.0086
AR(3)	-0.302843	1.243369	-0.243566	0.8085
MA(1)	0.066378	1.269733	0.052277	0.9585
MA(2)	-0.858999	0.650915	-1.319679	0.1926
MA(3)	-0.011167	0.753597	-0.014819	0.9882

R-squared	0.159779	Mean dependent var	7349.429
Adjusted R-squared	0.080513	S.D. dependent var	21419.70
S.E. of regression	20539.33	Akaike info criterion	22.79422
Sum squared resid	2.24E+10	Schwarz criterion	23.00549
Log likelihood	-666.4293	Hannan-Quinn criter.	22.87669
Durbin-Watson stat	1.714966		

Inverted AR Roots	.98	.27	-1.13
	Estimated AR process is nonstationary		
Inverted MA Roots	.90	-.01	-.95

ARIMA (3,1,4)

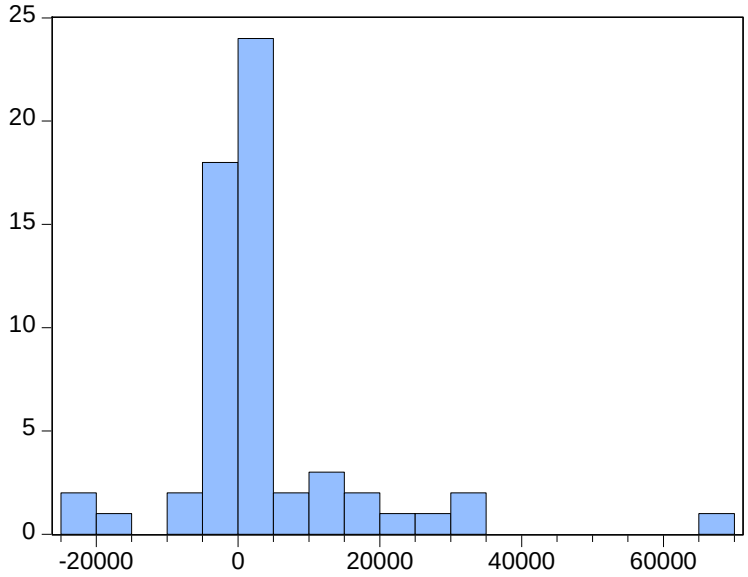
Dependent Variable: D(IM)
Method: Least Squares
Date: 02/14/11 Time: 01:12
Sample (adjusted): 1951 2009
Included observations: 59 after adjustments
Convergence achieved after 94 iterations
MA Backcast: OFF (Roots of MA process too large)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	0.554719	0.158084	3.509012	0.0009
AR(2)	0.359579	0.296901	1.211107	0.2313
AR(3)	-1.011614	0.240729	-4.202292	0.0001
MA(1)	-0.579472	0.262969	-2.203573	0.0320
MA(2)	-0.013711	0.354531	-0.038673	0.9693
MA(3)	1.251943	0.333111	3.758340	0.0004
MA(4)	0.583661	0.285302	2.045767	0.0459

R-squared	0.611412	Mean dependent var	7349.429
Adjusted R-squared	0.566575	S.D. dependent var	21419.70
S.E. of regression	14101.66	Akaike info criterion	22.05697
Sum squared resid	1.03E+10	Schwarz criterion	22.30345
Log likelihood	-643.6805	Hannan-Quinn criter.	22.15319
Durbin-Watson stat	2.174525		

Inverted AR Roots	.75+.71i	.75-.71i	-.95	
	Estimated AR process is nonstationary			
Inverted MA Roots	.87+.94i	.87-.94i	-.58+.16i	-.58-.16i
	Estimated MA process is noninvertible			

Normality Test

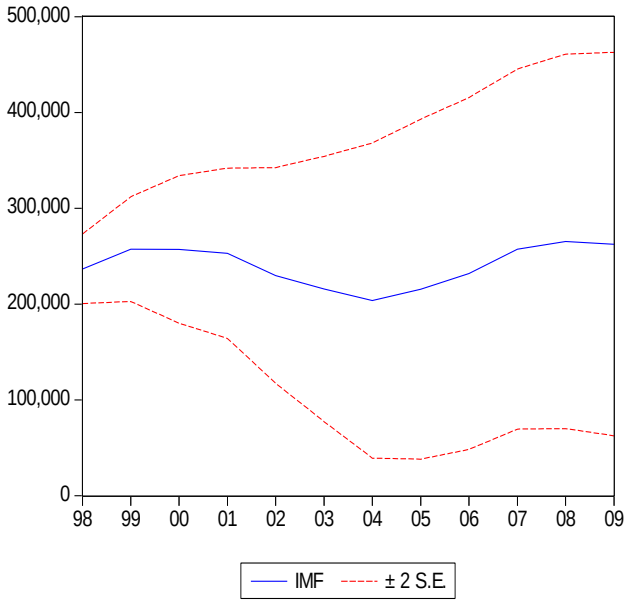


Series: Residuals	
Sample 1951 2009	
Observations 59	
Mean	3453.408
Median	268.9888
Maximum	66129.48
Minimum	-23834.52
Std. Dev.	12890.07
Skewness	2.147535
Kurtosis	11.76508
Jarque-Bera	234.2158
Probability	0.000000

Forecast Test

a) By graph

After financial crisis 1997



Forecast: IMF	
Actual: IM	
Forecast sample: 1998 2009	
Included observations: 12	
Root Mean Squared Error	163615.1
Mean Absolute Error	133921.0
Mean Abs. Percent Error	31.58653
Theil Inequality Coefficient	0.261646
Bias Proportion	0.641522
Variance Proportion	0.225011
Covariance Proportion	0.133467

b) By table

Obs (years)	IM+2*IM_SE (Forecast value of export)	IM-2*IM_SE (upper limit)	IM (lower limit)
1947	NA	NA	624.6000
1948	NA	NA	862.1000
1949	NA	NA	936.4000
1950	NA	NA	1324.100
1951	NA	NA	1868.500
1952	NA	NA	1661.600
1953	NA	NA	1451.400
1954	NA	NA	1318.100
1955	NA	NA	1542.900
1956	NA	NA	1751.100
1957	NA	NA	1806.700
1958	NA	NA	1656.100
1959	NA	NA	1739.300
1960	NA	NA	2150.600
1961	NA	NA	2230.500
1962	NA	NA	2447.400
1963	NA	NA	2516.900
1964	NA	NA	2521.400
1965	NA	NA	3356.200
1966	NA	NA	3378.700
1967	NA	NA	3319.000
1968	NA	NA	3524.100
1969	NA	NA	3581.900
1970	NA	NA	4288.400
1971	NA	NA	4416.200
1972	NA	NA	4543.200
1973	NA	NA	5933.900
1974	NA	NA	9891.200
1975	NA	NA	8530.400
1976	NA	NA	9713.300
1977	NA	NA	11164.70
1978	NA	NA	13645.90
1979	NA	NA	17161.10
1980	NA	NA	23451.00
1981	NA	NA	26603.80
1982	NA	NA	29023.00
1983	NA	NA	30795.20
1984	NA	NA	32925.90
1985	NA	NA	30437.80
1986	NA	NA	27921.40
1987	NA	NA	31933.90

1988	NA	NA	43293.40
1989	NA	NA	60858.10
1990	NA	NA	79118.60
1991	NA	NA	100831.1
1992	NA	NA	101440.5
1993	NA	NA	117404.7
1994	NA	NA	155921.0
1995	NA	NA	194344.5
1996	NA	NA	197279.8
1997	NA	NA	220935.5
1998	264451.3	191797.7	228124.5
1999	303097.6	193856.0	248476.8
2000	388529.9	234387.9	311458.9
2001	369091.9	191366.3	280229.1
2002	415802.0	190379.0	303090.5
2003	454929.0	178146.8	316537.9
2004	564064.6	235199.8	399632.2
2005	610307.2	255434.4	432870.8
2006	661900.3	294395.5	478147.9
2007	689931.0	314158.2	502044.6
2008	717020.6	326201.0	521610.8
2009	635178.4	234702.4	434940.4

APPENDIX E

SAS Command:

```
proc arima;
identify var=export(1);
estimate p=3 q=3;
forecast lead=11;

identify var=import(1);
estimate p=3 q=4;
forecast lead=11;
run;
```

SAS OUTPUT:

The ARIMA Procedure

Name of Variable = export

Period(s) of Differencing	1
Mean of Working Series	9052.111
Standard Deviation	25476.82
Number of Observations	61
Observation(s) eliminated by differencing	1

Autocorrelations

Lag	Covariance	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1	Std Error
0	649068124	1.00000	|**********|	0
1	111510315	0.17180	|*** . |	0.128037
2	185324948	0.28552	|****** |	0.131762
3	-4151771	-.00640	. | . |	0.141542
4	91092645	0.14034	|*** . |	0.141547
5	12162095	0.01874	. | . |	0.143810
6	112362888	0.17311	|*** . |	0.143850
7	48018495	0.07398	|* . |	0.147225
8	229448491	0.35350	|******* |	0.147834
9	28369684	0.04371	|* . |	0.161096
10	72869556	0.11227	|** . |	0.161290
11	-29585726	-.04558	. *| . |	0.162566
12	9334294	0.01438	. | . |	0.162776
13	33594070	0.05176	. |* . |	0.162797

14	-10217878	-.01574	.	.	0.163066
15	-13255331	-.02042	.	.	0.163091

"." marks two standard errors

Inverse Autocorrelations

Lag	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
1	-0.14192	. ***| .
2	-0.16650	. ***| .
3	0.06504	. |* .
4	-0.04294	. *| .
5	0.03490	. |* .
6	-0.02294	. | .
7	0.00182	. | .
8	-0.27923	******| .
9	0.04855	. |* .
10	-0.00723	. | .
11	0.05347	. |* .
12	0.04335	. |* .
13	-0.12424	. **| .
14	0.08344	. |** .

The ARIMA Procedure

Inverse Autocorrelations

Lag	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
15	0.04653	| . |* . |

Partial Autocorrelations

Lag	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
1	0.17180	| . |*** . |
2	0.26380	| . |***** |
3	-0.09727	| . **| . |
4	0.08854	| . |** . |
5	0.01600	| . | . |
6	0.12008	| . |** . |
7	0.04228	| . |* . |
8	0.29094	| . |****** |
9	-0.07059	| . *| . |
10	-0.06099	| . *| . |
11	-0.02291	| . | . |
12	-0.06142	| . *| . |
13	0.09064	| . |** . |
14	-0.12233	| . **| . |
15	-0.05753	| . *| . |

Autocorrelation Check for White Noise

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	10.65	6	0.0998	0.172	0.286	-0.006	0.140	0.019	0.173
12	21.37	12	0.0453	0.074	0.354	0.044	0.112	-0.046	0.014

WARNING: The model defined by the new estimates is unstable. The iteration process has been terminated.

WARNING: Estimates may not have converged.

ARIMA Estimation Optimization Summary

Estimation Method	Conditional Least Squares
Parameters Estimated	7
Termination Criteria	Maximum Relative Change in Estimates
Iteration Stopping Value	0.001
Criteria Value	1.866493
Maximum Absolute Value of Gradient	3.6394E9
R-Square Change from Last Iteration	0.192612

The ARIMA Procedure

ARIMA Estimation Optimization Summary

Objective Function	Sum of Squared Residuals
Objective Function Value	3.054E10
Marquardt's Lambda Coefficient	0.001
Numerical Derivative Perturbation Delta	0.001
Iterations	13
Warning Message	Estimates may not have converged.

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
MU	4900.4	6874.3	0.71	0.4790	0
MA1,1	0.10929	7.87371	0.01	0.9890	1
MA1,2	0.44867	5.41992	0.08	0.9343	2
MA1,3	0.13841	1.04180	0.13	0.8948	3
AR1,1	0.26985	7.80052	0.03	0.9725	1
AR1,2	0.91564	4.13461	0.22	0.8256	2
AR1,3	-0.35420	3.76219	-0.09	0.9253	3

Constant Estimate	826.773
Variance Estimate	5.6556E8
Std Error Estimate	23781.43
AIC	1409.028
SBC	1423.804
Number of Residuals	61

* AIC and SBC do not include log determinant.

Correlations of Parameter Estimates

Parameter	MU	MA1,1	MA1,2	MA1,3	AR1,1	AR1,2	AR1,3
MU	1.000	0.587	0.590	0.569	0.583	0.589	-0.574
MA1,1	0.587	1.000	0.997	0.904	1.000	0.997	-0.996
MA1,2	0.590	0.997	1.000	0.915	0.997	0.999	-0.991
MA1,3	0.569	0.904	0.915	1.000	0.903	0.917	-0.872
AR1,1	0.583	1.000	0.997	0.903	1.000	0.996	-0.997
AR1,2	0.589	0.997	0.999	0.917	0.996	1.000	-0.992
AR1,3	-0.574	-0.996	-0.991	-0.872	-0.997	-0.992	1.00

The ARIMA Procedure

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	.	0	.	0.066	0.018	-0.008	-0.052	0.147	-0.131
12	10.96	6	0.0895	0.008	0.266	0.023	0.112	-0.142	-0.035
18	11.46	12	0.4901	0.046	-0.021	-0.048	0.008	-0.011	-0.031
24	12.06	18	0.8442	-0.027	-0.005	-0.010	-0.070	-0.004	0.020

Model for variable export

Estimated Mean	4900.41
Period(s) of Differencing	1

Autoregressive Factors

Factor 1: 1 - 0.26985 B**(1) - 0.91564 B**(2) + 0.3542 B**(3)

Moving Average Factors

Factor 1: 1 - 0.10929 B**(1) - 0.44867 B**(2) - 0.13841 B**(3)

Forecasts for variable export

Obs	Forecast	Std Error	95% Confidence Limits	
64	570504.0733	23781.432	523893.3226	617114.8240
65	501640.2594	36432.132	430234.5927	573045.9261
66	554777.7578	53909.181	449117.7042	660437.8115
67	500793.6167	64161.028	375040.3128	626546.9205
68	560099.4634	77358.384	408479.8178	711719.1090
69	508678.2595	85607.408	340890.8232	676465.6958
70	569053.2962	96419.226	380075.0867	758031.5057
71	518082.5016	103439.10	315345.5963	720819.4070
72	578650.2776	112788.35	357589.1689	799711.3863
73	527765.1976	118997.59	294534.2051	760996.1902
74	588373.0477	127349.68	338772.2612	837973.8342

Name of Variable = import

Period(s) of Differencing	1
Mean of Working Series	7349.429
Standard Deviation	21237.41
Number of Observations	59
Observation(s) eliminated by differencing	1

The ARIMA Procedure

Autocorrelations

Lag	Covariance	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1	Std Error
0	451027379	1.00000	|********************|	0
1	66317390	0.14704	|***. |	0.130189
2	101048711	0.22404	|****. |	0.132974
3	-14371146	-.03186	*| . |	0.139225
4	69818870	0.15480	|***. |	0.139348
5	-29498902	-.06540	*| . |	0.142233
6	64000756	0.14190	|***. |	0.142742
7	26436086	0.05861	|*. |	0.145113
8	93426784	0.20714	|****. |	0.145514
9	-2680426	-.00594	. | . |	0.150429
10	46461000	0.10301	|**. |	0.150433
11	62610070	0.13882	|***. |	0.151623
12	4178195	0.00926	. | . |	0.153762
13	47160178	0.10456	|**. |	0.153772
14	-23066292	-.05114	*| . |	0.154972

"." marks two standard errors

Inverse Autocorrelations

Lag	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
1	-0.24538	*****| . |
2	-0.05047	. *| . |
3	0.06939	. |*. |
4	-0.11487	. **| . |
5	0.14479	. |***. |
6	-0.10207	. **| . |
7	0.03483	. |*. |
8	-0.20996	.****| . |
9	0.15793	. |***. |
10	-0.04770	. *| . |
11	-0.12461	. **| . |
12	0.11103	. |**. |
13	-0.13910	. ***| . |
14	0.10440	. |**. |

The ARIMA Procedure

Partial Autocorrelations

Lag	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
1	0.14704	. |*** . |
2	0.20689	. |****. |
3	-0.09441	. **| . |
4	0.13381	. |*** . |
5	-0.08432	. **| . |
6	0.11176	. |** . |
7	0.07721	. |** . |
8	0.12328	. |** . |
9	-0.04568	. *| . |
10	0.02408	. | . |
11	0.17528	. |****. |
12	-0.12115	. **| . |
13	0.12143	. |** . |
14	-0.12958	. ***| . |

Autocorrelation Check for White Noise

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	7.80	6	0.2534	0.147	0.224	-0.032	0.155	-0.065	0.142
12	13.30	12	0.3479	0.059	0.207	-0.006	0.103	0.139	0.009

WARNING: The model defined by the new estimates is unstable. The iteration process has been terminated.

WARNING: Estimates may not have converged.

ARIMA Estimation Optimization Summary

Estimation Method	Conditional Least Squares
Parameters Estimated	8
Termination Criteria	Maximum Relative Change in Estimates
Iteration Stopping Value	0.001
Criteria Value	22.14881
Maximum Absolute Value of Gradient	4.6786E9

R-Square Change from Last Iteration	0.273357
Objective Function	Sum of Squared Residuals
Objective Function Value	2.284E10
Marquardt's Lambda Coefficient	0.00001
Numerical Derivative Perturbation Delta	0.001
Iterations	13
Warning Message	Estimates may not have converged.

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
MU	7300.0	3904.0	1.87	0.0672	0
MA1,1	-0.83664	2.57064	-0.33	0.7462	1
MA1,2	-0.16969	1.93347	-0.09	0.9304	2
MA1,3	-0.12478	1.77343	-0.07	0.9442	3
MA1,4	-0.13713	0.62135	-0.22	0.8262	4
AR1,1	-0.73314	2.59556	-0.28	0.7787	1
AR1,2	0.20227	1.78323	0.11	0.9101	2
AR1,3	-0.06458	2.27624	-0.03	0.9775	3

Constant Estimate	11646.81
Variance Estimate	4.4784E8
Std Error Estimate	21162.28
AIC	1350.115
SBC	1366.735
Number of Residuals	59

* AIC and SBC do not include log determinant.

Correlations of Parameter Estimates

Parameter	MU	MA1,1	MA1,2	MA1,3	MA1,4	AR1,1	AR1,2	AR1,3
MU	1.000	-0.037	-0.021	0.017	0.040	-0.042	-0.028	0.021
MA1,1	-0.037	1.000	0.666	-0.510	-0.484	0.997	0.606	-0.791
MA1,2	-0.021	0.666	1.000	0.293	0.287	0.645	0.990	-0.077
MA1,3	0.017	-0.510	0.293	1.000	0.942	-0.526	0.359	0.924
MA1,4	0.040	-0.484	0.287	0.942	1.000	-0.504	0.360	0.864
AR1,1	-0.042	0.997	0.645	-0.526	-0.504	1.000	0.588	-0.803
AR1,2	-0.028	0.606	0.990	0.359	0.360	0.588	1.000	-0.001
AR1,3	0.021	-0.791	-0.077	0.924	0.864	-0.803	-0.001	1.000

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	.	0	.	0.083	-0.006	0.061	-0.087	0.069	-0.067

12	5.75	5	0.3313	0.075	0.145	-0.092	0.129	0.058	-0.003
18	7.73	11	0.7375	0.078	-0.056	-0.086	0.041	0.042	-0.063
24	8.98	17	0.9410	-0.071	-0.063	-0.052	-0.042	0.008	0.004

The ARIMA Procedure

Model for variable import

Estimated Mean	7300.019
Period(s) of Differencing	1

Autoregressive Factors

Factor 1: 1 + 0.73314 B**(1) - 0.20227 B**(2) + 0.06458 B**(3)

Moving Average Factors

Factor 1: 1 + 0.83664 B**(1) + 0.16969 B**(2) + 0.12478 B**(3) + 0.13713 B**(4)

Forecasts for variable import

Obs	Forecast	Std Error	95% Confidence Limits	
64	445744.5787	21162.275	404267.2817	487221.8757
65	418963.8955	31514.777	357196.0679	480731.7231
66	445421.7705	43248.407	360656.4506	530187.0904
67	420586.4801	50848.179	320925.8805	520247.0796
68	457522.2259	60551.966	338842.5531	576201.8986
69	435357.7604	66459.804	305098.9390	565616.5818
70	472329.1555	74131.571	327033.9469	617624.3641
71	450002.1670	79012.769	295139.9863	604864.3478
72	486927.4546	85561.948	319229.1180	654625.7913
73	464599.0938	89824.230	288546.8380	640651.3495
74	501526.5563	95636.151	314083.1451	688969.9676