Financial Crisis in the US Economy: Evidence from a Probit Model for Time Period 2001-2009

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Submitted to the
Institute of Graduate Studies and Research
in partial fulfilment of the requirements for the degree of

Master
of
Business Administration

Eastern Mediterranean University
January 2011
Gazimağusa, North Cyprus

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ABSTRACT

This Thesis empirically investigates the probability of determinants of currency crises in the USA economy for the year 2008. In particular, it focuses on the case of the USA economy taking into account both domestic fundamental and external shock (contagion effect) by conducting both ordinary least square (OLS) technique and Probit model.

The evidence found in this study shows that the USA currency crisis was contagious from the countries such as England and Qatar. It also indicate that deteriorating trade balance, increase of banks' claims on private and domestic sector, deficit current account balance, misalignment of real exchange rate, and high market pressure index increase speculative attack on the currency in the case of the USA case.

Based on our findings, it could suggest that a financial crisis in a country not only depends on a country's economic structure and its policy but also region as well as global effect apart from the cultural and political effects

Keywords: The USA Economy, Financial Crisis, Contagion, Probit Model

ÖZ

Yapılan bu tez çalışması ampirik olarak Amerika Birleşik Devletler ekonomisinde 2008 yılında meydana gelen finansal krizi ölçmektedir. Bu ilişkiyi ölçerken içsel ve dışsal ekonomik faktörleri ele almaktadır. En Küçük Kareler ve probit teknikleri uygulanarak yukarıda belirtilen krizin rolü ölçülmeye çalışılmıştır. Çalışma, ayni zamanda kullanılan ilgili modelin doğruluğunuda ortaya koymaya çalışmıştır. Elde edilen ampirik sonuçlar, İngiltere ve Katar gibi ülkelere verilen borçların geriye dönmemesi sayesinde Birleşik Devletlere sıçrayan ekonomik bulaşıcılığı göstermektedir. Ampirik sonuçlar ayni zamanda ticaret dengesinin, artan iç kredilerin, cari hesaplar dengesi ve döviz endekslerinin Amerikan ekonomisi üzerinde büyük etkisi olduğu ölçülerek belirtilmiştir. Ayni zamanda, piyasalar üzerinde oluşan yüksek baskı endeksinin para birimlerine olan etkiside Amerikadaki krize sebeb olan nedenlerden birisidir. Ampirik Bulgular bir krizin nedenlerinin sadece ekonomik, siyasi, kültürel etkiler olmadığını, bunların bölgesel ve küresel nedenler olacağınıda ortaya koymaktadır.

Anahtar kelimeler: Amerikan Ekonomisi, En Küçük Kareler Yöntemi, Probit modeli, Ekonomik bulaşıcılık,

Dedicated to my parents with love

ACKNOWLEDGMENTS

I would like to express my deepest gratitude and appreciation to my supervisor Assoc. Prof. Dr. Sami Fethi, for his patient guidance and encouragement throughout this study. His experience and knowledge have been an important help for my work.

I wish to express my thanks to all the members of Faculty of Business and Economics at Eastern Mediterranean University and also I would like to thank all my friends in North Cyprus, for their friendship and hospitality.

A very special thanks goes to my lovely family for their never-ending pray and invaluable support. It is impossible for me to return their endless love and sacrifice.

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LIST OF ABBREVIATION

TBR .....Treasury Bill Rate

SDR .....Special Drawing Right

ECU.....European Countries Union

IFS .....International Financial Statistics

IMF .....International Monetary Fund

OLS .....Ordinary Least Square

RER .....Real Exchange Rate

MISRER .....Miss-alignment Real Exchange Rate

GDP .....Gross Domestic Product

GDPPC .....Private Claims to Gross Domestic Product

GDPDC .....Domestic Credit to Gross Domestic Product

TT .....Terms of Trade shocks

GDPCAB .....Current Account Balance to Gross Domestic Product

MPI .....Market Pressure Index

MDPIUSA .....USA Market Pressure Index

DMPIGER .....Dummy Germany Market Pressure Index

DMPIENG .....Dummy England Market Pressure Index

DMPIFRA .....Dummy France Market Pressure Index

DMPIBAH .....Dummy Bahrain Market Pressure Index

DMPIQAT .....Dummy Qatar Market Pressure Index

DMPIOMA .....Dummy Oman Market Pressure Index

Chapter 1

INTRODUCTION

Recent years have seen an increase in currency crises affecting a large number of countries, either directly or indirectly. Certain similarities are generally observed in the way these crises unfold: a loss of foreign exchange reserves, a capital outflow, and a sudden depreciation of the currency. If similarities between these economies also exist just before currency crises occur, they could be used to predict these crises.

Countries around the world have come under pressure or faced a crisis at different points in time. There have been numerous currency crises in international financial markets. Kamin (1999) presents evidence in favour of even broader similarities between crisis episodes. The important crises ones were in Mexico in 1976 and Argentina, Brazil, Peru and Mexico in the early and mid-80s, and in Chile and Argentina in the 1980s. In 1992 the European Exchange Rate Mechanism (ERM) suffered a crisis, as did Mexico in 1995. But, the East Asia financial crises in the late 1997 and early 1998 have the greatest impact on world economy development. Each crisis is specific: the debt crises in Latin America of the 1980s are different from the Mexican crisis in 1994, which differs from the crises of South East Asia in 1997 which engulfed countries like Thailand, Indonesia, Malaysia and South Korea and the Philippines and it was unexpected by most observers.

At the latest, the financial crisis in 2008 is one of the most complicated ones, The USA banking crisis hit the domestic economy and slowed down economic growth in the region as well as in Europe in the year 2008 (Contagion effects).

The US economy experienced high risk of deep recession after explosion of the dot-come Bubble in early 2000. This situation was followed by terrorist attacks in September 11 in 2001. In regard to this situation, Central banks were trying to stimulate the US economy by creating capital liquidity through a decrease in interest rates. As a return, investors found higher returns which included of higher risk in investments. On the other side lenders took greater risks too, and banks approved mortgage loans to whom where asking money with poor credit. Demand for mortgage drove the Housing-Bubble high in 2005 and finally collapsed in August of 2006.

US economy had never experienced sharp drop in GDP. GDP growth rate has been never negative in last 30 years. Depreciation of US dollar against other 5 currencies is dramatic and reached the lowest point in 2008. The dollar value against Euro has been decreased in recent 10 years especially in 2008. The large U.S current account deficits have been sustained as a result of foreign capital inflows. This kind of inflows can exercise increasing pressure on the dollar value while investors demand dollars to be able to purchase assets in dollar. When a dollar depreciates at a rate quicker than foreign investors expect, a currency crisis (dollar crisis) become more likely. USA economy has never experienced this huge drop in export in last 30 years from 1927 Billion dollars in third quarter of 2008 to 1520 Billion dollars in second and third quarter of 2009 and also the drop in current account in last 2006 after subprime crisis and continued after that till third quarter of 2008. There is huge

increase in Gross debt of central Government in late 2007 till late 2009 and can be describe by lending central government to private sector as well as domestic sector and non-residents. Trade balance of USA reached the lowest point in last 30 years in third quarter of 2008 around 240.45 Billion dollar negative. The huge negative balance in trade can have a negative effect in current account and as a result it has a negative effect in balance of payment. Drop in trade balance can be one of the important factors in balance of payment crisis because trade balance has a big effect on current account in any nation.

This thesis is investigating USA crisis and effect of some economic fundamental on recent crisis. There is critical question about recent financial crisis in the world which is arguing about reasons why US should be argued and blamed for whole world crisis. Question can be answered by pointing that, still, The United Sates is one of the largest economy and largest developed countries among all of the countries and still the most important financial market in the world. Role of US economy in other countries and on the world economy as a most important country cannot be neglected. So, this thesis focuses on the US economy and situation of crisis happened in recent years. Thesis also study effect of other countries in other regions such as Europe and Middle-east on the recent crisis.

This study empirically investigates the determinants of financial crisis (or currency crisis), which occurred in US economy in 2008.We conduct a probit model as the main tool to identify the leading indicators of financial crisis using a sample of quarterly data covering the period 2001Q4-2009Q3 pooled out from IMF data base. The Thesis is structured as follows:

Chapter 2

LITERATURE REVIEW, FINANCIAL CRISIS MODELS

Among all of the countries around the world there have been such countries which have under pressure or faced a crisis at different points in time. There have been numerous currency crises in international financial markets. Currency crisis also called Balance-of-Payment crisis which is a speculative attack over the foreign exchange market in a country. The somehow significant crises were in Mexico in 1976 and Argentina, Brazil, Peru and in Chile and. In 1992 the European Exchange Rate Mechanism (ERM) suffered a crisis, as well as Mexico in 1995. Beside, the East Asia financial crises in the late 1997 and Russian financial crisis in 1998 are some of recessions attributed to currency crisis. Crises have happened in different periods of time and there is a large volume of literature about the causes and impacts of the various balances of payment crises as well as on the theoretical and empirical aspect of currency crisis. Different people have argued the different point of view of crisis. Catherine P. and Andrew B. (1999) investigated theoretical causes about predicting currency crisis and its indicators. .Cartapanis (1994, 1996) argued that sudden changes on the financial markets are rarely a response to an unreasonable analysis of a country's situation or a particular kind of assets also the overshooting of the markets, besides the sensitivity very often exhibit the short-sighted nature of forecasts and a real lack of understanding in the way they are used . Dooley (1997) presented a model of crisis in emerging market also Flood and Garber (1984) argued

the theoretical part of causes of balance of payment crisis and collapsing the exchange rate regime. Flood and Marion (1998), Krugman (1979, 1996), Masson (1998) and also Obstfeld (1994, 1996) investigated the logic of currency crisis. Blanco and Garber (1986) investigated devaluation and speculative attack on the Mexican Pesso regarding currency crisis. Furthermore, Calvo and Mendoza (1996) presented balance of payment crisis happened in Mexico and its fundamental reasons. Cole and Kehoe (1996) exhibited debt crisis as well as Dornbusch, Goldfajn and Valdes (1995) who argued about currency crisis and collapses. Eichengreen, Rose and Wyplosz (1995) argued attack on currency.

Tthere are several literatures about currecy crisis and its reasons as well as contagion effects of crisis such as Kaminsky and Reinhart (1996) argued the causes of banking and balance of payment problem. Kaminsky, Lizondo and Reinhart (1997) investigated the leading indicators of currency crisis. There are several generation of models of crisis which can be categorized as below.

2.1 First Generation Model

The first generation model of currency crisis is based on balance of a payments crisis. Contemporary theoretical work on currency crises was initiated by Krugman (1979). It was offered in 1979 and was based on the work of Salant and Henderson (1978). Krugman argued that crisis occur when a continuous downfall or decline in the economic fundamentals becomes inconsistent with an attempt to fix the exchange rate. The Krugman model and also its extensions represent what has become known as first generation models of a balance-of-payments crisis. Extensions of Krugman model have been developed by Flood and Garber (1984) and Cornolly and Taylor (1984). Furthermore, Krugman (1991) extended the analysis to a focus on zone

model. Flood and Garber and Kremer (1996) incorporate the role of sterilization into the analysis.

The main insight of these models is that a crisis stands up as a result of an inconsistency between an excessive deficit in public sector which becomes monetized and the exchange rate system.

There are several authors who have refined Krugman's work. Flood and Garber (1984) constructed a simplified linear model, introducing a stochastic component. Also, Connolly, Michael, Dean Taylor (1984) analysed a crawling peg regime and argued the behaviour of the relative prices of traded goods following the collapse of the exchange rate regime. In their analysis, the real exchange rate appreciates and the current account decline prior to the collapse. The related contents, Edwards Sebastian (1989) have mentioned the importance of currency overvaluation and current account deterioration and relation between them which precede currency devaluation. On the other hand, in the advance model of Calvo, G (1987) overvaluation in cash has been investigated.

2.2 Second Generation Model

There are difficulties in first generation models in describing the contagion effects and the balance of payments crises in countries related to whole fundamentals cause to the development of second-generation models. In this model, speculative attack's features are explicitly incorporated compared to first generation.

During 1992 and 1993, European countries have been faced hard speculative attacks on their currencies while they were trying to maintain their fixed exchange rates. Member countries of the European Monetary System allowed more flexibility in

their currencies, permitting their currencies to move within a band of 15 percent rather than 22.5 percent for most Exchange Rate Mechanism (ERM) rates in August 1993 (Klein & Nancy, 1979). Currency crises can happen when economies have sound macroeconomic fundamentals. But these countries do not have the features that are described by the first-generation model on currency crisis (Obstfeld, Models of Currency Crises with Self-fulfilling Features, 1996).

Furthermore, the second-generation model investigates that a currency crisis can also occur without the financing of a fiscal deficit through domestic credit creation. The second-generation models of currency crisis are initiated under the investigation of Obstfeld (1996). Other researchers such as Calvo and Mendoza (1997), Cole and Kehoe (1996), and Dornbusch, Goldfajn and Voldes (1995) investigated the crisis and collapses and the relationship of crisis with current account deficit and currency devaluation. Besides, Krugman (1996) and Sachs, Tornell and Velasco (1996) argued about collapse of currency and crisis and reasons of this kind of crisis in economy.

2.2.1 Multiple-Equilibrium and Self-Fulfilling

Moreover, many of the second-generation models, implicitly or explicitly, accept the likely of a self-fulfilling crisis. This type of crisis occurs, when the economic policies are not predetermined, but they respond to changes in the economy and as a result of that economy agents investigate and they try to put this relationship into account for the aim of forming their expectations. At the same time, the expectations and actions of economic agents have some effects on some variables to which economic policies respond. This situation creates the possibility for multiple equilibria in the economy and as a result the economy may move from one point of equilibrium to another point without a change in the fundamentals.

Such expectations may arouse people to change their domestic currency to foreign currency before depreciation if they expect that the currency is going to be devalued in the near future. They will expect lots of pressure on the central bank while the conditions of the economy are not even solid. Krugman (1998a) argued that a fixed exchange rate could be costly to defend, if people expect that it will be depreciated sometime in the future.

2.2.2 Herding Behaviour and Contagion Effect

Furthermore, in other second-generation model which crisis is not influenced by the fundamentals position, it can be the result of pure speculation against a currency. Based on this model, there can be at least two kind of analysis. Models of herding behaviour argues that costs of information may trigger foreign investors to take decisions based on limited information and this, in turn, makes the economy more sensitive to gossip (Calvo and Mendoza, 1997). They argued that with informational frictions, herding behaviour might become more predominant as the world capital market grows. With the world trend toward globalization, the cost of collecting country-specific information to discredit rumours increases and managers facing reputation costs, choose to copy the market portfolio. The details in Country Credit Ratings (CCRs) are assumed to cost a lot. They argued an empirical regularity about the CCRs that new data changes the view of investment conditions dramatically in emerging markets than in developed and least developed countries. Therefore, small rumours can cause herding behaviour and as a result moving the economy from point of No-Attack to the point of Attack equilibrium.

2.2.3 Contagion Effect in Crisis

Contagion refers to the idea that financial crises can widely spread from banks to other banks as well as institution to other financial institution or from a country to

another one while currency crisis happens or when stock market crashes and this functionally spreads across countries. One dramatic example of contagion effect can be the spreading of the Thai crisis in year 1997 to the other countries such as South Korea.

Contagion effects, beside, talks about groups of countries belonging to the same region and they may be perceived common policy characteristics (Drazen, 1998). He argued how a currency crisis in one country can provide necessary information about government preferences among other countries and this causes in "contagion.". When one country faces with crisis, investors may perceive a higher risk of a crisis in neighbouring countries. This is also has been argued in Cerlla & Saxena (2000), while they tried to show Indonesia's recent currency was a result of domestic fundamental and its contagion effect.

2.2.4 Moral Hazard

Krugman (1998b) and Corsetti et al. (1998) have argued that moral hazard can be explained as a reason for a currency crisis, especially the Asian crisis of 1997. If the economy faces with excessive investment, financial institutions have the freedom to escape at no personal cost in the case of the institution's bankruptcy. Although Corsetti et al. (1998, 1998a) investigated moral hazard as a source of excessive external borrowing, over-investment and current account deficit.

2.3 The New Generation Model

Some crises, which includes the Scandinavian language countries in 1990s, Bulgaria in 1996, Venezuela, Argentina and Mexico in 1994, Turkey in 1994 and Asian countries in 1997 and the East Asian financial crisis have been a result of a banking crisis following by urge in currency crisis, either by an raise in the money supply or by a large-scale withdrawal resulting to a decline in money demand.

Mishkin (1996) argues that a balance of payments crisis causes banking crisis. Stoker (1995) suggests that an external shock, binded with a commitment to a fixed exchange rate, may causes to a loss of reserves. When this loss of reserves is not sterilized, then a speculative attack is following by a period of irregularly high interest rates leading to an increased bankruptcies, credit crunch and financial crisis. Mishkin investigated the idea that depreciation could weaken the banks position if they have a large share of their liabilities converted in foreign currency. On the other hand, Diaz-Alejandro (1985), Velasco (1987), Calvo (1995) and Miller (1995) found that a banking crisis lead to a balance of payments crisis. Chang and Velasco (2000) investigated that a currency crisis may result to banking crisis if local banks have debts in the shape of foreign currency.

Corsetti, Pesenti and Roubini (1998), Frankel (1998) and Krugman (1998a, 1998b) argue that deteriorating macroeconomic fundamentals are at the root of the Asian crisis. They argue that the fundamental problem is due to the banking sector. As indicated by Radelet and Sachs (1998) and Krugman (1998), weak financial systems and asymmetric information in the banking sector lead to the over investments in the financial crisis. On the other hand, there are some ideas that self-fulfilling expectations are responsible for the Asian crisis.

In addition, Radelet and Sachs (1998) recommend that the ratio of the short-term debts to foreign banks to available foreign exchange reserves were high in these Asian economies that were hit badly by the crisis. There is a slowdown in the rate of the overheating in the economy because of the increase in the current account deficit that leads to an increase in interest rates and this is argued in Corsetti, Pesent and

Roubini (1998). Furthermore, Kaminsky et al (1998) present a comprehensive review of the literature on balance of payment crises.

The empirical literature on contagion has frequently argued that there is a dramatic significant correlation in financial asset price or capital flows. Calvo and Reihart (1996) find that there is a correlation between weekly returns on equities and dollar-denominated bonds called Brady Bonds in Latin America, and also in the Mexican crisis. Frankel and Schmuckler (1998) investigated that the Mexican crisis had a dramatic bad spill over effect on the other Latin America countries. Moreover, Eichengreen, Rose and Wyplosz (1996) use probit estimation for group of 20 industrialized countries and show that currency crises are related to the presence of trade channels between countries, but they could not neglect the contagion effect probability as well.

Elwell (2008) investigated dollar crisis and its prospect and implication. The large U.S current account deficits have been sustained as a result of foreign capital inflows. This kind of inflows can exercise increasing pressure on the dollar value while investors demand dollars to be able to purchase assets in dollar. When a dollar depreciate at a rate quicker than foreign investors expect, a currency crisis (dollar crisis) become more likely.

Horta et al (2008) argued about contagion effect of the US subprime Crisis on developed countries. The founded result suggests that market in France, Italy, Canada, Japan and United Kingdom reflect important level of contagion which is less relevant in such countries like Germany. Canada is found to be the country with high-rank intensity of contagion (Horta et al 2008). Based on Fratzcher, M (2002),

argues the topic of contagion and believes it is the transferring the crisis to a specific country based on its real and financial interdependence with other countries that they are already suffering from cirisis. Bekaert at al (2005) investigated that there is correlation level which is more than normal in contagion. Moreover Kodres and Pritsker (2002) showed that contagion effect is most common between such countries when they already carry similar macroeconomic fundamentals.

Recent years a lot of analysis has been done about global financial crisis which has been brought by USA financial crisis. Mis-pricing of risk has been argued as a dramatic reason for recent financial crisis. This was explained by very low risk spreads, with difference between safe assets and risky assets, having declined to historically low levels. Fluctuations were unusually low. Leverage was high, since financial institutions realized that they have to add to yield, because of facing with very low interest rates. (Goodhart, 2007).

Many blame the regulatory system which caused systematic failure regarding recent crisis. As remedy, the government should have policy and seize weak financial companies and try to liquidate them. The traditional mortgage type had several characteristics which had recently been improved. Fixed rates were forced to become variable by using unpredictable inflation rates. (Winkler, 2008).

Studies about recent crisis probability have been increased due to realize how predictable it was. For example Camara et al (2008) argued about implied probability of bankruptcy. They focused on stock and option prices to obtain probability. They got result and found option pricing equations which looks like to Merton's ruin model and empirically tested the model on global financial firms and investigated the

results for twelve years which includes the subprime mortgage crisis. They found, the default probability for the global financial firm increases steadily during the subprime crisis period. (Camara, Popova, & Simkins, 2008).

So, many studies have been done to investigate probability of recent financial crisis and this study is focusing on recent crisis based on probit model to argue how some fundamental of economies factors affect the probability of crisis while facing mortgage crisis and global crisis as a contagious effect.

Chapter 3

REVIEW OF THE USA ECONOMY

3.1 Main Structure of the U.S. Economy while facing crisis

Still, The United Sates is one of the largest economy and largest developed countries among all of the countries and still the most important financial market in the world. But financial crisis cannot be neglected. The US economy experienced high risk of deep recession after explosion of the dot-come Bubble in early 2000. This situation was followed by terrorist attacks in September 11 in 2001. In regard to this situation, Central banks were trying to stimulate the US economy by creating capital liquidity through a decrease in interest rates. As a return, investors found higher returns which included of higher risk in investments. On the other side lenders took greater risks too, and banks approved mortgage loans to whom where asking money with poor credit. Demand for mortgage drove the Housing-Bubble high in 2005 and finally collapsed in August of 2006.

There are some factors such as subprime crisis and terrorist attack in US economy which stimulated the economy as well as having bad effects on fundamentals of US economy such as GDP, Export and Import, Interest rate, Current account, Exchange rate and etc over time.

3.1.1 Trend of GDP

USA Economy experienced the recession in December 2007 based on National Bureau of Economic Research (NBER) which can be divided to two sections. The first part was lasted for the first half of 2008 and American economy faced with decline in Gross Domestic Product but after that in the second section US economy faced with greatest drop in output, investment and consumption and as a result huge rise in rate of unemployment (Labonte, 2009). In figure1 trend in USA GDP has been shows based on IMF data for last 30 years from 3rd Quarter in 1979 till 3rd 2009.

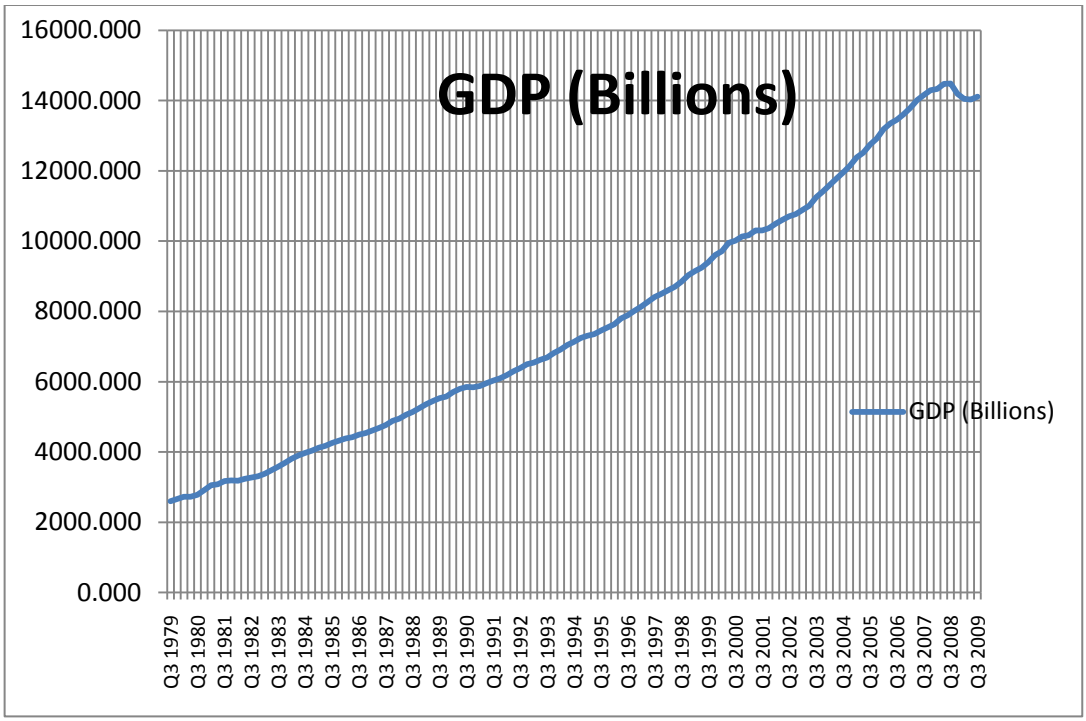

Figure 3.1 USA GDP (Million dollar), from IMF.1979Q3-2009Q3

As it shows, there is a drop in 30 years trend, US economy had never experienced sharp drop in GDP. Growth rate can describe this trend more clear in last 30 years in Figure 2.

To better realize the bad economic situation of largest economy in the world, it is more understanding to focus on the growth rate of GDP in last 30 years based on the IMF data. Figure2 shows the fluctuations of GDP growth rate.

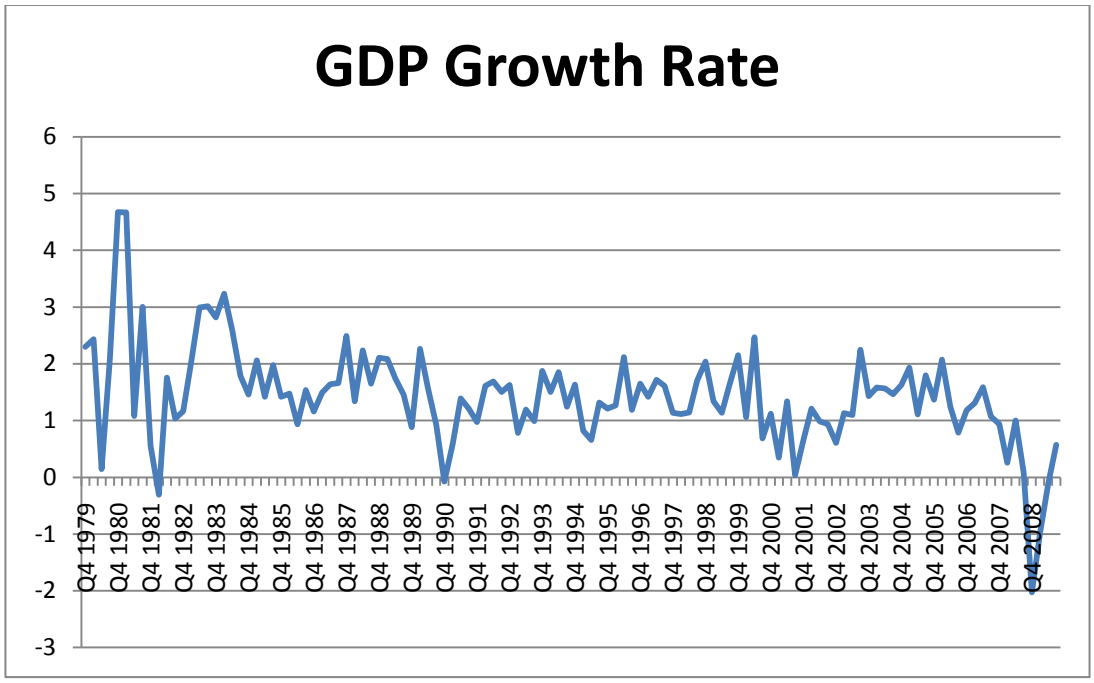

Figure 3.2 GDP Growth Rate (%) in last 30 Years, from IMF, 1979Q3-2009Q3

3.1.2 Interest Rate and Liabilities

In two section of time while American economy was facing with high inflation, situation was forcing the Federal Reserve (Fed) to stimulate the American economy by decreasing the interest rate and it brought down the short-term interest rate (Treasury-Bill Rate) around zero. Figure 3 illustrates this decrease which has been done by Federal Reserve as a remedy for economic situation(4^{th} Quarter of 2009 was 0.167).

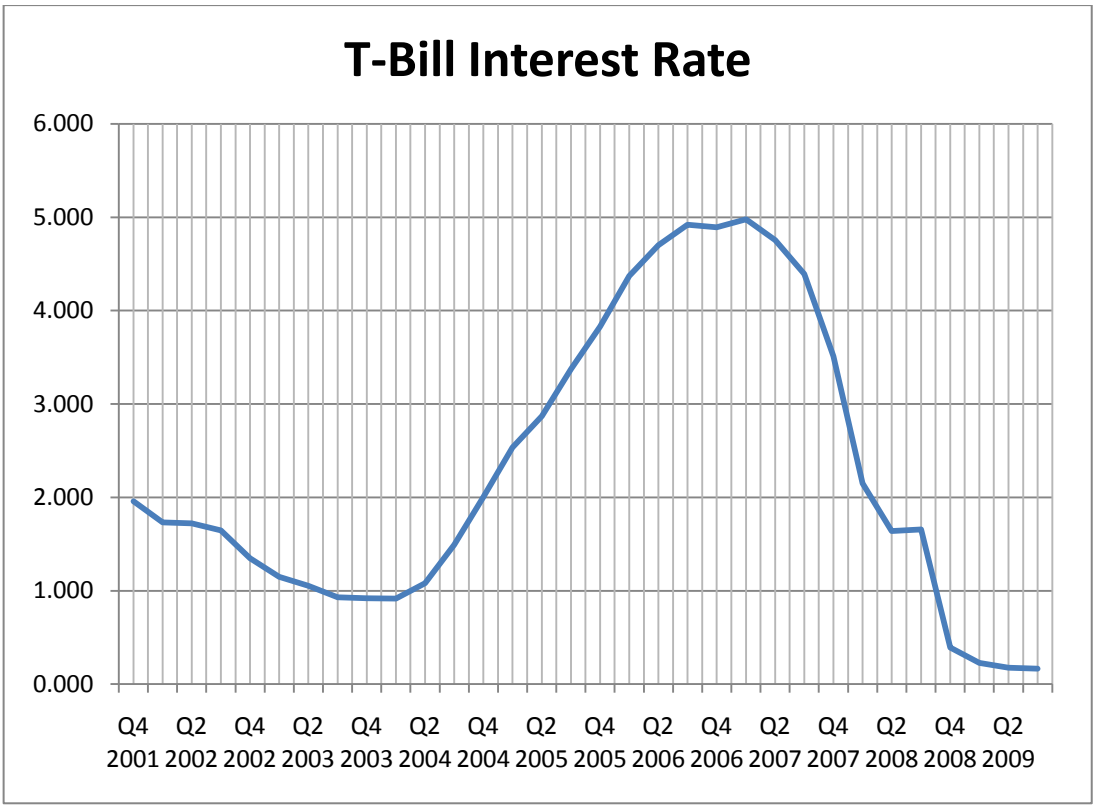

Figure 3.3 Treasury Bill Rate (%), from IMF, 2001Q4-2009Q3.

Gross Debt of USA central government (Liabilities) had a huge increase in last 2 years. Figure 4 illustrates this rise in liabilities in last 30 years from IMF.

US economy experienced increasing the liabilities by lending to private sector as well as non-residents and this can be realized from the following chart which is pooled out from the IMF data center.

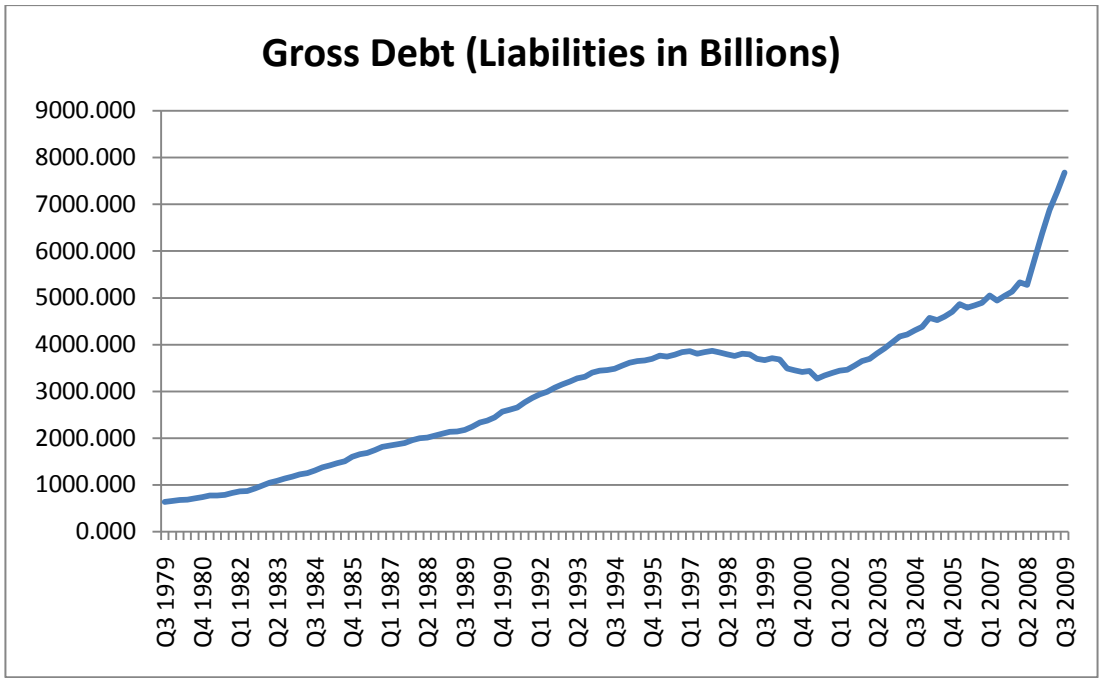

Figure 3.4. Gross Debt of Central Government (Billions), from IMF, 1979Q3-2009Q3

As figure 4 shows, there is huge increase in Gross debt of central Government in late 2007 till late 2009 and can be describe by lending central government to private sector as well as domestic sector and non-residents.

3.1.3 Export and Import

As the figure 5 illustrates, USA has never experienced this huge drop in export in last 30 years from 1927 Billion dollars in third quarter of 2008 to 1520 Billion dollars in second and third quarter of 2009.

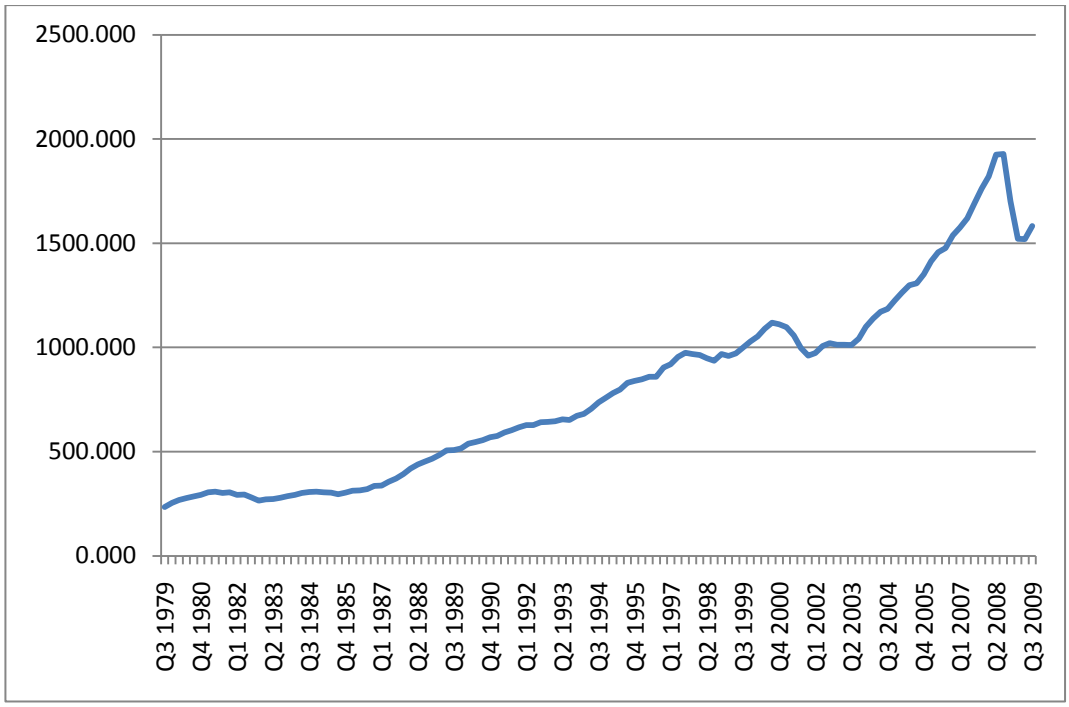

Figure 3.5 Export of US. (Billion Dollar), from IMF, 1979Q3 - 2009Q3

Besides, USA Economy faced with a huge decrease in Export of goods after third quarter of 2008 and this can be explained by effect of world financial crisis when other countries decide about their policy to control their trade balance to have lower import with USA and then US economy faces with this dramatic drop in export of goods and services and this is a result of crisis happened in US economy and based on National Bureau of Economic Research (NBER), Economy of USA entered recession in December 2007 and this drop can explained as a result of crisis in largest economy. Import of US economy also can be explained by the following chart based on the data pooled out from the IMF.

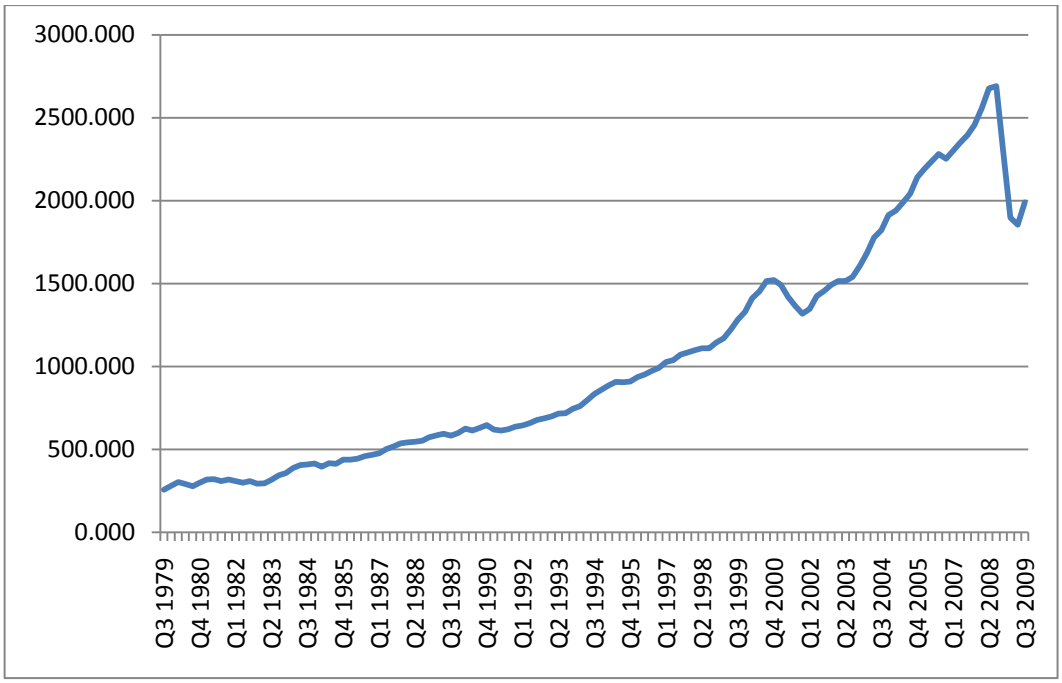

Figure 3.6 Import of US economy in Billion Dollar, from IMF, 1979Q3-2009Q3

As figure 6 shows, there is a drop in import also from 2690 Billion Dollars in third quarter of 2008 to 1990.5 Billion in third quarter of 2009 which shows almost 700 Billion drop in import in one year. This drop in import was a policy to control the trade deficit as lower they can for having a less impact in current account cause trade balance plays a significant role in current account in any economy and can be controlled by government. Furthermore, current account is one of the elements in balance of payment same as capital account. But, this difference between export and import can be explained by trade balance.

3.1.4 Trade Balance of US economy

Trade balance of USA reached the lowest point in last 30 years in third quarter of 2008 around 240.45 Billion dollar negative. The huge negative balance in trade can have a negative effect in current account and as a result it has a negative effect in balance of payment.

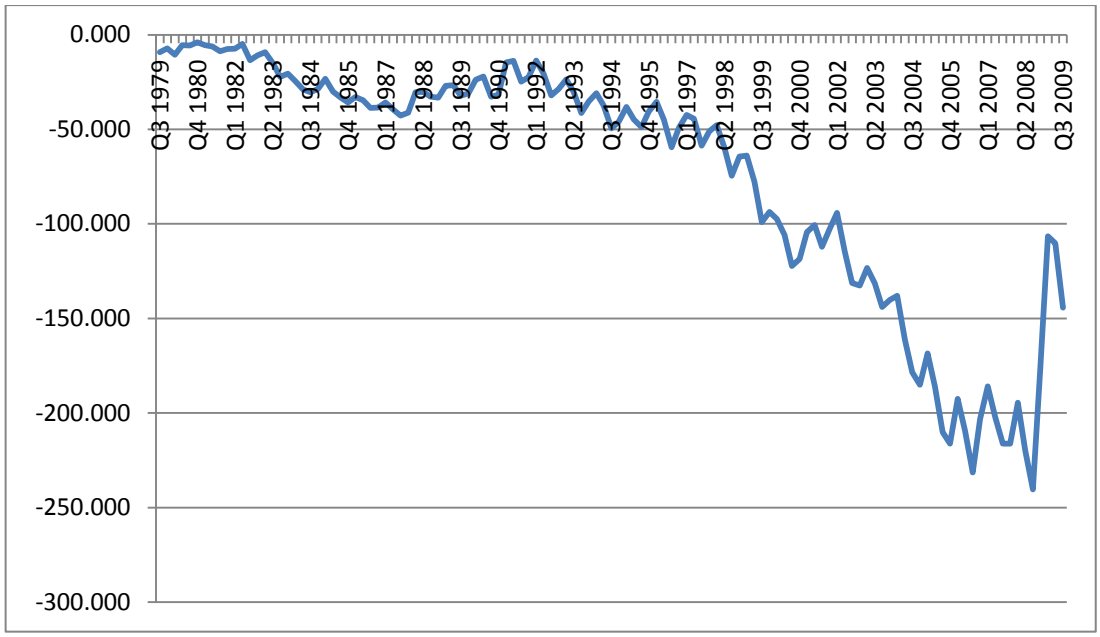

Figure 3.7 USA trade balance in Billion Dollar, from IMF, 1979Q3-2009Q3

As a result, drop in trade balance can be one of the important factors in balance of payment crisis because trade balance has a big effect on current account in any nation. So, US economy faced with huge current account deficit as a result of huge drop in trade balance in late 2008.

3.1.5 Current Account

Current account which is defined as records of nation's current international transactions including export and import of goods and services also net income from abroad and net unilateral transfer payment. (Grodon, 2009).

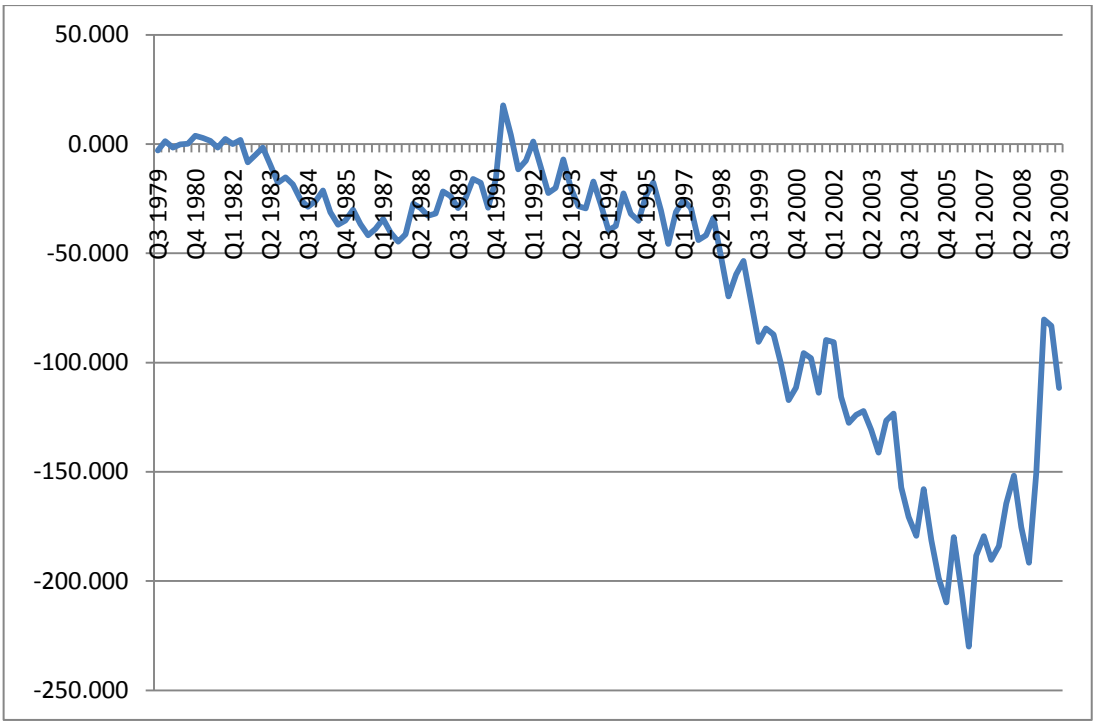

Figure 3.8 US Current Account in Billion Dollar, from IMF, 1979Q3-2009Q3

Figure 8 illustrates the drop in current account in last 2006 after subprime crisis and continued after that till third quarter of 2008 which shows less current account deficit which compensated by borrowing from foreigners or from central bank.

3.1.6 Dollar Value against SDR (special drawing right)

SDR is an international reserve asset which is created by the IMF in 1969. SDR value is determined daily based on the basket of different currencies of five member countries: Germany and France in euro, United Kingdom in pound sterling, Japan in yen, and the United States dollar. The trend of dollar value in the following chart illustrates the depreciation of dollar against the other currencies in the world.

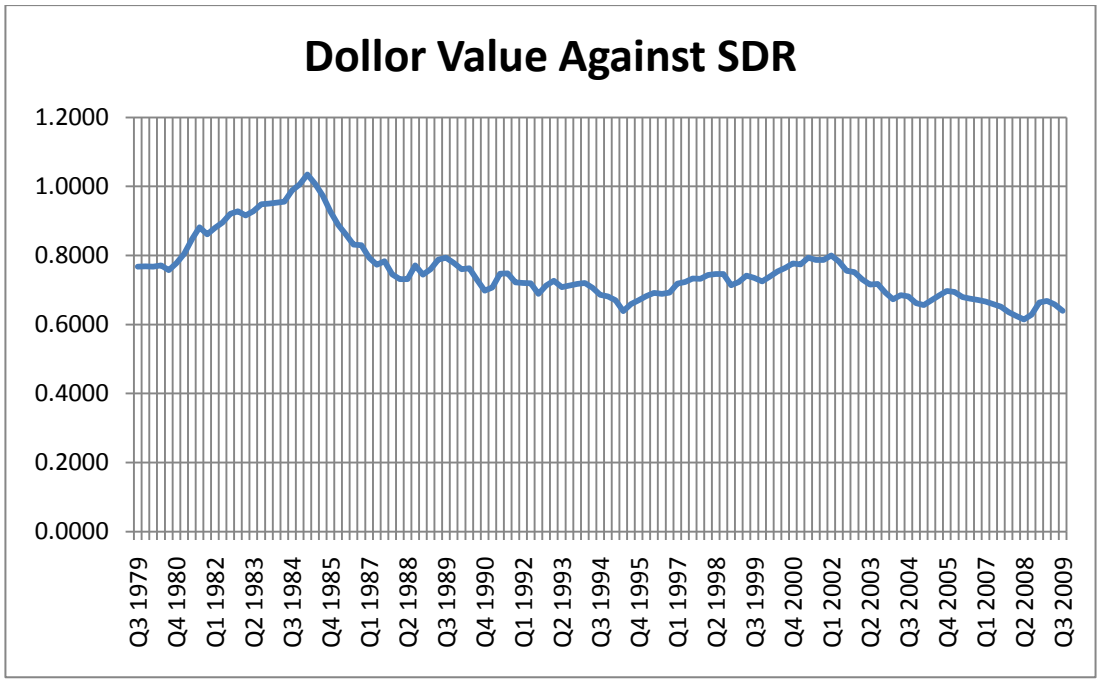

Figure 3.9 SDR per Dollar , from IMF, 1979Q3-2009Q3

As figure 9 shows, depreciation of US dollar against other 5 currencies is dramatic and reached the lowest point in 2008. This depreciation of US dollar can be explained also by showing the Dollar-Euro exchange rate.

3.1.7 Dollar Value against Euro

The dollar value against Euro has been decreased in recent 10 years especially in 2008. Figure 10 shows depreciation of US dollar against euro in only 10 years after the euro currency applied in euro-zone area in January 1999. Euro is the second largest currency in the world after the US dollar and also second most traded currency.

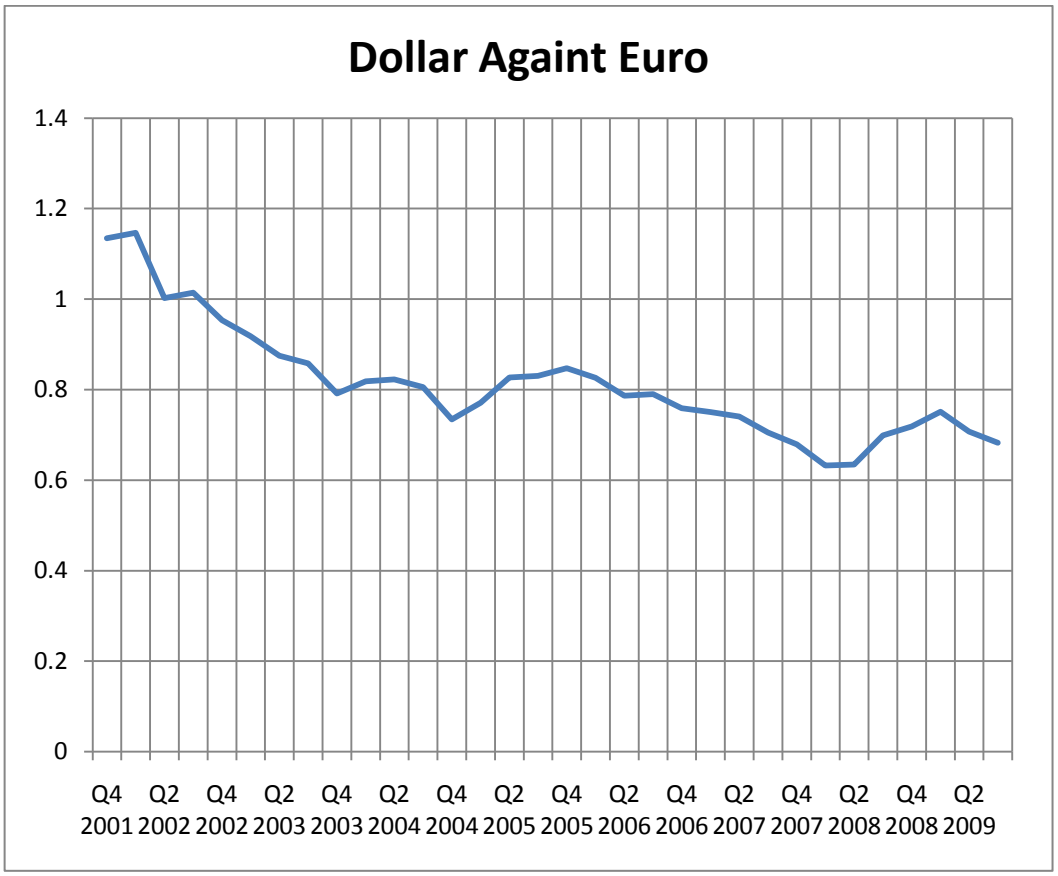

Figure 3.10 Euro Per Dollar, Data pooled our from IMF, 2001Q4-2009Q3

In 2008 depreciation of Dollar value reached the lowest point (ECU/Dollar) when there is a huge trade deficit and current account deficit in US economy. European Country Union Rate against US dollar declined regardless of US government efforts to keep their currency valuable.

3.2 US Subprime Crisis

US subprime crisis is one of the largest and complicated crises in the world which affected the whole economies around the world started in August 2007 and even international financial markets were stroked by this credit crunch (Toussaint, 2008). Spreading and developing of this relatively small US subprime market had a huge impact over the global financial system. In fact, losses related to subprime crisis happened by such a huge financial institutions all over the developed world spreading in the G7 countries. In the US the Citigroup, CIBC in Canada, In France big financial institution such as the Crédit Agricole and the HSBC in the United Kingdom as well as the Deutsche Bank in Germany, are examples of dramatic huge banks reporting large losses related to the subprime crisis. Even after huge bailout (giving money to a company in a danger situation and preventing from being bankrupt, insolvency and collapse) which was 700 Billion dollar from the congress to the financial institution, still crisis spreading and shows its effects. Banking crisis has a impressive effect on GDP growth and can make its growth negative and can cause frequent bankruptcies as well as high unemployment. Afterward, as a result this kind of financial crisis can cause breakdown of the whole payment system and capital flight and increasing the probability of currency crisis. Recently released 700 Billion dollar bailout could not solve the problem when there is huge investment in various risky assets.

Afterward, making a total 3 Trillion in bailout money in 2008 which shows a big loss in financial market still has put the financial system at risk (Woellert & Kopecki, 2008). Many blame United States housing bubble was a trigger of the crisis. As banks began to increasingly paying more and huge loan to potential home owners,

the housing price started to increase as well. Banks were optimistic regarding to get back their money by encouraging public to get in the belief they would be able to pay it back over a time because they were looking at a interest rates. Once a sudden the interest rates started to raise in mid 2007 the market housing price began to drop dramatically. The following chart illustrates the median and average sales prices of new homes sold in United States from 1963 till 2008.

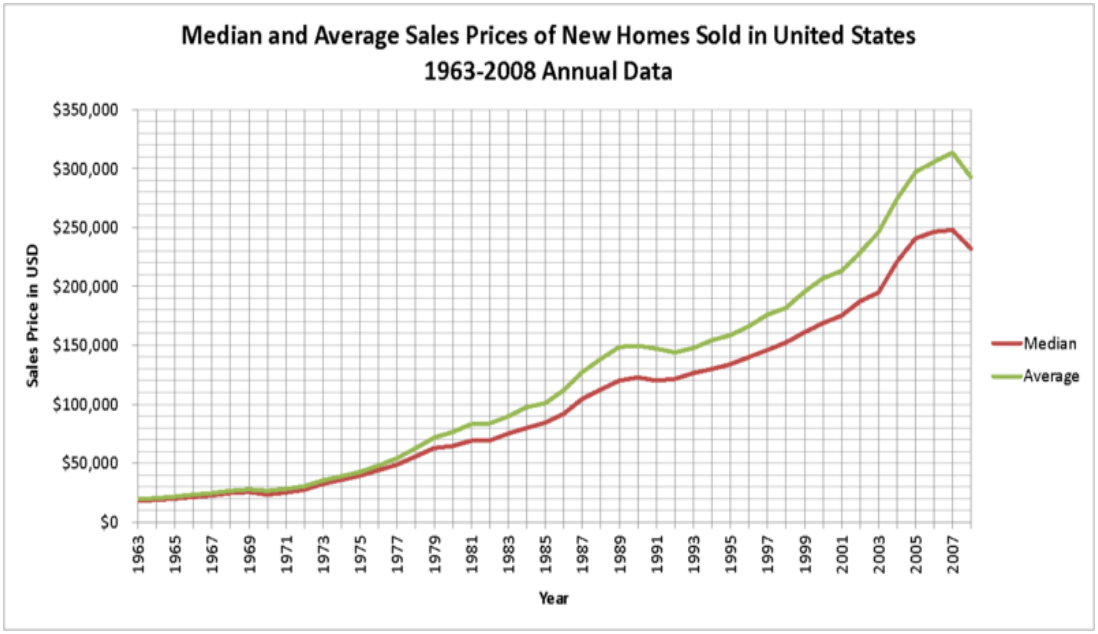

Figure 3.11 Median and Average Sales Price new home sold in United States 1963-2008 annual data, Collected from Census Bureau.

Afterward, drop in housing price by big percentages in 2006 made consumers to think about not paying off their expensive houses with high interest rate.

Refuse in paying back the mortgage to the bank put banks under pressure regarding to refund their gone money by public. As a result, banks began to lack liquidity caused by paying risky mortgages. (Murphy, 2008).So subprime crisis is one of the major reasons to current financial crisis still continuing around the world.

Chapter 4

DATA AND EXPLANATORY VARIABLES

4.1 Data

The financial and macroeconomic variables are taken from the International Monetary Fund's international financial statistics (IFS). The data set spanning 2001Q4 through 2009Q3.

32 observations has been pooled out for USA, England, France, Germany and some Arab countries such as Qatar, Bahrain, Dubai. Besides, there is critical point about selecting such countries among all other countries. US economy as a largest economy in the world has big trade partners in different region such as Europe and Middle-east. So, study has developed the area of focus on the biggest trade-partners of USA in the Europe and Middle-east and data have been collected for them from IMF. England, France, and Germany can be taken to consideration as biggest economies in Europe who share huge trade with USA. In Middle-east region, study has focused on such big economies like Bahrain, Qatar and Oman because based on the released data they are among biggest economies which have huge trade with USA. For example Wallace in 2009 has argued about role of Qatar in USA economy and pointed it as a one of the biggest trade-partners with USA (Wallace, 2009). On the other hand Bahrain which has been called freest economy in the Middle-east is another big trade-partner of USA from Middle-east. (World, 2008)

4.2 The explanatory variables

There exist numerous macroeconomic variables, which can qualify as good proxies for the initial conditions. In this paper, there are twelve variables, which are thought to be critical in explaining output response during crises; and these form the core variables that are specifically interested in. These variables are: total non-gold international reserve, period-average exchange rates, interest rates and explanatory variables such as; real exchange rate (MISRER), private claims to gross domestic product (GDPPC), domestic credit to gross domestic product (GDPDC), terms of trade shocks (TT), current account balance (GDPCAB), the USA market pressure index (DMPIUSA), dummy Germany market pressure index (DMPIGER), dummy England market pressure index (DMPIENG), dummy France market pressure index (DMPIFRA), dummy Bahrain market pressure index (DMPIBAH), dummy Qatar market pressure index (DMPIQAT) and dummy Oman market pressure index (DMPIOMA).

4.2.1 Real Exchange Rate Misalignment

Several authors have emphasized that currency crises are usually preceded by periods of exchange rate overvaluation or misalignment. We define "misalignment" as the negative of the percentage deviation of the RER from its average over the previous 32 observations. This definition makes our variable easily comparable in both dimensions, across time and across countries. Kaminsky et al (1998) found that various measures of the RER are among the variables that have worked best in empirical analysis of the determinants of crises. An increase in the RER misalignment is expected to increase the risk of a currency crisis. We expect the positive relationship between real exchange rate and the possibility of crisis.

4.2.2 Private Claims and Domestics Credits to Gross Domestic Products

Private Claims to Gross Domestic Product and Domestic Credits to Gross Domestic Products are financial terms, which measure the lending activity of the banking system. A rapid increase in these ratios could signify a growing strain of the banking system. This variable is intended to account for a possible boom and bust lending cycle associated with the crisis countries: financial inflows in previous years had been channelled into the property market, stock market, and the corporate sector with decreasing profitability. Thus, both domestic credits to gross domestic products and private claims to gross domestic products and the possibility of currency crisis are expected to have positive relationship.

4.2.3 Terms of Trade Shock

There is a fair amount of evidence showing that some currency crisis is preceded by negative terms of trade shocks (e.g. Edwards, 1989). Here, we attempt to measure the variables by calculation of annual export/annual import. While it is clear whether the crisis results from the shock or from the policy reactions to the shock, the relationship between terms of trade shocks and crisis is well established. In addition, the literature on equilibrium RER has shown that a term of trade deterioration usually leads to a depreciation of the equilibrium rate, which may in turn force a devaluation of the nominal exchange rate. We expect a negative relationship between this variables and the probability of crisis.

4.2.4 The USA Market Pressure Index

There are different definitions of crisis that have been used in empirical literature. Some papers use a narrow definition of crisis as a devaluation of exchange rate. While Cerra and Saxena (2000) refer crisis is an intense in speculative pressure on the country's currency, i.e., as an increase in Market Pressure Index (MPI). It is

constructed as stated above. DMPIUSA is constructed as dependent variable for the OLS estimation. Moreover, this variable is used to calculate dummy market pressure index.

4.2.5 Dummy USA Market Pressure Index

This is a dependent variable (DMPIUSA) for probit estimation and it is calculated based on the Market Pressure Index formula as follows:

$DUMMPI_X = 1$ if $MPI_X > \mu MPI_X + 1.5*\sigma MPI_X$,

Using the formula above, when DMPIUSA equals to 1, it's denotes the crisis has occurred and 0 otherwise.

4.2.6 Dummy Germany, England, France, Qatar, Bahrain and Oman Market Pressure Index

Dummy for these countries are explanatory variables used in probit estimation. Regarding to the speculative pressure (or contagion effect) in England, Germany, France, Bahrain, Qatar and Oman, these explanatory variables are expected to indicate significance influence for the USA economy. Those figures are calculated using the same formula as Dummy Market Pressure Index for the USA economy.

4.2.7 Current Account balance

Along with an appreciation of the RER, a deterioration of the current account balance is also expected in anticipation of a currency crisis. If the RER variable were an exact measure of the relative price of tradable to non-tradable goods and if countries responded the same to changes in the RER, the current account variable would likely not add any extra information to that contained in the RER variable. However, if either of these two assumptions does not hold, we should expect the current account balance to add to the RER in explaining currency crisis. We expect

to find a negative relationship between the current account balance and the probability of crisis. It is defined as current account balanced divided by GDP.

Chapter 5

MODEL AND METHODOLOGY

In this thesis, Ordinary Least Square (OLS) as well as Probit models are conducted to empirically investigate financial crisis in the USA economy due to the internal and external economic shocks (i.e. especially in the financial and banking sectors).

Probit model is used as the main tool to identify the leading indicators of currency crisis. As Griffiths et al. (1999: 740) descried 'The Probit model is a nonlinear (in the parameters) statistical model that achieves the objective of relating the choice probability pi to explanatory factors in such a way that the probability remains in the [0, 1] interval.' It is appropriate when the dependent variable y_t t = 1, 2, 3…n takes the value of 1 or 0. In econometrics such models naturally arise when the economic agents are faced with a choice between two alternatives, and their choice depends on a set of k explanatory variables or factors. The models are also referred to as 'qualitative' or 'limited dependent variables' or as 'stimulus and response models'.

We now describe our approach in estimating the determinants of currency crisis. The variable to be explained (y_t) is dichotomous, and takes the value of 1 if a currency crisis occurred during the year and 0 otherwise. The formula is used as following:

$$\text{Prob(crisis t)} = \text{prob(yt)} = \Theta\,(\beta' X_{t-1}) = \int_{\infty}^{\beta' X_t} \frac{1}{\sqrt{2\,\Pi}} \exp\{-1/2\,t^2\}\,dt$$

Where: X_{t-1} a vector of explanatory variables in period *t-1*, β is a vector of coefficients to be estimated, and Θ is the normal cumulative distribution function. The maximum likelihood estimator of β is obtained by maximizing the following log-likelihood function. Note that in this estimation, we are implicitly assuming the existence of an unobservable or latent variable (y_t*), which is described by:

$$\ell\ (\beta) = \sum_{t=1}^{n} y_i\ \log[\,F(\beta' X_i)] + \sum_{i=1}^{n} (1 - y_i) \log[1 - F(\beta' X_i)]$$

$$Y_t^* = \beta' X_{t-1} + U_t$$

Where β and X_{t-1} same as before, U_t is a normally distributed error term with zero mean and unit variance, and the observed variable y_t behaves according to $y_t = 1$ if $y_t^* > 0$, and $y_t = 0$ otherwise.

In the probit model, the sign of β_t is very important and If $\beta t > 0$ then an increase in X_t increase the probability that $y_t = 1$; and if $\beta_t < 0$ then an increase in X_t reduces the probability that $y_t = 1$.

It is worth to note that the dependent variable under this study is constructed in the following form rather than using as a standard discrete dependent variable in the literature giving 1 for crisis years and 0 otherwise. Hence, we follow the methodology used in the literature of Eichengreen, Rose and Wyplosz or ERW (1996). This methodology explains that the probit model uses the discrete dependent variable (e.g. Dummy the USA market pressure index/DUIMPI), and permits estimation of the probability of a speculative attack. The discrete dependent variable

is constructed as follows (using the definition of a crisis or speculative attack as in ERW (1996) :

$DUMMPI_X = 1$ if $MPI_X > \mu MPI_X + 1.5*\sigma MPI_X$, and 0 otherwise;

Where x denotes USA, μ denoted the mean and σ denotes the standard deviation. According to ERW (1996), the index of speculative pressure is at least one and half of standard deviations above the sample mean as instances of speculative attacks. According to this definition, the USA economy faced 19 times crisis from 2001Q4 to 2009Q3.

In order to determine the dummy market pressure index in the USA economy, it is vital to construct a measure of exchange rate pressure, termed the Market Pressure Index (MPI), as follow:

$$MPI_{i,t} = \frac{(\%\Delta e_{i,t})}{\sigma_{\Delta e_{i,t}}} + \frac{(\%\Delta i_{i,t})}{\sigma_{\Delta i_{i,t}}} - \frac{(\%\Delta r_{i,t})}{\sigma_{\Delta r_{i,t}}}$$

Where e is the US dollar exchange rate and Δ denotes the growth in the exchange rate, interest rate and non-gold international reserve respectively, i is the interest rate of the USA and r is the non gold international reserves that the central bank has in the USA. The changes in exchange rate, interest rate and reserves are weight by their respective σ (standard deviation). This is have been argued by in 1996. (Eichengreen, Rose, & Wyplosz, 1996)

This index is high when there is pressure on the currency and low if there is no attack on the currency, either the exchange rate would depreciate, or interest rate would be raised toward off the attack, or the central bank would sell foreign currency to support the exchange rate.

In this study, England, France and Germany are selected for comparison since the USA experienced the same problems and intense attacks on their financial and banking sectors in the 2008 global crisis. On the other hand, it is well known that some investment banks in the USA provide loans to some countries in the Middle East region, such as Qatar, Oman, Bahrain and Saudi Arabia. These are also selected to be used within this study.

In order for these reasons, the countries' Market Pressure Index and Dummy market pressure index are used as explanatory variable to prove the contagion in the crisis. The market pressure index and its dummy market pressure index (DUMMPI) for England, France Germany, Bahrain, Qatar, and Oman are calculated in the same way, which that's market pressure index and dummy market pressure index are calculated for the USA economy.

Chapter 6

INTERPRETATION OF EMPRICAL ANALYSIS

In section, we critically evaluate the possibility for the existences of currency crisis as well as existence of speculative pressure and contagion effect in the case of the USA economy using OLS technique and probit model respectively. Before conducting these two methods, we apply a correlation matrix to detect multicollinearity among the-explanatory variables for the sake of unbiased results (see table 6.1).

Table 6.1 Correlation Matrix for OLS estimation

	DMPI USA	**MISR ER**	**GDP PC**	**GDP DC**	**GDP CAB**	**TT**
DMPI USA	1.0000					
MISR ER	0.57	1.000 0				
GDPP C	0.24	0.28	1.00 00			
GDPD C	0.11	0.10	0.21	1.000 0		
GDPC AB	- 0.39	- 0.35	- 0.20	0.15	1.0000	
TT	-0.36	-0.29	-0.05	-0.06	-0.36	1.0 000

Source: Results are from the calculation by using software microfit 4.0.

We expect to have low correlation between explanatory variables and high correlation between the dependent variable and the explanatory variables. As can be

seen in Table 6.1, the correlation matrix of the relevant variables does not matter in terms of multicollinearity. It is important to emphasize that the pair wise correlations between the variables used as percentages of GDP such as GDPPC and GDPDC that are regrouped data and they have almost same features. Hence it is quite normal that they are low correlated with dependent variable (e.g. 0.24 and 0.11).

6.1 Empirical Results From OLS Estimation In The Case Of The USA Economy

Our empirical test results have been carried out by Microfit 4.0 (Pesaran and Pesaran, 1997). Having analysed the diagnostic test results for the serial correlation, function form normality and heteroscedasticity[1], we evaluated the results estimated from our OLS regression equations using t-test, F-test, Darwin-Watson (DW) statistics and R^2 values.

Individual significance (t-test results) is presented in Table 6.3 and all variables used for OLS estimation are significant at 10 % level and over whereas F-test result indicates that OLS regression holds overall significant. In addition R Square indicates that 51 percent of the total variation in the dependent variable can be explained by the regression model. The OLS results are shown in the Tables 6.2 and this is our final outcome, which indicates almost the best model can be estimated after the insignificant variables were dropped sequentially. This is called parsimonious model.

[1] Diagnostic test results were not presented in the relevant table but there is no misspecification evident for these results.

Table 6.2 Ordinary Least Square Estimation

Dependent variable	**DIMPUSA**
Variable sample period	2001Q4-209Q3
Constant	0.57 (1.69)
MISRER	0.64 (2.97)
GDPCAB	-0.23 (-1.69)
TT	-0.55 (-1.87)
GDPPC	0.17 (-2.24)
R^2	0.51
F-Test	6.04
DW	2.02

Source: Results are from the calculation by using software microfit 4.0

Table 6.3 OLS estimation with significance levels

Variable	**Result** (*significant or insignificant)*	**Reason** *($t_{cal} > t_{tab}$)significant & ($t_{call} < t_{tab}$) insignificant*
Constant	significant	1.69 (10%)
MISRER*	Significant	2.97 (1%)
GDPCAB***	Significant	-1.69 (1%)
TT***	Significant	-1.87 (10%)
GDPPC*	Significant	-2.24 (1%)

Note: * indicates statistical significant at a 1%, ** indicates statistical significant at a 5% and *** indicates statistical significant at a 10% and other is not statistically significant at conventional levels

6.2 Empirical results From the Probit Model

We follow the same procedure like we apply in the previous estimation thus we first provide a correlation matrix for the same purpose. As can be seen in Tables 6.4, the correlation matrix of the relevant variables does not matter in terms of multicollinearity. Table 6.4 shows the pair wise correlations between the variables are reasonably normal. It should be noted that the correlation coefficient between DIMPUSA and GDPPC as well as DIMPENG is slightly low but it is not a problem in terms of multicollinearity.

The probit results are shown in the Tables 6.5 and this is our final outcome, which indicates almost the best model can be estimated after the insignificant variables were dropped sequentially from the equation. This is also called parsimonious model.

Table 6.4 Correlation matrix for Probit model estimation

	DIMPUSA	MISRER	GDPCAB	TT	GDPPC	DMPIENG	DMPIQAT
DIMPUSA	1.00						
MISRER	0.57	1.00					
GDPCAB	-0.38	-0.34	1.00				
TT	-0.36	-0.25	-0.36	1.00			
GDPPC	0.23	0.21	0.20	0.05	1.00		
DMPIENG	0.17	0.32	0.36	0.04	0.07	1.00	
DMPIQAT	0.49	0.40	0.28	0.24	0.11	0.14	1.00

Source: Results are from the calculation by using software microfit 4.0

The estimated results from probit model tell us that the exchange rate (MISRER), private claim to gross domestic product (GDPPC), current account balance (GDPCAB) are found significant at least 5 percent level of significant and dummies for England and Qatar market pressure index (DMPIENG and DMPIQAT) determine the level of currency crisis at 10 percent level of significant in The USA economy. Others variable such as terms of trade shocks (TT) also have an impact on the dependent variables which are significant at 10 percent significant level.

The results from Probit estimation suggest that MISRER, GDPPC as well as GDPCAB have got expected impact on the dependent variable which determine the probability of currency crisis in the case of the USA economy whereas TT has also an impact but not as much as the others do have. In other words, these variables mentioned above might be the best indicator, which can explain the probability of financial crisis from internal and external shocks point of view for The USA economy (see table 6.5 and 6.6).

Table 6.5 Determinants of currency crisis and contagious effect

Variables	Regression of Coefficients (t-statistics)
	Probit estimation
Constant	-0.19 (-1.69)
MISRER	0.15** (2.52)
GDPCAB	-0.33** (-2.36)
TT	-0.32*** (-1.78)
GDPPC	0.17** (2.31)
DMPIENG	0.95*** (1.77)
DMPIQAT	0.93*** (1.91)
Goodness of fit	0.90
Pseudo-R-Square	0.66

Note: Note: * indicates statistical significant at a 1%,
** indicates statistical significant at a 5% and
*** indicates statistical significant at a 10% and
Other is not statistically significant at conventional levels

Table 6.6 Probit estimation with significance levels

Variables	**Result** **Significant or insignificant**	**Reason** **tcal<ttab insignificant &** **tcal>ttab significant**
MISRER	significant	(2.52) (%5)
GDPCAB	Significant	(-2.36) (%5)
TT	Significant	(-1.78) (%10)
GDPPC	Significant	(2.31) (%5)
DMPIENG	Significant	(1.77) (%10)
DMPIQAT	Significant	(1.91) (%10)

Note: Note: * indicates statistical significant at a 1%, ** indicates statistical significant at a 5% and *** indicates statistical significant at a 10% and other is not statistically significant at conventional levels

Chapter7

CONCLUSION AND RECOMMENDATION

The main objective of this paper is empirically investigates the probability of currency crisis due to internal and external economic shocks. In this paper, we would like to point out that there might be both domestic fundamental and external shock such as contagion from the countries such as England and Qatar for the USA economy in the light of currency crisis. For this purpose we conduct ordinary least square technique and probit model to analyse the probability of the relevant economic fundamentals and the speculative attack such as contagion effect.

The evidence found using both OLS technique and probit model indicate that a relatively small set of macroeconomic variables play an important role in determining the factors of crises. More specifically, we found that deteriorating trade balance increases of bank's claims on private sector and domestic's credit, misalignment Real exchange rate and high market pressure index increase the probability of a speculative attack on the currency in the case of the USA economy. The results also suggest that currency crises could be contagious from the countries, particularly England and Qatar. Actually, these countries led the USA economy to be under pressure and it is more influential than the others in the regions. This may stem from their openness degrees to the world economy (ie., Globalization) and the loans that lent to the countries under inspection. Hence, we could conclude that there is a linkage between the economic fundamentals and recent currency crises in the USA

economy so central banks should closely monitor the changes in these fundamental variables to prevent the occurrence of currency crises. In other words, a financial crisis in a country not only depends on a country's economic structure but also a regional and globalization effect apart from the cultural and political effects.

In fact, the political confidence in the USA economy was also instrumental in causing the USA's crisis. We could not apply this factor in our case due to lack of statistical data however; this has been proved from the depreciation of the USA currency during the recent years. It can be argued that the wrong political decision also determinants of currency crisis in the USA case as well as financial factors and contagion effect. It is therefore, political confidence is also suggested as a leading indicator in predicting the USA's crisis.

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