



**T.C  
YEDITEPE UNIVERSITY  
GRADUATE INSTITUTE OF SOCIAL SCIENCES**

**THE EXCHANGE RATE DETERMINATION  
IN EMERGING MARKETS: THEORY AND PRACTICE**

**By**

**Mehrin DALAN**

**Submitted to the Graduate Institute of Social Sciences  
In partial of fulfillment of the requirements for the degree of Master of  
International Economics and Finance**

**ISTANBUL, January, 2008**



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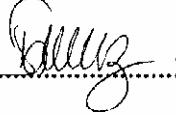
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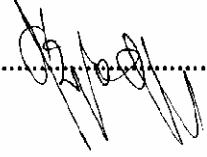
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## LIST OF ABBREVIATIONS

<b>ADF</b>	Augmented-Dickey-Fuller Test
<b>AIC</b>	Akaike Info Criterion
<b>aPPP</b>	Absolute Purchasing Power Parity
<b>BOP</b>	Balance of Payments
<b>CA</b>	Current Account
<b>CFA</b>	Central African Franc Zone
<b>CIRP</b>	Covered Interest Rate Parity
<b>CPI</b>	Consumer Price Index
<b>DC</b>	Domestic Credit
<b>DOLS</b>	Dynamic Ordinary Least Square Test
<b>EMU</b>	European Monetary Union
<b>EPC</b>	Economic Policy Committee
<b>EU</b>	European Union
<b>FA</b>	Financial Account
<b>FE</b>	Foreign Exchange Curve
<b>FER</b>	Foreign Exchange Reserves
<b>GATT</b>	General Agreement on Tariffs and Trade
<b>GDP</b>	Gross Domestic Product
<b>IBRD</b>	International Bank for Reconstruction and Development
<b>IMF</b>	International Monetary Fund
<b>IRP</b>	Interest Rate Parity
<b>JOH-ML</b>	Multivariate Maximum Likelihood Procedure of Johansen Cointegration Test
<b>KA</b>	Capital Account
<b>NMC</b>	National Monetary Council
<b>OECD</b>	Organization for Economic Cooperation and Development
<b>OLS</b>	Ordinary Least Square Test
<b>OMO</b>	Open Market Operations
<b>OPEC</b>	Organization of the Petroleum Exporting Countries
<b>ORA</b>	Official Reserves Account
<b>PPP</b>	Purchasing Power Parity
<b>rGDP</b>	Real Gross Domestic Product
<b>rPPP</b>	Relative Purchasing Power Parity
<b>SC</b>	Schwarz Criterion
<b>UIRP</b>	Uncovered Interest Rate Parity
<b>VEC</b>	Vector Error Correction
<b>WB</b>	World Bank

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## LIST OF SYMBOLS

$\eta_x$	The Sum of The Price Elasticities of Demand for Exports
$\eta_m$	The Sum of The Price Elasticities of Demand for Imports
<b>a</b>	The Absorption
<b>b</b>	The Amount of the Domestic Bonds
<b>b*</b>	The Amount of the Foreign Bonds
<b>c</b>	The Volume of the Consumption Expenditures
<b>e</b>	The Nominal Exchange Rate
<b>f</b>	The Forward Exchange Rate
<b>g</b>	The Volume of the Government Expenditures
<b>I</b>	The Volume of the Investment Expenditures
<b>i</b>	The Nominal Interest Rate at Home
<b>i*</b>	The Nominal Interest Rate Abroad
<b>m</b>	The Money Supply at Home
<b>m*</b>	The Money Supply Abroad
<b>M</b>	The Volume of the Import Expenditures
<b>M<sup>D</sup></b>	The Quantity of Money Demanded
<b>p</b>	The Domestic Price Level
<b>p*</b>	The Foreign Price Level
<b>s</b>	The Spot Exchange Rate
$u_t$	The Regression Residual
<b>w</b>	The Amount of Wealth
<b>x</b>	The Volume of the Export Expenditures
<b>y</b>	The Real Income at Home
<b>y*</b>	The Real Income Abroad
<b><math>\pi</math></b>	The Inflation Rate at Home
<b><math>\pi^*</math></b>	The Inflation Rate Abroad
$\beta_1$	The Monetary Differential
$\beta_2$	The Output Differential
$\beta_3$	The Interest Rate Differential
$\beta_4$	The Price Differential

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## ABSTRACT

One of the major concerns of the recent years is to investigate the economies of the emerging markets, because of their increasing attraction in the economic arena. These countries are examined in terms of their preferences of monetary, fiscal and exchange rate policies. Especially, the exchange rate policy is one of the most essential driving factors of the economy. Recently, lots of tests are conducted in order to find out which approach best describes the countries' economic needs and among these approaches whether the monetary approach explain exchange rate fluctuations in emerging markets or not.

Therefore, in this thesis, the main objective is to explain the exchange rate movements in the emerging countries, especially in Turkey, Taiwan, Brazil and Argentina, with the long-run monetary model approach, both theoretically and empirically. The core emphasize of the long-run monetary model of the exchange rate determination is a relation between the nominal exchange rate and the monetary variables such as the money supply, the real income, the nominal interest rate and the Consumer Price Index (CPI) differentials.

## ÖZET

Son yılların en çok konuşulan konularından biri, ekonomi çevrelerinin onlara olan ilgilerinin artmasından dolayı, yükselen piyasalardır. Bu ülkeler para, maliye ve döviz kuru politikalarındaki tercihlerinden dolayı incelenirler. Özellikle, döviz kuru politikası, ekonominin en temel taşlarından birini oluşturmaktadır. Son zamanlarda, hangi yaklaşımın ülkelerin ekonomik ihtiyaçlarını daha iyi karşıladığını ve parasal yaklaşımın döviz kurundaki dalgalanmaları açıklayıp, açıklayamadığını anlamak için birçok test yapılmaktadır.

Bu yüzden, bu tezdeki temel amaç, yükselen piyasalardaki döviz kuru hareketlerinin uzun dönem parasal model ile incelenmesidir. Bunun için özellikle Türkiye, Tayvan, Brezilya ve Arjantin örnekleri üzerinde durulmuştur. Uzun dönem parasal model, temelde, nominal döviz kuru ile parasal değişkenler (para arzı, reel gelir, nominal faiz oranı ve tüketici fiyat endeksi) arasında bir ilişkinin olduğunu vurgulamaktadır.

## CHAPTER 1. INTRODUCTION

Throughout the world, countries adopt several different exchange rate policies to compensate their economic needs. The popular exchange rate regimes are flexible (floating), fixed and managed float exchange rate systems. These systems have both positive and negative impacts on the economy. They are chosen according to the aims, such as inflation rate targeting or growth rate targeting, of the monetary authorities.

As the world becomes to be more globalize, the developing countries tend to improve their economic situations and move to the emerging markets statues. These countries are important as they have lots of advantages compare to other countries. For instance, young population of these countries is very high. So, there are many people to work in different jobs. Also, there is rapid growth in these countries such as in India and China. Additionally, the biggest oil companies and the richest people in the world are usually from these countries. Therefore, lately, the emerging markets have become one of the main engines of the economic arena. However, there is not sufficient analysis for these countries.

There are several theoretical and empirical studies that deal with the exchange rate determination by the help of the monetary approach. This is the reason why the monetary approach is taken as a main concern in this thesis. By the results of the Bilson's (1978, p. 53) study that covers the relation between the Deutsche mark-pound sterling floating exchange rates from January 1972 through April 1976 and by McDonald and Taylor's study (1992, p. 32) that reports the study of Putnam and Woodbury (1979), for the pound sterling-the US dollar exchange rates for the period from 1972 to 1976, the validity of the monetary approach in the long-run is supported. On the other hand, the study of Boothe and Glassman (1987, p. 451) shows that most of the macro economic variables, for instance the relative money supply, the Real Gross Domestic Product (rGDP), the nominal interest rate and the CPI, have biased estimations for a long-run relationship between the exchange rate and the macroeconomic variables. There are not only some evidences of validity of the long-run monetary model in the exchange rate determination, but also there are little counter ideas towards it.

The aim of this thesis is to explain reasons behind the exchange rate fluctuations in the emerging markets with the long-run monetary approach. The long-run monetary model

of the exchange rate determination emphasizes a strong connection between the nominal exchange rate and the monetary fundamentals such as the relative money supply, the real income, the nominal interest rate and the Consumer Price Index (CPI). The long-run monetary model is one of the most popular models that explain exchange rate movements. Also, exchange rates are one of the key elements that influence the economy both positively and negatively. Additionally, as there are everyday changes in the emerging countries' economies, these markets are the most suitable markets for empirical studies. For these reasons, the exchange rate movements in the emerging countries, especially in Turkey, Taiwan, Brazil and Argentina, will be examined, both theoretically and empirically, under the long-run monetary approach. Initially, the single countries will be analyzed and then, the panel data will be tested.

When the empirical studies are analyzed, it is realized that there are not any studies that test exchange rate determination by the long-run monetary model in the emerging markets. Most of the studies are related to the developed and developing countries. Thus, Turkey, Taiwan, Brazil and Argentina are chosen as testing cases. There are also some other emerging economies as Mexico, Chile, China, Russia, Singapore, Israel, Jordan etc., but, the data of Turkey, Taiwan, Brazil and Argentina, for the period 1986:Q1-2006:Q4, are more available than others. Additionally, these four countries adopt similar monetary and exchange rate policies. Thus, it is another reason why these countries are chosen. As a result, when the literature is reviewed, it is seen that there is no study related to the exchange rate determination by the long-run monetary model in the emerging countries. Therefore, this study will present new findings.

The questions that are targeted to be answered in this thesis are as follows:

- 1- What kinds of exchange rate policies are conducted in emerging markets?
- 2- What are the possible threats for these economies?
- 3- Does the monetary approach explain exchange rate fluctuations in emerging markets?

Chapter two analyzes the history of the monetary systems. The basic characteristics of these economic eras in terms of their adopted exchange rate and the monetary policies will be outlined. Initially, the international gold standard system, which was between 1870 and 1914, will be focused on. Both the fundamental features and positive and negative aspects of this era will be discussed. Then, the interwar years era, which took place

between the beginning of the First World War (1914) and the beginning of the Second World War (1939), will be presented. After this era, the characteristics of the Bretton Woods system, which was between 1944 and 1971, will be summarized. Finally, the floating exchange rate system, which became influential from the beginning of 1973 and continues today, will be analyzed.

Chapter three draws the picture of the exchange rate theories and outlines their fundamental characteristics. To this extent, the exchange rates and the current account (CA) dynamics, which consist of the elasticities approach, the j-curve effect, the pass-through effect and the absorption approach, will be studied. Then, the purchasing power parity condition (PPP), the interest rate parity condition (IRP, which includes the covered interest rate parity (CIRP) and the uncovered interest rate parity (UIRP) conditions), the monetary approach (which consists of the Mundell-Fleming model, the Dornbusch's sticky-price monetary model, the flexible-price monetary model and the Portfolio approach) will be analyzed. Finally, the sterilization subject will be discussed. These theories basically deal with the relation between the exchange rates and the macroeconomic variables.

Chapter four considers the exchange rate policies. All different types of the exchange rate policies will be listed. On particular, the three most adopted exchange rate regimes, which are the floating (flexible) exchange rate policy, the fixed (pegged) exchange rate policy and the managed float exchange rate policy will be analyzed. They will be considered in terms of their positive and negative effects on the macroeconomic variables.

In chapter five, the exchange rate regimes in the emerging markets will be analyzed. The list of the exchange rate regimes based on the emerging countries and their effects on the credibility, the financial fragility, and the monetary and fiscal policies will be discussed.

In chapter six, the long-run monetary model, which is chosen as a testing theory, will be focused on. In the long-run monetary model, the relation between the nominal exchange rate and the monetary variables such as the money supply, the real income, the nominal interest rate and the CPI will be tested. The methodology and the type of data will be discussed. First, in order to show the expected cointegration connection between the variables, the unit root test will be conducted. Then, based on the existence of the unit

roots of the variables, these variables will be included into the long-run monetary model or not. Later, the cointegration coefficient and cointegration residual tests will be carried out. For this reason, the Johansen Cointegration Test (JOH-ML), the Ordinary Least Square (OLS) and the Dynamic Ordinary Least Square (DOLS) tests will be performed. Then, the Vector Error Correction (VEC) test will be carried out. Afterward, in order to get more appropriate conclusions, the variables of the countries will be combined and the panel data will be created. The same tests will also be applied to the panel data. At the end of the chapter, a summary of the empirical studies, their findings and the continuous views will be discussed. The results of the unit root tests of the single country and the panel, the cointegration coefficient results, the cointegration residual results and the VEC results will be presented.

Final chapter will summarize the thesis. The answers of the questions that are searched throughout the thesis will be stated. Additionally, the contribution of the thesis to the literature of the exchange rate determination in the emerging markets will be presented and further studies will be discussed.



## **CHAPTER 2. THE HISTORY OF THE MONETARY SYSTEMS**

### **2.1. Introduction**

Before discussing the basic fundamentals of the exchange rate theories, it is useful to present the historical background of these theories. Thus, this chapter will be devoted to the history of the monetary systems. Sequentially, the international gold standard system (1870-1914), the interwar years (1914-1939), the Bretton Woods system (1944-1971) and finally, the modern floating exchange rate system (1973-present) will be considered. The fundamental features and negative and positive aspects of these monetary systems will be outlined.

All economical activities are conducted by the help of the monetary transactions. This means that in order to buy or sell a commodity, a person has to have or receive something that has a monetary value. However, there is not an exact date of when the first monetary operation was conducted. The first monetary system was founded at the time of the Roman Emperor Julius Caesar. After the Roman Emperor Julius Caesar, the Byzantine Emperor minted the gold money, which was called “solidus”. The 7<sup>th</sup> century was the time of the Islamic dinar, but it was not minted in gold, but in silver metal. The silver Islamic dinar was the rival of the gold money. After that time, the other European countries also began to issue money. In the 18<sup>th</sup> century, after the Industrial Revolution took place in England, the British pound sterling became the leader of the economical world and affected all other currencies. Initially, the British pound was made of silver, but after some time passed, it was made of both silver and gold. By the beginning of the 19<sup>th</sup> century, gold alone became used as commodity money.

In the beginning of the 19<sup>th</sup> century, the international monetary system began to be discussed under different headings. First is the International Gold Standard System, which took place between the years of 1870 and 1914. Second is the Interwar Years, which was observed between the years of 1914 and 1944. Third is the Bretton Woods System, which was seen in the time interval of 1944 and 1973. The final one is the Floating Exchange Rate System, which began in 1973 and continues until now (Savas, 2004, pp. 51-53).

## 2.2. International Gold Standard System (1870-1914)

The international gold standard system began around 1870 and ended up around the beginning of the First World War in 1914. The main exchange rate policy of this era was the “*fixed exchange rates*” as all the currencies were tied to gold. The other name for the fixed exchange rate currency is the pegged exchange rate regime. This means that the countries would fix their national currencies to the official price of the gold, which is known as the mint parity price. This, in a roundabout way, causes convertibility of the domestic money to all other monies on the gold standard. For the continuation of the gold standard, the participating countries to the gold standard had to obligate to buy and sell gold to anyone at the fixed price. However, unless this occurred, monies began to vary and the main feature of the gold standard, which was the fixed exchange rate, may not have been maintained. Gold was a homogeneous, storable, transportable and dividable commodity.

Positive aspects of the international gold standard system were as follows: The supply of the gold cannot have been easily increased as it was costly to mine and to produce. So, there would have been long-run stability of the state’s money stock, real output, prices, the interest rates and the exchange rates. In the short-run, prices could have fluctuated, however, because of the inclination to the long-run stability, prices would have returned to their initial levels. If there was a balance of payments (BOP) deficit, this meant that there was a net outflow of the gold; the country would have decreased its money supply and its prices. Thus, this would have caused an increase in the net exports and would have brought the BOP equilibrium back. On the other hand, if there was the BOP surplus, this means that there was a net inflow of the gold; the country would have increased its money supply and its prices. So, this is the reason that a decrease in the net exports and the BOP equilibrium position would have come back. There was no central bank intervention. Certified authorities could have determined the ratio of money stock to the gold reserves. It was a peaceful period during which there were no wars. There was free mobility of the capital between countries. England was the world’s chief trader and London was the capital of the world’s financial markets. England determined the gold parity values and maintained the credibility of the system. The pound also served as a vehicle currency (Husted and Melvin, 1995, p. 463).

The negative aspects of the international gold standard system were as follows: There were increasing amounts of the resource costs such as mining and transportation costs. So, it was very expensive for a country to determine and to trade a tangible commodity that was gold. Also, the other countries may have not increased their economical status as the economically powerful countries, such as England, would not have allowed this. As the fixed exchange rate policy was adopted and the pegged exchange rate would not have quickly harmonized the changes in the economy, the BOP deficit or surplus could not have corrected for a long time and this would cause worsening of the economic situation in the future, as had happened around the years of the First World War. In addition, by the beginning of the First World War, the economical and financial faces of the world began to differ and this caused a change in the international monetary systems. The new monetary system was not directly a new born system but rather was an alternative to go back to the gold standard system.

### **2.3. The Interwar Years (1914-1939)**

By the beginning of the First World War in 1914, the gold standard system ended and the interwar years began. This system ended by the outbreak of the Second World War in 1939. The convertibility of the countries' currencies into gold began to be questioned in this era. Because of the scarcity of gold, governments financed wartime expenditures by printing money and this avoid the fixed exchange rates not to hold anymore. Also, during that period, the inflation problem began to arise in these countries and this also affected the gold standard at the old exchange values.

Some of the countries attempted to turn to the gold standard system. For example, France returned at much lower values, whereas the US with the help of the low inflation returned at the old parity. On the other hand, in 1925, the UK returned to a gold standard system at the prewar parity even though prices had increased. However, because of the overvaluation of the pound, the amount of the UK exports declined and this led to high interest rates, high unemployment rates and deflation of the wages and prices. As a result, the UK was no longer the world's leader of trade and after that time, the US became the trade leader of the world. After the First World War, the British pound fluctuated freely against the US dollar. In 1931, the UK discarded the gold standard system by suspending

the convertibility of the pound to gold. Now, the US had to bear the problem of the high demand for converting gold to dollars. This caused a 15 percent drop in the US gold reserves. So, in 1933, the US increased the official price of gold to \$35 for decreasing the amount of export of gold. By the beginning of the 1936, many nations dropped the gold standard system. There occurred much devaluation of the currencies. In the interwar years, by the beginning of the industrial depression in the UK in 1926 and the collapse of the stock market in the US in 1929, the Great Depression began and it continued until the beginning of the Second World War in 1939 (Isard, 1995, p. 40).

The restored old gold standard system was a desired system, but, because of the remaining shocks, the financial crises and the beginning of the Second World War, the monetary and the exchange rate theories all collapsed and it continued until the end of the Second World War. After the Second World War, the countries began to reconstruct their financial position by the help of the Bretton Woods system.

#### **2.4. The Bretton Woods System (1944-1971)**

By the end of the Second World War, the world economical leaders, the US and the UK, understood the importance of having another monetary system. After the war ended many European countries and Far East countries needed to rebuild their countries, so, they needed to ask the help of the industrialized countries. Because of all these economic problems, 44 nations joined for a conference in Bretton Woods, in the US, for negotiating the world's new exchange rate system that would maintain international trade. The well-known people of the conference were the US Treasury authority *Harry White* and the British economist *John Maynard Keynes*.

At the end of the Bretton Woods Conference, the International Monetary Fund (IMF) was founded. The main duty of the IMF is, based on some agreements, to lend money to the member countries that face a lack of foreign exchange reserves. The nations must pay a quota or fee in order to be a part of the IMF. The economic performance of a country determines how much the nation will pay as a quota. According to the IMF rules, 25 percent of the quota has to be paid in gold and the remaining 75 percent has to be paid in the nation's currency. At the end of the conference not only the IMF was established but also the International Bank for Reconstruction and Development (IBRD), which was then

the World Bank (WB), and the General Agreement on Tariffs and Trade (GATT) were recognized. These two institutions work in a different manner. The WB helps the nations to refinance themselves and the GATT set the rules for trade restrictions (Daniels and VanHoose, 2002, p. 78).

The other name of the Bretton Woods system is *the gold exchange standard*. In this system, the exchange rate system was the “*adjustable-pegged*” exchange rate system. These will be discussed in detail in the following chapters. Under this system, the countries fixed their currencies to another country’s currency and thus, it was the US dollar. In the system different than the gold standard system, all currencies were connected to each other by the US dollar. The US dollar pegged its value to gold at a mint parity rate of \$35 per ounce. The countries may alter their par values not only by revaluing but also by devaluing their currency with an endorsement of the IMF.

The act of the Bretton Woods system required that the US employ a self-governing and anti-inflationary monetary policy by being always prepared to exchange the US dollar for gold at the parity value. In addition to this, all other countries had to purchase or sell the US dollar in order to keep their national currency exchange values stable against the dollar within the 1 percent margin on either side of the declared par value. In the incidence of a “*fundamental disequilibrium*” with the BOP, the parity is allowed to be changed only if the IMF member consults with other members (Article IV, Section 5). However, the expression “*fundamental disequilibrium*” was never named and then proved to be a source of contention among some members. The escape clause differed from that of the gold standard as countries were not supposed to, at a later date, return their currencies to the original parity (Aldcroft and Oliver, 1998, p. 97).

During, the time period between 1945 and 1968, the Bretton Woods system worked well. There was growth in output, steady rise in world trade, no liquidity crisis and stable short-run prices. As there was a continual increase in the conversion of the dollar for gold, the problem of the lack of dollar existed. In the late 1950s, the US faced a large BOP deficit and by the beginning of the 1960s the first of several dollar crises occurred. Fear of the owners of the large foreign holdings of dollars directed them to switch their dollar holdings for the US gold reserves and this caused a decrease in the US gold reserves. This scarcity of the US gold reserves made other nations think that the dollar may be devalued relative to gold. Also, in 1964, US federal expenditures increased because of the Vietnam

War. The inflation rate began to rise in the US. Because of all these reasons, in 1967, the devaluation of the other nations' currencies began with the devaluation of the British pound and continued with the German mark. The stress on the system continued and in August 1971, the US president Richard Nixon declared that the US would no longer convert the US dollar into gold or any other reserve assets. Thus, by announcing the inconvertibility of the dollar, the US eliminated the main feature of the Bretton Woods system. Because of the inappropriateness of the US and some of the European countries macroeconomic policies and not devaluing the US dollar, the mechanism of the Bretton Woods system broke down (Krugman and Obstfeld, 2006, p. 508).

The decline of the Bretton Woods system can be summarized under several headings. First, the rate of growth of GDP for the European members of the Organization for Economic Cooperation and Development (OECD) dropped in every period from the beginning of the 1950s. In addition, around 1960s, the higher rates of inflation and unemployment took place in Europe. Second, the monetary authorities were not in favor of changing the parities. So, this worsened the situation in European countries. Third, some countries had inappropriate monetary and fiscal policies that eliminated short-run internal balance until they were obligated to devalue as a result of a fundamental disequilibrium. Fourth, the Economic Policy Committee (EPC) did not prevent the problems of the countries. Finally, confidence in the dollar decreased and this caused a fear that the ratio of dollar liabilities to gold would increase. Also, the payments became to be delayed, the stability of the exchange rate destroyed and inflation began to increase tremendously (Aldcroft and Oliver, 1998, p. 192). These are the basic reasons of break down of the Bretton Woods system.

As a result of the collapse of the Bretton Woods system, the new era that is the floating exchange rate system began to take place in the international monetary systems and most of the countries began to adopt this new financial system.

## **2.5. Floating Exchange Rate System (1973-Present)**

After the collapse of the Bretton Woods system, the world began to be managed under a floating exchange rate system. At the end of the year 1971, the Smithsonian Agreement was declared. According to the agreement, there would have been a change in

the exchange value of dollar against gold from \$35 to \$38 per ounce and also, the dollar was devalued by 8 percent. Additionally, the speculative inflows and outflows of capital began to affect the other currencies. Therefore, in 1972, the British government let the UK pound float in order to respond to the needs of demand and supply conditions. In 1973, as there was not an official permission for free moving of the currencies, the major nations' currencies were all floating.

After the beginning of the year 1973, exchange rates were not maintained directly by free market forces of supply and demand, whereas there were the central banks' intervention that they tried to get the advantageous exchange rate. So, that kind of exchange rate is called a "*managed float exchange rate*". The advantages and the disadvantages of adopting the managed float exchange rate system will be discussed in the fourth chapter.

In 1976, the Jamaica Accords was held by the member nations of the IMF. According to the Accords, each member nation determined its own exchange rate agreement. By the beginning of the year 1973, under the influence of the floating exchange rate regime, the chief countries faced conflicting macroeconomic policies, considerable economic shocks and current account deficits. Also, in 1973, the OPEC crisis occurred. The oil importing countries were hurt by the increase in oil prices. They had to overcome the high inflation and high oil prices problems. After that in 1985, Plaza Agreement was held. It was the meeting of the central bankers and finance ministers of the G5 nations, which are France, Germany, Japan, the UK and the US. According to the agreement, it was announced that the dollar's exchange value was so powerful that the nations should try to decrease the value of the dollar. After the Plaza Agreement, in 1987, Louvre Accord was held by the central bankers and the finance ministers of the G7 nations, which consists of G5 nations, plus Canada and Italy, however, Italy did not attend the Accord. As a conclusion of the Louvre Accord, the participant nations decided that the dollar's exchange value had decreased to the desired level and the only reason why the central banks should intervene in foreign exchange markets is to ensure the stability of the exchange rates (Daniels and VanHoose, 2002, p. 87).

In December 1994, the Latin American financial crisis occurred and the Mexican peso devaluated. In 1997, the East Asian crisis happened. In 1998, Russia and Brazil experienced crises. These crises will be used as dummy variables in the long-run monetary

model that will be tested in the sixth chapter. Throughout 1998, eleven European Union countries stabilized their exchange rates and by the beginning of 1999, they established the European Central Bank and created a new currency, which is called “euro”. The nations transferred their financial and banking statements to euro. By the coming of the July 2002, they began to circulate the euro currency in the real economic life. Also, this brought an end to their national currencies.

Nowadays, there are several types of the exchange rate arrangements that are mainly used. The first one is *free exchange rate*, where the exchange rates are freely determined by the free market forces of supply and demand. The second one is *basket peg currencies*. This means if a country trades with more than one country, then it is better to determine the exchange value of the currency by the weighted average of the foreign currencies rather than any single currency. There are mainly six or fewer currencies that enter into the basket. If there are not limited amounts of currencies, controlling the basket peg will be hard. The third one is *European Monetary System currency*, which means that the member countries of the System do not float against each other but against the other part of the world. The fourth one is *crawling peg*. This means that a nation pegs its currency to another nation’s currency and allows the par value to differ in regular times. The crawling peg decreases the exchange rate volatility and increases the economic efficiency. The crawling peg is a better exchange rate arrangement for a country that has a large amount of trade with a different country, but has an instable currency. The fifth one is *exchange rate band* that has an upper and a lower limit in which the exchange value of a currency can fluctuate (Husted and Melvin, 1995, p. 470). All these exchange rate arrangements will be mentioned in the fourth chapter, which deals with exchange rate policies. In particular, the floating, fixed and the managed float exchange rate policies will be discussed in detail.

All of the above are mostly used exchange rate arrangements in mean while. The floating exchange rate system began in 1973 and continues until now. Nowadays, the economic efficiency is generally affected by the exchange rate volatility and its uncertainty; therefore, the choice of an exchange rate system becomes an important issue.



## **2.6. Conclusion**

In this part of the study, the history of the monetary systems was mentioned in the chronological order. It is common that all monetary systems had lots of positive sides at the times that they were conducted. However, when the country's or the world's economical faces changed, it became essential to change the remaining monetary system and passed to the new one. Besides these, the childhood, the youth and the old age of the monetary systems were discussed. Their essential features and pros and cons of these eras were analyzed. It is understood that when the gold is the valuable element, it is meaningful to use the gold as an exchange vehicle, or it is expressive to use the fixed exchange rates after the war years as the economy is not at the desired levels or it is influential to use the flexible exchange rate or the managed float exchange rate system in the times of the global economic world.

In the following chapter of the study, the exchange rate theory will be discussed in detail. What kinds of exchange rate theories have been applied, what their positive and negative aspects are and what kinds of variables they include in their formulas will be mentioned.

## CHAPTER 3. EXCHANGE RATE THEORIES

### 3.1. Introduction

In chapter two of this thesis, the history of the monetary system was examined. The international gold standard system, the interwar years, the Bretton Woods system and the floating exchange rate system were discussed. In this chapter; the basic definitions of the exchange rates and components of the BOP will be mentioned. Then, the exchange rate theories will be analyzed in terms of how they determine the exchange rates and how the exchange rates determine the theories. Finally, a general conclusion about the exchange rate theories will be made.

### 3.2. Basic Definitions

Exchange rate theory is surrounded by several approaches and they explain the exchange rates under fix exchange rates, flexible exchange rates or controlled exchange rates. Initially, the basic definitions of the exchange rate determination approaches will be stated. Then, these approaches will be discussed.

Basically, *exchange rate* means to measure the value of one currency relative to another currency. Therefore, exchange rate is a relative price that indicates the price of one currency in terms of another currency.

In the exchange rate concept, there are two main terminologies; one of them is exchange rate appreciation and other one is exchange rate depreciation. *Exchange rate appreciation* occurs when the price of the foreign currency is cheaper than the domestic currency, so domestic currency is more valuable than the foreign currency. On the other hand, *exchange rate depreciation* occurs when the price of the domestic currency is less than the foreign currency, so foreign currency is more expensive than the domestic currency (Daniels and VanHoose, 2002, p. 38). For instance, if demand for a nation's currency increases that currency will appreciate, or vice versa; if demand for the nation's currency declines that currency will depreciate. Contrary to these, if supply of a nation's currency increases that currency will depreciate, or vice versa; if supply of the nation's currency decreases that currency will appreciate. Also, if a nation's currency appreciates, some foreign currencies will depreciate relative to it. In discussing the exchange rates, the

difference between the nominal exchange rate and the real exchange rate must be understood. *The nominal exchange rate* is the number of units of foreign currency that can be obtained for one unit of domestic currency. In addition to this, the nominal exchange rate does not reflect changes in the price levels of the two nations. Contrary to the nominal exchange rate, *the real exchange rate* takes into account the changes in the price levels of the two nations. Thereby, it shows the purchasing power of domestic goods in exchange for foreign goods (Abel and Bernanke, 2001, p. 473).

The other definition of the exchange rate is effective exchange rate. *The effective exchange rate* is a measure of the weighted average value of a currency relative to a selective group of currencies (Daniels and VanHoose, 2002, p. 44). In addition, the effective exchange rate reflects the prices actually paid and received by traders for foreign exchange (Krueger, 1983, p. 17). Another kind of exchange rate is the cross rate. *The cross rate* is a bilateral exchange rate that is calculated from at least two other exchange rates (Krueger, 1983, p. 16). The number of the cross rates of the countries differ by the parallel of the number of their trading partners. When countries decide to trade with each other, they take into account spot and forward exchange rates for their payments. For that reason, *the spot exchange rate* is the existing rate for buyers and sellers that are affected at the time the rate is quoted. On the other hand, *the forward exchange rate* is the exchange rate at which an agreement can be signed at the same time to buy or sell foreign exchange in the future (Krugman and Obstfeld, 2006, p. 314).

Another significant concept in defining exchange rate is overvalued and undervalued currencies. The reason why the overvalued and the undervalued currency occur is the difference between the current market-determined rate and the rate that is implied by a formal or informal economic model. Thus, according to that, if the current market-determined rate is greater than the implied rate by a theory, then, the currency is called *the overvalued currency*. For example, if country A has an overvalued currency relative to country B, exports from A to B decrease and imports From B to A increase. Therefore, in the lack of adjustments in the exchange rate values, countries with overvalued currencies will tend to have a negative balance of trade. So, the value of this currency will depreciate because of the market adjustments. Contrary to that, if the current market-determined rate is weaker than the implied rate by a theory, then, the currency is called *the undervalued currency*. For instance, if country A has an undervalued currency

relative to country B, exports from A to B increase and imports from B to A decrease. Consequently, in the lack of adjustments in the exchange rate values, nations with undervalued currencies will tend to have a positive balance of trade. This time the value of this currency will appreciate because of the market adjustments (Daniels and VanHoose, 2002, p. 59).

### **3.3. Components of the Balance of Payments (BOP)**

All international transactions are included in *the BOP* of the country. It is a double entry bookkeeping account, so, the balance of it will always be maintained. This means the accounts are based on the principle that any transaction resulting in a payment to foreigners is entered with a minus sign while any transaction resulting in a receipt from foreigners is entered with a plus sign. So, the sum of all minus entries equals to the sum of all plus entries. There are three types of international transactions that are recorded in the balance of payments; the current account, the financial account and the capital account (Krugman and Obstfeld, 2006, p. 294).

The first one is *the current account (CA)*, which is a record of all transactions of goods and services between countries. Exports, imports and tourist expenditures, dividend and interest incomes flowing to and received from abroad, insurance and shipping payments and receipts and other flow transactions are included in here (Krueger, 1983, p. 19). The second one is *the financial account (FA)*, which includes the records of all international purchases or sales of financial assets. These assets are held as money, stocks, factories or government debts (Abel and Bernanke, 2001, p. 173). The third one is *the capital account (KA)*, which is a record of all asset transactions between a nation and the rest of the world. These transactions are such as borrowing from abroad, purchases of securities from abroad and drawing down a foreign bank account (Husted and Melvin, 1995, p. 311). The relation between these components and the exchange rates will be discussed in the following sections.

### **3.4. The Exchange Rate Theories**

In this part of the study, the exchange rate theories will be examined. These theories include the determination of the exchange rates and the relation of the exchange rates with other macroeconomic variables. Initially, the exchange rates and the current account dynamics will be analyzed. In this context, the elasticities approach, the j-curve effect, the pass-through effect and the absorption approach will be studied. Then, the purchasing power parity (PPP) and the interest rate parity conditions (IRP), the monetary and the portfolio approaches and sterilization will be discussed. Lastly, all exchange rate theories will be evaluated.

#### **3.4.1. Exchange rates and the current account dynamics**

Firstly, the initial theory of the determination of the exchange rate, which is the elasticities of demand for and supply of exports and imports and the demand for and supply of foreign currency, will be discussed. The theory develops some conditions for devaluation to have positive effects on the balance of trade. Then, the j-curve and the pass-through effects will be observed. Finally, the absorption approach will be examined by pointing out how it influences the CA.

##### **3.4.1.1. Elasticities approach**

In the elasticities approach (elasticity as an economic terminology means responsiveness of quantity to a change in price), changes of prices of goods and services are the main concerns of determination of nation's BOP and its currency's exchange value. These price changes occur because of changes in the tastes, production technology, government taxes or subsidies.

When there is a change in the prices obtained from exports and imports, then, the currency will either appreciate or depreciate. As there are price changes of exports and imports, there also will examine changes in the quantity of imports demanded and the quantity of exports supplied. Therefore, the changes in the quantities will be established through the elasticity of export supplied and the elasticity of import demanded. If demand

or supply is elastic, then, the changes of the quantities demanded or supplied will be quite responsive to the changes in the price levels. On the other hand, if demand or supply is inelastic, then, the changes of the quantities demanded or supplied will be quite irresponsive to the changes in the price levels.

Under the assumption of the fixed prices of domestic and foreign goods and fixed income, changes in the nominal exchange rate will directly change the real exchange rates. Also, supplies of the domestic exported goods and foreign imported goods have to be perfectly elastic. Thus, these changes in the demand volume have no effect on their price levels (Caves et al., 1993, p. 327). The CA formula is;

$$CA = px - ep^*M \quad (3.1)$$

In the CA formula; “ $p$ ” is the domestic price level, “ $x$ ” is the volume of the domestic exports, “ $e$ ” is the nominal exchange rate, “ $p^*$ ” is the foreign price level and “ $M$ ” is the volume of domestic imports. The formula states that the “ $x$ ” is positively related with the exchange rate, which means when the exchange rate depreciates, the foreign residents will find domestic goods cheaper. This will create the CA surplus. On the other hand, the “ $M$ ” is negatively related with the exchange rates, which means when the exchange rate depreciates, the domestic residents will find foreign goods more expensive. Again, it will cause the CA surplus.

As the prices are assumed to be fixed, the effect of a change in the nominal exchange rate on the CA could be observed. In order to do that, the Marshall-Lerner condition has to be derived (Appleyard and Field, 1986, p. 54). Let’s divide both sides of the CA formula with respect to “ $e$ ”;

$$\frac{dCA}{de} = \frac{dx}{de} - e \frac{dM}{de} - M \quad (3.2)$$

Then assume that, initially, the CA was in balance, which means “ $x = eM$ ”. Now in the equation (3.3), the both sides will be divided by the “ $M$ ”;

$$\frac{dCA}{de} \frac{1}{M} = \frac{dx}{de} \frac{e}{M} - e \frac{dM}{de} \frac{1}{M} - 1 \quad (3.3)$$

This means;

$$\frac{dCA}{de} \frac{1}{M} = \eta_x + \eta_m - 1 \quad (3.4)$$

Therefore, the Marshall-Lerner condition states that, in the balanced CA, depreciation of the exchange rate will improve the CA only if the sum of the price elasticities of demand for exports and imports are greater than unity. There are two effects of the Marshall-Lerner condition. The first one is *the price effect* that means after the devaluation of the exchange rate, it worsens the CA as imports will become more expensive relative to exports. The second one is *the volume effect*, which means following the devaluation of the exchange rate, it improves the CA as exports will become cheaper relative to imports. However, it is argued that in the short-run the Marshall-Lerner condition may not hold. In the short-run, the price effect has a bigger influence on the CA than the volume effect. Therefore, after the devaluation of the exchange rate, the CA worsens and this causes an introduction to a new effect, which is a J-curve effect.

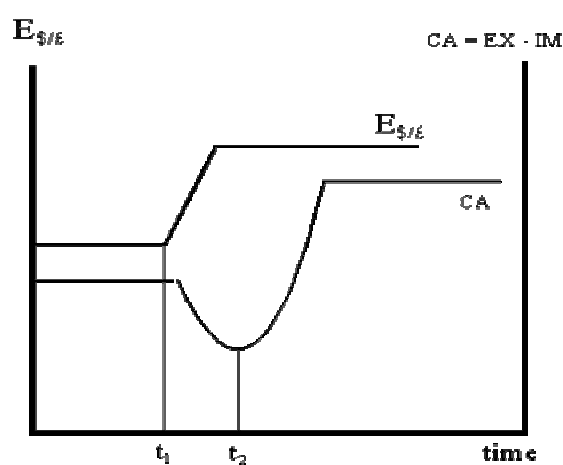
In conclusion, in the elasticities approach, the exchange value of the currency will depend on the elasticities of export supplied and import demanded. So, the domestic currency either will depreciate or appreciate according to the elasticities of export supplied and import demanded.

#### **3.4.1.2. J-Curve effect**

According to the J-curve effect, when the country faces a BOP deficit, to make the situation better, the depreciation of the domestic currency will not have an immediate effect on the BOP deficit, because of the less elasticity of imports demanded and exports supplied in the short-run. Thus, after the depreciation of the domestic currency, the quantities of imports demanded and exports supplied do not differ much. So, when the currency is depreciated, as an immediate effect, this will worsen the situation and the BOP deficit will become larger because higher prices on foreign imports will be greater than the reduced volume of imports. After some time passes, the BOP deficit becomes smaller and smaller and initially it comes to the balance and then, the BOP surplus occurs. On the

graph, this situation is pictured as the letter “J”. Thus, this phenomenon is known as J-curve effect that is shown in the Figure (3.1). The J-curve effect is not observed always, because when there is a depreciation in the exchange rate, its effect on the CA could be observed no earlier than one or two years. In this time interval, the exchange rate might have been appreciated again. So, the depreciation of the exchange rate will not have an immediate impact on the CA. Also, even income payments, receipts and unilateral transfers have small role on the CA determination; they can also affect the CA.

**Figure (3.1): The J-Curve Effect**



Source: Suranovic, 2006.

It is believed that the depreciation of the currency will have a positive effect on the BOP. This assumption is not valid for the short-run. However, for the long-run, elasticities of the imports demanded and the exports supplied are larger because households have more time to regulate their expenditures to the price changes. Therefore, the devaluation of the domestic currency is a helpful policy for the BOP corrections, in the long-run (Krueger, 1983, p. 39).

### 3.4.1.3. Exchange rate pass-through effect

The pass-through effects consider the ability of prices to adjust in the short-run. The time interval for the pass-through effect is when a change in the domestic currency's exchange value results in a change in the domestic and foreign prices. Thus, if the domestic currency depreciates, this will cause an increase in the prices of the imported



goods in the devaluating country and a decrease in the prices of the exported goods. On the other hand, if the domestic currency appreciates, this will cause a decrease in the prices of the imported goods and an increase in the prices of the exported goods. If prices do not respond in this manner, then, the policies that are conducted will not help to improve the situation of the BOP. The degree of pass-through effects changes across nations, time and industries. It is an important effect as it shows the effect of the change in the value of the domestic currency on the nation's BOP (Daniels and VanHoose, 2002, p. 262).

#### **3.4.1.4. Absorption approach**

The elasticities approach and the absorption approach are two of the oldest models that are used to determine the exchange rates. In the elasticities approach, main focus is on the prices of exported goods and imported goods. Those prices are used to maintain the BOP and the exchange rate. On the other hand, the absorption approach (absorption as an economic terminology means a nation's total expenditures on final goods and services) takes prices stable and concentrates on the changes in the real domestic income. Hence, the economists named the absorption theory as *a real income theory* that has a role in the determination of the BOP and the exchange rates. Also, as the prices are taken to be constant, this approach can be named as a short-run approach, because the prices cannot be constant in the long-run.

The mathematical expression of the absorption, which is represented by "*a*" is (Daniels and VanHoose, 2002, p. 265);

$$a = c + g + I + M \tag{3.5}$$

A country's expenditures consist of consumption expenditures (*c*), government expenditures (*g*), investment expenditures (*I*) and import expenditures (*M*). The other definition of the country's expenditures is the domestic absorption (*a*). So, the equation (3.5) shows the absorption of a country. Both components are used in real terms as the approach takes prices as constant.

$$y = c + g + I + x \tag{3.6}$$

On the other hand, a country's real income ("y", real income is a measure of the real expenditures on the nation's output of the final goods and services) is obtained by the sum of the consumption expenditures ( $c$ ), investment expenditures ( $I$ ), government expenditures ( $g$ ) and exports ( $x$ ). The equation (3.6) states the components of the "y".

$$CA = x - M \quad (3.7)$$

$$y - a = (c + g + I + x) - (c + g + I + M)$$

$$y - a = x - M$$

$$y - a = CA \quad (3.8)$$

In the 1950s and 1960s, when the elasticities and the absorption approaches were developed, capital flows were not under consideration. However, the CA was the center of the attention. In the absorption approach, the CA is the difference between foreign real expenditures on exports and domestic real expenditures on imports, as it is implied in the equation (3.7). Hence, when the domestic absorption is subtracted from the real income, the real expenditures on exports minus the real expenditures on imports is reached, which is the CA. Therefore, the standard equation of the absorption approach is the real income minus the absorption that is equal to the CA, as it is stated in the equation (3.8).

As a result, if a country produces more output than it absorbs, then, the country will face with a CA surplus. On the other hand, if a country produces less output than it absorbs, then, the country will counter a CA deficit. Contrary to this, if a country produces the same output than it absorbs, then the country will experience a CA balance (Husted and Melvin, 1995, p. 425).

The absorption approach is a beneficial model that helps to understand the behavior of a country's CA balance and the exchange value of its currency during eras of economic expansions and economic contractions. If a country experiences an economic expansion, as households become wealthier, they will spend more on imported goods and services. So, the volume of the import will be greater than the volume of the export. This will cause a CA deficit. In order to improve the CA, domestic currency needs to depreciate. By this way, the amount of exports will increase relative to the amount of imports. Contrary to this, if a country experiences an economic contraction, as households become poorer, they

will spend less on imported goods and services. This will cause a CA surplus and for improving the situation, the domestic currency will appreciate.

In the real world, the economy does not reflect in the same manner as it is stated above. At this point, the absorption approach helps us to understand the real economic environment (Daniels and VanHoose, 2002, p. 267). Assume that a country experiences an economic expansion (increase in the real income and the absorption), in the real world; it is not clear that whether the country will face with the CA deficit or surplus. This depends on which element, the real income or the absorption, inclines faster than the other. According to the absorption approach, if a country faces an economic expansion and if the real income of the country increases faster than the absorption, then as exports rises relative to imports, the country will have the CA surplus and the domestic currency will appreciate. However, if the absorption increases faster than the real income of the country, then as imports rises relative to exports, the country will have the CA deficit and the domestic currency will depreciate. Finally, as the absorption and the real income of the country rise at the same proportion, then the CA will be in balance and the exchange value of the currency will not change. Contrary to this, if a country experiences an economic contraction and if the real income of the country decreases faster than the absorption, then as exports decline relative to imports, the country will have the CA deficit and the domestic currency will depreciate. On the other hand, if the absorption goes down faster than the real income of the country, then as imports decrease relative to exports, the country will have the CA surplus and the domestic currency will appreciate. Finally, as the absorption and the real income of the country decline at the same proportion, then the CA will not change and the exchange value of the currency will not differ.

According to Harry Johnson (Caves et al., 1993, p. 373); “...the new insight gained from the “absorption” terminology was that a country that is in deficit, and so spending more than it is earning, is decumulating international reserves. Over time, this change in the stock of reserves has implications for the money supply and thus for expenditure itself. These lead to the monetary approach to the balance of payments.” As it is meant in this quotation, the existence of the absorption approach leads to existence of the monetary approach to the exchange rate determination.

### 3.4.2. The purchasing power parity (PPP)

In previous models, the elasticities and the absorption approaches, the theory of determination of exchange rates and BOP are restricted to the CA. However, by the beginning of the 1970s, as financial flows put into account, the KA transactions begin to be considered in the theory of determination of exchange rates and BOP.

The PPP's roots went back to the Salamanca school in the 16<sup>th</sup> century Spain and the writing of Gerrard de Malynas appearing in 1601 in England. The PPP, first, was named by the Swedish economist Gustav Cassel. Cassel said that (Hoontrakul, 1999, p. 5); *“Without purchasing power parity theory, there would be no meaningful way of discussing over and undervaluation of exchange rates.”*

Even if the PPP theory is applied for long years, the economists are still not sure about its complete validity. The PPP theorem implies that for a small country, the fixed exchange rate maintains the domestic price level, however, under the flexible exchange rate, the domestic price level sustains the exchange rates and the purchasing power over goods remains unchanged (Krueger, 1983, p. 64).

There are two types of the PPP that take place in the theory of the PPP approach; the absolute purchasing power parity (aPPP) and the relative purchasing power parity (rPPP).

$$p_i = ep_i^* \tag{3.9}$$

The equation (3.9) shows aPPP. The variables are “ $p_i$ ” (the price of the  $i$  commodity at home), “ $p_i^*$ ” (the price of the  $i$  commodity abroad) and “ $e$ ” (nominal exchange rate). There are some assumptions for aPPP to hold. If prices of goods are equal across countries and if the same goods are weighted same in each country's market basket, then, the aPPP will hold. Also, there are some other requirements for the aPPP to hold. The first one is the existence of the law of one price (the law of one price means that when computed in a common currency, freely traded commodities should be priced the same everywhere under perfect market setting assumptions) (Hoontrakul, 1999, p. 6), so the transaction cost must be zero, the second one is no barriers, no tariffs, no taxes and no quotas, the third one is two price levels of two countries must consist of homogeneous

goods and the fourth one is existence of complete certainty of the economic environment (Isard, 1978, p. 60). However, as these assumptions cannot be easily sustained in the real life, the rPPP was developed.

The mathematical expression of the rPPP is;

$$\% \Delta e = \% \Delta p - \% \Delta p^* \quad (3.10)$$

$$\% \Delta e = \pi - \pi^* \quad (3.11)$$

The equation (3.10) states that the percentage change in the exchange rate is equal to the difference between the percentage changes in the price levels of the home country and abroad. In addition to this, the equation (3.11) implies that the percentage change in the exchange rate is equal to the difference between the inflation rates at home country and abroad, respectively. Also, the equation (3.11) will be used in the sixth chapter as one of the parts of the long-run monetary model that is tested. As there are some assumptions for the aPPP to hold, also, there are some requirements for the rPPP to hold. The requirements are perfect market setting, complete information about the foreign exchange, the domestic exchange and goods markets and constant equilibrium in real exchange rate.

There are some deviations from the PPP condition. The productivity rates between countries create some differences in real exchange rates. If a nation's productivity rate increases in a home country, this will lead to an appreciation of the domestic currency relative to the foreign currency or vice versa. The components that cause the changes in the productivity rates are changes in the technology, tastes, commercial policies and growth in the labor force. In addition to this, the economy does not adjust in the same speed in both goods and assets markets. In the short-run the goods' prices can be sticky, the labor wages can be decided by long-term contracts, the imperfect competition may arise in the product market, the capital flows that are determined by the international fiscal and monetary policies can affect the countries' economic environment differently and different commodity baskets in different countries may cause the PPP not to be valid in the short-run, but in the long-run, there can be some instances that PPP might hold (Hoontrakul, 1999, p. 8).

In conclusion, the PPP is a theory of a link between domestic and foreign prices of goods and services and exchange rate. There are two types of the PPP. First one is aPPP that chains price levels and exchange rates. In order aPPP to hold, several assumptions, which are existence of law of one price, no transaction costs, no barriers, no tariffs, no taxes, no quotas and two price levels of two countries must consist of homogeneous goods, must hold. The other type of the PPP is rPPP, which relates price changes and changes in the exchange rates. Validity of rPPP is also based on several assumptions including perfect market setting, complete information about foreign and domestic exchange and goods markets and constant equilibrium in real exchange rate. As a result, it is stated that the neither form of PPP holds in the short-run, however, some studies proved the validity of PPP in the long-run (Holmes, 1967, p. 687).

### **3.4.3. The interest rate parity condition (IRP)**

After the existence of the flexible exchange rates, in order to determine exchange rates, the asset markets are taken into account, too. There emerges an increasing attention to the role of the expectations and the forward markets, which are the best accessible markets that answer to the role of expectations. So, this condition takes into account the asset market. The IRP approach, like the PPP, also follows the essence of the law of one price. Also, it accepts that perfect capital mobility and perfect capital substitutability exist between countries (Hoontrakul, 1999, p. 9). The IRP approach divides into two components as the covered interest rate parity (CIRP) and the uncovered interest rate parity (UIRP). The components emphasize how the IRP approach determines the exchange value of domestic and foreign currencies.

#### **3.4.3.1. The covered interest rate parity (CIRP)**

The CIRP states that there will be no gain in borrowing or lending in one country's asset market than the other country's asset market, as the interest rate is hedged due to the exchange rate risks.

The mathematical expression of the CIRP is;

$$i - i^* = f - s \tag{3.12}$$

In the equation (3.12), “ $i$ ” implies the nominal interest rate at home, “ $i^*$ ” states the nominal interest rate abroad, “ $f$ ” shows the forward exchange rate and “ $s$ ” indicates the spot exchange rate. Thus, according to the formula, the difference between the interest rate on a domestic financial tools and the interest rate on a foreign financial tools, whose characteristics are same, such as time to maturity, is equal to the forward premium.

There are some deviations from the CIRP and the reasons are the existence of the transaction costs, political risk, potential tax advantages and the liquidity preferences between countries (Levi, 1990, p. 276). Based on some studies, in the short-run, as the above assumptions may be held fix, the CIRP holds, but there are not exact findings for the long-run validity of the CIRP, as the above assumptions may not be fixed. According to the CIRP, while giving any decision about the economical issues, all financial markets (foreign exchange, money and forward markets) have to be taken into account. Therefore, if the central bank attempts to stabilize its own currency, it has to take into account the relation between the foreign exchange markets, the money markets and the forward markets, because of the CIRP.

### **3.4.3.2. The uncovered interest rate parity (UIRP)**

The UIRP condition is an unhedged interest rate parity condition and is a term that is used in the rational expectations framework. So, the forward exchange rate is strongly affected by the individuals’ behaviors about the new information that they get from the market expectations.

The mathematical expression of the UIRP is;

$$i - i^* = E (s_{t+1} - s_t) \tag{3.13}$$

In the formula; “ $i$ ” implies the nominal interest rate at home, “ $i^*$ ” states the nominal interest rate abroad, “ $s_{t+1}$ ” is next years’ spot exchange rate and “ $s_t$ ” is this years’ spot exchange rate. The equation (3.13) states that if the capital markets are integrated, the interest rate differences between the domestic and foreign financial instruments, which are same in all characteristics, such as time to maturity and exchange rate risk, must be equal to the expected difference between the next years’ spot exchange rate and this years’ spot

exchange rate. Also, the other component of the long-run monetary model that will be tested in the sixth chapter is the UIRP.

In order the UIRP to hold (Isard, 1978, p. 76), the country risk premium and the exchange rate risk premium have to be eliminated. There have to be perfect capital flow, no transaction costs and no simultaneity induced by the monetary authorities. Also, the CIRP has to be valid. The individuals' expectations about the future spot rate are not easily measured. In addition to this, according to the UIRP to hold, expected changes in the nominal exchange rate must be positively related to the differences in the nominal interest rate across countries. In conclusion, there are problems about the validation of the UIRP as the forward risk premiums cannot be eliminated, the exchange rate risk premium may be entirely diversifiable from country to country and as most countries employ different monetary policies.

#### **3.4.4. The monetary approach**

In previous approaches, especially in the elasticities and the absorption approaches, the BOP and the exchange rate determination are made by the help of the transactions in goods and services markets and the financial markets are omitted. However, after the broke down of the Bretton Woods system, in order to determine the BOP and the exchange rate, economists begin to use the floating exchange rates and the greater integration of goods and financial markets across economies. Therefore, the monetary approach is one of these new approaches and here, money will be examined as a main determiner of the BOP and the exchange rates. The monetary approach is divided into four parts, which are the Mundell-Fleming model, the Dornbusch's sticky-price model, the flexible-price monetarist model and the portfolio approach.

##### **3.4.4.1. Mundell-Fleming model**

The Mundell-Fleming model is an open economy version of the IS-LM model, which is a classical Keynesian closed economy model. In this model, there is a capital flows between countries. In the monetary approach, money, foreign exchange and goods markets are all in equilibrium in the long-run. In the model, the other assumptions are no



exchange rate risk premium, holding of the UIRP and the PPP, fixing the prices in the long-run and also, there is underemployment at a constant price level (Hoontrakul, 1999, p. 13).

In the model, the goods market is represented by the IS curve. IS curve is an Investment-Saving curve, which has a negative slope. The curve shows the relation between the nation's income and the interest rate. The equilibrium nominal interest rate implies that aggregate expenditure is equal to the nation's income. The mathematical representation of the IS curve is;

$$y + M = c + I + g + x \quad (3.14)$$

The equation (3.14) implies that in the goods market, the sum of the domestic national income ( $y$ ) and the amount of imports ( $M$ ) is equal to the sum of the consumption expenditures ( $c$ ), investment expenditures ( $I$ ), government expenditures ( $g$ ) and the amount of the exports ( $x$ ).

On the other hand, in the model, the money market is shown by the LM curve. The LM curve is a Liquidity Money curve, which has a positive slope. The curve implies the relation between the nation's income and the interest rate. In the equilibrium, the quantity of money demanded is equal to the quantity of money supplied.

$$M^D / p = f(y, i) \quad (3.15)$$

In the LM curve, the quantity of money supplied is autonomous. The equation (3.15) states that the quantity of money demanded is affected positively by the nation's income ( $y$ ) and negatively by the nominal interest rate ( $i$ ). In the equilibrium condition, the quantity of money demanded is equal to the quantity of money supplied.

Contrary to the closed economy IS-LM model, in the Mundell-Fleming model, there is a foreign exchange market and a FE (the foreign exchange) curve;

$$BOP = CA + KA = 0 \quad (3.16)$$

The equation (3.16) shows the FE curve. The *BOP* is actually equal to the current account (*CA* is a function of real income and the exchange rate), the capital account (*KA* is a function of the interest rate differential between the home country and foreign countries) and the official reserves account (ORA). However, the ORA is supposed to be zero. The FE curve also has a positive slope. The steepness of the slope depends on the capital mobility between countries.

Another useful aspect of the Mundell-Fleming model is the explanation of the efficiency of monetary and fiscal policies under both the fixed exchange rate regime and the flexible exchange rate regime (Froyen, 2005, p. 344). Under the assumption of the perfect capital mobility and the fixed exchange rate regime, monetary policy is completely ineffective in influencing national income. In addition to this, under flexible exchange rate regime, fiscal policy is completely ineffective in affecting the national income. On the other hand, under the imperfect capital mobility and the fixed exchange rate assumption, depending on the degree of the imperfect capital mobility, monetary policy may be more effective than fiscal policy. In adding to this, under flexible exchange rate regime, fiscal policy is more effective than monetary policy in effecting the national income.

In conclusion, according to the Mundell-Fleming model, the *CA* balance can be maintained by increasing real income or depreciating exchange rate. Also, the *KA* can be improved by depreciating exchange rate. Consequently, for a stable real income, the *BOP* can always be enhanced by increasing the interest rate or government spending or decreasing taxes. On the other hand, for a given *BOP*, increase in the interest rate and the level of government spending will increase the nation's real income.

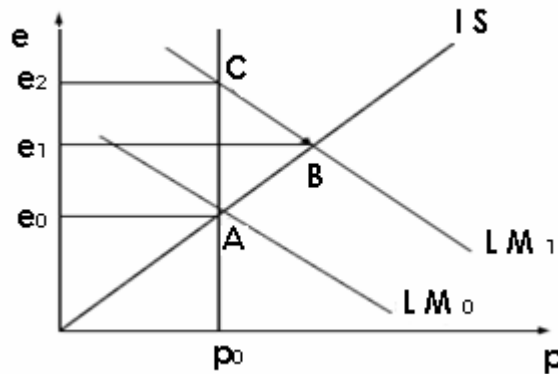
The model also has some deficiencies (Krueger, 1983, p. 85). It covers the short-run adjustments, therefore, for the long-run, the expected improvements may not be observed in the economy. Moreover, the behavior of the capital inflows and outflows are rather insufficient for making straightforward conclusions about the economy that are made in the model. Nevertheless, it did very considerable contributions to the economic theory by saying that the *BOP* consists of not only *CA* but also *CA* and *KA*, so it put the capital flows into focus. By replacing the assumption of price fixity with price stickiness, the new model, the Dornbusch's exchange rate overshooting model occurred.

#### **3.4.4.2. The Dornbusch's sticky-price monetary model**

The sticky-price monetary model was developed by Dornbusch. The model covers the short term overshooting of the nominal and real exchange rates above their long-run equilibrium levels, under the assumptions of the sticky goods' prices in the short-run, quickly adjustable prices in the financial markets, perfect capital mobility, endogenous interest rates, being at full employment level, flexible exchange and interest rates, holding of the UIRP in the short-run and the PPP in the long-run. Therefore, based on these assumptions, the Dornbusch's overshooting model tries to find answers to the question why exchange rates have a high variance (Hoontrakul, 1999, p. 16).

The mechanism of the Dornbusch's overshooting model is as follows and shown in Figure (3-2) (Sarno and Taylor, 2002, p. 104); initially the economy is in equilibrium at point A. Then, suppose there is an expansionary monetary policy (for instance increase in the money supply), for this reason, the economy will need to go to a new equilibrium point, which is point B. However, after the positive shock in the economy, as goods prices are sticky in the short-run, the new equilibrium will probably be achieved by the quick changes in the financial market prices and this will cause an overvaluation of the exchange rate. The short-run equilibrium point will be the point C, when the UIRP holds. Thus, after some time passes, the goods price will response to the positive shock in the economy and will not be sticky anymore. For this reason, the economy will come to the long-run equilibrium point, which is point B. At point B, the financial market prices will decrease not to the initial levels but to the original levels and a new long-run equilibrium will be attained between money and financial markets and the supply of goods. In other words, in order to achieve new short term equilibrium, the financial market will initially overreact to a change in money supply, but over time, goods prices will also respond to these changes and the economy as a whole will settle on a new long-run equilibrium.

**Figure (3.2):** The Dornbusch's Sticky-Price Monetary Model



Source: Froyen, 2005, p. 345

To conclude, the Mundell-Fleming model and Dornbusch's sticky-price monetary model have some differences (Sarno and Taylor, 2002, p. 105). Holding of the UIRP condition is common in both models. For simplicity, output is fixed in the overshooting model. Unlike in the Mundell-Fleming model, output is no longer demand determined and excess aggregate demand guides toward inflation rather than output. Also, for simplicity, the real income is fixed in the short-run in the Dornbusch's sticky-price monetary model. If output is assumed to be at the natural level in the long-run and interest rates have to be at the level of foreign interest rates, there is money neutrality in the model. Also, the reason why the PPP holds in the long-run is the money neutrality. After discussing the Mundell-Fleming model and the Dornbusch's sticky-price model, the flexible-price monetary model comes into account.

#### **3.4.4.3. The flexible-price monetary model**

The monetarist model's roots trace back to the philosopher David Hume and his famous price specie flow model (Krugman and Obstfeld, 2006, p. 492). This model takes place in the Mercantilist era and based on the analysis to have a continuously favorable balance of trade. According to the model, a nation has a BOP surplus and this increases the amount of exports. However, after some time passes, the general level of prices begins to rise and this causes exports to decline and imports to rise. This procedure will continue until trade imbalances corrected.

The flexible-price monetary model is a leading exchange rate model that affected the floating exchange rate in the 1970s. It is also called the monetarist model. First of all, the three standard equations of the sticky-price model have to be considered, in order to realize the relationship between the three models that are the Mundell-Fleming model, the sticky-price model and the flexible-price model.

$$\dot{s} = i - i^* \quad (3.17)$$

$$m = p + k\bar{y} - \theta i \quad (3.18)$$

$$\dot{p} = \gamma[\alpha + \mu(s - p) - \bar{\gamma}] \quad (3.19)$$

In the equations, “ $i$ ” is the nominal interest rate at home, “ $i^*$ ” is the nominal interest rate abroad, “ $m$ ” is the money supply at home, “ $p$ ” is the domestic price level and “ $\bar{y}$ ” is the fixed real income at home. According to the equations, it is assumed that output is at its natural level. However, in the flexible-price monetary model, prices, contrary to the Mundell-Fleming and the Dornbusch’s overshooting model, are flexible. This means that changes in the exchange rates have to be straightly related with the changes in the price levels not only in the short-run but always. Therefore, this means the PPP will hold continuously.

The considerable differences between the three models are as follows (Sarno and Taylor, 2002, p. 108): In the Mundell-Fleming model, prices are held constant and output is demand determined. In the Dornbusch’s overshooting model, prices are sticky and adjust slowly to the excess demand, whereas, in the long-run, output is at its natural level. In the flexible-price monetary model, prices are flexible and adjust immediately to the excess demand and output is at its natural level.

At the beginning, the monetarist model defines the exchange rate as a relative price of two monies. Then, the relative price is modeled in terms of the relative supply of and demand for these monies. So, the money market equilibrium for the domestic and foreign countries is emphasized as follows;

$$m_t = p_t + \kappa y_t - \theta i_t \quad (3.20)$$

$$m_t^* = p_t^* + \kappa^* y_t^* - \theta^* i_t^* \quad (3.21)$$

In the equations, “ $m$ ” is the money supply at home, “ $p$ ” is the domestic price level, “ $y$ ” is the real income at home, “ $i$ ” is the nominal interest rate at home and the variables with asterisks represent the foreign country variables. Another assumption for understanding the flexible-price monetary model is the exogenously determined domestic interest rate in the long-run because of the perfect capital mobility assumption. Also, holding of the continuous rPPP is assumed. In addition to these, the income elasticities and interest rate semi-elasticities of money demand are the same for the domestic and foreign countries. So, under all these assumptions, the basic equation for the flexible-price monetary model is (Sarno and Taylor, 2002, p. 109);

$$s_t = (m_t - m_t^*) - \kappa(y_t - y_t^*) + \theta(i_t - i_t^*) - (p_t - p_t^*) \quad (3.22)$$

The equation (3.22) states that an increase in the domestic money supply leads to a depreciation of the domestic currency in terms of the foreign currency. In other words, this will cause an increase in the nominal exchange rate ( $s_t$ ) expressed as the domestic price of the foreign currency. On the other hand, an increase in the domestic real income will imply an appreciation of the domestic currency in terms of the foreign currency.

In conclusion, as the flexible-price monetary model is widely used for the determination of the exchange rates; many assumptions have to be considered in order to reach to a conclusion. This environment may not be observed in the real world. Also, although the flexible-price monetary model focuses on only the money market; in the open economy macroeconomics, totally, there are six markets that are goods, labor, domestic bonds, foreign bonds, money and foreign exchange markets. For this reason, by taking only one market into consideration, the aggregate effects of the other markets are eliminated. In general, the flexible-price monetary model explains the significant issues of its time (the time in which this model was developed), however, because of having so many assumptions, the model is criticized for being inapplicable, but, it is still used (Daniels and VanHoose, 2002, p. 287; Sarno and Taylor, 2002, p. 110). In the sixth chapter of this thesis, this approach will be tested empirically, by taking into account the examples of Turkey, Taiwan, Brazil and Argentina.

#### 3.4.4.4. Portfolio approach

In the portfolio approach different than the monetary approach, households do not only hold their wealth in money but also in addition to money they hold domestic and foreign securities. So, according to the portfolio approach, the value of the domestic currency is determined by the quantity of money and domestic and foreign securities demanded and the quantity of money and domestic and foreign securities supplied, at least in the short-run. There may be different financial variables that are used in the determination of the exchange value of the domestic currency, but here, three types of them; domestic money, domestic bonds and foreign bonds will be used (Hoontrakul, 1999, p. 17). This type of diversification comes from the assumption of imperfect substitutability of the capital. However, in the previous models, which are the sticky-price monetary model and the flexible-price monetary model, the perfect substitutability of the capital is assumed (Sarno and Taylor, 2002, p. 115).

According to the portfolio approach, although there is a gain in holding bonds, which is the interest rate, there is no gain in holding money. In addition to this, public do not have any need to hold the foreign currency as they can easily find it in the spot exchange market while they are attending to a foreign transaction. The money is the risk free element whereas the bonds involve the risk element. Because of this, in order to minimize the effects of risks and maximize the effects of returns, public shares its wealth ( $w$ ) into domestic money ( $m$ ), domestic bonds ( $b$ ) and foreign bonds ( $b^*$ ) (all are in nominal terms), as it is shown in the equation (3.23) below;

$$w = m + b + eb^* \quad (3.23)$$

In order to see the effect of the portfolio approach in the exchange rate determination, the effects of the change in the domestic money stock and the change in the foreign interest rate will be analyzed.

The mechanism of the portfolio approach is as follows (Daniels and VanHoose, 2002, p. 298); assume that the nation's central bank desires to increase the domestic money stock through the open market purchases of the domestic bonds, this results increase in the domestic money supply and causes the domestic interest rate to decrease. As there is a

decrease in the domestic interest rate, households decide to redistribute their wealth decrease the amount of domestic bonds that they demand. The amount of wealth that households have does not change, just the allocation of the wealth changes, so, as the amount of the domestic bonds demanded decreases, the amount of the foreign bonds and the amount of the domestic money stock increase. The increase in the demand for foreign bonds raises the demand for the foreign currency, therefore, the value of the spot exchange rate increases and this depreciates the domestic currency.

According to the portfolio approach (Krueger, 1983, p. 88), a decrease in the domestic interest rate causes depreciation of the exchange value of the domestic currency. Contrary to this, an increase in the domestic interest rate causes appreciation of the exchange value of the domestic currency. In addition to this, the open market purchases of securities results in depreciation of the domestic currency whereas the open market sales of securities causes an appreciation of the domestic currency. On the other hand, as there is an increase in the foreign interest rate, public increase the amount of the foreign bonds that they have and decrease the amount of the domestic bonds and the amount of the domestic money demanded. As the purchases of the foreign bonds increase, the demand for the foreign currency increases. This causes an increase in the spot exchange rate and depreciation of the domestic currency. To conclude, according to the portfolio approach, increase in the foreign interest rate results in a depreciation of the domestic currency. However, decrease in the foreign interest rate results in an appreciation of the domestic currency.

In conclusion, even if the portfolio approach covers the public's wealth in a larger perspective, it has not got much attention in the economic literature as the monetary models do. The reason behind that might be the hardness of constructing the portfolio approach in the real world. The data set for domestic and foreign bonds cannot be found easily and also, even if sufficient data is found, maybe, the data will not be on bilateral basis (Sarno and Taylor, 2002, p. 132).

### **3.4.5. Sterilization**

The nation's central bank sometimes sterilizes its interventions. However, the amount and the time of the sterilization depend on its effects on the domestic currency. The



sterilized foreign exchange interventions both under the monetary and the portfolio approaches will be discussed.

As mentioned above, under the monetary approach, the exchange value of the domestic currency is determined by the change in the quantity of money demanded and the quantity of money supplied. In the monetary approach (Husted and Melvin, 1995, p. 445), by the help of the foreign exchange market intervention, an increase in the foreign exchange reserves (FER) causes a multiple increase in the money stock through the money multiplier. By the sterilization, there will be an open market sale of the financial instruments, which will result in a decrease in the domestic credit (DC). The decrease in the DC will be at the same amount of the increase in the FER. So, as a conclusion of these transactions, the domestic money stock will remain constant. There will be no change between the quantity of money demanded and the quantity of money supplied. Thus, under the monetary approach, totally sterilized foreign exchange intervention will be unsuccessful as there will be no difference in the exchange value of the domestic currency. On the other hand, under the portfolio approach, the exchange value of the domestic currency is determined by the quantity of money and domestic and foreign securities demanded and supplied. In the portfolio approach (Husted and Melvin, 1995, p. 447), when the nation's central bank purchases the FER, it increases the demanded amount of the foreign bonds. The increase in the amount of the foreign bonds demanded causes an increase in the demand for foreign currency. This increase in the amount of foreign currency leads to a depreciation of the domestic currency. By the purchases of the FER, the money stock will multiply increase through the money multiplier. At this point, the nation's central bank sterilizes the intervention by the open market sale of the DC. The decreasing amount of the DC will be exactly the same as the increasing amount of the FER, so the domestic money stock will be constant. On the other hand, the open market operations will cause an increase in the quantity of domestic bonds accessible. Thus, the sterilized foreign exchange intervention reasons an exchange of domestic bonds for foreign bonds. Under the portfolio approach, fully sterilized foreign exchange intervention will cause an exchange of the domestic bonds for foreign bonds and this leads to a depreciation of the exchange value of the domestic currency. Therefore, under the portfolio approach, the sterilized foreign exchange intervention is effective.

Many economists believe that sterilized foreign exchange interventions may have two types of effects on the exchange rates: (1) the portfolio balance effect and (2) the announcement effect (Daniels and VanHoose, 2002, p. 302). First one is *the portfolio balance effect*. In the portfolio balance effect, if a foreign exchange intervention decreases the supply of the domestic assets compare to the foreign assets, then the expected gain from domestic assets decrease and as a result, the exchange value of the domestic currency appreciates. Thus, in the portfolio balance effect, the open market purchases of the domestic currency causes appreciation of the exchange value of the domestic currency. The second effect is *the announcement effect*. In the announcement effect, if a nation's central bank announces that they plan to involve in a future anti-inflationary policy by contracting its money stock, the traders may believe this message and will suppose a future appreciation of the domestic currency. For this reason, they will increase their demand for the domestic currency. This increase in demand may cause an actual appreciation of the domestic currency. Hence, in the announcement effect, the intervention of the monetary authorities may cause an increase in the exchange value of the domestic currency. Studies carried out by Kathryn Dominguez of Harvard University and Jeffrey Frankel of the University of California at Berkeley implied that during 1980s and 1990s, in the years that the national central banks conducted numerous interventions, the announcement effect had bigger effects on the exchange rates rather than the actual level of the intervention.

As a result, the portfolio balance effect and the announcement effect have remaining conclusions at least in the short-run.

### **3.5. Conclusion**

In this part of the study, the theories that are used in the exchange rate determination through out the economic history were gone over. The initial theories mainly focus on the CA, but at the time of the 1970s, when the worldwide economy experienced big crises like OPEC crisis, the authorities realized the importance of the capital flows. For this reason, after that time, the exchange rate theories, which are the PPP condition, the IRP condition, the monetary approach and the portfolio approach, cover also the KA. Thus, it seems like the exchange rate determination theories divide into parts as the ones which consider the CA and as the other ones which consider both the CA and the KA.

The very early theory of the exchange rate determination, which uses the CA, is the elasticities approach. The theory mainly focuses on the effects of the changes in the price levels of the goods and services on the determination of the country's BOP and its exchange rate. The theory put lots of assumptions into consideration. All assumptions of the effects and the approaches were already discussed in this chapter. However, this approach has some defects. The assumptions that are considered for the theory to be applicable in the real world are not very acceptable. Thus, by the elasticities approach, determining the exchange rate is only made on the theoretical basis. The effects that put the CA into center are the J-curve effect and the pass-through effect. Also, these effects are not observed in all countries and always, as the changes in the exchange rates and their effects on the BOP occur in different time intervals. Also, not only the exchange rate changes, but also the changes in the income payments, receipts and unilateral transfers may have some functions for affecting the BOP. The second approach is the absorption approach. Same as the elasticities approach, the conditions, such as constant prices, that are assumed in this theory are not very appropriate to the real world. Therefore, it is realized that the theories, which take into account only the CA, are not very suitable to the exchange rate determination, so, at this point the capital flows began to be taken into account.

The theory that considers both the CA and the KA is the monetary approach. In order to cover the monetary approach, firstly, the PPP and the IRP conditions must be mentioned. These two conditions are used in the flexible-price monetary model. The PPP is separated as aPPP and rPPP. When compare the aPPP with the rPPP, it is obvious that the rPPP is more applicable condition than the aPPP based on the assumptions it takes into account. Thus, the rPPP is used as one of the components of the flexible-price monetary model that is tested, empirically, in the sixth chapter. Generally, the PPP is criticized for not having valid conditions for the exchange rate determination as its assumptions are hardly found in the real world. After the PPP, when the asset markets began to be considered for the exchange rate determination, the role of the forward markets exists. Thus, it brings the IRP on the stage. The IRP condition is also divided as the CIRP and the UIRP. Again, the CIRP and the UIRP have some hardly applicable assumptions to the real economical world. The UIRP is the one other variable in the flexible-price monetary model that will be exercised in the sixth chapter.

The monetary approach, different than the other approaches, considers the equilibrium in money, foreign exchange and goods markets. It covers four models. First one is the Mundell-Fleming model. Based on the above mentioned assumptions, the positive aspect of the model is; it makes clear the necessity of the monetary or the fiscal policies under the fixed or flexible exchange rates. On the other hand, the negative aspect is; it has lots of limitations and is not valid in the long-run. The other one is the Dornbusch's overshooting monetary model. Here, the prices are not flexible. Step by step, the assumptions that are adopted by these models have become more suitable to the real world. The assumptions that are accepted by this model are more appropriate to the reality, however, some of the empirical studies prove that the sticky-price monetary model is weak, when the data period is extended beyond the late 1970s (Sarno and Taylor, 2002, p. 124). For instance, the reports of Driskell (1981) suggest that the sticky-price monetary model for the Swiss franc-US dollar rate over the sample period 1973-1993 has approving results. However, Backus (1984) finds little relationship for the US dollar-Canadian dollar data for the period 1971-1980. The third model of the monetary approach is the flexible-price monetary model. The scientific studies states that the flexible-price monetary model is some cases supports the data and in some other cases do not support the data (Sarno and Taylor, 2002, p. 123). One of the studies implies that there is strong evidence for the flexible-price monetary model for the German mark-US dollar exchange rate during the German hyperinflation of the 1920s. On the other hand, another study states that beyond the late 1970s, for the German mark-US dollar exchange rate the estimation results do not support the flexible-price monetary model. The last approach of the exchange rate determination is the portfolio approach. In the model, the domestic money, the domestic and the foreign securities is considered. Initially, this theory was also very popular in the economic arena, however, after some time passed, it was understood that collecting the data for the domestic and foreign bonds is not an easy job. Therefore, this theory lost its popularity.

By the needs of the economic era, lots of different exchange rate determination theories have been used through out the economic history. The validity of the approaches is always being criticized among the economists. The main criticism is about their unrealistic assumptions that do not fit with real world. Therefore, it may not be claimed that these approaches directly determine the exchange rates. Also, all approaches are short-

run approaches, so, the validity of them might not be mentioned in the long-run. In addition to these, taking prices as fix may only be applicable for some of the industries. Even this thesis covers all exchange rate theories theoretically; the flexible-price monetary model will be conducted empirically in the sixth chapter.

The following chapter will discuss the exchange rate policies. Especially, the advantages and the disadvantages of the fix, the floating and the managed float exchange rate regimes.

## CHAPTER 4. EXCHANGE RATE POLICIES

### 4.1. Introduction

In chapter two, the history of the monetary systems was analyzed. Chapter three focused on the exchange rate theories and this chapter will study the exchange rate policies. The exchange rate policies occur due to the needs of the exchange rate theories and the economic environment. The two basic exchange rate policies are the floating exchange rate policy, which is also called flexible exchange rate policy, and the fixed exchange rate policy. Besides to the floating and the fixed exchange rate policies, there are also some other types of the exchange rate policies that their meanings and emergences in the history of the monetary systems were analyzed in the second chapter, and they are as follows (Frankel, 2004, p. 92);

#### A. Floating corner

1. Free floating
2. Managed floating

#### B. Intermediate regimes

3. Band
  - 3a. Bergsten-Williamson target zone (fundamental equilibrium exchange rate)
  - 3b. Krugman-ERM target zone (fixed nominal central parity)
4. Crawling peg
  - 4a. Indexed
  - 4b. Preannounced crawl (tablet, in Spanish)

#### 5. Basket peg

#### 6. Adjustable peg

#### C. Firm fix corner

7. Currency board
8. Dollarization (or eurozation)
9. Monetary union

This list goes from above to the bottom as being the most flexible to the most rigid exchange rate policy. Nine different types of the exchange rate policies are divided into

three extensive parts, which are floating corner, intermediate regimes and fix corner. The target zone is defined according to the size of the borders. The crawl is named according to the speed of the adjusting exchange rate. The basket peg is denoted to the number of the currencies in the basket and all currencies are publicly known. The adjustable peg countries fix their currencies to another country's currency and in this system, the amount of the shock is essential to generate the change in the parity.

As it is classified in the International Financial Statistics of the IMF, the countries are classified according to the exchange rate policies they obtain (Frankel, 2004, p. 95) and they are listed as follows;

As of 2004, there are forty-eight countries in the fix corner. The twelve of them are the members of the European Monetary Union (EMU), thirty-six of them are the developing countries, which are also defined as transition economies. Of these thirty-six countries; eight are dollarized countries, which are Ecuador, El Salvador, Panama, four South Pacific Island countries and San Marino, where the legal inclination is the Italian lira but not the US dollar, twenty are in the monetary unions, in which six are in the Eastern Caribbean Union and fourteen are in the CFA franc zone, and the remaining eight are in the currency boards.

Based on the 2004 statistics, the ninety-eight members of the IMF are classified in the intermediate regimes. The twenty-nine of these countries pursue the conventional fixed peg arrangements. The ten of them use the basket peg arrangements. The sixteen of them are the members of the exchange rate bands or crawls and they are divided as five countries in the horizontal bands (four of them are developing countries and the last one is the Denmark, which is the remainder of the EMU), four countries in the crawling pegs and there are seven countries in the crawling bands. Finally, there are forty-three countries, which are classified as using managed float exchange rate policy that means having a flexible inclination in the foreign exchange market, but with using de facto targeting and government intervention that it has to be named as an intermediate regime.

Lastly, based on the 2004 statistics, forty countries are classified as having flexible exchange rate policy. The nine countries are the fully industrialized countries and the remaining thirty-one countries are the middle income, developing or the transition economies' countries.

In conclusion, according to the IMF statistics, based on the year of 2004, there are forty-eight countries in the fix corner, ninety-eight countries in the intermediate regime and forty countries in the floating corner. In the following chapter, in the selected testing countries, which are Turkey, Taiwan, Brazil and Argentina, what kind of exchange rate policies are applied will be mentioned.

In this part of the study, based on the above classifications, the advantages and the disadvantages of the floating, fixed and the managed float exchange rate policies will try to be pointed out. In the second chapter of the thesis, the meanings of these exchange rate policies were already stated.

## **4.2. The Floating (Flexible) Exchange Rate Policy**

In this policy the currency values are determined by the fluctuations in the foreign exchange market without any governmental intervention. The sake of intervention occurs when a government agency buys foreign exchange, keeps it for some periods and then sells it. Here, the government interferes into the foreign exchange market in order to control the foreign exchange (Calvo and Reinhart, 2002, p. 380). A currency that is used in the floating exchange rate policy is called the floating currency. The floating exchange rate policy is mostly used from the end of the Bretton Woods system, around 1970s, until now. As all exchange rate policies have, there are some advantages as well as some disadvantages of the floating exchange rate policy. The floating exchange rate policy emerged by the existence of the flexible-price monetary policy that was mentioned in the previous chapter.

### **4.2.1. The advantages of the floating exchange rate policy**

The advantages of the floating exchange rate policy can be summarized under four different headings. These may be listed as; (i) conducting independent monetary policy; (ii) damping of the real shocks automatically both domestically and internationally; (iii) retaining seigniorage income; and (iv) being lender of last resort and avoiding speculative attacks (Frankel, 2004, p. 96).



The former advantage of the flexible exchange rate is to create an independent monetary policy. What meant by the independent monetary policy is that if a country experiences an economical shock, like a decrease in demand for the goods it manufactures, in order to avoid recession, the government make an intervention through conducting expansionary policy. However, under the floating exchange rate regime, the economy is expected to adjust equilibrium and make a recovery. The self-correction mechanism will work like the monetary expansion and the depreciation of the currency. This will cause an increase in the demand for the domestic products and will precede the economy to the preferred levels of employment and output faster than it could be under the fixed exchange rate policy. This will cause to have an independent monetary policy. As there is self-governing monetary policy, the government will not play an essential role in the foreign exchange market.

The latter advantage of the floating exchange rate policy is to be able to conduct automatic adjustments to the trade shocks. The immediate adjustments to the unfavorable trade shocks in the country's terms of trade is made by depreciating the domestic currency. Having floating exchange rate policy makes the depreciation of the domestic currency to be easily carried out even in the existence of the rigid wages and prices.

The third advantage of the flexible exchange rate policy is retaining seigniorage income and being lender of last resort. The meaning of being the lender of the last resort is printing as much money as essential to come problems over that banks can face. Before the crisis year 2001, it was thought that the countries that use the currency board, dollarization or monetary union and let overseas banks to work inside its margins do not need a lender of last resorts as the overseas banks will operate what the domestic banks need in the case of the economic difficulties. However, this belief was broken by the example of Argentina. The further discussions will be made in chapters fifth and sixth.

Finally, the fourth advantage of the floating exchange rate policy is avoiding speculative attacks. As there are some arguments in the economy like there will be depreciation or appreciation of the domestic currency, the residents will respond to these arguments and will behave according to them. Thus, in the economy, the unfavorable conclusions will occur and this will cause the speculative attacks. However, if the floating exchange rate policy is adopted, even there are some speculative attacks, the economy will

adjust automatically to the new equilibrium position and will maintain the new employment and output levels.

The above mentioned headings are the advantages of adopting floating exchange rate policy. However, as there are some good parts of having flexible rates, there are also some unwilling parts of having it. In the following part, the disadvantages of the flexible exchange rate policy will be analyzed.

#### **4.2.2. The disadvantages of the floating exchange rate policy**

The disadvantages of the floating exchange rate policy can be explained under four headings. These might be scheduled as; (i) uncertainty and diminishing in the volume of trade; (ii) terms of trade changes; (iii) instability in the economy; and (iv) complication in the use of domestic stabilization policies (Calvo and Reinhart, 2002, p. 384).

The first disadvantage of the flexible exchange rate is creating uncertainty and causing diminishing in the amount of trade. For example, assume that a Turkish manufacturer agrees to buy twenty US cloths for \$100,000. At the current exchange rate of, suppose, 2 YTL for \$1, the Turkish manufacturer supposes to pay 200,000 YTL for these cloths. However, in the six month delivery period the exchange rate shifts to 3 YTL for \$1, the \$100,000 payment for the Turkish manufacturer will now be 300,000 YTL. The rise in the YTL price of dollars will cause a loss for the Turkish manufacturer. Therefore, if the Turkish manufacturer thinks that involving in a foreign trade will carry some risks, he will change his trading partners and will begin to purchase from the domestic cloths. Thus, this uncertainty of the floating exchange rate will cause diminishing in the amount of trade.

The second disadvantage of the floating exchange rate is creating changes in the terms of trade changes. As the floating exchange rate experiences depreciation and appreciation of the domestic currency, this affects the combination of the terms of trade. Thus, if a country's international value of its exchange appreciates; this will cause a rise in its terms of trade, or vice versa. For instance, a rise in the YTL price of dollars will represent that Turkey have to export more goods and services to respond an explicit levels of imports from the US. As a result, the latter disadvantage may be named as negative effects on the CA balance and the purchasing power.

The third disadvantage of the exchange rate flexibility is creating instability in the economy. If a country's economy is at its full employment level and a shock in the economy occurs, this will affect the domestic currency and will cause depreciation. Thus, the result will put inflationary process in the economy. Or the opposite of this may occur and appreciation of the domestic currency may be observed. So, this time, the result will be a depreciatory process in the economy.

The last disadvantage of the floating exchange rate is causing a complication in the use of domestic stabilization policies. This may happen while always searching for the full employment and price stability in the economy. Under the floating exchange rate policy, the economy tries to maintain equilibrium and operate at this level. Thus, to maintain equilibrium, many policies have to be conducted and thereby creating complication in the use of the domestic stabilization policies.

Finally, it seems that all disadvantages of adopting floating exchange rate policy are related to each other. For this reason, if there is a lack in one of the economic objective, there occurs a lack in the other economic objective. In the next part, the fixed exchange rate policy will be analyzed.

### **4.3. The Fixed Exchange Rate Policy**

The fixed exchange rate policy is a policy in which a currency's value is pegged to the value of another single currency or to a basket of other currencies. Therefore, the depreciation or the appreciation of the single currency affects all other currencies. In this policy, there is government intervention into the foreign exchange market for the sake of intervention (Calvo and Reinhart, 2002, p. 392). A currency that is used in the fixed exchange rate policy is called the fixed currency. The fixed exchange rate policy was mostly used from the end of the Second World War, in 1945, until to the broken of the Bretton Woods system in 1970 that was mentioned in the second chapter of the thesis. At this time, the Western Europe fixed its currency to the US dollar. Nowadays, it is also conducted in some of the countries as a strategy for the exchange rate policy. As all exchange rate policies have there are, also, some advantages and some disadvantages of the fixed exchange rate policy.

#### **4.3.1. The advantages of the fixed exchange rate policy**

Especially, in the Neo-Classical approach, it is claimed that the fixed exchange rate policy is worthless comparing to the floating exchange rate policy to deal with the economical problems. This is told because of thought that the floating exchange rate policy is more responsive to the changes in the foreign exchange market whereas the fixed exchange rate policy is more controlled policy by the government and does not represent the true value of the currency. However, in explicit circumstances, fixed exchange rate policy may be preferable for generating the economic stability. For instance, during the Asian crisis, as China adopted the fixed exchange rate and Malaysia pegged its currency to the US dollar, they, both, managed to survive from the negative effects of the crises. There are three advantages of the fixed exchange rate policy. These can be listed as; (i) supporting a nominal anchor to the monetary policy; (ii) encouraging trade and investment; and (iii) preventing competitive depreciation or appreciation (Frankel, 2004, p. 98).

The initial advantage of the pegged exchange rate policy is to supply a nominal anchor for the monetary policy. This means if there is an inflationary environment and the economy cannot relief itself, the central bank may work better with fixing the exchange rate and avoiding it to fluctuate. As the central bank announced the newly adopted exchange rate policy, which is pegging the currency, people, who are responsible from setting wages and prices, will suppose that the inflation will be low in the future and will give their pricing decisions according to this. So, the public will help government to get over the inflation problem. Thus, fixed exchange rate policy and rigid monetary policy will solve the problem of inflation.

The second advantage of the fixed exchange rate is that it encourages trade and investment. The main argument here is that adopting fixed exchange rate will reduce the problems that can emerge because of the fluctuations in the exchange rate; however, the fixed exchange rate will decrease the exchange rate risk. Thus, as the investors will be comfortable with the level of the currency, they will increase their amount of trade and investment. In addition to this, if the domestic currency is fixed directly to the one of the neighbor country's currency, this will eliminate the transaction and border costs and even, will increase the amount of international trade and investment more.

The third advantage of the fixed exchange rate is preventing competitive depreciation or appreciation. The essential point here is that a country tries to get an advantage in the trade compare to its trading partners and this is done by devaluing its currency. Thus, as the country devalues its currency, its products become cheaper, for that reason, that country takes the advantage of the trade. Around the end of the 1990s, each time one country in Latin America or in East Asia devalued its currency and took the advantage of the competitive trade. For instance, in 1995, Mexico did the same thing to Argentina and in 1999; Brazil got this advantages compare to the rest of the South American countries. The previous model of this advantage was the “beggar thy neighbor” policies of the 1930s. However, after all countries began to devalue their currencies at the same time, they understood that devaluation did not work anymore for getting the trade advantage and they found the new way; adopting the fixed exchange rate policy.

In this part, the advantages of the fixed (pegged) exchange rate policy were discussed. In the next part, the disadvantages of the fixed exchange rate policy will be examined.

#### **4.3.2. The disadvantages of the fixed exchange rate policy**

The disadvantages of the fixed exchange rate policy may be summarized under four different headings. These can be summarized as; (i) having no independent monetary policy; (ii) requiring of long time for the correction of the terms of trade; (iii) not representing the correct value of the currency; and (iv) introduces the speculative bubbles (Levy-Yeyati and Sturzenegger, 2003, p. 28).

The first disadvantage of having a fixed exchange rate policy is not having an independent monetary policy. In the usage of the monetary policy under the fixed exchanges, different than the floating exchange rates, there is a strict government intervention into the foreign exchange market. So, as the government is responsible from carrying out the policies, the way that they use will not be objective and will not be for the sake of all public. Therefore, when there is a fixed exchange rate policy, monetary authorities fail to pursue macroeconomic objectives such as inflation targets and economic growth rates.

The second disadvantage of adopting a fixed exchange rate policy is need of a long time for correction of terms of trade. This means if the country experiences a trade deficit, the demand for the foreign currency will rise. This will increase the price of the foreign currency in terms of the domestic currency. As the prices of the foreign products rise, they will be less attractive for the domestic residents, so, they will not purchase them and the amount of the imports will decrease. This will cause a decrease in the amount of trade deficit. However, under fixed exchange rate policy, this automatic balance in the terms of trade does not seen fast as it is compared to the floating exchange rate policy. For this reason, this long-time horizon fails to correct the terms of trade.

The third disadvantage of adopting a fixed exchange rate policy is that it fails to represent the correct value of domestic currency. As it is mentioned in the first disadvantage, in this policy, there is high government intervention. So, the value of the currency does not maintain freely in the foreign exchange market and this creates differences in the true value of the currency. These differences may affect the amount of the exports and imports inversely. Again, this will cause an imbalance in the amount of trade.

The final disadvantage of the pegged exchange rate is it introduces more speculative bubbles than the flexible exchange rate. A speculative attack involves enormous selling of domestic currency assets by both domestic and foreign investors. Countries that adopt a pegged exchange rate are more vulnerable to a speculative attack than countries using a flexible exchange rate. This is caused because of the huge volume of reserves required to hold the fixed exchange rate in place at that fixed level. Nonetheless, if monetary authorities select to preserve a pegged exchange rate during a speculative bubble, they may cause unfavorable economic depression or financial crises. For instance, the crises happened in the US dollar in 1985, the Japanese yen in 1995, East Asian crises in 1997 and recent Argentinean crisis in 1999-2002.

Main disadvantages of using fixed exchange rate policy were discussed, above. In the following part, one another exchange rate policy, which is managed float, will be analyzed.

#### **4.4. The Managed Float Exchange Rate Policy**

The managed float, or in other words dirty float, exchange rate policy is defined as an exchange rate policy where a country allows the international value of its currency to be determined by the supply and demand in the foreign exchange market. Additionally, in certain cases, there will be government or the central bank intervention in the foreign exchange market in order to stabilize the international value of the currency (Daniels and VanHoose, 2002, p. 85). It seems like the managed float exchange rate policy is a policy between the floating and the fixed exchange rates, neither totally free nor pegged.

From the beginning of the 1970s until present, it is the era for the floating exchange rate. However, commonly, it is thought that calling a managed float era for this period will be more accurate. The flexible side of the exchange rate comes from the free movement of the exchange rate prior to the supply and demand changes in the foreign exchange market. The floating exchange rate is needed because of the changing economic conditions between trading countries that require continuous changes in the value of the exchange rate. This will eliminate the BOP deficits and surpluses. On the other hand, the fixed exchange rate is needed because of the unfavorable movements of the exchange rate both domestically and internationally. Thus, governments, in order to affect the amounts of the supply of and demand for exchange rate, intervene into the foreign exchange market and buy or sell big amounts of domestic or foreign currency. By doing so, they manage the domestic currency. For instance, in 1987, which we mentioned in the second chapter, the Group Seven countries (G-7) that are Britain, Canada, France, Germany, Italy, Japan and the United States dealt to manage the values of the US dollar. Recently, the value of the dollar has decreased as the US trade deficit becomes larger. So, G-7 countries, except the US, decided that if the dollar depreciation had continued, this would have affected the economic position of the remaining G-7 countries. Thus, the G-7 countries intervened into the foreign exchange market and bought big amounts of dollars to increase the value of the dollar. Since then, whenever they feel that it is necessary to intervene into the market, they have made some purchases and sells and have stabilized the value of the market (Caballero and Krishnamurthy, 2003, p. 887). Also, some other nations, in order to avoid the fluctuations in the exchange rate peg their currencies to another currency or to the basket of the certain currencies.

In the next part of the study, the advantages and the disadvantages of the managed float exchange rate policy will be examined.

#### **4.4.1. The advantages of the managed float exchange rate policy**

The managed float exchange rate policy mainly has three advantages; (i) increasing in the volume of the world trade and finance; (ii) reducing the effects of the sudden devaluations and depreciations; and (iii) eliminating the harsh economical problems, which may have resulted in broken down of the fixed exchange rate regime (Calvo and Reinhart, 2002, p. 393).

The former advantage of the managed float exchange rate policy is rising in the amount of the world trade and finance. Some of the economists, who work on the economic environment during the Bretton Woods system and aftermaths of it, argue that the unpredictable exchange rates might decrease the volume of world trade. However, when the statistics are observed, it is realized that the growth rates under the managed float exchange rate regime (from the Bretton Woods system till present) and the fixed exchange rate regime (from 1945 to the end of the Bretton Woods system in 1970) are nearly same (Levy-Yeyati and Sturzenegger, 2003, p. 32). As the currency is let to fluctuate as much as it is necessary for efficient trade and is controlled to avoid unfavorable movements, this causes an increase in the volume of trade.

The latter advantage of the managed float exchange rate regime is decreasing the effects of the unexpected depreciations and devaluations. The reasons of the second advantage are nearly same with the former advantage. Having an exchange rate regime, which is both fixed and flexible, avoid the problems such as going away from the macroeconomic objectives like inflation targeting in the economy, because when the devaluation in the economy is conducted, it will be limited at some time and will not continue forever. Thus, this currency fixing helps to maintain the macroeconomic objectives.

The last advantage of the managed float exchange rate regime is eliminating the harsh problems in the economy. Mainly, the managed float regime tries to avoid the problems that may arise because of the fixed and flexible exchange rates. For instance, between 1973-1974 and 1981-1983, increase in the oil prices and in 1980s and in the first



half of the 1990s, rise in the budget deficit of the US, all grounded disparities in international trade and finance. The fix side of the managed float regime put pressures on the negative movements of the economy and the floating side of it let the system to regulate to these positive movements in the economy.

In this part of the study, the advantages of the managed float exchange rate regime were analyzed. In the following section, the disadvantages of the managed float exchange rate regime will be considered.

#### **4.4.2. The disadvantages of the managed float exchange rate policy**

Same with the advantages, there are three disadvantages of the managed float regime; (i) having volatile exchange rate; (ii) being unable to eliminate the trade imbalances; and (iii) requiring more intervention into the foreign exchange market for the sake of stabilization goals (Levy-Yeyati and Sturzeneger, 2003, p. 23).

The first disadvantage of the managed float exchange rate regime is being a volatile exchange rate. This volatility is sometimes seen when there is continuous stability in the economical and financial areas. The speculative attacks play a crucial role in the determination of the exchange rate and under the managed float regime that kind of actions are seen more gradually. It does not only affect the value of the exchange rate but also eliminate the increase of the volume of international trade and investment. Thus, the exchange rate volatility both affects the exchange rate regimes and the trade activities.

The second disadvantage of the managed float exchange rate policy is it does not eliminate the trade imbalances. The famous examples for this argument are the continuous trade deficit of the US and contrary to that, the continuous trade surplus of Japan. Having constant trade imbalances are not a good remark for the countries economic performances. In order to correct trade imbalances, the monetary authorities of these countries think that passing to the flexible exchange rate policy may correct the situation. However, changes in the exchange rates between the US dollar and Japanese yen have not yet improved the conditions. Thus, there is a bias of whether this exchange rate policy is appropriate for these countries' trade policies or not (Brue et al., 1999, p. 807).

The final disadvantage of the managed float exchange rate regime is it requires more intervention into the foreign exchange market for the sake of stabilization goals. As it

is stated in the previous parts of this chapter, the managed float exchange rate regime is not only a pegged exchange rate but also a floating exchange rate. So, it carries out features of both regimes. However, recent economic indicators, like examples given previously, prove that the managed float regime becomes to behave more flexibly as it is supposed to be. The governments should intervene into the foreign exchange market not in the short-run to manipulate the fluctuations in the currency but also in the long-run to make sure that the exchange rate is appropriate to the country's economical goals. If the flexible and the fixed exchange rates are in balance in the exchange rate regime, then the domestic and foreign stabilization objectives will be achieved not only in the short-run but also in the long-run.

Until now, the advantages and the disadvantages of the floating, fixed and the managed float exchange rate regimes were explained. Now, in the next section, the empirical evidence on the performance of regimes will be given.

#### **4.5. Empirical Evidence on the Performance of Regimes**

In this part of the study, some of the empirical evidences of performances of above talked regimes will be explained (Frankel, 2004, p. 121);

As it has been discussed, the exchange rate policies have many pros and cons. Their applicability differs in terms of countries' economic performances and needs. Thus, in order to observe, how growth rates differ across regimes Ghosh, Gulde and Wolf (2000), Levy-Yeyati and Sturzenegger (LYS) (2002) and Reinhart and Rogoff (2002) conducted some tests and went over some statistics.

**Table 4.1** Three Empirical Studies of Growth Rates Across Regimes

Ghosh, Gulde, & Wolf (2000)	Average Growth Rate (1975-1996)				Growth (per capita) Coefficient, Conditioned	
	All Countries		Lower-income		All	
	GDP	Per Capita	GDP	Per Capita	Per Capita	
Float	3.1	1.7	3.6	1.4	norm=0	
Currency board	4.0	3.1	2.9	2.2	+2.1 **	
Regular peg	3.3	0.9	3.3	0.5	-0.8 ***	
<b>Levy-Yeyati &amp; Sturzenegger (2002)</b>						
	Average Growth Rate per capita (1974-2000)			Growth (per capita) Coefficient, Conditioned		
	All Countries		Non-industrial	All Countries		Non-industrial
	IMF	LYS	LYS	IMF	LYS	LYS
Float	1.0	1.9	1.7	Norm = 0		
Fix	1.2	1.5	1.3	-0.3	-0.8 **	-1.1 **
Intermediate	2.0	1.0	1.5	+0.5 *	-1.0 ***	-1.2 ***
<b>Reinhart &amp; Rogoff (2002)</b>						
	Average Growth Rate (per capita) All Countries (1970-2001)					
	Standard		Excluding Dual Rates			
Free float	0.5		1.1			
Peg	1.4		1.7			
Limited flexibility	2.2		2.6			
Managed float	1.9		1.5			

IMF = International Monetary Fund, LYS = Levy-Yeyati and Sturzenegger system.  
 Note: Significant at (\*) 10 % level, (\*\*) 5% level, and (\*\*\*)1% level.

Source: IMF; Ghosh, Gulde, Ostry, & Wolf, 1996; Levy-Yeyati & Sturzenegger, 2000; and Reinhart & Rogoff, 2002. Table prepared by Marina Halac & Sergio Schmukler.

Ghosh, Gulde and Wolf (2000), taking into account the countries under the IMF's de jure classification system, observed the average growth rates of the countries under the float, currency board and regular peg policies. According to the results, shown in Table 4.1, when the average growth rates of all countries (from 1975 to 1996) are examined, it is seen that both in GDP and per capita categories currency board regime get the highest value. On the other hand, when the lower income countries are observed, it is realized that in GDP group floating exchange rate policy and in per capita group currency board get the highest value. Thus, it seems like currency board worked better under these systems in the studies of Ghosh, Gulde and Wolf (2000).

The second study belongs to LYS (2002). They went over the float, fix and intermediate policies (from 1974 to 2000). In all countries category, IMF results says that

intermediate policies perform better, however, in LYS results floating policy is superior. Nevertheless, in non-industrial category, LYS implies that the floating exchange rate regime is better than the others. Thus, it looks like floating exchange rate policy is better in the observations of LYS (2002).

The final empirical study was carried out by Reinhart and Rogoff (2002). Different than Ghosh, Gulde and Wolf (2000) and LYS (2002), they worked with four exchange rate policies and they are free float, peg, limited flexibility and managed float exchange rate regimes (from 1970 to 2001). Their study considers all countries together and divides as standard and excluding dual rates. In both rates, the limited flexibility exchange rate regime performs better than the others. Hence, for Reinhart and Rogoff (2002), limited flexibility policy is the superior one in comparing the average growth rates of the countries.

In conclusion, in these three empirical studies, it is observed that the time interval is nearly same for all studies; however, as the statistical methods and the point of views are different, all results are different. For the IMF classification intermediate regimes, for Gosh, Gulde and Wolf (2000) classification currency board, for LYS (2002) classification floating exchange rate regime and for Reinhart and Rogoff (2002) classification limited flexibility are the favorable regimes. This proves that the distinction between exchange rate regimes is very obvious more in reality than in the theory.

#### **4.6. Conclusion**

In this chapter, the exchange rate policies were discussed. As there are many different theories, there are also different exchange rate regimes that are used in these theories. In the first part, the floating (flexible) exchange rate regime's negative and positive sides were discussed. Then, the fixed (pegged) exchange rate policy's pros and cons were mentioned. Finally, the advantages and the disadvantages of the managed float exchange rate policy were analyzed. It is seen that all policies have some good parts and some bad parts; however, they have to be categorized in terms of their replies to the countries economic needs. All countries adopt an exchange rate regime that is suitable for their needs and when they conduct it and see the results then they say that this regime is appropriate to our economical needs or not. In conclusion, it does not really matter to use

one exchange rate regime or the other, but, the important part is actually how it has been conducted rather than which exchange rate regime is conducted.

In the following chapter, the exchange rate policies in the emerging markets will be analyzed and whether or not these regimes respond the needs of their countries will be examined.

## **CHAPTER 5. EXCHANGE RATE POLICIES IN THE EMERGING MARKETS**

### **5.1. Introduction**

Chapter two includes the history of the monetary systems. The main objectives of it were firstly, the international gold standard system, secondly, the interwar years, thirdly, the Bretton Woods system and finally the floating exchange rate system. In chapter three, the exchange rate theory was analyzed in details. Under this topic, the current account dynamics, the PPP, the IRP and the monetary models were dealt. In chapter four, the exchange rate policies were observed. The advantages and the disadvantages of the floating, fixed and the managed float exchange rate regimes were discussed. Additionally, in this chapter, the exchange rates in the emerging markets will be analyzed. The list of the exchange rate regimes based on the emerging countries and their effects on the credibility, financial fragility and monetary and fiscal regimes will be discussed.

Based on statistics of Obstfeld (2004) and IMF (2005), there are around 28 countries that are considered as having an emerging market. The emerging market refers to the business and market activity in developing regions of the world. This term, initially, was used by Antoine van Agtmael, who was an economist in the World Bank around 1980s. The economical level of the emerging countries is between the developing and the developed countries. Both economics and politics are the influence of the financial market. These countries usually try to improve their economical and political situation.

Table 5.1 implies which countries are considered as emerging countries and what kind of exchange rate regime they adopt. Thus, according to Table 5.1, about 7 countries out of 28 countries use the fixed exchange rate regime, about 17 countries out of 28 countries adopt the floating exchange rate regime and the rest of the countries employ the crawling peg or the pegged exchange rate regime. According to the statistics on the Table 5.1, the emerging countries mostly use the floating (flexible) exchange rate regime and then, the fixed exchange rate regime.

In this study, the emerging countries that are Turkey, Taiwan, Argentina and Brazil are dealt. Thus, in the following part of the chapter, the exchange rate and the monetary policies of Turkey, Taiwan, Argentina and Brazil will be analyzed.

**Table 5.1** Emerging Countries and Their Exchange Rate Regimes

<b>Emerging Countries</b>	<b>Exchange Rate Regime</b>
Argentina	floating exchange rate regime
Brazil	floating exchange rate regime
Chile	flexible exchange rate regime
China	flexible exchange rate regime
Colombia	crawling peg exchange rate regime
Czech Republic	flexible exchange rate regime
Egypt	floating exchange rate regime
Hong Kong	linked exchange rate regime
Hungary	crawling peg exchange rate regime
India	floating exchange rate regime
Indonesia	fixed exchange rate regime
Israel	floating exchange rate regime
Jordan	flexible exchange rate regime
Malaysia	fixed exchange rate regime
Mexico	fixed exchange rate regime
Morocco	floating exchange rate regime
Pakistan	fixed exchange rate regime
Peru	floating exchange rate regime
Philippines	floating exchange rate regime
Poland	fixed exchange rate regime
Russia	floating exchange rate regime
Saudi Arabia	pegged exchange rate regime
Singapore	floating exchange rate regime
South Africa	flexible exchange rate regime
South Korea	fixed exchange rate regime
Taiwan	floating exchange rate regime
Thailand	fixed exchange rate regime
Turkey	floating exchange rate regime

Source: Obstfeld, 2004 and IMF Statistics, 2005.

## **5.2. The Exchange Rate and the Monetary Policies of Turkey, Taiwan, Argentina and Brazil**

According to the IMF statistics of the 1970s, about 85 percent of the emerging countries adopted pegged exchange rate regime. However, recently, this statistic has changed and the emerging countries begin to employ either the floating exchange rate or the managed float exchange rate policies. They figure out their exchange rate policy

according to their trade, monetary and fiscal policies. In this part of the study, the exchange rate and the monetary policies of the above talked countries will be analyzed.

### **5.2.1. The exchange rate and the monetary policies of Turkey**

When Turkey's economic life is observed, it is realized that after 1980s, the Turkish economic policy gained a new face. On January 24, 1980, the Turkish Government decided to make considerable economic reforms. They prepared stabilization programs for liberalizing the economy and reducing the Government's role in the economy. Therefore, the monetary and the exchange rate policies were reconsidered.

The exchange rate policy was more flexible after 1980s compare to the period of pre-1980s. At the beginning of the 1980, the significant devaluation occurred in the Turkish Lira, the several devaluations continued until the end of the year. In order to eliminate the ups and downs in the PPP of the Turkish Lira, from the beginning of the May 1981, the exchange rate began to be adjusted on a daily basis. According to the information in the Central Bank of Turkey, The Turkish exchange rate regime started to be not flexible exchange rate regime but rather crawling peg between the years of 1980 and 1988 and after 1988 to the middle of 90s it may be named as managed float.

After the year 1988, there have been more liberalization movements, interbank transactions and increasing amount of the convertibility behaviors. Turkey experienced severe crises in recent years. Especially, the crises, which happened around 1994 and 2001, were very influential on the economic environment. Effects of these crises continued several years. As Turkey is a developing country, it was also negatively affected by the crises that occurred in Russia (1998), in Asia (1997) and in Latin America (1999). In 1999, as Turkey began to experience inflationary economic environment, in order to eliminate the negative effects of this inflationary economic environment, the government decided to apply a disinflationary program that essentially means preventions for the inflation or the slowing of the rate of inflation per unit of time. Disinflation is usually considered as a positive policy for the economy as a whole. However, as this program was beneficial for the economy at the beginning, the economy did not escape from the 2001 banking crisis. After the 2001 banking crisis, Turkey began to use flexible exchange rate policy, but the



exchange rate is under control of the Central Bank of Turkey and when there is undervaluation of the currency, it intervenes and recovers the situation.

According to the annual report-2006 of the Central Bank of Turkey, the monetary authorities adopted the inflation targeting regime in 2006 and nowadays, still use this regime. In the inflation targeting regime, improvements in the public sector are the main concerns for the monetary policy as the monetary authorities cannot have any controls on the public sector. Based on the law of the Central Bank of Turkey, if the monetary authorities aim to maintain the price stability, they have to observe improvements in budget and fiscal policy and have to behave according to the effects of these policies on inflation.

Nowadays, the Central Bank of Turkey, which is the monetary authority in Turkey, along with the inflation targeting, continues to use the floating exchange rate regime. Thus, the main policy tool to achieve inflation targeting is the short-run interest rate. Also, as there is a strict monetary policy, not only the inflation rate and the interest rate but also the PPP and the unemployment rate are tried to be taken under control.

### **5.2.2. The exchange rate and the monetary policies of Taiwan**

In last four decades, Taiwan has reached to the rapid economic growth. However, in late 60s, because of experiencing a trade deficit and a decrease in the foreign exchange reserves, the government adopted foreign exchange control and an exchange rate system fixed to the US dollar.

Beginning from 1978, Taiwan passed to the managed float exchange rate system. Under this system, the foreign exchange rate was set not by the Central Bank but by the Center of Foreign Exchange. A range of 2.25 % around the previous day's rate was determined in order to avoid the unfavorable fluctuations in the exchange rate.

Throughout 80s, Taiwan's trade surplus increased and the country began to use floating exchange rate system in 1989. In 90s, two important events depreciated the Taiwanese dollar. First one was the conflict between China and Taiwan in 1995 and second one was the Asian financial crisis in 1997.

When Taiwan's economic life is practiced, it is seemed that from the 1999 crisis to 2003, Taiwan experienced a deflationary situation. Not only domestic factors but also international factors affected this deflationary environment. Domestic factors may be pointed out as having instable political environment and destabilized financial system. On the other hand, international factors might be sequenced as having an uncomfortable relation with its neighbor China, having tremendous increase in the value of the technology in China and thus, increase in the amount of the Chinese economy. Also, the existence of the financial crises all around the world influences the Taiwan's economy unfavorably.

Taiwan is an export-oriented country. In order to escape from the negative effects of being an export-oriented country, as a monetary policy instrument, Taiwanese Government decreases not only the discount rate but also the required reserve ratio. In addition to this, the Central Bank of China (Taiwan) intervened into the foreign exchange market in order to recover the Taiwanese dollar and to increase the amount of exports.

Nowadays, Taiwan uses the floating exchange rate regime. In order to sustain this, the Central Bank of China (Taiwan) tries to increase their amount of exports by maintaining the level of the Taiwanese dollars. Also, puts control over the interest rate and the unemployment rate. The Taiwanese Government tries to maintain the economic stability by employing the monetary and the fiscal policies together.

As of September, 2007, according to the Monetary Policy Decisions of the Board Meeting of the Central Bank of China (Taiwan), the Board decides to increase the discount rates and to determine the Taiwan dollar by the market forces, but in case of seasonal or irregular factors, like hot money or irrational expectations, Central Bank of China (Taiwan) will intervene into the foreign exchange market. These decisions are given based on the current situation of Taiwan's economy like increase in the inflation rate, the stagnation in the economic growth, decrease in the unemployment rate, improvements in the job markets, having appropriate monetary growth rates and nominal interest rates below the natural levels.

Taiwan together with Singapore, Hong Kong and South Korea was known as East Asian Tigers. These countries were noted for maintaining high growth rates and rapid industrialization between the early 1960s and 1990s. Nowadays, economic progress in Taiwan is at satisfactory level.

### **5.2.3. The exchange rate and the monetary policies of Brazil**

Brazil, like most of the emerging markets, also faced with some financial crises. These crises caused an increase in the inflation rate. This situation destroyed the Brazilian monetary authorities' belief about the inflation. They thought that the increase in the inflation rate would not bother unless it affects the supply of and demand for goods and services negatively. Therefore, the monetary authorities generally obtained money creation as a monetary policy to overcome the budget deficits.

From 1967 to 1990, they used crawling pegged exchange rate regime to the US dollar, but in 1986, they transferred to the fixed exchange rate system in order to react to the rocketing prices. From the beginning of the 1990, they have a floating exchange rate regime with less government intervention. Nonetheless, in order to control the money creation, from 1995 to 1999, they used an adjustable band. The inflation rate in June 1994 was 5000 percent and in June 1998, it dropt to the 4 percent. In 1999, because of the existence of the Asian crisis in 1997 and the Russian crisis in 1998, Brazil experienced a currency crisis and until then they again begin to use the floating exchange rate system. The National Monetary Council (NMC) deals with exchange rate policy and the Central Bank of Brazil is responsible from the monetary policy. Thus, enlargement in the Brazilian foreign debt burden, ups and downs in the agricultural exports' and oil imports' prices have caused inflation problem in Brazil. Thus, in order to solve this problem, Brazilian monetary authority uses price stability, as a monetary policy.

As of beginning of 2007, Brazil's economic growth performance is likely to improve. Productivity of the sectors has increased since macroeconomic stabilization in the mid-1990s, which are supported by structural reforms, including trade, investment and product market liberalization. Brazil experiences remarkable progress in recent years towards consolidating macroeconomic stability. Applied monetary policy still responds to changes in the inflation rate expectations. On the other hand, the current fiscal policy has been oriented by debt sustainability issues. Nowadays, Brazilian government's main objective in innovation policy is to persuade the business sector to be a part of the productivity-enhancing modernization activities.

From 1964 to 1985, in Brazil, military forces were in charge. From 1985 to 1988, the civil government was in control and in 1988, the democracy was re-established.

Current, president is Luiz Inacio Lula da Silva. During the crises in Brazil, there was also political instability in the country. Nowadays, Brazil's GDP is the highest of Latin America with developed agricultural, mining, manufacturing and service sectors. According to the IMF and the WB, Brazil has the ninth largest economy in the world by PPP and tenth largest at market exchange rates.

#### **5.2.4. The exchange rate and the monetary policies of Argentina**

Argentina, like many other nations such as Turkey, Taiwan, Singapore and Russia, also suffered from chronic inflation problems and currency crises during its economic life. In the early 1960s, Argentina used 6 programs to get over its inflation problem. Initially, the monetary authority of Argentina thought that using a fixed exchange rate regime would have help to decrease the inflation rate to the world inflation rate. The thought of the monetary authority worked at the beginning but then because of the enlargement in the external debt and increase in the amount of the provisional attacks, the program did not work. Thus, they tried to adopt the floating exchange rate regime or to change the domestic currency in circulation for a while. In the period from 1950s to 1970s, soft military and weak civilian administration was in charge. After this period, the violence in the political arena began to increase and in 1983, the democracy was restored.

The 1990's began with hyperinflation. The Convertibility Law was approved in the beginning of 1991 by the President Carlos Menem. According to the Law, fixed peso-dollar parity and validated contracts in foreign currencies were accepted. The decrease in the demand for local assets had started in the middle of 1998. This situation was carried by a constant increase of the country risk premium. Nevertheless, in 2000, the deviation in the domestic financial market and the resignation of the Vice-President distorted the convertibility period. Then, economy began to experience several dynamics. As there occurred an expectation of devaluation of the local currency, public began to get rid of their domestic reserves and to pass to the international reserves. This caused more chaotic situation in the Argentinean economy. However, as the Central Bank of Argentina encouraged the liquidity of the banking system, initially, there were no bankruptcy problems in the banking system. After the collapse of the Convertibility Law, the monetary authorities established the currency board approach in order to avoid the capital flows and

to stabilize the markets. Initially, they thought that using of the currency board policy would have been temporary until the stabilization of the nominal exchange rate was sustained, then, they would have let the peso to float. However, the choice of the floating exchange rate regime, after the IMF demanded it, proved to be inconvenient.

Between the years of 1999 and 2002, Argentina, also, experienced a currency crisis because of the external and internal reasons. External reasons were the remaining crises in other countries like in Brazil and in Asian countries. However, the internal reasons were having doubt about banks and the Treasury, experiencing the economic depression and having the increasing inflation. Because of all these reasons, the international currency was considered as an only asset to allocate financial assets. After two and a half months of the devaluation, the central bank began to issue papers in order to provide another financial asset that could fight with the dollar. These caused enlargements in the CA deficit. This was the beginning of the banking crisis in Argentina. By the aids of the IMF, Argentina tries to recover its situation. Since 2002, Argentina uses floating exchange rate policy together with industrialization and import substitution policies. These caused stability in the economy. From 2002 to 2007, Argentina had 2 different presidents. Currently, Argentina's President is Cristina Fernandez de Kirchner.

After the exchange rate and the monetary policies of Turkey, Taiwan, Brazil and Argentina were discussed, how these policies affect the credibility, financial fragility and monetary policy will be analyzed. So, following section will cover these issues' pros and cons.

### **5.3. The Choice of the Exchange Rate Regime and Credibility Issue**

After the 1980s, as the world's economy have become more integrated, debates about the exchange rate policies' effects on policy credibility have become more crucial. This means how the choice of the exchange rate regime affects the credibility of the monetary and the fiscal policies.

For the monetary authorities of the emerging countries, there are two ways for sustaining the credibility of the policies: either choose a fixed exchange rate policy that is known as a hard-peg currency or adopting a freely moving flexible exchange rate policy. The credibility of the monetary and the fiscal policies is maintained by the fixed exchange

rate policy as choosing a currency board or full dollarization (Calvo and Mishkin, 2003, p. 101). In the currency board, either the central bank or the government fixes the exchange rate of the remaining currency to one of the foreign currencies and also, guarantees the full convertibility of them. It has to be ready to convert domestic currency for the foreign currency on requirement and has to have enough international reserves to provide so. In the currency board, there are only one domestic currency and limited amount of the foreign currencies. On the other hand, in full dollarization, the central bank or the government eliminates totally the validity of the domestic currency and substitutes it with one of the foreign currencies such as the US dollar; this is why this position is called full dollarization. The full dollarization position can also be sustained by the Euro. This time, the position will be called full eurozation.

In the currency board, the monetary authority has direct control on the monetary policy, as there are limited amount of foreign currencies and the domestic currency is not directly fixed to any of the foreign currencies. However, in the full dollarization, the monetary authority has limited control or even non-control on the monetary policy as the parity of the domestic currency is directly subject to the changes in the foreign currency. Thus, in the fixed exchange rate regime maintaining the credibility of the policies directly match with obtaining either the currency board or the full dollarization. There are examples in the world for this type of the credibility issue.

For example, Argentina adopted the fixed exchange rate policy and for guaranteeing it, they used the currency board approach. In the application process of this approach, they understood that they have to support not only the monetary system but also the banking system for not leaving the banking system without the lender of last resort. The central bank of Argentina was very independent. They did not able to overcome the budget deficit problems. Thus, the financial sector in Argentina was partially destroyed. Then, banks were forced to purchase Argentinean government bonds to finance the budget deficit. As the value of these bonds declined, they began not to cover the budget deficit, so, the amount of the fiscal debt increased. The banks' attractiveness plunged. This was the beginning of the banking crisis in Argentina by the end of 2001. Thus, choosing the fixed exchange rate regime may cause some problems related to the credibility of the monetary and the fiscal policies.

On the other hand, the freely moving flexible exchange rate policy is a policy in which the exchange rate is determined by the direct movements in the foreign exchange market. However, in the emerging countries, the floating exchange rate means little flexibility of the foreign exchange and the little intervention of the government or the central bank in the financial markets. A country, which uses the flexible exchange rate regime, can follow some different monetary policy strategies. Some of them are concerning the money supply, considering the inflation rate or taking into account the nominal anchor that is hidden in the theory.

In the emerging countries' economies, the volume of exports, imports and the international movements of the capital take considerable part of the economy. Thus, if there are huge fluctuations in the value of the exchange rates, there will be huge waves in the economy. For instance, while the country's bank owns loans that are in foreign exchange and the reduction of the value of the domestic currency relative to the foreign currency occurs, the economy will face with the unfavorable movements. So, for the central bank and the government, this situation will be called as *the fear of floating* that is described as unwilling behavior of the free floating of both the nominal and the real exchange rate. Thus, for the emerging countries, choosing the floating exchange rate regime also causes some problems.

Table 5.2 shows the GDP growth rates for some of the emerging countries which are Argentina, Hong Kong, Brazil, Mexico, Peru and Singapore. The data belongs to the years between 1997 and 2000.

**Table 5.2** The GDP Growth Rates in The Selected Countries

	<b>GDP Growth Rates (%)</b>			
<b>Country</b>	1997	1998	1999	2000
<b>Countries With Currency Boards</b>				
Argentina	8.1	3.9	-3.0	1.5
Hong Kong	5.3	-5.1	1.2	3.6
<b>Countries With Flexible Rates</b>				
Brazil	3.7	0.1	-1.0	4.0
Mexico	7.0	4.6	3.0	5.0
Peru	7.2	0.7	3.0	5.5
Singapore	9.0	0.3	4.5	5.0

Source: Chang and Velasco, 2000 and IMF Statistics, 2000.

Table 5.2 implies that the countries that were under-control of the currency board did not achieve the desired growth rates after the 1997 and 1998 crisis. Following 1997, the GDP growth rates became to decline, sharply. In the year of the Russian financial crisis, in 1998, the growth rates even decreased to the negative digits. In the year of 2000, the rates became to have little improvements. Contrary to this, despite Brazil adopted the flexible exchange rates faced with the decrease in the growth rates during and after the crises years, the fluctuations in the value of the growth rates had little effect on the economy as whole.

As it is discussed in chapter four, none of the exchange rate policies directly fit to the emerging country's economical needs. Each of them has some positive and negative sights. If an economy experiences a shock that results from the fluctuations in the money supply and demand, the fixed exchange rate regime seems more appropriate to correct the economy compare to the flexible exchange rate regime as it will eliminate the deviations from the value of the domestic currency more efficiently. Contrary to this, if an economy faces with a terms of trade shock that means fluctuations in the prices of export and import, the floating exchange rate regime looks more attractive as it can fit to the needs of the economy more rapidly and efficiently (Chang and Velasco, 2000, p. 72).

In general, the essential point for the success in the emerging markets is not to choose the floating or the fixed exchange rate regime but to search for the credibility in the financial sector, the fiscal and the monetary policies.

#### **5.4. The Financial Fragility and the Exchange Rate Policy**

As it is discussed in the above part of the study, first thing that the choice of the exchange rate regime depends on is the credibility of the monetary and the fiscal policies. The second one is the vulnerability of the financial sector. In the recent exchange rate and the banking crises, all over the world, it is seen that they have a close relationship between each other.

Under this heading, the bank runs and choosing the appropriate exchange rate policy, dollarization of liabilities and contractionary devaluation will be discussed.



#### 5.4.1. The bank runs and the exchange rate regimes

The bank runs will be analyzed together with the hard peg currency, the fixed exchange rate and the floating exchange rate regimes. As stated above, the government or the central bank of a country is responsible from conducting the monetary policies of the country. Thus, as a monetary policy instrument, they may require to increase the volume of the domestic credits. If the country has already adopted the hard peg exchange rate regime, this will eliminate the inflation but will destroy the bank stability. The reason behind the instability of the banking sector is leaving it without the lender of last resort. In addition to this, if the country obtains the currency board, this type of exchange rate regime will also deepen the crises in the banking sector compare to the crises in the BOP side, because the currency board will try to fix the domestic currency to the limited amount of foreign currencies and this will affect the amount of lending and borrowing loans in the banking sector. On the other hand, if the country has the fixed exchange rate regime, as an above heading of the hard peg currency and the currency board, the situation will not be better but instead of the banking crisis, there will be BOP crisis, because of the willingness of the central bank to act as a lender of last resort.

Contrary to the above statements, the country may prefer to use the freely floating exchange rate regime. In this situation, the banks will work as a lender of last resort and the banks' deposits will be in domestic credits. Thus, the banking and the BOP crises may be eliminated. This mechanism for the flexible exchange rate works as *"...In a crisis, depositors withdraw domestic currency from commercial banks to buy foreign exchange at the central bank, while simultaneously the central bank is printing domestic currency to aid the commercial banks...With flexible rates the central bank is no longer obligated to sell all of its available reserves to fend off a speculative attack. Instead, those who run are punished by devaluation, while those who do not run know that there will still be dollars available for withdrawal at a later date. In equilibrium, neither speculative withdrawals nor devaluation can occur."* (Chang and Velasco, 2000, p. 73).

In contrast, under fixed exchange rate regime, the situation will be different than the flexible exchange rate regime and it is as *"...In a crisis...with fixed exchange rates, this sequence of actions makes the panic self-fulfilling by causing the central bank to run out of dollars."* (Chang and Velasco, 2000, p. 72).

As pointed out in the second part of this chapter, the choice of exchange rate regime is very important, because of its direct effects in the economy. Since the fixed and the flexible exchange rates both sustain the credibility of the monetary and the fiscal policies in different aspects, in the bank runs, based on the results of the instances, the floating exchange rate regime is seemed more attractive than the fixed exchange rate regime. Therefore, in the bank runs, emerging markets' central banks' authorities prefer the pegged exchange rate policy.

#### **5.4.2. The dollarization of liabilities**

Since some of the emerging countries prefer to decrease the negative effects of the floating exchange rates, they decide to dollarize all liabilities. As stated above, the dollarization is defined as elimination of the domestic currency and substitution of it with one of the foreign currencies, which is the dollar.

Nowadays, in order to prevent the crises that can occur because of the domestic currency debt, countries have dollar debts to deal with these crises. However, the situation may reverse and the dollarization of the local currency may not improve it. For instance, if the country experiences devaluation and a trader borrows in dollars and receives his revenue in terms of local currency, this may increase the value of the dollar debt and may cause bankruptcies, fiscal and financial crises. This result will depend on which exchange rate regime the country adopts, because if a real depreciation occurs because of an external shock, the economy will take time to recover itself regardless of the exchange rate policy. In a deflationary environment in the economy, under the influence of the flexible exchange rates, the change in the relative prices will be quicker than the changes in the relative prices under the fixed exchange rates or the currency board.

Liability dollarization can be an essential problem for the countries that the amount of borrowing in the dollar is huge that has a close economy and when the earnings of the institutions and people are in local currencies. This has been the case in the emerging markets for a long time. Countries such as Argentina are harmed by liability dollarization in a serious way, however, countries like Chile and South America that have efficient monetary, financial and fiscal policies, pass this trap (Calvo and Mishkin, 2003, p. 105).

These results lead to the additional researches. Thus, in the following part, the currency composition of debt needs to be discussed.

### **5.4.3. The contractionary devaluation**

In the studies of the contractionary devaluation, mostly tested hypothesis is whether easier money and a depreciated exchange rate increase the financial vulnerability or not. Some of the economists monitored that if there is imperfections in the domestic credit markets and depreciation of the exchange rate exists, then, a decrease in the real exchange rate worsens the events in the credit markets. These observations arisen at the end of 1990s after the Asian crisis, however, it is thought that the results of the observations contain general conclusions for the economies as whole.

Also, some other studies stress that the depreciation of the exchange rate may be contractionary through its impacts on guarantee. For instance, if investors require borrowing some additional loans for their investments, they may ask to foreign lenders for these additional loans. This time, in order to secure their positions, the foreign lenders will require any kind of guarantees like house or land. Then, when sudden devaluation of the exchange rate exists, the dollar value of this guarantee may decline. This will cause a decrease in the amount of this credit. Thus, the effects of the depreciation of the exchange rate will be unfavorable for this collateral. However, despite the negative effects of the devaluation of the exchange rate on the guarantee, there are also some positive effects of it on the output.

The positive effects of the depreciation of the exchange rate on the country's macroeconomic variables are declination in the domestic interest rate and exchange the expenditures of the country from the foreign goods to the domestic goods. However, the positive effects cannot directly characterize and calculate, as they can differ from country to country and from different macroeconomic goals to the initial economical positions that all countries obtain.

In conclusion, all theories' ups and downs, and their credibility and financial fragility differ from country to country. Thus, the suitable policy for the internal and the external shocks is different for all countries. In the following section of the study, the models that can be applied to the real world problems will be examined.

## **5.5. The Strategy of the Monetary Policy and the Exchange Rates**

Generally, the emerging markets are very sensitive to the changes in the external and internal economies. Thus, the essential question in this part of the study is how to carry out the monetary policy under floating or the fixed exchange rate regimes in order to maintain the stability of the economy and low inflation. In the below part, this question will try to be answered (Taylor, 2000, p. 13).

The monetary policy instruments normally target the nominal exchange rate, the nominal interest rate, the money supply, the rGDP or the price level. These instruments may be change through open market operations (OMO), changing reserve requirement ratios, behaving as a lender of last resort or operating in foreign exchange markets. The most useful instrument that the central banks concern, especially in the emerging markets, is the inflation targeting.

The inflation targeting means fluctuations in the inflation rate around the desired actual rate. For example, if the targeting inflation rate is 5 percent for a country and for a long time the actual inflation rate is 10 percent, then, this will not be considered as an achievable monetary policy. Instead, the inflation rate around 4 or 6 percent will be accepted as a successful monetary policy. The monetary authorities do not have to state the inflation rate, explicitly. Instead, it may be announced implicitly and indirectly. Thus, the choice of the exchange rate and the target market components will shape the monetary policy. The inflation targeting is more applicable under the floating exchange rates than a fixed exchange rate system, a currency board or full dollarization as the inflation targeting imposes a nominal anchor on domestic prices.

Under open economy conditions, the effects of the selected exchange rate regime on the inflation happen in two ways. First one is which was discussed in the chapter three of the study; the PPP. That means the exchange rate assists to establish the relative price between the domestic and foreign goods. It helps to formulate a ratio between them. This will create changes in the demands for domestically and internationally produced goods, domestic aggregate demand and inflation. Whereas the second one is, the exchange rate influences the domestic currency prices of imported foreign goods. They enter into the formula of the consumer price index (CPI). Therefore, if the monetary authorities of the country target the inflation as a monetary policy instrument at least in the short-run, they

have to deeply care about the changes in the nominal exchange rate. Thus, as discussed in the chapter three of the thesis and stated in the flexible-price monetary model (equation 3.22), the macroeconomic variables that have to be reconsidered are the money supply, the real output, the nominal interest rate and the CPI.

As stated above, the exchange rate for the successful monetary policies needs to be the freely floating exchange rate regime. However, what is true in theory is not true in practice. In theoretical meaning, as it is stated in chapter four, the floating exchange rate policy is a policy in which a currency's value is determined due to the fluctuations in the foreign exchange market. There is no government intervention. However, in practice, the definition of the flexible exchange rate regime is different than that. The market meaning of the floating exchange rate is one in which the central bank or the government places it according to the economy's desired value. When it deviates from the expected value from time to time, they intervene into the foreign exchange market by buying or selling the foreign exchange and maintain the value of it. So, in practice, the floating exchange rate means *dirty* flexible exchange rate (Chang and Velasco, 2000, p. 74). Thus, the dirty float exchange rate serves better to the strategies of the monetary policy especially to the inflation targeting.

On the other hand, for the fixed exchange rate regime the situation is not same and what is correct in the theory is also correct in practice. Thus, both in theory and in practice, the fixed exchange rate is defined as a policy in which a currency's value is pegged to the value of another single currency or to a basket of other currencies. In addition to this, there is government intervention into the foreign exchange market, when the desired value of the exchange rate deviates from its original point. However, as long as the theory and appliance of the fixed exchange rate match, it is not suitable to the monetary policy's strategies, particularly to the inflation targeting.

In conclusion, for the inflation targeting, the governments and the monetary authorities have to move from the fixed exchange rate regime to the floating exchange rate regime in order to maintain the needs of the monetary policy strategies. However, the floating exchange rate regime has to be dirty floating exchange rate as by this way, it will be applicable in the practice.

## **5.6. Conclusion**

This part of the study highlights the significance of credibility and financial fragility for the strategies of the optimal monetary policy in the emerging markets, especially for the choice of exchange rate system. For this reason, firstly, the exchange rate and the monetary policies of Turkey, Taiwan, Argentina and Brazil were analyzed. Secondly, credibility and financial fragility issues were mentioned in detail. Credibility and the financial fragility are very country specific characteristics and differ from country to country. The general outcome of credibility and financial fragility issues are; they are more important for the success in the emerging markets than the choice of floating or fixed exchange rate regime. Thus, which exchange rate regime needs to be used depends on the monetary policy strategies and macroeconomic goals.

In the following section, the empirical studies of the flexible-price monetary model for Turkey, Taiwan, Argentina and Brazil will be conducted.

## **CHAPTER 6. MONETARY APPROACH TO EXCHANGE RATE DETERMINATION: THE CASE OF TURKEY, TAIWAN, BRAZIL AND ARGENTINA**

### **6.1. Introduction**

In chapter two, the history of the monetary systems was analyzed. Then, in chapter three, the exchange rate theory was discussed in details. In chapter four, the exchange rate policies were studied. After that, in chapter five, the exchange rates in the emerging markets were analyzed and tried to list which emerging country adopted which exchange rate. However, in this chapter, firstly, a summary of the empirical studies, their findings and the continuous views will be discussed. Then, methodology, type of data, the model, the results of the unit root tests of the single country and the panel, the cointegration coefficient results, the cointegration residual results and the VEC results will be stated. Finally, the general conclusions will be given.

In this chapter, the questions of whether there is a cointegration relation between the nominal exchange rate and the monetary variables such as the money supply, the rGDP, the nominal interest rate and the CPI differentials or not will be answered. Then, if there is a cointegration relation between these monetary differentials, how much each variable affects the changes in the value of the exchange rate, the signs and the magnitudes of the coefficients will be tested.

In the following section of the chapter, theoretical development of the determination of the exchange rate will be stated by the help of the studies of the certain economists, who work on these fields and mainly dealt with the cointegration issue in the exchange rate determination.

### **6.2. Theoretical Development of the Exchange Rate Determination**

In this part of the study, the aim is to go over the views and the empirical findings of the certain economists about the exchange rate determination.

Several studies conducted different tests in order to observe the validity of the monetary approach in the exchange rate determination, which still remain controversial. In

one of them, Bilson (1978, p. 53) studied the relation between the Deutsche mark-pound sterling floating exchange rates. In this study, the data was taken from January 1972 through April 1976 and Bayesian estimation procedure was used. According to the results of the test, the study supports the validity of the monetary approach in the long-run. One another study was McDonald and Taylor's study (1992, p. 32) that reported the study of Putnam and Woodbury (1979), who used the equation (3.22), which was emphasized in the third chapter, for the pound sterling-the US dollar exchange rates for the period from 1972 to 1976, typically supports the monetary approach. Other study, which is opposite of the flexible-price monetary model that is Dornbusch's study (1976, p. 1163) supports the sticky-price monetary model for the exchange rate determination. He conducted a study for the Deutsche mark-the US dollar exchange rates for the period from 1973 to 1978 and added the long-term interest rate differential variable into the model. At the end of the study, he argues that the exchange rate of a country in the long-term could be determined under the heading of the sticky-price monetary model. In addition to the above economists, also, Mark (1995, p. 214) pointed out a new way for the monetary model by presenting that departures from a simple set of monetary fundamentals like relative money supply and relative real output level are beneficial for predicting the US dollar exchange rates at longer periods for the interval 1981-1991. Contrary to the Mark's (1995, p. 214) results, Berben and van Dijk (1998, p. 254) and Berkowitz and Giorgianni (2001, p. 83) proved that Mark's (1995, p. 214) tests are based on the strict assumption of the stable cointegration relationship among nominal exchange rates, relative money supplies and relative output levels. Thus, if this assumption is not considered, the supposed cointegration relationship between the nominal exchange rate and the monetary fundamentals will not hold.

When the unit root and the cointegration tests are observed, which are the main objectives in this thesis, it is realized that there are also some other researchers, who revised these issues and stated their empirical findings. For example, the study of Boothe and Glassman (1987, p. 451) states that most of the macro economic variables, such as the money supply, the rGDP, the nominal interest rate and the CPI, have non-stationary behaviors, which means there is a unit root. Existence of the unit root is the prior condition for testing the cointegration. Thus, the study implies that the time series of the exchange rates at all levels are non-stationary that means there are unit roots; however, their first



differences are stationary that means there are not any unit roots. In conclusion, he says that these non-stationary results reason biased estimation for a long-run relationship between the exchange rate and the monetary variables such as the money supply, the rGDP, the nominal interest rate and the CPI differentials.

Contrary to the above studies, which support the monetary models in most of the exchange rate determinations in the long-run, there are also some other researchers, who are against the holding of the monetary approach in all aspects. The monetary approach worked well until 1978, however, when the period is enlarged, the results of the studies begin to be inconsistent as the theory suggests. This means some of the variables are not correctly signed, the equations have little explanatory power and there is a problem in the residual's autocorrelation. For instance, McDonald and Taylor (1991, p. 179) studied the strength of the monetary model for the long-run. They worked on the US dollar-pound sterling, the US dollar-the Deutsche mark and the US dollar-the Japanese yen exchange rates from the beginning of the 1976 to the end of the 1990. They went over the flexible-price monetary model and found that unrestricted monetary model supports acceptable clarification for the long-run nominal exchange rate for the three remaining exchange rates. Contrary to this, in the study, it is found that for one of the exchange rates some of the monetary restrictions might not be rejected and this causes a reconsideration of the monetary approach at least in the long-run. Thus, the existence of a long-run relationship between the exchange rate and the monetary variables that are the money supply, the rGDP, the nominal interest rate and the CPI, is a biased estimation in this study.

After some studies were conducted by only using single country's coefficients, it was realized that the results that were obtained did not directly match with the theory. Therefore, in order to avoid these misleading results, most of the studies employed panels and used several countries' coefficients together especially after the post Bretton Woods float. As originally emphasized by Levin and Lin (1992, p. 92), panel techniques may have greater influence on the correction of the unit root and the cointegration tests. Also, Im, Pesaran and Shin (1997, p. 15) worked on the panel techniques. When the panel techniques are used, the results of the unit root and the cointegration tests become more accurate compare to the results of the single countries. Thus, after this time, whenever the exchange rate determination tests are conducted, generally, both the single country and the panel techniques are used together.

In addition to the above economists, Groen (2000, p. 303) and Mark and Sul (2001, p. 36), also, conducted tests for a stable long-run relationship between nominal exchange rates and monetary variables obtaining panel cointegration tests for the post-Bretton Woods float. These two studies claim strong support for the cointegration relationship among nominal exchange rates and the monetary differentials such as money supply and real output level by conducting panel cointegration tests. As well, using long span of data helps to improve the problems that may be faced. Thus, all countries in a panel satisfy the long-run monetary model even some individual countries are not directly fit to the monetary model.

In conclusion, when the validity of the monetary approach is studied, it is realized that, in some of the studies, it behaves well for the first part of the Bretton Woods experience. However, some other studies states that especially after the second part of the Bretton Woods float some of the significant exchange rates do not support the theory. Thus, in order to see the effects of the monetary approach on the exchange rate determination, the panel techniques may be applied. Also, this may have some misleading results but at least the results could be closer to the theory. In the coming part of the chapter, the question whether there is a cointegration relationship between the nominal exchange rate and the money supply, the rGDP, the nominal interest rate and the CPI differentials will be explained. Also, if there is a cointegration relationship, what the degrees of influences of monetary variables are on the nominal exchange rate will be observed.

### **6.3. The Monetary Model**

This part of the chapter will derive the monetary model that will be used in the empirical study. This study is testing the long-run validity of the monetary approach that has been explained in chapter three and existence of the cointegration relationship between the exchange rate and the monetary variables. The selected countries that are taken as the domestic countries are Turkey, Taiwan, Brazil and Argentina and as the foreign country is the US. The derivation of the monetary model is as follows; initially, money supply functions are supposed for the domestic and foreign countries;

$$m_t - p_t = \alpha_1 i_t + \alpha_2 y_t \quad (6.1)$$

$$m_t^* - p_t^* = \alpha_1 i_t^* + \alpha_2 y_t^* \quad (6.2)$$

In the equations (6.1) and (6.2), “ $m$ ” is the money supply at home, “ $p$ ” is the domestic price level, “ $i$ ” is the nominal interest rate at home and “ $y$ ” is the real income at home. All variables are considered at time  $t$ . As all variables consist of many digits, they are all in logarithmic forms and lower case letters signify log levels. Asterisks imply foreign variables. Secondly, the rPPP that was mentioned in the chapter three is considered;

$$e_t = p_t - p_t^* \quad (6.3)$$

In the formula (6.3), “ $e$ ” is the nominal exchange rate. The asterisk shows the foreign fundamental. When the equation (6.1) and the equation (6.2) are solved for  $p_t$  and  $p_t^*$  and the final expressions are put into the equation (6.3), the equation (6.4) will be reached;

$$e_t = (m_t - m_t^*) - \alpha_1 (y_t - y_t^*) + \alpha_2 (i_t - i_t^*) \quad (6.4)$$

Thirdly, the monetary approach takes into account the UIRP that was dealt in the third chapter;

$$i_t^* - i_t = E(\Delta e_{t+1} | I_t) \quad (6.5)$$

In the equation (6.5);  $E(\Delta e_{t+1} | I_t)$  is the expectations operator conditional on information available at time  $t$ . Thus, the final equation that is tested in this study is;

$$e_t = (m_t - m_t^*) - \alpha_1 (y_t - y_t^*) + \alpha_2 (i_t - i_t^*) - \alpha_3 (p_t - p_t^*) \quad (6.6)$$

Therefore, in the test, the monetary, output, interest rate and the CPI differentials will be used. Initially, the unit root tests will be conducted and depending on the existence of the unit root tests, the cointegration tests will be conducted. The empirical analysis will estimate the cointegration relationship for the following variables;

$$e_t = \beta_0 + \beta_1(m_t - m_t^*) + \beta_2(y_t - y_t^*) + \beta_3(i_t - i_t^*) + \beta_4(p_t - p_t^*) \quad (6.7)$$

The equation (6.7) is used for estimating the cointegration coefficient results, the cointegration residual results and the VEC results. For estimating these results, the OLS, the DOLS and the JOH-ML tests will be conducted.

#### **6.4. The Data**

The data that is used in this study consist of quarterly observations for the period of 1986 to 2006. The selected variables of the model are the nominal exchange rate, the money supply, the rGDP, the nominal interest rate and the CPI. The nominal exchange rate is used as the US dollar per domestic currency. For the money supply, M2 (a measure for the total money supplies that covers checkable demand deposits plus savings and other time deposits) is taken into consideration. The rGDP is calculated by caring about the seasonally adjusted numbers and the year of 1992 is taken as the base year for each country. The nominal interest rate is chosen as the 3-months interbank rate. Turkey, Taiwan, Brazil and Argentina are the domestic countries and the US is the foreign country. The reason why these countries are selected is the data availability. The years from 1986 to 2006 covers lots of crises and the international monetary arrangements like modern float, the Asian crises, the Latin American crises, the Turkish crises and the IMF agreements. Thus, dummy variables are used in the tests in order to get more accurate results. The dummy variables include more than one effect as by this way, the estimated results are closer to the reality. In Turkey, the dummy variable includes the Russian Crisis (1998:Q2-1998:Q4 as 1 and otherwise zero), the Asian Crisis (1997:Q4 as 1 and otherwise zero) and Turkish Crises (1994:Q2-1994:Q3 as 1 and otherwise zero and 2000:Q1-2001:Q3 as 1 and otherwise zero). In Taiwan, the dummy variable consists of the Russian Crisis (1998:Q2-1998:Q4 as 1 and otherwise zero), the Asian Crisis (1997:Q4 as 1 and otherwise zero) and

Taiwanian Crises (1995:Q2-1995:Q4 as 1 and otherwise zero and 1998:Q2-1999:Q2 as 1 and otherwise zero). In Argentina, the dummy variable implies the Russian Crisis (1998:Q2-1998:Q4 as 1 and otherwise zero), the Asian Crisis (1997:Q4 as 1 and otherwise zero), Brazilian Crises (1999:Q3-2000:Q2 as 1 and otherwise zero) and Argentinean Crises (1999:Q3-2002:Q1 as 1 and otherwise zero). Finally, in Brazil, the dummy variable uses the Russian Crisis (1998:Q2-1998:Q4 as 1 and otherwise zero), the Asian Crisis (1997:Q4 as 1 and otherwise zero), Argentinean Crises (1999:Q3-2002:Q1 as 1 and otherwise zero) and Brazilian Crises (1994:Q2-1994:Q4 as 1 and otherwise zero and 1999:Q3-2000:Q2 as 1 and otherwise zero). In the panel data, dummies are not used. All variables are measured in log levels. For some countries, some of the data are missing. In order to support these missing data, the changes in the other variables are followed and the absent data are filled by using the linear interpolation techniques. For each country and for each measure, the data are taken from the country's central bank or its statistical institute. All relevant names and the web addresses of the central banks and the statistical institutions will be presented in the reference part of the thesis.

## **6.5. Methodology and Estimation Results**

In this part of the study, all estimation results of the unit root tests, the cointegration coefficient results, the cointegration residual results and the VEC results will be given. For this reason, the OLS, the DOLS, the JOH-ML and the VEC tests will be carried out. Both the single country and the panel estimations' results will also be shown. The variables that are tested are in difference logarithmic forms. In the study, the EViews program is used. This is a statistical package for Windows and is mainly used for econometric analysis such as cross-sectional, panel data analysis, time series estimation and forecasting.

### **6.5.1. The unit root tests**

In the unit root test, the aim is initially to search for the integration features of the nominal exchange rate and the monetary differentials of the money supply, the rGDP, the nominal interest rate and the CPI. In other words, as a definition, the unit root test is a statistical test for the proposition that in an autoregressive statistical model of a time series,

the autoregressive parameter is one. In a data series  $y(t)$ , where “t” is a complete number, modeled like;

$$y_{(t+1)} = ay_{(t)} + \text{other terms} \quad (6.8)$$

In the formula, “a” is an unknown constant and the unit root test would be a test of the hypothesis that  $a=1$ , generally against the alternative that  $|a|<1$ .

The unit root test is the precautionary condition for testing the cointegration tests, because, based on the results of the unit root test, the variables whether will be added to the cointegration formula or not. If a variable does not have a unit root, then, this variable will not be put into the formula or vice versa. For the cointegration tests, the variables have to have non-stationary behaviors and this is observed by the help of the unit root test.

This study has used Augmented Dickey Fuller (ADF) Test in order to investigate integration properties of  $e_t$ ,  $m_t - m_t^*$ ,  $y_t - y_t^*$ ,  $i_t - i_t^*$  and  $p_t - p_t^*$  for the selected countries. In the test,  $H_0$  is defined as there is a unit root and there is a non-stationary behavior of the tested variable and otherwise  $H_1$ . According to the ADF Test, if the calculated t-statistics is less than the critical value then the  $H_0$  is rejected or if the calculated t-statistics is more than the critical value then the  $H_0$  is accepted. For the single country tests, in Table 6.1, the unit root is tested both for the trend and for the constant and trend components. The consideration of trend inclusion has been based on the visual assessment of the results. Columns ADF Test and Stationarity show results and interpretation of the unit root test, respectively. In the Stationarity Column, the existence of the unit root is shown by  $I(1)$  and otherwise  $I(0)$ .

For the panel, in Table 6.2, the methodology is different like there are three tests conducted and if the results of at least two tests implies the existence of the unit root, then, it is concluded that there is a unit root in this variable. Levin, Lin and Chu (1992, p. 92) estimate the unit root according to the t-statistics and state that the null hypothesis is  $I(1)$ . Im, Pesaran and Shin (1997, p. 15) use w-statistics and imply that the null hypothesis accept the existence of the unit root. Contrary to these tests, Hadri (2000, p. 150) uses z-statistics and assumes the null hypothesis of stationarity. The test results are divided into two as whether they include a linear trend or not. The tests will be conducted based on these criteria.

### 6.5.2. The unit root test results

In this part of the study, the unit root test results both for the single country and for the panel study will be presented. By the help of these results, testing of cointegration relation between exchange rate and monetary variables will be proceeded.

In general, based on the unit root test results in Table 6.1, the theoretical estimations confirm that the considered variables contain a unit root. It is concluded that all five variables  $e_t$ ,  $m_t - m_t^*$ ,  $y_t - y_t^*$ ,  $i_t - i_t^*$  and  $p_t - p_t^*$  are non-stationary  $I(1)$  for Turkey, Taiwan and Brazil. For these countries, it is necessary to test for cointegration relationship among all considered variables. On the other hand, based on estimations for Argentina, it is concluded that  $e_t$ ,  $i_t - i_t^*$  and  $p_t - p_t^*$  are non-stationary  $I(1)$ , while  $m_t - m_t^*$  and  $y_t - y_t^*$  are stationary  $I(0)$ . For that reason it is necessary to test for cointegration relationship among only  $e_t$ ,  $i_t - i_t^*$  and  $p_t - p_t^*$  for Argentina as there are no long-run changes in  $m_t - m_t^*$  and  $y_t - y_t^*$ . In conclusion, all these tests show that there is unit root at different levels of significance for all variables in all countries except monetary differential and output differential for Argentina. Therefore, study excludes these two variables for cointegration analysis for Argentina.

**Table 6.1** Unit Root Test Results

Country	Variables	ADF Test	Stationarity
<b>Turkey</b>	$e$	-1.74	$I(1)$
	$m-m^*$	-1.49	$I(1)$
	$y-y^*$	-1.50	$I(1)$
	$i-i^*$	-1.92	$I(1)$
	$p-p^*$	-2.39	$I(1)$
<b>Taiwan</b>	$e$	-2.21	$I(1)$
	$m-m^*$	-2.09	$I(1)$
	$y-y^*$	-2.41	$I(1)$
	$i-i^*$	-1.03	$I(1)$
	$p-p^*$	0.64	$I(1)$
<b>Brazil</b>	$e$	-1.45	$I(1)$
	$m-m^*(\text{trend})$	-1.23	$I(1)$
	$y-y^*(\text{trend})$	-0.59	$I(1)$
	$i-i^*$	-2.43	$I(1)$
	$p-p^*$	-1.69	$I(1)$
<b>Argentina</b>	$e(\text{trend})$	-1.94	$I(1)$
	$m-m^*$	-3.88	$I(0)$
	$y-y^*$	-4.49	$I(0)$
	$i-i^*$	-1.48	$I(1)$
	$p-p^*(\text{trend})$	-2.26	$I(1)$

Note: “trend” denotes that there is a constant with time dummy in the regression.

Decision of stationarity is based on 5 percent significance level.

Trend component is added by the author’s preference for some of the variables.

On the other hand, Table 6.2 shows the panel unit root test results. Testing of the panel unit root is different than the single country unit root test. In the panel unit root test, there are Levin, Lin and Chu (1992, p. 92), Im, Pesaran and Shin (1997, p. 15) and Hadri (2000, p. 150) estimations. Thus, if two of the three estimations imply the evidence of a unit root, then, it is concluded that this variable includes a unit root. According to these results, the panel unit root test results are different than the single country unit root test results. Therefore, when the panel unit root test is carried out, the theoretical estimations verify that the considered variables “ $e_t$ ,  $m_t - m_t^*$ ,  $i_t - i_t^*$  and  $p_t - p_t^*$ ” include a unit root, which means they are non-stationary  $I(1)$ , however, “ $y_t - y_t^*$ ” does not include a



unit root, which means it is stationary  $I(0)$ . It is concluded that all these tests imply that there is unit roots at five percent significance level for all variables except output differential. Thus, thesis excludes this variable for cointegration analysis for the panel.

**Table 6.2** The Panel Unit Root Test Results

	c			c,t		
	LLC <sup>a</sup>	IPS <sup>a</sup>	Hadri <sup>b</sup>	LLC <sup>a</sup>	IPS <sup>a</sup>	Hadri <sup>b</sup>
e	-2.81 I(0)	-1.31 I(1)	10.56 I(1)	-0.63 I(1)	0.68 I(1)	6.25 I(1)
m-m*	-4.03 I(0)	-2.92 I(0)	10.33 I(1)	-2.27 I(0)	1.86 I(1)	9.93 I(1)
y-y*	-6.44 I(0)	-6.74 I(0)	9.76 I(1)	-3.99 I(0)	-2.52 I(0)	10.11 I(1)
i-i*	0.73 I(1)	-0.22 I(1)	5.96 I(1)	1.11 I(1)	0.47 I(1)	3.14 I(1)
p-p*	-1.52 I(1)	-0.06 I(1)	9.60 I(1)	-0.37 I(1)	1.11 I(1)	7.53 I(1)

Note: “c” and “ct” denote that there is a constant and a constant with time dummy in the regression.

<sup>“a”</sup> null of non-stationarity (unit root)

<sup>“b”</sup> null of stationarity (no unit root)

In the following subsection of the study, the cointegration relationship among the nominal exchange rate and the monetary differentials, which are monetary, output, interest rate and price variables, of Turkey, Taiwan, Argentina, Brazil and the panel data will be held.

### 6.5.3. The cointegration tests

In this part, methodology of cointegration coefficient and cointegration residual tests will be discussed. In the unit root test, it is observed that whether the nominal exchange rate and the monetary differentials have non-stationary behaviors or not. However, in the cointegration tests, there is a search for any evidence to assume cointegration relation between the nominal exchange rate and the monetary differentials. Cointegration relation is tested only for non-stationary variables. The cointegration coefficient estimates imply the relation between the variables, whereas, the cointegration

residual estimates imply whether there is a long-run cointegration relationship between variables or not.

This section reports the cointegration coefficient estimates (Table 6.3) and the cointegration residual estimates (Table 6.4) for four countries and the panel data based on the unit root test results. Different estimation procedures are adopted to test cointegration relation with monetary essential model in equation 6.7. These are Ordinary Least Square (OLS), Dynamic Ordinary Least Square (DOLS) and Multivariate Maximum Likelihood Procedure of Johansen (JOH-ML). The OLS estimates give consistent coefficients of long-run model but standard errors are unreliable where long-run model estimates suffer from small-sample bias. Therefore OLS estimators showed little proof of efficiency. In DOLS estimates, leads and lags abolish asymptotically any possible bias due to endogenous or serial correlation. Therefore, the DOLS is more efficient than the OLS estimates. In DOLS estimates, Stock and Watson's (1993, p. 787) and Rapach and Wohar's (2001, p. 369) methods are used and the number of leads and lags are located equal to two for all countries. In addition to these, the JOH-ML estimates are also asymptotically efficient and yield covariance matrices suitable for inference. Nevertheless, the JOH-ML method is responsive to number of lags included and this method does not work very well in small samples. In JOH-ML estimates, the Sims (1980, p. 24) Schwarz criterion (SC) are used. The maximum lag order of ten and 10 percent significance level for SC are considered. It selects nine lags for Brazil, seven lags for Argentina and Turkey, three lags for the panel data and two lags for Taiwan.

In the following part, the cointegration coefficient and the cointegration residual results will be given and discussed based on the criteria that whether the coefficients' magnitude is close to one or not, whether the coefficients' signs are correct or not and whether the coefficients' are statistically significant or not.

#### **6.5.4. Cointegration coefficient results**

In the below Table 6.3, the cointegration coefficient results of four countries and the panel data are stated. As it is stated above, there are three criteria for testing the monetary model and they are whether the magnitude is close to one or not, whether sign is correct or not and whether there is evidence of significance or not.

**Table 6.3 The Cointegration Coefficient Results**

	<b>OLS</b>	<b>DOLS</b>	<b>JOH-ML</b>
<b>Turkey</b>			
$\beta_1$	0.89*** (0.01)	0.91*** (0.01)	-0.38* (-0.20)
$\beta_2$	-0.10 (0.10)	-0.70*** (0.24)	-18.72*** (-6.13)
$\beta_3$	0.32*** (0.03)	0.30*** (0.04)	0.42 (-0.49)
$\beta_4$	0.03* (0.02)	0.05** (0.02)	-1.83*** (-0.41)
<b>Taiwan</b>			
$\beta_1$	-2.03*** (0.32)	-2.73*** (0.37)	1.46** (-0.61)
$\beta_2$	2.10*** (0.33)	2.85*** (0.39)	-1.62** (-0.63)
$\beta_3$	-0.18*** (0.03)	-0.20*** (0.03)	0.10** (-0.05)
$\beta_4$	2.34*** (0.52)	3.42*** (0.59)	-1.74* (-0.97)
<b>Brazil</b>			
$\beta_1$	0.57** (0.26)	0.26 (0.45)	12.03*** (-1.92)
$\beta_2$	-0.44*** (0.16)	-0.21 (0.28)	-8.42*** (-1.32)
$\beta_3$	-0.14*** (0.04)	0.28*** (0.09)	1.68*** (-0.25)
$\beta_4$	0.60*** (0.12)	0.77*** (0.19)	-5.33*** (-0.67)
<b>Argentina</b>			
$\beta_1$	-	-	-
$\beta_2$	-	-	-
$\beta_3$	0.14*** (0.02)	0.16*** (0.05)	0.85** (-0.42)
$\beta_4$	1.21*** (0.02)	1.24*** (0.03)	-1.82*** (-0.17)
<b>Panel</b>			
$\beta_1$	0.59*** (0.03)	0.61*** (0.03)	0.11 (-0.28)
$\beta_2$	-	-	-
$\beta_3$	-0.17*** (0.04)	0.38*** (0.07)	0.82 (-1.62)
$\beta_4$	-0.09 (0.06)	-0.27*** (0.05)	-8.86*** (-1.11)

Note: The standard errors are in parentheses.

\*, \*\* and \*\*\* refers to 10 percent, 5 percent and 1 percent significance levels, respectively.

The theoretical values implied by the simple monetary model are  $\beta_1=1$  (the monetary differential),  $\beta_2= -1$  (the output differential),  $\beta_3=1$  (the nominal interest rate differential) and  $\beta_4= -1$  (the price differential). According to the theory, the monetary and the nominal interest rate differentials must be signed positive that means they are positively related with the nominal exchange rate. On the other hand, the output and the price differentials must be signed negative that means they are negatively related with the nominal exchange rate.

Empirical analysis shows that in single countries' analyses neither the signs nor the magnitudes reflect homogeneous behaviors. Furthermore, the mix results are obtained under different estimation procedures for single countries. However, the results show that coefficients have statistically high significance levels.

In Turkey and Brazil, the monetary differential has the correct sign with the theory. Additionally, Turkey has closer magnitudes to the theory. This behavior is also similar for income differential for these countries. While they have the correct sign, they have smaller values in magnitudes in the OLS and the DOLS estimates, but very high magnitudes in the JOH-ML estimate. In interest rate differential, Turkey, Brazil and Argentina performs similar signs, yet, the OLS and the DOLS estimates perform very similar results for Turkey, 0.32 and 0.30, and for Argentina, 0.14 and 0.16, respectively. In the OLS and the DOLS estimates, the price differential has the opposite sign with the theory in all countries, however, in the JOH-ML estimate; the sign confirms the theory and magnitudes are slightly higher in all countries.

In Taiwan, even though coefficients are statistically significant in all estimation procedures only in the JOH-ML estimate, it has the correct sign as the theory suggest, but, the opposite sign in the OLS and the DOLS estimates. Furthermore, magnitudes are slightly larger except in the interest rate differential.

Because of the effects of dummies, it may be told that Russian and Assian crises, generally, affected the economies of Turkey, Brazil and Argentina; however, Taiwan did not affected by the Russian crisis.

On the other hand, in panel analysis, there is enough evidence to assume that the coefficients have the correct sign with the theory. The monetary differential has given similar signs and magnitudes in the OLS and the DOLS estimates at 1 percent significance level, respectively. The interest rate differential is statistically significant in the OLS and

the DOLS estimates at 1 percent significance level, respectively. However, its sign is opposite in the OLS estimate and the true in the DOLS estimate with varying magnitudes. In price differential, sign is correct in the DOLS and the JOH-ML estimates but has varying magnitudes.

In conclusion, in the single country estimates, Turkey, Brazil and Argentina even have varying magnitudes, they have more accurate signs as the theory suggests. Thus, in these countries, there is a relation between nominal exchange rate and monetary variables. However, Taiwan is totally out of this group because of its incorrect signs and higher magnitudes. So, in Taiwan, there is a little relation between variables. In panel analysis, there are more similarities between coefficients than the single countries. For the monetary and the price differentials, the signs confirm the theory but the magnitudes vary under different estimates.

In the following part of the thesis, the cointegration residual results will be analyzed and whether there is a cointegration relation between variables or not will be searched.

#### **6.5.5. Cointegration residual results**

In the cointegration residual test, the existence of the cointegration relation between the nominal exchange rate and the monetary variables are searched. Thus, here, the residual is observed. The residual is the observable estimate of the unobservable error, which means difference between the predicted and the observed value. Residual is observable and not independent of each other. Value of the residual is the t-statistics. For obtaining the correct result of the residual, the lowest Akaike info criterion (AIC) value is considered.

For Turkey, Taiwan and Brazil, the  $e_t$ ,  $m_t - m_t^*$ ,  $y_t - y_t^*$ ,  $i_t - i_t^*$  and  $p_t - p_t^*$  variables and for Argentina, the  $e_t$ ,  $i_t - i_t^*$  and  $p_t - p_t^*$  are considered as non-stationary, however, their linear combination might be stationary. This is why; the cointegration residual test has to be conducted. Specifically, the equation 6.9 has to be tested;

$$u_t = e_t - \beta_0 - \beta_1(m_t - m_t^*) - \beta_2(y_t - y_t^*) - \beta_3(i_t - i_t^*) - \beta_4(p_t - p_t^*) \quad (6.9)$$

In the equation 6.9, “ $u_t$ ” has to be found, regression residual are stationary  $I(0)$ . In order to find it, the equation 6.7 has to be tested for Turkey, Taiwan and Brazil. For Argentina, the monetary and the output differentials have to be omitted from the formula.

**Table 6.4 Cointegration Residual Results**

	<b>OLS<sup>a</sup></b>	<b>DOLS<sup>a</sup></b>	<b>JOH-ML<sup>b</sup></b>
<b>Turkey</b>	-0.25	-0.31	111.76***
<b>Taiwan</b>	-0.34	-0.39**	86.18***
<b>Brazil</b>	-0.17	-0.26	189.98***
<b>Argentina</b>	-0.19	-0.16	80.50***
<b>Panel</b>	-0.09***	-0.14***	122.99***

Note: \*\* and \*\*\* refers to 5 and 1 percent significance levels, respectively.

<sup>a</sup> OLS test of  $H_0$ : No Cointegration, significance based on MacKinnon (1991)

<sup>b</sup> Johansen one-sided upper-tail test of  $H_0$ : No Cointegration, 5 and 1 percent critical values equal to 68,52 percent and 76,07 percent, respectively.

Based on results represented in Table 6.4, in the single country estimates, there is not enough evidence to assume cointegration relation between the nominal exchange rate and the monetary variables (monetary, output, interest rate and price differentials) other than Taiwan. In Turkey, Brazil and Argentina, the t-values are not higher enough to prove the cointegration relationship except in the JOH-ML estimate. These results are similar with the literature that has been explained previously. On the other hand, in panel analysis, there is enough evidence to assume cointegration relation between the nominal exchange rate and the monetary variables. In all tests, t-values are higher enough to confirm the cointegration relationship for 1 percent, respectively. This result is also similar with the literature.

As a common conclusion, in the single country estimates, there is enough evidence to assume long-run relationship between the nominal exchange rate and the monetary variables for Taiwan. On the other hand, as it is assumed, the panel data maintains the long-run monetary model in all estimates.

The following part presents the results of the VEC model and examines how the long-run equilibrium is restored between the nominal exchange rate and the monetary variables.

### 6.5.6. The VEC model

The VEC model implies the short-run dynamics of each variable in the simple monetary model and anchors the dynamics to long-run equilibrium relationships that are recommended by the economic theory. Thus, in order to examine how the deviation from long-run equilibrium is corrected between the exchange rate “ $e_t$ ” and the set of monetary fundamentals, which are  $m_t - m_t^*$ ,  $y_t - y_t^*$ ,  $i_t - i_t^*$  and  $p_t - p_t^*$ , the VEC model needs to be estimated. In the VEC model, the Johansen approach is applied, Harris (1995). The equation 6.10 represents the Johansen approach;

$$\Delta z_t = \sum_{j=1}^{k-1} \Gamma_j \Delta z_{t-j} + \Pi z_{t-k} + u_t \quad (6.10)$$

In the equation 6.10,  $z_t$  is (nx1) vector (n=5 for this study, as there are five variables),  $\Gamma_j$  and  $\Pi$  are (nxn) matrices of parameters representing short-run and long-run impacts, respectively.  $\Pi = \alpha\beta'$ , where  $\alpha$  reflects the speed of adjustment toward equilibrium, while  $\beta$  is a matrix of long-run coefficients.

### 6.5.7. The VEC model results

Table 6.5 shows estimates of the VEC coefficients for  $e_t$ ,  $m_t - m_t^*$ ,  $y_t - y_t^*$ ,  $i_t - i_t^*$  and  $p_t - p_t^*$  for four countries and the panel. All of them have proof of cointegration relationships at different significance levels.

Table 6.5 illustrates the result for the VEC model. Franses, 1998, Monetary Models become as:

$$\Delta e_t = \eta_0 + \sum_{i=1}^p \eta_{1i} \Delta e_{t-i} + \sum_{i=1}^p \eta_{2i} (m - m^*)_{t-i} + \sum_{i=1}^p \eta_{3i} (y - y^*)_{t-i} + \sum_{i=1}^p \eta_{4i} (i - i^*)_{t-i} + \sum_{i=1}^p \eta_{5i} (p - p^*)_{t-i} + \lambda_1 z_{t-1} + \varepsilon_{1t}$$

$$\Delta(m - m^*)_t = \theta_0 + \sum_{i=1}^p \theta_{1i} \Delta e_{t-i} + \sum_{i=1}^p \theta_{2i} (m - m^*)_{t-i} + \sum_{i=1}^p \theta_{3i} (y - y^*)_{t-i} + \sum_{i=1}^p \theta_{4i} (i - i^*)_{t-i} + \sum_{i=1}^p \theta_{5i} (p - p^*)_{t-i} + \lambda_2 z_{t-1} + \varepsilon_{2t}$$

$$\Delta(y - y^*)_t = \varphi_0 + \sum_{i=1}^p \varphi_{1i} \Delta e_{t-i} + \sum_{i=1}^p \varphi_{2i} (m - m^*)_{t-i} + \sum_{i=1}^p \varphi_{3i} (y - y^*)_{t-i} + \sum_{i=1}^p \varphi_{4i} (i - i^*)_{t-i} + \sum_{i=1}^p \varphi_{5i} (p - p^*)_{t-i} + \lambda_3 z_{t-1} + \varepsilon_{3t}$$

$$\Delta(i - i^*)_t = K_0 + \sum_{i=1}^p K_{1i} \Delta e_{t-i} + \sum_{i=1}^p K_{2i} (m - m^*)_{t-i} + \sum_{i=1}^p K_{3i} (y - y^*)_{t-i} + \sum_{i=1}^p K_{4i} (i - i^*)_{t-i} + \sum_{i=1}^p K_{5i} (p - p^*)_{t-i} + \lambda_4 z_{t-1} + \varepsilon_{4t}$$

$$\Delta(p - p^*)_t = \mu_0 + \sum_{i=1}^p \mu_{1i} \Delta e_{t-i} + \sum_{i=1}^p \mu_{2i} (m - m^*)_{t-i} + \sum_{i=1}^p \mu_{3i} (y - y^*)_{t-i} + \sum_{i=1}^p \mu_{4i} (i - i^*)_{t-i} + \sum_{i=1}^p \mu_{5i} (p - p^*)_{t-i} + \lambda_5 z_{t-1} + \varepsilon_{5t}$$

where  $\lambda_n$  reflects the speed of adjustment toward the equilibrium where “n” is from 1 to 5 and the equilibrium relations are determined by;

$$z_t = e_t - \beta_0 - \beta_1 (m - m^*)_t - \beta_2 (y - y^*)_t - \beta_3 (i - i^*)_t - \beta_4 (p - p^*)_t \quad (6.11)$$

**Table 6.5 VEC Model for  $e_t$ ,  $m_t - m_t^*$ ,  $y_t - y_t^*$ ,  $i_t - i_t^*$  and  $p_t - p_t^*$**

	$\mathcal{K}$	$\lambda_1$	$\lambda_2$	$\lambda_3$	$\lambda_4$	$\lambda_5$
<b>Turkey</b>	7	0.01	0.02**	0.01	-0.05*	0.21***
<b>Taiwan</b>	2	-0.10***	-0.08*	0.02	-0.38*	-0.03**
<b>Brazil</b>	9	0.01	0.11***	0.11	0.14	-0.01
<b>Argentina</b>	7	0.07***	-	-	0.27***	-0.01
<b>Panel</b>	3	-0.01***	0.01***	-	0.01	0.01***

Note: The data is taken from the “Cointeq 1” results in the VEC estimate.

“ $\mathcal{K}$ ” is the number of lags used in equations.

\*, \*\* and \*\*\* refers to 10 percent, 5 percent and 1 percent significance levels, respectively.



Based on the results stated in Table 6.5, error correction coefficients of the exchange rate are found statistically significant only for Taiwan and Argentina for 1 percent significance level, respectively. These tests show that, in Taiwan, 10 percent of disequilibrium is corrected by changes in the exchange rate when deviation from the long-run equilibrium takes a place. Furthermore, in Taiwan, the changes in money supply, interest rate and the CPI are also responsible for correcting the long-run equilibrium by 8, 38 and 3 percents. In Argentina, 7 percent of disequilibrium is adjusted by changes in exchange rate, while 27 percent is adjusted by changes in interest rate.

In Brazil, only, error correction coefficients of the money supply are found statistically significant, therefore, 11 percent of disequilibrium is corrected by changes in the money supply. On the other hand, in Turkey, the changes in money supply, interest rate and the CPI are also responsible for correcting the long-run equilibrium by 2, 5 and 21 percent, respectively.

In panel analysis, error correction coefficients of the exchange rate, money supply and the CPI are found statistically significant, while correcting the disequilibrium at the same level that is 1 percent.

In conclusion, between the years of 1986 and 2006, in Turkey; the CPI, in Taiwan; the interest rate, in Brazil; the money supply and in Argentina; the interest rate are responsible for correcting the long-run equilibrium more than other variables. On the other hand, in panel, the exchange rate, the money supply and the CPI are correcting the disequilibrium.

## **6.6. Conclusion**

This chapter empirically tested long-run monetary model in the exchange rate determination. First, the model was conducted for countries Turkey, Taiwan, Brazil and Argentina, for the period from 1986 to 2006. Then, the values of variables were combined and a panel data was created.

Firstly, the stationarity of the variables were searched by the help of a unit root test. Based on the results of the unit root test, with the variables that had a unit root (non-stationary behavior), the cointegration coefficient and the cointegration residual tests were carried out. For this reason the OLS, the DOLS and the JOH-ML tests were conducted. In

the cointegration coefficient test, the relation between variables, whether they were correctly signed or not, whether they were closed to unity or not and whether they were statistically significant or not were analyzed. On the other hand, in the cointegration residual test, existence of the cointegration relation between the nominal exchange rate and the monetary variables were searched. Finally, the VEC test was carried out and which variable is more efficient for correcting the disequilibrium in the model was found.

In conclusion, in the cointegration coefficient tests, Turkey, Brazil and Argentina have more common characteristics; however, Taiwan is not part of this group. Therefore, based on the effects of dummies, it may be concluded that Russian and Asian crises, generally, affected the economies of Turkey, Brazil and Argentina; however, Taiwan did not suffer from the Russian crisis. Panel analysis' results are more close to what the theory suggests. Furthermore, in the cointegration residual tests, only Taiwan supports the long-run monetary model, whereas all other countries are statistically insignificant. On the other hand, for panel analysis, there is enough evidence for the long-run monetary model. In the VEC model, in Taiwan and Argentina, interest rate is an important variable for correcting the disequilibrium in the model, whereas, in Turkey; the CPI and in Brazil; the money supply are the essential variables for correcting the long-run equilibrium. In panel, the exchange rate, the money supply and the CPI are correcting the disequilibrium at the same level.

## CHAPTER 7. CONCLUSION

The purpose of this thesis is to focus on the exchange rate fluctuations in the emerging markets with the long-run monetary model. The long-run monetary model of the exchange rate determination, mainly, claims a strong connection between the nominal exchange rate and the monetary variables like the monetary differential, the output differential, the interest rate differential and the price differential. For this reason, the exchange rate behaviors in the emerging economies, specifically in Turkey, Taiwan, Brazil and Argentina, are analyzed, both theoretically and empirically. Initially, single countries are studied. Then, the panel data is tested.

Currently, these four countries, mainly, conduct similar exchange rate regimes and monetary policies. In all of them, the floating exchange rate regime is in effect. On the other hand, in Turkey, monetary policy is very strict and puts the inflation targeting as a main concern. In Taiwan, in order to support the efficient working of the economy, monetary and fiscal policies are used in a balance. In Brazil, same with Turkish monetary authorities, price stability is considered as an essential monetary policy target. In Argentina, nowadays, the economic stability tries to be maintained.

The answer to the first question, which is what kinds of exchange rate policies are conducted in emerging markets, is as follows: The exchange rate policies are selected according to the needs of the economic environments in these countries. These countries experienced several financial crises in a limited amount of time; therefore, there have been changes in the exchange rate policies very often. However, their preferences are fixed, floating and managed float exchange rate regimes. In Turkey, before the 1980s' political and financial crises, the exchange rate policy was stricter, whereas, after 1980s the exchange rate policy was more flexible. However, between the years of 1980 and 1988, Turkey used crawling peg and after year 1988 to the present they use the flexible exchange rate policy. In Taiwan, around late 60s, the government adopted foreign exchange control and the exchange rate system fixed to the US dollar. Beginning from 1978, Taiwan passed to the managed float exchange rate system. In 1989, Taiwan began to use floating exchange rate system. After experiencing several crises between the years of 1999 and 2003, Taiwan, now, uses the floating exchange rate policy. Nonetheless, Brazil, like most of the emerging markets, also faced some financial crises. From 1967 to 1990, they used

crawling pegged to the US dollar, but later from beginning of 1986, they used fixed exchange rate policy for couple of years. Since the beginning of 1990, they have a floating exchange rate regime with less government intervention. However, in order to control money creation, from 1995 to 1999, they used an adjustable band. After several crises that occurred both domestically and internationally, they adopted the floating exchange rate policy. Furthermore, Argentina also experienced chronic inflation problems and currency crises, but, Argentina's government initially chose to solve their problems with the help of the fixed exchange rate regime and then, switched to the floating exchange rate regime. In these four countries' history, beginning from 1950s to 1980s, there were some political problems that affected the economy negatively. Nearly, in all countries, the CA, the inflation rate, the interest rate and the growth rate were affected negatively. In those times, in order to escape from these situations, they generally used the fixed or the managed float exchange rate policies. However, after 1980s, as the world become more global and internal and external crises have more influential effects on their economies, in order to let domestic currencies reach to their natural levels, they began to use flexible exchange rate policies.

The reply to the second question, which is what the possible threats are for these economies, is as follows: The emerging countries' economies are the most sensitive economies to the internal and external crises in the countries. When there is a shock in one of the developed countries, it directly affects the growth rate, efficiency and future of the domestic economy. Additionally, if there is a contractionary event in the domestic economy, effects of it continue for a long time. The reason behind this is the vulnerable structure of the emerging markets. The emerging economies are vulnerable, because of having instability in politics and in economy, having large domestic debt that may not be easily sustainable and having high amount of imports, while having less amount of exports. All these results state that these countries are very dependable to the external and internal crises. This is the first one of the threats of the emerging markets. In the emerging markets, changes in the exchange rate policies are more compare to the developed countries. For instance, in last four decades, in Brazil, there have been used four different exchange rate policies, however, in the USA; there has been adopted only one exchange rate policy. Thus, as the effects of an exchange rate policy is seen in a remaining amount of time and there is an often change in it; there is not a chance for the exchange rate policy to show its

effects in the emerging country. So, this is the second one of the threats of the emerging markets. One another threat of the emerging markets is; their monetary authority and government are not totally independent from each other. As these two institutions are not separated from each other, the decisions that they give may not be objective. Both of them care the other one's benefit and at the end, they do not give decisions for the sake of public but rather for themselves. In order to have proper working of the government and the monetary authorities, they have to be independent and have to give decisions by caring the public.

The answer to the third question, which is whether the monetary approach explains exchange rate fluctuations in emerging markets or not, is as follows: In this thesis, Turkey, Taiwan, Brazil and Argentina are the issued examples of the emerging markets. Additionally, for testing the monetary approach in exchange rate determination, the cointegration tests and the VEC model are used. Therefore, after examining all results, in the single country estimations, only for Taiwan, there is enough evidence to assume cointegration relation between the nominal exchange rate and the monetary variables. However, all other countries, which are Turkey, Brazil and Argentina, are found statistically insignificant. On particular, for getting more accurate results, all variables of all countries are combined and the panel data is created. Same tests are also conducted for the panel. As a result, the panel shows strong evidence for the validity of the long-run monetary approach. In the cointegration coefficient results of the panel, coefficients have the correct sign with the theory. They are all statistically significant at 1 percent significance level. However, their magnitudes vary across different estimation procedures. On the other hand, in the cointegration residual results of the panel, in all tests, t-values are higher enough to confirm the cointegration relationship at 1 percent significance level.

The strongest and the most important statement that can be made related to this thesis is as single country estimation the long-run monetary model supports enough evidence for explaining the exchange rate fluctuations only for Taiwan, whereas, for the panel data, there is a stronger proof of the long-run monetary model.

As a further study, the number of the observed countries may be increased. Raising the number of countries may create better overview for the cointegration relationship between the nominal exchange rate and the monetary variables. These countries do not have to be only emerging countries, also, developed and developing countries may be

added to the observations and comparison between them may be made. The new members of the EU, which are Bulgaria and Romania, and the recently growing economies, which are Russia and China, may be added to the observations. Additionally, not only the long-run monetary approach, but also the portfolio approach may be tested. By this method, it may be observed whether or not different tests give similar results for the same and different countries or not. In the tests that are conducted in this thesis, the linear relation of the variables is taken into account, on the other hand, as a further study, their non-linear combination may be observed. Furthermore, the observed period may be enlarged or shorten in order to see the results of the time period effect on the tests.

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