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EVALUATING THE DETERMINANTS OF THE LEVEL OF A CENTRAL BANK'S INTERNATIONAL RESERVES: THE CASE OF TURKEY

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ABSTRACT

EVALUATING THE DETERMINANTS OF THE LEVEL OF A CENTRAL BANK'S INTERNATIONAL RESERVES: THE CASE OF TURKEY

International Reserves have always played an important role in the well-being of the countries, especially in fighting against economic crises. As the economy advances, the financial markets and instruments also advance and develop. These changes are also affecting the varieties of the crises, which induce the probability of the burst of a more aggressive type of them that could affect the global countries in a more adverse manner. That`s why the international reserve is very mandatory subject to be considered for the well-being of the whole global world. Taking into consideration all of these reasons, we have evaluated the determinants of the Central Bank of the Republic of Turkey's international reserves, and based on that we have assessed the reserve adequacy from an optimization point of view in a comprehensive manner by emphasizing its validity of creditworthiness and stability using a completely different approach. This approach is based on using a buffer stock model which had been modified by Frenkel and Jovanovic in 1981. By imposing the Autoregressive Distributed Lag (ARDL) and Nonlinear Autoregressive Lag (NARDL) methods we derive the optimal level of reserves for the period between 1990:1 and 2020:4. According to the result of the empirical analyses, we found that short-term debt, opportunity cost, exchange rate, and current account balance have a significant symmetrical impact on the demand for reserves by CBRT in the short run. Also, according to NARDL results, there is a significant asymmetrical impact of opportunity cost in the short run and adjustment cost in the long run existing on the demand for reserves by CBRT. The effect of the shocks that had occurred specifically in 1990, 1994,1997,1999, and 2000-2001 led to the experience of major economic crises that had been caused by distortions that have been affected by the exchange rate, short-term debt, and current account balance due to the low amount of reserves. Based on the experiences that had been experienced across that period, CBRT demand for

reserves was mainly targeted to decrease the distortions that might emerge from these parameters in the short run. But the insignificancy of the effect of these parameters in the long run, indicates that the risks that these parameters possess in the long run are not taken as a primary concern in the demand for reserves. The lack of concern brought to the emergence of the recent economic crisis in 2018. Although the level of actual reserves was not as low as in comparison to the previous periods so that implying the effect of the 2018 economic crisis on Turkey`s economy was not as severe in comparison to the timeline of the crises that had been evaporated back in 1994 and 2001. This can be induced from the presence of the short-term effect of opportunity cost and the long-run impact of the adjustment cost on the demand for reserves by CBRT. By indicating that the main intention of accumulating the reserves is concerned with precautionary motives rather than mercantilist motives. This aspect also shows what crucial role ARDL and NARDL methods play within the analysis so that be able to reveal these dynamic interactions. Although, despite the increasing trend in the reserve level of Turkey for most of the time it could not catch the trend of optimality level which indicates that despite the increase in the amount of reserves in comparison to the initial years, the economy of Turkey is still vulnerable to the other shocks that are coming apart from the parameters of the analysis. The best example of such kind of shocks is the pandemic of Covid 19 that burst in 2020. That's why CBRT needs to manage its own reserve policies more effectively so that to take more operative steps in order to deprive the effect of vulnerabilities that might splurge on the economy.

Keywords: International Reserves, NARDL, Adjustment Cost, Turkey

JEL Classification: F31, F32, F43, G01.

ÖZ

MERKEZ BANKASININ ULUSLARARASI REZERV DÜZEYİNİN BELİRLEYİCİLERİNİN DEĞERLENDİRİLMESİ: TÜRKİYE ÖRNEĞİ

Uluslararası Rezervler, ülkelerin refah düzeyinde ve özellikle de ekonomik krizlerle mücadelede her zaman önemli bir rol oynamıştır. Ekonomi gelişmişlik düzeyi arttıkça finansal piyasalar ve araçlar da gelişmektedir. Bu değişimler, krizlerin çeşitliliğini de etkilemekte ve global olarak ülkeleri olumsuz etkileyebilecek daha agresif kriz türlerinin ortaya çıkma olasılığını artırmaktadır. Bu nedenle uluslararası rezervler, küresel refah açısından dikkate alınması gereken çok önemli bir konudur. Tüm bu sebepler göz önünde bulundurularak, Türkiye Cumhuriyet Merkez Bankası'nın uluslararası rezerv düzeyinin belirleyicilerini ve buna ek olarak rezerv yeterliliğini tamamen farklı bir yaklaşım olan optimizasyon yaklaşımıyla kredibilite ve istikrarın önemi vurgulanarak değerlendirilmiştir. Kullandığımız bu yaklaşım Frenkel ve Jovanoviç tarafından 1981 yılında geliştirilmiş bir tampon stok modeline dayanmaktadır. Gecikmesi Dağıtılmış Otoregresif (ARDL) ve Doğrusal Olmayan Gecikmesi Dağıtılmış Otoregresif (NARDL) metodolojilerini uygulayarak 1990:1 ile 2020:4 arasındaki zaman aralığında optimal rezerv düzeyi hesaplanmıştır.

Ampirik analizlerin sonuçlarına göre, kısa vadeli borç, fırsat maliyeti, döviz kuru ve cari işlemler dengesinin kısa dönemde TCMB'nin rezerv talebi üzerinde önemli bir simetrik etkiye sahip olduğu görülmüştür. Buna ek olarak, NARDL sonuçlarına göre TCMB'nin rezerv talebinde kısa dönemde fırsat maliyeti, uzun dönemde ise ayarlama maliyetinin önemli bir asimetrik etkisi bulunmaktadır. Özellikle 1990, 1994, 1997, 1999 ve 2000-2001 yıllarında yaşanan şokların etkisi düşük rezerv miktarı ile birleşince, döviz kuru, kısa vadeli borç ve cari işlemler dengesinde kırılganlıklara yol açmış ve büyük ekonomik krizlerin yaşanmasına neden olmuştur.

Belirtilen dönemde, TCMB'nin rezerv talebi kısa dönemde esas olarak bu parametrelerden kaynaklanabilecek kırılganlıkların azaltılmasını hedeflemiştir.

Ancak uzun dönemde bu parametrelerin önemsiz olması, bu parametrelerin uzun dönemdeki risklerinin rezerv talebinde öncelikli olarak dikkate alınmadığını göstermektedir. Bu durum ise 2018 yılında ekonomik krizin yaşanmasına neden olmuştur. Fiili rezervlerin seviyesi önceki dönemlere kıyasla düşük olmadığı halde, 2018 ekonomik krizinin Türkiye ekonomisi üzerindeki etkisinin 1994 ve 2001 yıllarında yaşanan krizlere göre şiddetinin daha az olduğu ortaya çıkmıştır. Bu durum ise fırsat maliyetinin kısa dönemde ve ayarlama maliyetinin ise uzun dönemde rezerv talebi üzerindeki etkisini göstermektedir. Bu da rezerv birikiminin temel amacının merkantilist güdülerden ziyade ihtiyati güdülerle ilgili olduğunu göstermektedir. Bu sonuç aynı zamanda ARDL ve NARDL yöntemlerinin bu dinamik etkileşimleri ortaya çıkarmakta ne kadar önemli bir rol oynadığını da göstermektedir. Ancak rezerv seviyesi yıllar içerisinde artış eğilimi gösterse de, optimal seviyeyi yakalayamamıştır, bu da analizde kullanılan parametrelerin dışındaki diğer şoklara karşı Türkiye ekonomisinin kırılgan olduğunu göstermektedir. Ancak rezerv seviyesi yıllar içerisinde artış eğilimi gösterse de, optimal seviyeyi yakalayamamıştır, bu da analizde kullanılan parametrelerin dışındaki diğer şoklara karşı Türkiye ekonomisinin kırılgan olduğunu göstermektedir. Bu duruma en iyi örnek 2020 yılında yaşanan Covid-19 pandemisinin ekonomide yaratığı şok gösterilebilir. Bu nedenle TCMB'nin kendi rezerv politikalarını daha etkin bir şekilde yönetmesi ve ekonomideki kırılganlıkların etkisini ortadan kaldırmak için daha operasyonel adımlar atması gerekmektedir.

Anahtar Kelimeler : Uluslararası Rezervler, NARDL, Türkiye, Ayarlama Maliyeti

JEL Sınıflandırma Kodu: F31, F32, F43, G01.

PREFACE

Economic growth has been playing a major role for the country's development. The management of the economy so that to able to sustain against any possible shocks that might arise from the inner or outer side plays a huge role for the prosperity. In order to ensure the efficiency of the economy to withstand the effect of these shocks, effective policies needed to be applied. One of such kind of policy is the accumulation of international reserves. Based on that a lot of analyses had been made in order to define the importance of international reserves as an active policy against the turmoils that might splurge upon the countries. But at the same time, related analyses towards the subject were not so easy to conduct because it was very difficult to assess the appropriate level since each country has a different economic structure.

Despite the presence of the different economic structures within the countries, new methods have emerged in order to assess the adequacy of international reserves. Through time as the economic and financial integration become more diverse, the new methods become obsolete in reflecting the new exposures that evaporate on the economy. Because of that, as the global economy gets more diverse, it is mandatory to develop new methods in order to assess the reserve adequacy so that to be able to withstand the upcoming exposures that might negatively affect the country's economies.

The main aim of the study is to investigate the determinants of international reserves for Turkey for the period between 1990:Q1-2020:Q4 and to present empirical evidence on the adequate level of reserves by approaching from an optimization point of view.

In the end, I would like to express my huge gratitude to my thesis supervisor Prof. Dr. Muhittin Kaplan for his huge support and guidance throughout my research.

Shahriyar Huseynli

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INTRODUCTION

Although its importance has varied for time periods and across countries, the size, adequacy and composition of central bank's international reserves has always been an important research area in economics. The foreign currency reserves play a very pivotal role in stimulating the economy, acting as a component of the money supply, thereby proceeding as a leveler for imbalances between the demand and supply of foreign exchange. Furthermore, it provides necessary buffer stock in times of financial turmoil in order to increase the smoothness of consumption so that making the economy restore back to full potential in a shorter period. Especially after crises, countries face a low level of Gross Domestic Product (GDP) for a short period of time, which might be taken a longer period to get back to an adequate level based on their developments.

A brief review of discussions on reserves shows that international reserve policies have gone through four main periods; the Gold Standard Period, the Bretton Woods System Period, Flexible Exchange Period, and Financial Globalization Period namely. During the Gold Standard Period, central banks held gold reserves to maintain price stability and to sustain macroeconomic stability. However, the importance of reserves for eliminating the external vulnerability of a country became a pivot dilemma especially following the Great Depression of 1929.

The Bretton Woods system was established in 1944. The main idea behind the new system was to enable institutions like IMF and World Bank to maintain economic stability around the globe with more profound objectives of facilitating growth and international trade in promoting employment and reducing the poverty. In the Bretton Woods system, countries pegged their national currencies to US dollars at a fixed rate. This led some countries to accumulate as many as dollars in their account as they could because all the trade was basically based on one currency. This event could be described as the first time when the countries started to accumulate paper currency as in form of reserves besides just gold and silver, in a tremendous manner. For some other countries, however, the new system meant to have cronical current account

deficits. For these reasons, the central banks began to accumulate foreign currency reserves to finance their current account deficits and to overcome economic instabilities related to current account deficits. During the Bretton Woods system period of 1945-1973, this type of reserve policy was pursued by developing countries in particular.

With the breakdown of the Bretton Wood System in 1973, in which countries started to implement a floating exchange rate regime, economies become more sensitive and vulnerable to external financial disturbances related to increased volatility in exchange rate markets. It is worth to mention that there was widespread use of tariffs and quotas in international trade and capital movements were strictly restricted over the period of 1973-1990's. To cope with such disturbances, in this period, central banks were forced to increase their international reserve requirements.

In recent years, the importance of international reserves has increased sharply following economic globalization which is a combination of the international trade liberalization of 1980's and the liberalization of capital markets in 1990's. Due to globalization, world economies and financial markets of countries are highly integrated to each other, tremendous amount of capital begins to flow across countries without any obstacles. These developments caused the sizes and frequencies of financial and economic disruptions that countries experience in recent years. The devastating effects of such economic and financial disruptions of course differ across countries depending on the structure, vulnerability, and depth of financial markets in these countries. In response to problems related to the globalization of markets, countries started to implement different policies which also affected other countries in different manners, leading to further financial and economic disruptions in other countries. To cope with such problems, each country started to implement different policy packages but the international reserves policies are at the center in each of these policy packages.

The importance of the reserve policies changes from country to country due to the exchange regime implemented in these countries. In the fixed exchange rate system, central banks' reserve targeting is not so viable as the level of required reserves was

important for preserving the value of the currency and for avoiding devaluation. Therefore, if there are changes in the policy system as moving from a fixed exchange rate towards a flexible exchange rate, then it leads to targeting reserve adequacy due to the possibility of looseness of credibility. For example, during the 2008 financial crisis, international reserves were used to stabilize domestic markets in developing countries. As the effect of the crisis started to diminish, the developed countries started to implement the new expansionary monetary policies in an unprecedented manner. Through facilitating the flow of capital into developing countries so that leading them to accumulate more reserves.

An adequate level of reserves plays an important role in coping with both internal and external shocks with minimum costs. Even if a country gets into a crisis, it could recover from crisis in a short period time with minimum costs so long as it has an adequate level of foreign reserves. If the balance of reserves that central banks are keeping at their disposables will be below the minimum then the countries especially developing ones will be at the possess of the outsource shocks, by leading to the probability of the increase of economic crises. If such a kind of scenario would be observed, then the volatility in capital inflows and outflows increases, difficulties may be encountered in providing external financing and the country`s fragility may increase with the negative impact of macroeconomic indicators.[1]

Other reasons to hold reserves can be enumerated as follows. Firstly, reserves are required to smoothen to sustain the exchanges, transactions, and economic relations among countries in both financial and goods markets. Secondly, international reserves are also facilitating the advantages for the inner state of the countries too, such as bringing financial stability towards the economy and making it to be attractive for foreign investments. In case of any turmoil that might threaten the economy, a country might use the reserve at its disposal in order to immediately mitigate its effect of it. That’s why the reserves play a very crucial role as a sign of safeguard for investors and accumulation of it is very important for attracting foreign investments.

[1] See: IMF(2011)

Thirdly, another important reason for holding reserves is related to facilitating the growth of the country. Each country is using different strategies to stimulate the growth of their economies. The accumulation of reserves is a more convenient strategy to ensure the long-run growth of the economies. Especially the developing countries that are in desperate need of growth strategies can use the reserves in order to reach the level of development that they are seeking for. Because the international reserve levels contribute to the growth of domestic and foreign investment opportunities which also triggers to increase the exports and to finance the import bills associated with intermediary parts and machines. But the country can eliminate this external vulnerability in case that if it has enough reserves on its account but on the other hand holding a lot of reserves as we mentioned can lead to some costs.

One of these costs is the adjustment cost, which is a policy-related cost with taking necessary measurements to obtain the additional amount of reserves if the reserve level is at a low level. Another one is the opportunity cost associated in the form of foregone interest earnings which can be better be evaluated as investing in more higher-yield assets. For this reason, it is important to examine both the determinants of the demand for reserves and the adequate level of reserve holding empirically.

1.1.1 Objectives of the Study

The main objective of this thesis is to investigate the determinants of a Central Bank's international reserves and attempt to measure the adequacy level of reserves required to shield the economy against internal and external shocks. In the existing empirical literature, there are two main approaches on the subject. The first approach involves developing and using different metrics to calculate the required level of international reserves. The second approach measures the required level of reserves making use of econometrics models in the analysis of the determinants of the level of international reserves and to measure.

There are lots of metrics that have been used for the calculation of adequacy of reserves especially based on different aspects of various behavior of countries` economies in times of the different periods of crises. In the early studies, trade variables were used as the major factor that affects the demand for reserves. The reason

for that was due to the fact that the trade variable was having significant weight on the balance of payments account[2]. Because of that, the reserves were compared to trade figures and mainly to imports so that giving approximate value for adequacy. In time each metric that has been implemented changed accordingly with stages of countries' economic development by leading most of them to lose their validity points due to the different causes of the structure of crises. Accordingly, as the crises structures change by each time of evaporating so that leads to questioning the validity of measurements of metrics through unresponsiveness of parameters with other economic variables to act as crises predictor and as serving the wrong measure for the reserve adequacy.

However, recent changes in the world economy such as increasing trade volumes, integration and interaction levels among countries made single metric evaluation approaches susceptible in the assessment of the optimal reserve level. The reason is that, as the countries started to develop and become more interdependent, also at the same time the increase of the capital flows among themselves, reveals the fact that relying only on one specific method of evaluating the adequacy did not prove reliable results. In a way that the metrics that generally have been accepted were dealing with the specific form of targets related to the evaluation of reserve adequacy but as the trade started to emerge more extensively between countries and led to extensive growth of economics, more uncertainties started to emerge.

As mentioned above, there is also vast empirical literature on the determinants of international reserves and the measurement of the adequacy of reserves that makes use of econometric models. Heller (1966) was the first who criticized the metrics approach and introduced a model for the assessment of reserve adequacy. His approach was based on solving the optimization problem in order to assess reserve adequacy. This optimization problem was assembled in a cost-benefit approach from holding of the reserves. The main source of benefit from holding reserves is the cost of adjustment. There is a cost related with holding reserves and that cost is the foregone interest earnings that might be taken from reserves if they will be invested in other assets. The main difference that this approach has brought is the evaluation of the opportunity cost

[2] IMF (1958).

of holding reserves in face of assessment of the adequacy and the optimum level of reserves.

After Heller's approach towards the assessment of the reserves, vast studies started to be conducted in this field of study. Lots of different benchmarks started to be implemented in order to assess adequacy. Even though the empirical studies that have been done after Heller's work as like Clark (1970), Hamada and Ueda (1977), and Frenkel and Jovanovic (1981) did bring some new updates towards the main assumptions but the basic idea and conclusion of the studies did not change. Hence, the optimal reserves have a positive relationship with instabilities and a negative relationship with opportunity cost. Although still the primary benchmark for assessment of reserve adequacy was used the ratio of reserves to import ratio and was approaching to an ideal number of reserves in terms of trade variable.

But with the burst of Asian Financial Crises in 1997, the ongoing approach which focuses on the management of international reserves had evolved to a new approach that involves the assessment of international reserves. Previous studies on the subject lost their validity because the outbreak of the crisis showed that judging the international reserve adequacy based on just trade financing view is inadequate and not reliable because everything is about capital flows not about trade. The new benchmarks started to be developed and the vision of the international reserves' adequacy started to be implemented based on the importance of capital flows to be as the main source of risk for developing countries. That's why the new benchmarks were targeting more range of risks in comparison to the old studies and these studies induce the importance of reserves much more.

But later on, with the burst of another crisis in 2008, the literature takes a different turn and came upon the conclusion that even the developed countries who were strong enough in order to face the shocks, could not cope with it and fell to the wrath of it. Again, the lesson was clear that no matter what size of the country is or in what stage of development it is, the reserve and the management of it plays a crucial for the mitigation of any unfavorable effect on the economies.

Furthermore, it is worth to mention that there are a very limited number of empirical studies on the determinants and assessment of the adequacy of the international reserves for the Turkish economy. The existing studies on the Turkish reserve levels include Yaman (2003), Eren(2017) and Kılıcı (2020).

1.1.2. Methodology of Research

In the light of the existing empirical literature on the measurement of reserve adequacy, this thesis aims to investigate the relationship between the actual reserve level and the adequate level of Turkey and to explore in which state the reserve development and management of it is processing in Turkey. To this end, this study estimates a modified version of the Frenkel and Jovanovic (1981)'s model using both the ARDL and NARDL methods over the period 1990:Q1-2020:Q4 for the Turkish data.

This thesis contributes on a number of points to the present empirical literature. First, the metric approach designed by IMF to assess the adequacy started to lose its validity, especially in practice, and a new approach needed to be developed in order to assess the reserve level of Turkey. However, the current approaches implemented frequently in practice are linear in nature and do not take into account non-linearities in the analysis of the determinants of international reserves. In this sense, the NARDL approach used in this study will be able to capture non-linearities in the assessment of the adequacy of reserves filling this discrepancy in the literature.

The second contribution of this study involves the assessment of the reserve adequacy of total reserves of Turkey by using the buffer stock model which had been modified by Frenkel and Jovanovic (1981). The existing empirical studies on the assessment of the reserve level of Turkey focus only on the foreign currency component of international reserves and ignore other components of international reserves. In comparison to existing studies, this thesis assesses the reserve adequacy of total reserves of Turkey by using the buffer stock model which had been modified by Frenkel and Jovanovic (1981).

Furthermore, very few models had been implemented in order to assess the optimal level of reserves of Turkey. The basic reason for evaluating the adequacy level

of reserves from an optimization point of view is due to the fact that implementing the metrics that have been possessed by methodologies is not taking into consideration the opportunity cost of reserves which is crucial in assessing the adequacy of the reserves from the fact that there is a threshold in accumulating the reserves. That threshold is that accumulating more reserves than needed is not desirable, from the forgone interest perspective that might be better evaluated by investment in higher-yield assets in international markets. As a matter of fact, investing in higher-yield assets might provoke more successful investment returns which might increase the country's international reserves through flowing directly in type of foreign currencies such as euros or dollars. Eventually, giving more perspective towards adding into vaults of central bank`s international reserves so that by giving more better management of sustainability of the economy in case of managing external debts and providing better management of the inner economy through facilitating the efficiency of the balance of payments. From that perspective, evaluating the adequacy of reserves by using an optimization approach is very important for giving us an idea about how the reserves are actually managed and at what levels they are, through judging it based on the cost and benefit approach. That's why the buffer stock model of Frenkel and Jovanovic is more suitable to be applied due to its cost and benefits method for the assessment of the optimal level of reserves of Turkey Republic.

1.1.3. The Layout of the Thesis

To this end, this thesis is organized into four chapters. Chapter 2 introduces the importance of reserves, their role, and their effects of them on the economy. In Chapter 3 the reviews of the theoretical and empirical literature on foreign exchange reserves would be discussed. Chapter 4 involves the empirical part of this study. It introduces the empirical reserve models and the results obtained from the estimation of the models and discusses policy implications of the current study. Chapter 5 presents concluding remarks.

CHAPTER 1

THE IMPORTANCE OF INTERNATIONAL RESERVES AND THE ROLE OF INTERNATIONAL RESERVES IN AN ECONOMY

This chapter introduces the concept of international reserves by focusing on the importance, components and functions of reserves in an economy. It also provides discussions about the changes in the level of the reserves across the years. Furthermore, observing the development of the international reserves through different economic systems across time will provide us information by giving a very vivid description of their importance as a source of mitigation against the exposures. At last, we will discuss the development and composition of the international level of reserves of Turkey from 1975 to 2020.

1.1. The Importance of International Reserves

The financial crises have been one of the foremost threats to the well-being of countries for centuries, destroying the economic and financial stability of the economies and the whole world economy. The integration of countries makes things much more adverse because, in the period of the cold war, countries were more individualistic and had restricted access to financial markets. Thereby, the crises that occur in one country were not able to spread to other countries. With globalization, the boundaries around the countries were eliminated enabling free trade and free movement of capital possible around the world, the number of financial institutions and financial markets was developed rapidly. Hence the countries that are far from each other and sizes that are even different can be affected due to financial disturbances which can be caused even by small countries. Therefore, globalization can have devastating effects on the economy of other countries thanks to economic integration.

As witnessed through the history of financial crises, no matter what development stage the country is, either advanced or developing, the financial crises might lead to devastating effects. Even in the 2008 financial crisis, developed countries as the United States which had advanced financial institutions could not cope with it. However,

countries that manage to have an adequate or optimal level of reserves performed much better in managing the smoothness of their internal economy in the period of turmoils. Through that turmoils, it became very vivid that reserves play a very crucial role as a buffer stock against crises. Therefore, it is not surprising to witness the fact that reserves have been playing a major role as being the main indicator of liquidity and at the same time being a very crucial part of the international monetary system.

Stanley Fischer (1997) nicely summarizes the importance of the reserves as:

``Reserves matter because they are the key determinant of a country`s ability to avoid economic and financial crises. The availability of capital flows to offset current account shocks should reduce the amount of reserves the country needs. But access to private capital is often uncertain and inflows are subject to rapid reversals, as we have seen all too often in recent years. We have also seen in the recent crisis that countries that had big reserves, by and large, did better in withstanding contagion than those with smaller reserves…``(pp.1-3)

The first time the importance of international reserves was strikingly recognized can be traced back to the period of the Great Depression after World War II as a source of alleviating the effect of external vulnerability. The Great Depression was one of the biggest crises of the 20th Century by bringing devastating effects on whole world economies like a plague. It was a symbol that showed how the global economy can be affected by a crisis. Following the Great Depression, countries were more concerned about their domestic economies and tried to protect their domestic by tariffs and quotas. Adding the devastating effects of World Word II, the world economy activity had fallen sharply and international trade was about to stop be 1945.

After World War II, only two nations the United States and Great Britain were capable of boosting the global economy since it had a lot of gold reserves. By having so many gold reserves the only thing was to find a way and construct a mechanism to accelerate the global trade not just for only own merits but also for the whole other countries around the world. To build up a new world economic system, the British representative, John Maynard Keynes and the United States representative, Harry Dexter White started work to create a new foundation to overcome these incidents.

Hence, the Bretton Woods System was established as being the main system that manage the flow of international trade and currencies around the globe.

The IMF, the World Bank were estabilished as twin institutions of the Bretton Woods system and were responsible for the stability of the international financial system and the economic development of countries respectively. In the Bretton Woods system, the dollar became the key currency and the foreign currency reserves in addition to gold were the main source of buffer against mitigation of external variabilities and shocks. Hence, the importance of the international reserves has been also recognized by IMF (International Monetary Fund) as the main source of shield against external vulnerabilities in its own articles as one of the five variables to calculate each member`s ability to contribute, voting rights, and entitlement of IMF resources.[3]

Holding reserves in their disposable in the form of foreign currency assets is required particularly for the emerging countries to secure themselves against such kinds of vulnerabilities. Emerging countries like Turkey, are actually in need for outsource resources as an investment into their productive sectors so that to increase the factor of productions and through that to facilitate the growth. Unfortunately, these countries cannot use their own currencies to pay back their debts and cannot use their own currency in crisis periods. In the case that external outsource of money that needed to overcome instabilities won't be provided, then they could use these assets to stabilize the economy in the form of preserving the value of the domestic currency through providing the necessary flow of liquidity to domestic actors within the economy. Also unexpected changes in capital flows and exchange rates can lead these countries to financial crises. From that perspective, the reserves in the form of foreign currency assets are acting as a shield to provide the stability of the currency. From all these aspects we can see that what kind of crucial role international reserves play as the main source of stability to provoke necessary adjustments to keep countries' economies to act in full potential across the globe.

[3] Reserve Adequacy in Emerging Market Economies- J.Onno de Beaufort Wijnholds and Arend Kapteyn

Having explained the importance of international reserves, there is still one question that remains to be answered:: What do reserves mean? To be more precise we have to have a detailed information about the definition of international reserves including all perspectives of the concept of reserves and the components of reserves.

1.2. The Concept of International Reserves

There are many different definitions of international reserves in the literature. As means of the payments changed from precious metals like gold and then to paper currencies, the content and the definition of international reserves have also changed over time. Herbert Grubel (1984) described reserves as assets that national governments are willing to accept to settle debts. As a matter of fact, in a time of disruptions in the economy, countries sometimes need to borrow abroad to take appropriate measurements to overcome the adverse effect of it on the domestic economy. So that by borrowing from other countries or international institutions as IMF, national governments are using reserves to robust the economy. However, they are paying for their debts by means of international reserves, which are based on foreign currency, but we will discuss it in more detail as a part of the composition of international reserves in a meantime.

Another definition of international reserves is given by German economist Jürg Niehans (1970) who describe international reserves as similar to reserves that are operating through domestic commercial banks. Accordingly, the reserves that commercial banks keep are used to meet the requirements of central banks. These reserves are the minimum amount of cash, that is obligated to be kept in commercial bank`s vaults, in case of any situations related to sudden withdrawal due to anticipated demand, so that they would be able to meet liabilities. This is the insurance action that is implemented by central banks so that to prevent bank runs. Although, another reason why commercial banks are holding the reserves is related to the fact that they want to ensure the conversion of their liabilities into liquid matter, which most of them are comprehended in deposits. Correspondingly, central banks are also acting in a very similar manner as commercial banks by keeping international reserves for their liabilities such as money and central bank deposits so that to be able to convert to gold

and foreign currencies. However, central banks are using reserves as a buffer stock against the changes of other economic agents which are producers and consumers.

The most common and general definition of international reserves has been made by IMF (2013). Accordingly, international reserves (or reserve assets in the balance of payments) are those external assets that are readily available to and controlled by monetary authorities for meeting the balance of payments financing needs, for intervention in exchange markets to affect the currency exchange rate, and for other related purposes (such as maintaining confidence in the currency and the economy and serving as a basis for foreign borrowing)[4].

Considering the definitions that have been made so far, we can argue that international reserves appear not just as one metric measure of the asset but actually, it is more than that. It is the sum of all foreign currency assets and gold assets, even it has a broader content. In order to have a much better understanding of the composition of international reserves, we need to look at what kind of assets are having functions to have a status to be called international reserves. First of all, these assets needed to be profound within the international monetary system. They needed to be acceptable around the globe as the means of exchange so that could be usable in international trade and eligible for reallocation of capital between nations. Basically, what we mean is that for assets to be functional as international reserves it needs to be employed within the monetary system.

Another criterion for international reserves is that it should not have the status of domestic currency, meaning that the currency that has the eligible form to be called international reserves, it needed to be based on the international currency that is accepted by the overall global system. For instance, country A cannot keep it is own currency as an international reserve and use it as means of payment for debt and means of exchange in the international trade system because it is currency is not globally used as the international currency. Therefore, for the assets to function as international

[4] See: IMF (2013)

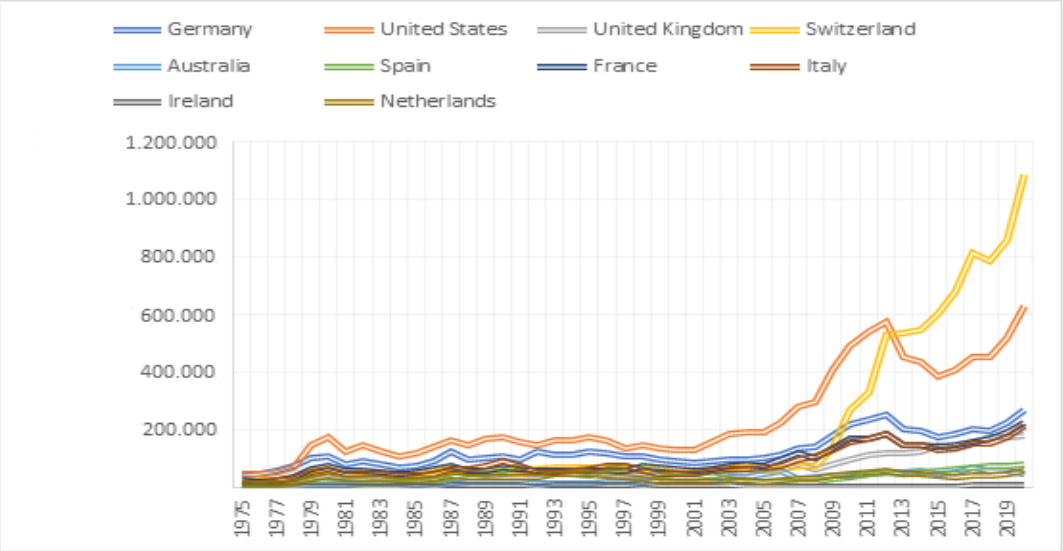
reserve it needs to be from the type of currency that is accepted as means of payment to be used in global international trade and the international monetary system.

Of course there exist some exceptions within the system for those countries whose currencies are actually accepted as the main international reserves, such as United States Dollar, Euro, Chinese Yuan, Japanese Yen, British Pound, Australian Dollar, Canadian Dollar, and Swiss Franc[5]. The countries that have their own domestic currencies as one of the main currencies above listed have more privileges within the system. That is why it is not surprising to see the importance of these countries' economies on the whole International Monetary System and the Globe. The most important institution, which is responsible for determining the classification of the composition of international reserves is IMF.[6] As a matter of fact, the International Monetary Fund is responsible for bolstering global monetary cooperation and facilitating trade around the globe. That is why IMF plays a very crucial role as an institution within the determination of necessary assets as a composition of international reserves. Before going into the analysis of the composition of international reserves let's have a look at the development of international reserves within the countries.

[5] Source: https://www.americanexpress.com/us/foreign-exchange/articles/could-dollar-be-replaced-as-world-reserve-currency/

[6] See: Eren (2017)

Figure 1. 1 International Reserves in Developed Countries (in millions of USD)[7]

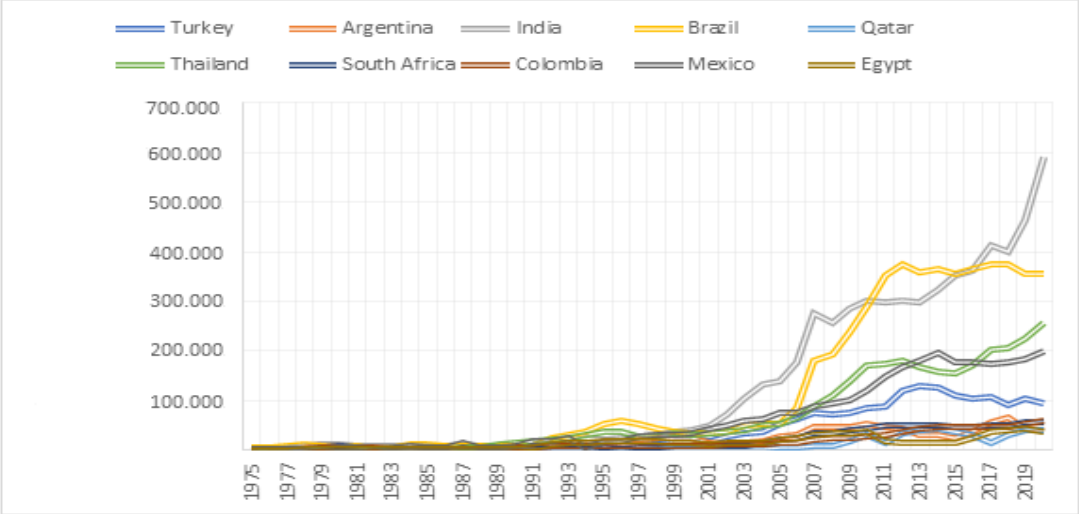


Source: The World Bank

In figure 1.1 the development of the international reserves across the developed countries have been represented. As we can see that across time the amount of reserves has been showing a gradually increasing trend especially through passing different phases of turmoils that the globe has seen. That turmoils have been so much critical and affected such big countries that it became mandatory to keep reserves within the vaults to fight those instabilities. Especially through these turmoils which come up in the form of financial crises induce the countries to have more reserves for precautionary purposes. The adage that has been used as ``Too big to fail`` has lost its validity due to critical periods of times that countries such as powerful as the USA witnessed through the timeline of different types of crises.

[7] For the simplicity of the comparison of international reserves within the countries, we emphasized the international reserves based on foreign exchange reserves, gold, reserves of IMF members held by IMF and SDR. This is also applicable for the figure 2.1 too.

Figure 1.2 International Reserves in Developing Countries (in millions of USD).



Source: The World Bank

As we can see from Figure 1.2 above, not just developed countries but also developing countries assessed the importance of reserves for precautionary purposes across the time being. Specifically, the turmoils that happened in the 1990s and consistently with the spurge of the 1997 Asian Crisis led to an increase in the amount of reserves of developing countries. With the implementation of the policies by developed countries that have been targeted to increase the liquidity within the economy, led to a switch toward investments into developing countries. With the increase of the investments, it actually directed to increase the capital flows towards them. Implementation of the low-interest rate policies made the developed countries not a juicy spot for investment in comparison to developing ones. That's why at the beginning of the 2000s there was a huge flow toward developing countries. With the burst of the flow of investments, it leads to a huge increase in the economies of these countries, and international trade has also been increased due to the high outside demand that has been made due to this flow. All of these led to an increase of international reserves within developing countries.

1.3. The Composition of International Reserves

As a matter of fact, the composition of international reserves is divided into two asset classifications, which is one of them is Official Reserve Assets and the other one is Other Foreign Currency Assets. But the main classification of assets that are generally accepted by central banks is Official Reserve Assets which is composed of Foreign Currency Reserves, IMF reserve position, SDRs, and Gold. To have a better understanding of the composition of the structure of assets and related classifications of it, it will be useful for us to analyze it through table below.

Table 1.1 The Composition of International Reserves[8]

A. Official reserve assets
1) Foreign currency reserves (in convertible foreign currencies)
(a) Securities
(b) Total currency and deposits with:
(i) other national central banks, BIS and IMF
(ii) banks headquartered in the reporting country
(iii) banks headquartered outside the reporting country
2) IMF reserve position
3) SDRs
4) Gold
(i) volume in millions of fine troy ounces
5) Other reserve assets
(i) financial derivatives
(ii) loans to nonbank nonresidents
(iii) other
B. Other foreign currency assets
(i) securities not included in the official reserve assets
(ii) deposits not included in official reserve assets
(iii) loans not included in official reserve assets
(iv) financial derivatives not included in official reserve assets

[8] See: IMF(2010).

(v) gold not included in official reserve assets
(vi) other

As we can see from the table above, that the composition of international reserves is based on a more broad range of assets than it seems. All the assets that are mentioned above are actually can be held only by one institution that is responsible for monitoring and using it which is Central Bank. As we mentioned before, and also as can be seen that the composition of reserves is divided into two classifications:

a) Official Reserve Assets
b) Other Foreign Currency Assets

These two classifications are called as unconditional and conditional reserves. By meaning that all the assets that are constituted as part of official reserve assets which are composed of Foreign Currency Reserves, IMF Reserve Position, SDR, and Gold are called as unconditional reserves. These unconditional reserves are the type of reserves that Central Banks use to bring balance to the economy through necessary measures by immediate financing of international payments imbalances or to preserve the stability of the country`s currency through indirect intervention to the foreign exchange markets. Hence, the intervention that Central Banks are using for bringing stability to currency is called as indirect intervention, which also constitutes one of the major policy instruments towards reflecting the size of the reserves.

The stability of the currency is one of the crucial roles of Central Banks. As a matter of fact, by keeping a stable currency level is actually gives the economy more stability and related smoothness in operating as a whole. Unless if it won't keep in a stable manner it might lead to adverse effects as by bringing the economy to the edge of the balance of payment issue or by through the loss of the confidence of inner actors (resident people who live within the country) and outer actors (investors) which might lead to in some cases even into more worse scenarios as to financial crises. The intervention of the Central Bank into the foreign exchange market is defined as the central bank`s purchase or sale of foreign currency for domestic currency in the

interbank market.[9] By meaning that, these purchases and sale of currencies is actually operating only directly with other banks. The wide definition would mean that foreign currency-denominated public sector borrowing in those countries where it is controlled by the monetary authority[10], through referring by the monetary authority to Central Bank.

When monetary authorities are intervening in the foreign exchange market it leads to changes in the level of reserves and these interventions are consist of two types: sterilized and non-sterilized intervention. So when monetary authorities are intervening in the financial market in a sterilized manner, due to the fact of an offsetting open market operation because money supply did not get affected by it.

Basically, it works in the way as the foreign currency is sold, leading to an increase of domestic currency within the economy through purchases of open market instruments by monetary authorities. Likewise, it works with the purchase of foreign currency but vice versa. As the foreign currency is bought, it leads to a decrease of domestic currency in the economy due to using it as the purchase of foreign currency through the sale of open market instruments.

But the non-sterilized approach is actually affecting the domestic money supply so implying the fact that as foreign currency is bought it leads to a decrease of domestic currency and vice versa. So that when the foreign currency is sold it leads to an increase of domestic currency so that causing to increase in the money supply. The sterilization method is the most preferring one because it protects against currency appreciation which also means that it protects against inflation.

As we can see how important role monetary authorities play within the system through enacting monetary policy in order to provide smoothness and stabilize the economy. But before analyzing conditional reserves let`s have a look into unconditional reserve assets of the central bank in more detail so that to have a better understanding of compositions of it, by looking at the evolution of developments of each of these assets across time.

[9] See: Lehto (1994)
[10] See: Federal reserve Bulletin (1983)

1.3.1 Gold

During the history of humankind, gold has been always playing as a crucial role in mitigating the needs of civilizations for centuries. That is why it is not surprising to see in the history of different civilizations the importance of gold as means of payments starting from medieval points of time till even functioning as one of the precious and important types of international reserve assets that have the whole privileges to be used within the international monetary system. The primary time when the first gold was used in history is known by 600 B.C. which was used in Lydia.[11] The gold actually was not just composed and looks like as it in nowadays, but was looking the way more different as it was composed of a very mixed structure of particles which were bound reluctantly within each other and consisted of gold and metal twisted with the amounts of copper and other metals.

Even in ancient times' Greeks called them `gold` or `white gold` depending on the vivid color structure which is based on yellow and sallow colors so encountering due to the proportion of gold or silver on it. Therefore, Lydians were making their coins by using this particle. In a later period of time, they found how to extract and separate the gold from the silver structure of it and first time ever that is how pure gold has become attainable to human hands. The first king who used gold as a coin for the first time was Croesus and throughout history, his name has always been remembered as `Rich as Croesus`.

Even though starting from that period of time, the phrase of wealth and gold was combined and acted as one unit in all spheres of history. So that the notion of wealthier you become, the more gold you have in your disposable became true. The symbol of the gold presumed on society was bringing as a style of richness to nations. That is why the countries that have the most gold were having the status as the most wealthier. Therefore, it is not surprising to see across the history why countries as England, Spain, France, and Portugal were exploring the new worlds in order to find much more gold so that to compete for the richness of their statuses within themselves.

[11] Source: https://www.thebalance.com/what-is-the-history-of-the-gold-standard-3306136

Hence, mainly gold has been used as the main currency in the gold standard period of time. In 1834 the United States was actually the first country that was under the gold standard but the discovery of gold in 1848 in Sutter`s Mill lead to more flow of gold to the market so that leading to an increase in the price of gold due to inflation. As a matter of fact, the first paper currency was established in 1861. Because of the lucrative market and due to new discoveries, the gold market was always presumed as a matter of interest of Europe at the same time. World trade was flourishing fast and the world needed stable standardized transactions so because of that gold was the best choice as a commonly accepted means of value, which also proves to be a very important candidate as an international reserve currency. In 1870 Europe adopted Gold Standard and from that moment it became the main component of the international monetary system.

1.3.1.1. Gold Standard System

Under the Gold Standard system, countries were obligated to fix the value of their currencies to some particular amount of gold. Although all the currencies that were operating at that period of time could be converted their currencies into gold at a fixed rate so that making the gold coins also the main type of domestic currency within the other currencies operating among. As a matter of fact, the currencies were actually fixed in terms of gold so the exchange rate between the currencies was also fixed too[12]. Due to that fact, the transactions that have been made by the countries were not anymore based on bulks of coins but were based on paper currencies that were tied to the gold and could be redeemed at any time at a fixed rate.

Before the Gold Standard, the paper currencies of different countries did not have the status of obligation to be presumed as international reserve assets and the only valuable asset that was accepted as a means of payment for the international transaction was gold. But by switching to the gold standard system paper money got value and that makes global trade to burst into high levels. This actually brings more smoothness to global trade by switching to use as a means of payment. Another

[12] https://www.gold.org/about-gold/history-of-gold/the-gold-standard

interesting fact, within the system, was that besides using just gold or silver as an international reserve, it leads to the use of foreign paper currencies as another composite of international reserves too. The probable reason for that is due to the shortages that might come from the gold side.

The most important problem related to global trade between countries is the balance of payment account. As the countries started to trade within themselves, they are exporting and importing the products worldwide. For exporting the product, the countries need to produce related products so by making exogenous demand to increase to the related demand for the variety of products it produces. By meaning that when a country exports the product, it is actually selling it in a foreign market so that by facilitating the product to be transmitted at the disposable of other consumers or governments that are located abroad. By selling the product abroad, countries are facilitating the flow of money directly to themselves. Eventually, leading to the creation of more jobs and an increased standard of living so that enabled to increase of the sustained growth of the Gross Domestic Product.

As the export increases it is good for countries' economies because it leads to more prosperity and increases in total the wealth of nations. Hence, the balance of payments of any country, actually tells us some sort that how much it saves in order to pay for the imports[13] As a matter of fact, as the country starts to export more as we mentioned above, it leads to an increase of the standard of living of people within that country so by decreasing the unemployment and due to high demand of the exported product or might be due to demand for different variety of products. This demand is actually facilitating to the hiring of more workers so that making the money to flow to citizens within it and due to that it increases the purchasing power of them as consumers too.

Hence, the import of the products leads to a decrease of the reserves as means of payment for it. The reason for that is because when the country imports the product from abroad it actually decreases the importing country`s Gross Domestic Product so

[13]Source: https://www.thebalance.com/what-is-balance-of-payments-components-and-deficit-3306278#:~:text=A%20balance%20of%20payments%20deficit,to%20pay%20for%20its%20imports.&text=If%20the%20deficit%20continues%20long,assets%20to%20pay%20its%20creditors.

that the money leaves the economy. By the money, we are referring to international reserves. If the country will import more than it exports it might lead to adverse effects on the economy so that if products that are produced won't have foreign demand for it is own services and goods from abroad, it will put into a difficult situation the whole economy, through by evaporation of the emergence of the balance of payment deficit

That's why it is not surprising to see the concerns of countries about it. In the gold standard system, the gold was performing as a mechanism so that self-correcting itself within the international monetary system. In the case that if within the system one of the countries were running a balance of payment deficit, it will correct it on its own due to the mechanism of the gold. So that the country which is experiencing it would have an outflow of gold so that leading to a decrease of the money supply. As the money supply decreases it affects the domestic price level by decreasing it so that increasing the rise in competitiveness and leading to the correction of the balance of payment deficit. In a similar manner, the countries which running through the balance of payment surplus would face the inflow of the gold and as the gold flows to the country it will enable to increase of the money supply which would lead to an increase of the domestic price level and therefore would correct the surplus balance from the economy. From this information, we can see that how crucial role gold was playing within the system to correct the imbalances in the balance of payments. Although in the gold standard system as we mentioned before, most of the central banks were concerned that gold reserves won't be available enough to meet the balance of payment deficit[14]. That is why they preferred to hold foreign paper currencies, bonds, and other assets as means of reserves against such undesirable outcomes that might occur from the balance of payment side. Also at the same time by keeping such assets as foreign paper currencies and bonds, help the central banks to sustain the stability in the price of gold as well as generate the interest income. As we can see that the gold standard system did not just show the importance of how much gold plays in the trade as the most valuable precious metal to which the paper currency was tied to. But also first time ever lead to facilitating the creation of a new source of international reserves by bringing the paper currency into being one of the important means of reserves. The

[14] See: Yaman (2003)

system lost it is pivot role as the main system due to the outbreak of First World War 1.

1.3.1.2. Bretton Wood System

But this outbreak could not put an end to the use of gold in history as the main currency. In 1944, in the conference that had been held in New Hampshire, Bretton Wood System was enacted, where IMF and World Bank were also established.

After the inter-war period of time, it was needed to have a new order of the monetary system so as to make the global trade to get back to normal. The reason for that was that the war had affected countries in a really bad manner by devastating the economies and leading to poverty to increase tremendously so that to increase the prosperity between nations, the global trade needed to flourish again. In order to do that the system that is needed for that should be stable and flexible. That is why in 1944 the conference has been held by allied expert economists in order to find the solution to this problem. The solution to this problem was bringing the new international system like Bretton Woods. Not surprisingly, after World War 2 there were two nations that has more resources available to run the world from this global turmoil so that could manage taking necessary political actions and economic actions to affect the globe. One of them was Germany and another one was the United States. But Germany due to the loss of war, it was facing several problems as one of them to be the culprit nation who started the war but United States was the one who finished it and also had more resources on it is hand in an economic manner. That's why United States' political and economical privileges persuade in bringing the dollar as the main currency of the system. Accordingly, the dollar within the system was equal to 35 dollars per ounce of gold, and other countries were obligated to adjust their currencies to the dollar. By making the dollar to increase it is domain as the main reserve currency in the world because countries were having dollars in their accounts as they were using it as means of payment in order to facilitate the transactions in the trade. The reason is due to the fact that the gold and dollars have direct exchange rates within themselves. As the Bretton Woods System started to operate, the world economy grew in a very rapid manner. As the trade was increasing the nations' economies were also increasing at the

same time. The growth was going high due to an increase of GDP through high exports that facilitated the soaring demand for goods and services after the war. The reason for that coming was due to the fact that prosperity started to rise across the nations and the effect of the war that affected the global economy in perish manner started to fade due to increasing growth so that global trade was performing at the highest ever levels since the war.

As all global trade payments for goods and services were going on in dollars, so as the global trade started to heat up there was more need for the dollars, and in order to face that demand, the United States was printing more money so that leading to the rise of inflation due to the monetary growth of the dollar. This inflation started to spread to the world in the form of growing of the United States balance of payments deficits[15]. Also, the Vietnam war that was provoked in 1955, additionally put too much pressure on the dollar which also lead the Bretton Wood System to collapse. The reason is that the constant expansionary monetary policy that the United States implemented, was not an appropriate policy for that system because it was leading to constant inflation. Especially after the finding of the major mines of oil in Saudi Arabia. A tremendous amount of gold flows to there and leads to an increase in the amount of dollars in Arabian countries in a huge manner. When these countries wanted to convert the dollars at their disposable to gold, the United States could not do it because it was in really bad shape due to the inflation effect it had and even if they could that would not be viable because it would lead to more devastating effect not just on it is own economy but as a whole in global world economies due to the system. These were the reasons why the Bretton Woods system could not exist till nowadays and after its collapse, countries started to switch into the implementation of a managed floating exchange rate system that still exists nowadays too.

[15] https://voxeu.org/article/operation-and-demise-bretton-woods-system#:~:text=The%20US%20decision%20to%20suspend,currency%20country%20of%20the%20system.

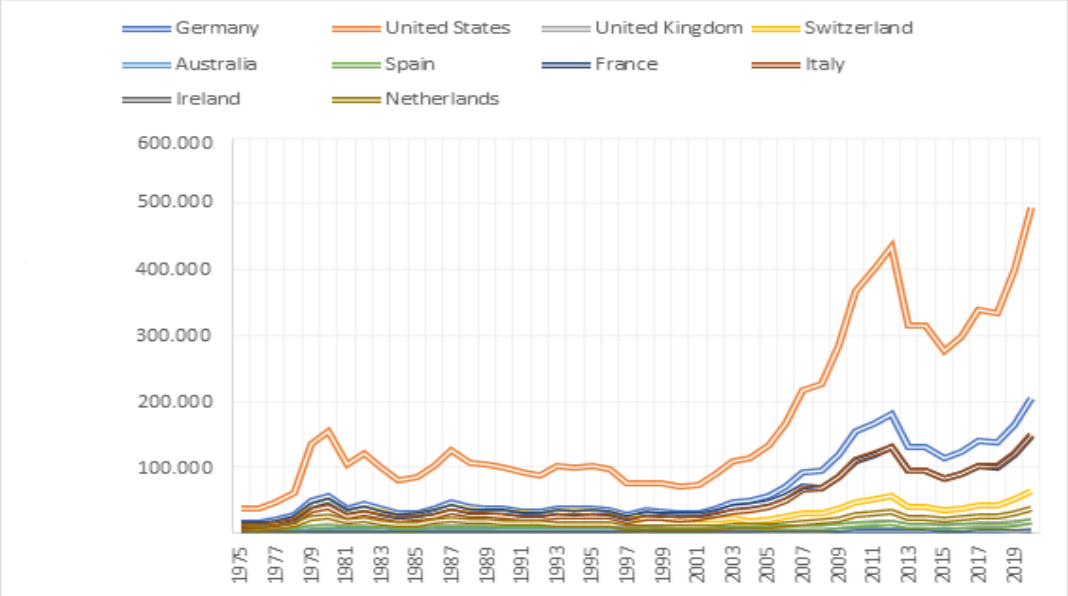
1.3.1.3. The World Gold Council

As we can see how an important role the gold has across the history of the evolution monetary system through allocating to bring other international assets as paper currency and bonds as a means of international reserves. Even in nowadays the importance of gold still preserves its value as it was in the past. Especially in a way that due to the development of the countries and emerging of uncertainties leads the countries and investors to prefer to invest more in gold rather than in different assets due to the safe phase of it. The reason of it due to the fact that the gold is actually preserving the safety by it is own against all the risks that might occur as in a geopolitical manner and in a financial disturbance manner. Even durıng the global crisis of 2008 most of the investors started to invest more in gold rather than other assets. As we can see, due to the high demand of gold across the globe, the gold mining companies have gathered around and established the organization in 1987 which is very similar to OPEC(Organization of the Petroleum Exporting Countries) whose name is the World Gold Council. It is the market development organization for the gold industry which has a very broad way of operating starting from mining to investment with the one purpose is to stimulate the demand for gold across the globe.[16] As a matter of fact, WGC analyzes the demand for gold under the main two roots: Gold Bullion and Exchange Traded Funds[17](BMD). Before the emergence of the crisis, the demand for gold bullion was very low, especially in developed countries but during and after 2008 it started to increase even more. The increase of the demand for gold was mainly maintained in the fact that the crises leads to huge evoke of large uncertainties about the future and at the same time with the bankruptcy of the big investment company like Lehman Brothers, made uncertainties to be prevailing in the markets for much longer period of time by questioning the timeline of it. The only salvation towards this downturn times was investing in gold. That is why it was not surprising to see the fact that, besides the investors who were increasing the gold in their portfolios, also countries were increasing their gold reserves in order to cope with turmoils and decrease the effect of it on their` economies. In order to see the

[16] https://www.gold.org/
[17] https://www.bmd.com.tr/upload/files/alt_n_fiyatlar__ve_beklentiler.pdf

development of the gold across time, it will be better for us to look at the graphical representation of it, through divergence of it in developing and developed countries.

Figure 1. 3 Gold Reserves in Developed Countries (in millions of USD)[18]



Source: Author Calculation

From the figure above, we can see how the gold reserves were changing across the periods in developed countries. Not surprisingly to notice the fact that starting from 1975 to 1990 the gold reserves were showing a gradually increasing trend due to the reason of the effect of the Bretton Wood System. Hence, in 1973 the System has been terminated but still, the value of preserving as the main indicator of liquidity in the gold terms was still valid even after the collapse of it. Especially taking into consideration the fact that these countries constitute a huge amount of role in world international trade and some of them eventually shaping the world economy through their policies. As a matter of fact, due to the preserving value of the Bretton Wood System and reliance on the safeguard of gold, these countries still preferred to keep their demand for gold as an international reserve. Not surprisingly, to see that the highest gold reserves are accumulated by the United States due to the privilege of it

[18] In order to get the amount of gold reserves, we have deduced from the Total Reserve amount the Total Reserves minus gold amount and got a net result of gold reserves. The source for both quantities has been taken from World Bank

being the founder of the Bretton Wood System. However, starting from 1990 until 2001, we can see that, there has been a gradually decreasing trend in the amount of gold within the developed countries.

First of all, in the 1990s the new era in the economy started to spurge through increasing of the productivity of the workforce by bringing into the market a new technological innovation as computers and software. Especially through these innovations, investment and consumption growth started to play a huge role in shaping the world economy, in a way increasing the potential growth of the world economy by creating more opportunities for all aspects of it through the growth of productivity. One of the biggest innovations was the development of the Internet which played a huge role in bringing new notions of advantages as facilitating the increase of global trade through electronic trade. At the same time, the reason for the expansionary growth was coming due to the fact that as more technologies started to spurge around more investment opportunities started to expand. Especially expansionary investments related towards R&D due to discovery of new technologies caused to increase the profit of private companies and also public investments too, which also lead to a decrease of the unemployment in a substantial amount, conduce to increase of the standard of living and facilitating the burst of productivity. In a sense that the contribution of growth was more prevalent by private companies due to their huge investments in new technologies and making to integrate them into the economy.

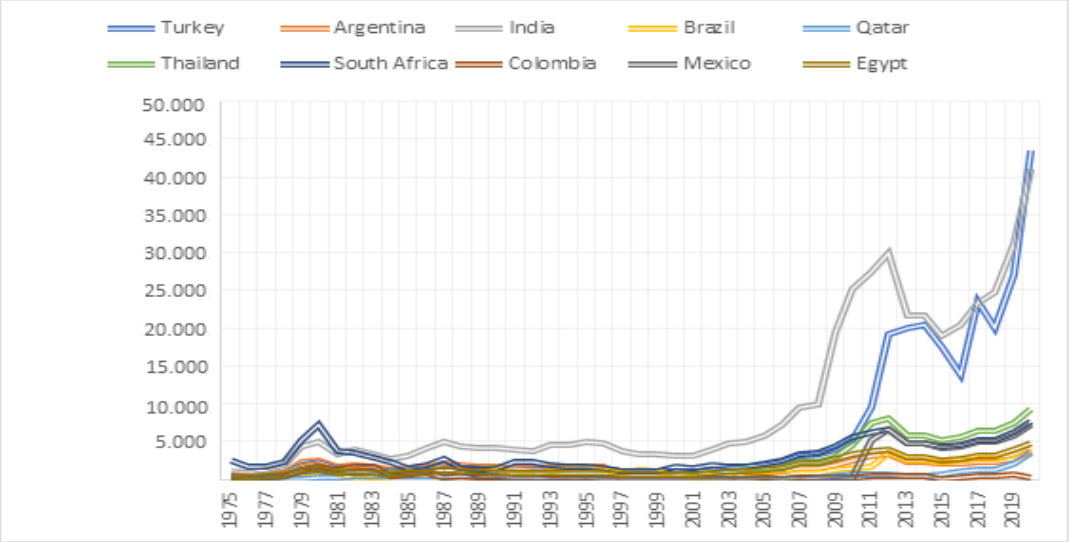
On another side, the government was providing also related support for the emergence of new technologies through related investments in it. Among the other things, the important part of these new technologies which is based as integrated parts has been widely supported and developed in public institutions as state-owned universities or through defense-related agreements. Thus, taking these all developments into consideration as we can see that through the bursting of new technologies lead to cutting the walls of barriers in the trade leads to more increase in the overall of globalization and capital integration within the countries. Furthermore, the collapse of the Soviet Union also affected the economy of the developed countries and led to more financial integration between each other. Due to the developments of new technologies, the technological boom led these countries to change their pattern of

investment strategies. In a way of keeping more wealth in form of foreign currency rather than gold and also the technological boom facilitates the increase of new innovations in derivative markets and also an invention of digital currency, which makes the gold demand have a steadier pace rather than other assets. As we can see from figure 1.3, the demand for gold was showing a moderate increase where the center of crucial demand for it became pivot after the 2008 global financial crisis.

Specifically in 2008 when the crisis started to take a more devastating speed of surrounding the whole global financial system, huge losses in stock markets and huge pressures in the exchange market led to uncertainties about the future of the economic and financial stability of nations. Therefore, the demand for gold as we can see started to show uptrend trends. Particularly, with the emergence of new crises in 2011, which is called as European Debt Crises that started in 2009 was related with the 2008 financial crisis so that making things to get even worse.

In 2014 there was an additional decline in the gold reserves due to the rise of the interest rate by the United States. After 2015 we can see that the demand for gold started to increase all the way to 2020, especially due to the uncertainty about the future of the markets that came out with Covid 19 pandemic, it is expected to show up more upward trend along with the duration of the virus. To have a better vivid description of how gold reserves have been developing across time, we need to have a look at the development of accumulation of gold reserves beside the developed countries to developing ones too.

Figure 1. 4 Gold Reserves in Developing Countries(in millions of USD)

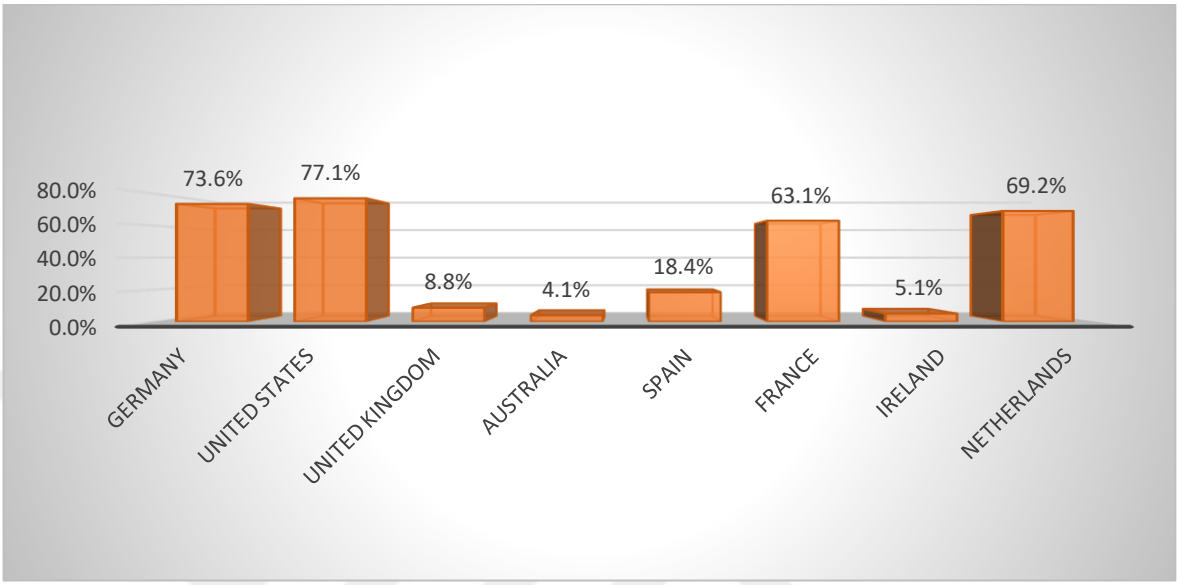


Source: Author Calculation

The collapse of the Soviet Union created more advantages for the growth rate of global countries that had emerged so that by giving opportunities to countries to catch up the moderate growth rates. The countries that almost for a decade have experienced a recession, due to the collapse of the Soviet Union started to recover from that state of condition and started to develop. Especially the verse of globalization started to spread much faster after 1991 through leading to new possibilities for countries that have not been able to access to financial markets or could achieve liberalization in their economy so that they could enact an independent economic policy to get the needed wave of economic progress for development as a whole. With the breakdown of the Union, the cold war had been ended between the nations and through that, it made the countries integrate towards each other more and facilitate the countries to change their status quo. Through that, it made it possible to bring a new stage of countries, which called emerging countries. The emerging countries are countries with the potential of having a huge growth rate in the future so that making these countries to be a huge contender for being in the group of developed countries. At the same time, countries that were severely damaged by the cold war and were undeveloped, could not have prosperity and an adequate level of standard of living. With the collapse of the Soviet Union and with the enlargement of integration of the world economy, these countries

could reach the needed level of development due to globalization and had become moderate and prosperous nations. Therefore, it is not surprising to see from the graph above that the gold reserves have been showing an increasing trend starting from 2008. The reason for such a kind of act behavior, we can see very alike as in developed countries due to 2008 financial crisis. The uncertainties related to the future and the turmoil that was prevailing made the developing countries acquire more gold as reserves. Especially Turkey and India have the biggest number of gold reserves in comparison to other developing countries as we can see from the table above. The reason of India has such an amount of gold reserves is related with the fact that in 1991, India faced an economic crisis that had a very devastating effect on the economy with leading to severe trade deficits that harmed the economy as a whole. In order to overcome the turmoil effect of the crisis, India had been indebted to England by 47 tons of gold. From that period on, India was increasing its gold reserves in a tremendous manner. As a matter of fact, in 2009 it purchased from IMF 200 tons of gold so that made India even outpacing China's gold reserves by four times. Certainly, this purchase shows of how much gold plays an essential role for India and that cruciality is coming from the past experience that it witnessed in 1991. From such a kind of behavior, we can deduce that India uses the precautionary motive to secure itself against turmoil that might happen in the future. Even in 2008 when the world economy was severely damaged by financial crises, India was performing way better than other countries. Mainly when the world's leading countries as the United States of America, the United Kingdom, Japan, and France were very severely damaged by the crisis, so that even the recovery process of the effect of it took years. Whereas India has not been affected too much and was much better performing in coping with the recession in comparison to them. Nevertheless, Turkey is also showing very high trends in the accumulation of gold reserves in comparison to other developing countries as we can see from the graph. Especially after 2001, the gold reserves started to increase and the reason for that is coming due to the economic crisis that it had experienced. However, when we observe the gold`s share in foreign exchange reserves we can see an absolutely different trend.

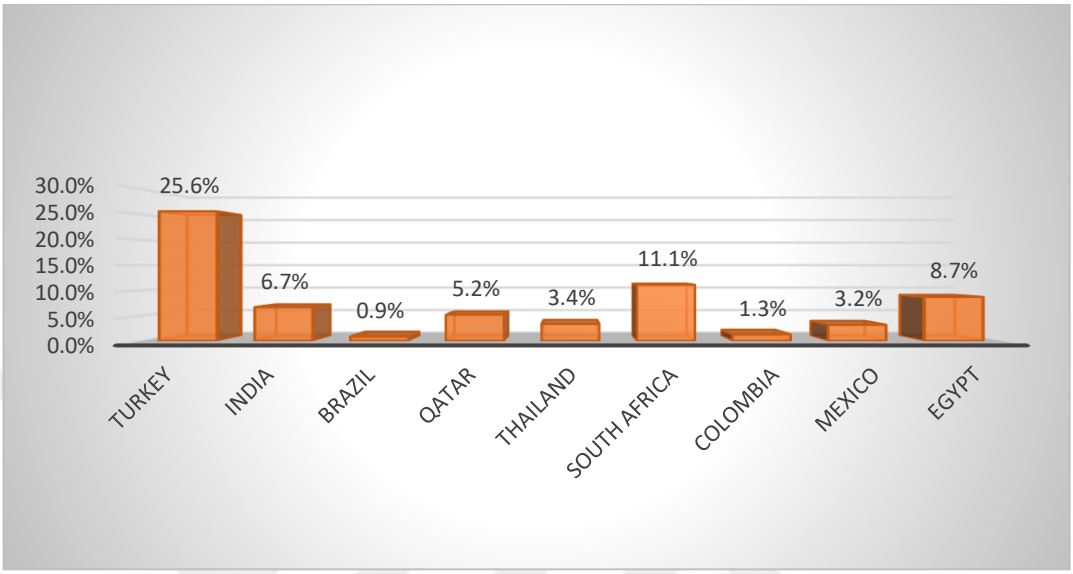
Chart 1.1 The Gold`s Share in Foreign Exchange Reserves in Developed Countries



Source: The Author Calculation.

Figure 1.3 has shown us, the amount of how much gold reserves are kept by developed countries in 2020, which are justified by chart 1.1. By giving a very vivid description of how important role the gold reserves have for such countries so that most of them prefer to keep their proportion of foreign exchange reserves as gold instead of currency reserves. But when we are analyzing the developing countries, we see a different scenario.

Chart 1.2. The Gold`s Share in Foreign Exchange Reserves in Developing Countries.



Source: The Author Calculation

In comparison to chart 1.1, the developing countries prefer to keep less their reserve in the form of gold rather than in the form of currency in 2020. From one side the result of figure 1.4 actually justifies that because in comparison to figure 1.3, the increase in the amount of gold reserves is less than in developed countries. The probable reason for that as we mentioned before is coming due to the structural differences between the developed countries and developing ones and also the development of new financial derivative instruments etc. Another reason for this kind of behavior embodied the fact that the developing countries prefer to keep reserves more in the form of liquid assets by gaining interest through them rather than keeping it in the form of gold. These figures and charts besides showing of how much gold reserves each country is keeping, also show different aspects of countries too. In a way of showing the difference in behavioral approaches of countries by emphasizing of how much risk appetite they are having. The developed countries are more risk-averse and prefer to keep their reserves more in the form of gold rather than developing countries, which prefer to keep in the form of liquid assets.

1.3.1.4. A Summary of the Importance of the Gold

From all this information, that we have mentioned above we can shortly summarize the reasons why gold plays a crucial role in the world economy. First of all, the probability of the possible war that might happen suddenly out of nowhere. In a case that, if the probability of war is inevitable, then countries preserve to keep the gold because disturbance that would be evoked by war will bring instability in the financial system. That's why countries prefer to keep gold as an international reserve because, in case of any kind of war that can happen out of nowhere as the means of payment measurement, only the gold would be used as a viable tool for that. Another reason why countries prefer to keep gold as the international reserve is that gold does not lose value, which could not be said about the money. The reason for that is because the money can lose it is value in case of inflation or due to other reasons but gold never loses its value against inflation so that it can preserve its value all the time. Besides all of that, gold is used as collateral for payments of debts, which shows how important a role as an insurance asset it plays in global transactions as a means of payment even for the exchange of goods and services. Also, since gold is accepted as a world international reserve, even in the case that if all financial assets around the world would be terminated, the gold would still be used as the last means of the resort. As we can see how crucial role, gold plays an important source in the history of human civilizations. Now, let`s have a look at other international assets within the international monetary system.

1.3.2 Convertible Foreign Currencies

The convertible foreign currency has a very special place in the central bank`s accounts. The reason is that it is the most liquid asset in comparison to gold and can be used in the international financial market to generate interest income. As a matter of fact, in order to understand the real meaning of the convertible foreign currency, we need to analyze it on per se. First of all, the definition of foreign currencies as the most liquid asset is traced back from the meaning ‘‘to be readily available’’, which indicates that at one-time availability to meet the balance of payments needs. The reason is that

the reserve asset has to be liquid enough so that it could meet the need of the balance of payments inquiry in the minimum amount of time and be in form of convertible currency. Therefore, liquidity is the mandatory driving force so that by enabling the opportunity for the asset to be able to be purchased and sold for foreign currency without affecting the core value of it at minimum cost and time. In order for it to happen, there have to be markets for such kinds of assets, so that without any kind of cutback that might affect transactions[19]. Besides that, the currencies needed to be also convertible, and the vivid definition of it, been summarized properly by International Monetary Fund as:

‘‘Convertibility defined as free usable for settlements of international transactions is required so that a reserve currency can be exchanged in the markets for another currency needed for the balance of payments purposes, with minimum cost and time and without substantial adverse exchange rate effect.[20]’’

By rephrasing the meaning of the sentence is actually embodied in the fact that in a case of facing a balance of payment problem, the country should be able to use the currency at its disposal so that to overcome it through necessary means of payments. Therefore, convertibility defines in terms of assets as the means of exchange of a currency to another currency. Besides that, as we mentioned, for convertible foreign currency to be eligible to be used as part of an international reserve asset, it needed to be maintained to be freely used.

As we can see from table 1.1 that foreign currency is not just based on paper currencies but also securities are also playing as part of it. The composition of foreign currencies has been changed during history, but the main source of the type of currencies that mostly used worldwide is the euro, dollar, and pound. That is why central banks mostly keep these currencies as the main source of international reserves. But most of the countries prefer to hold a large portion of dollars as reserves in comparison to other currencies, because due to the importance of the historical value of the dollar, which comes from the Gold Standard period of time and the Bretton Woods System. Even

[19] See: IMF(2015); Clarifying the Concept of Reserve Assets and Reserve Currency.
[20] See: IMF(2015); Clarifying the Concept of Reserve Assets and Reserve Currency.

though with the collapse of the Soviet Union after 1991, it gives more credit towards the USA to become as one of the keen economies that making it as a trustworthy country. Accordingly, countries were continuing to keep USD as reserves (Yaman, 2003, p.14)

Table 1. 2 National Currency Weights in Official Currency Reserves.

	USD	EUR	GBP	JPY	DEM	RMB	CHF	FRF	NLG	ECU
1992	55,3		3,1	7,6	13,3		1	2,7	0,7	9,7
1993	56,7		3	7,7	13,7		1,1	2,3	0,7	8,2
1994	56,6		3,3	7,9	14,2		0,9	2,4	0,5	7,7
1995	58,96		2,11	6,77	15,75		0,33	2,35	0,32	8,53
1996	61,98		2,68	6,71	14,67		0,30	1,85	0,24	7,08
1997	65,10		2,58	5,77	14,48		0,35	1,44	0,35	6,07
1998	69,28		2,66	6,24	13,79		0,33	1,62	0,27	1,30
1999	71,01	17,90	2,89	6,37			0,23			
2000	71,13	18,29	2,75	6,06			0,27			
2001	71,51	19,18	2,70	5,04			0,25			
2002	66,50	23,65	2,92	4,94			0,41			
2003	65,45	25,03	2,86	4,42			0,23			
2004	65,51	24,68	3,49	4,28			0,17			
2005	66,51	23,89	3,75	3,96			0,15			
2006	65,04	24,99	4,52	3,46			0,17			
2007	63,87	26,13	4,82	3,18			0,16			
2008	63,77	26,21	4,22	3,47			0,14			
2009	62,15	27,70	4,25	2,90			0,12			
2010	62,24	25,76	3,94	3,66			0,13			
2011	62,69	24,45	3,84	3,61			0,08			
2012	61,49	24,07	4,04	4,09			0,21			
2013	61,27	24,21	3,99	3,82			0,27			
2014	65,17	21,21	3,70	3,54			0,24			
2015	65,74	19,15	4,72	3,75			0,27			
2016	65,36	19,14	4,35	3,95		1,08	0,16			
2017	62,72	20,17	4,54	4,90		1,23	0,18			
2018	61,74	20,67	4,43	5,19		1,89	0,14			
2019	60,72	20,58	4,64	5,89		1,94	0,15			
2020	58,94	21,29	4,73	6,05		2,27	0,17			

Source: IMF Annual Report (2002)

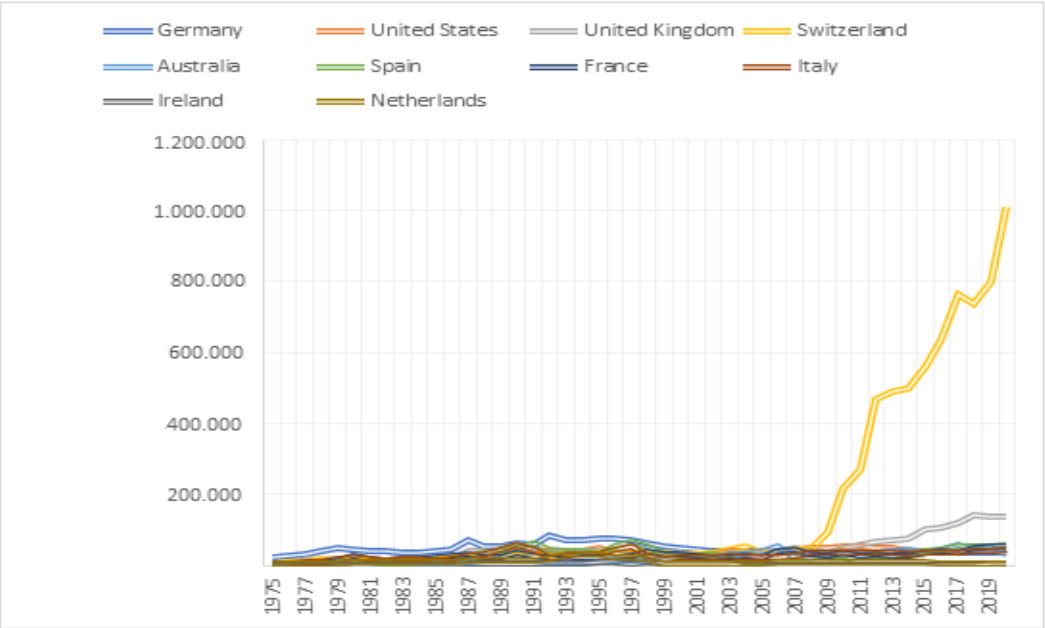
In the table above we can see the weights of national currencies, that sum up the whole world's international reserves. Lots of changes happened across 27 years, especially some of the currencies that had been taken away from usage. With the establishment

of the Euro currency in 1992, currencies such as Deutsch Mark, Dutch Gilder, French Mark has been taken out of circulation and been established under the root of one currency. Moreover, RMB which is the Chinese Renminbi starting from 2016 became also one of the important currencies within the reserve system. Another interesting fact is that by observing the weights we can see that none of the currencies does have the same level of shares as the Dollar. Euro which has been granted with huge hopes that could overpass the weight of USD, could not come close to it so that giving all the privileges towards USD and making one of the dominant currency shares in foreign exchange reserves. But in comparison to other currency shares, Euro is the second currency that has the largest share after the USD. That's why it is not surprising to see the reasons of why countries prefer to keep international reserves in the form of USD and Euro.

Although, another reason for holding the currencies as we mentioned before, comes from the fact that central banks hold them in order to make investments in international markets so that to have interest returns from them. That is why it is not surprising to see that, the most of international reserves are actually contained in the form of foreign currencies. Besides just interest purposes, countries are reluctantly preferring to keep foreign exchange reserves due to their liquidity. As a matter of fact, in case of facing an economic crisis, there has to be a liquid asset in hand so that to take immediate action towards mitigating the risk of it. Especially in the case of the production of products that are exporting abroad currency reserves play a very crucial role. Lots of products that exporters are producing are using some intermediary parts to get the final product, for that they are importing from abroad that necessary parts. These necessary parts are based upon raw materials and components. In case of a financial crisis or on the verge of it as for instance the recent pandemic, in most countries, there has been lockdown for several months. Due to that, most of the companies could not produce in a regular basis or even some of them could not produce at all. Some of them made a contract with foreign suppliers in advance for a certain amount of money and needed to be paid accordingly till the maturity date so that to be supplied with related components. In case of not fulfilling the duty, the suppliers may stop and much worse can even take interest of more than what the contract is been accounted for as insurance

towards not being executed from the other side of the party. From that point of view, this kind of delay of production may cost a lot for the whole country, if necessary, measures won't be taken in advance. In order to terminate such a kind of effect, the central bank can use the foreign exchange reserves on their account to help the companies to get the required materials for their production of goods.

Figure 1. 5 Foreign Exchange Reserves in Developed Countries (in millions of USD)



Source: IMF Data Statistics

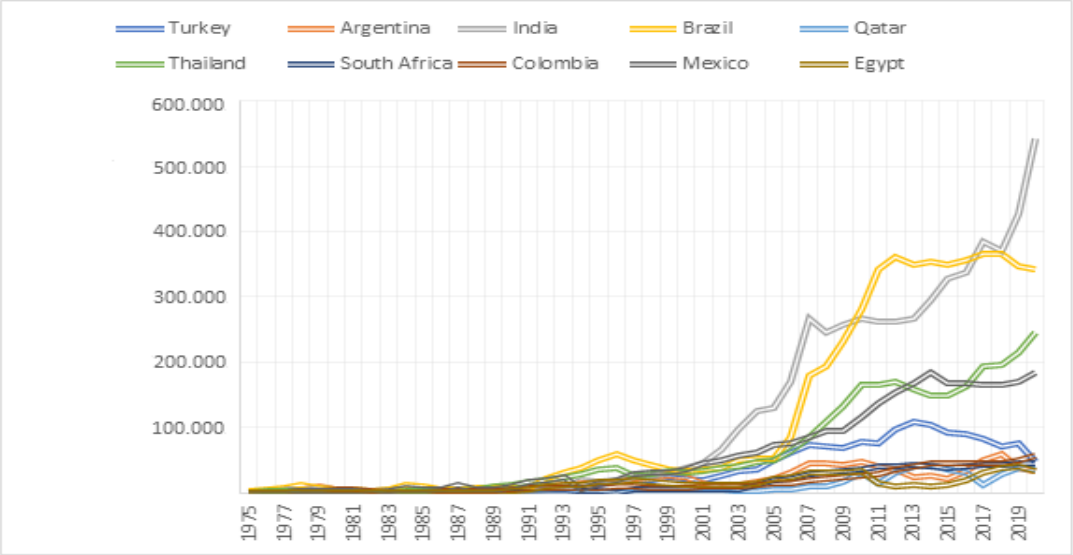
From figure 1.5, we can see how the foreign exchange reserves have been developed over time. A lot of information about the attitudes of the developed countries we can deduce from this graph. This graph is actually giving us information related with the allocation of the reserve management. It actually shows the direct relationship between figure 1.3. Accordingly, the financial crises that have emerged across the time period that we have chosen, has been hit the world twice. First, one was in 1997 and another one in 2008, so that led these countries to perform in various ways within the time interval.

From the figure 1.5, we see that Germany which has been severely hit by these two crises were showing different acts in order to stimulate the economy. Asian Crisis

which started in 1997 and ended in 1999, the percentage increase in gold reserves was 17 percent, whereas in foreign exchange reserves there has been decreased by 25 percent. 2008 Global Financial Crisis which lasted for one year, the percentage increase in gold reserves was 4 percent but foreign exchange reserves were decreased by 5 percent. From this information, we can stem the fact that, during both crisis periods, Germany was stimulating the economy by using the currencies that it has on its account. Therefore, to counteract the risk of going into a more adverse situation from the jeopardy loosening up on the foreign exchange, it accumulates more gold reserves partially to cover up the decrease of foreign exchange reserves. We can interpret this kind of behavior as a risk-averse attitude towards the risks that come up from a crisis. Also from another point during the crisis period of time especially in 2008, we can see that the countries were actually not reluctant to use their reserves at all, for that they were going into the credit lines in order to get the necessary amounts so that to cope with the crisis. The results of countries that we have obtained from tables are very similar to the findings of IMF related to reserve management of countries. Likewise, in Italy during the period of Asian Crisis, the percentage change of gold reserves between the beginning and the end of it has been increased by 18 percent but on Foreign Exchange Reserves side, there has been decreased by 64 percent. In 2008 there has been an increase in both sides of reserves, by 4 percent on the gold side and 29 percent on foreign exchange reserves. Whereas the United States gold reserves have not been changed during the first crisis but only foreign exchange reserves had been increased by 4 percent. However, in the 2008 crisis, its gold reserves and foreign exchange reserves have been increased relatively by 4 and 8 percent. The main reason of that was coming due to the fact that the epicenter of the Global Financial Crisis was the United States. In order to overcome the effect of the crisis on the economy, the central bank (FED) was implemented a special policy for stimulating, which is called quantitative easing. Through printing the more money they were purchasing all other assets as euros and other currencies, also gold too. That’s why it is not surprising to see that foreign exchange reserves during the crisis period of time have been increased by 8 percent.

As we can see from this information foreign exchange reserves and gold reserves ratios are intertwined within each other. By observing both ratios we can see how countries were performing in a crisis period of time and how they were managing the stimulation of the domestic economy. Besides just giving us related information with the usage of foreign exchange reserve, this indicator enlightens us more about reserve management. As a matter of fact, we have already known from the information that we have presented above and from related figures that, countries are relying on two reserve assets to stimulate the economy and taking necessary steps towards mitigating the risk. These two assets are gold and foreign currency assets. Figures 1.3 and 1.5 are justifying the reliability of this information by showing what crucial role these two assets play in the reserve system. In addition to figure 1.5, we can see that Switzerland has the highest amount of foreign exchange reserves in comparison to other countries. The reason for that is coming due to the policy enaction of the Swiss National Bank which is based on the prevention of overvaluation of the Swiss Franc. That's why the foreign exchange reserves of Switzerland are so high in comparison to other ones.

Figure 1.6 Foreign Exchange Reserves in Developing Countries (in millions of USD)



Source: IMF Data Statistics

In Figure 1.6 presented the development of Foreign Exchange Reserves in Developing Countries. Figures 1.5 and 1.6 present us a vivid description of the fact that the developing countries are reluctant to keep more foreign exchange reserves due to the allowance of monetary authorities to intervene in the market in order to bring stability in the exchange rate and inflation. With the extreme increase of the capital flows to developing countries due to the verge of globalization has become one of the main obstacles to economic prosperity. That's why exchange rate stability plays a very crucial role in the effectiveness of monetary policy. Especially it becomes mandatory in case of the confidence that might be shaken due to the mistrust of the economy of the country in case of crisis or any other similar situations as the recent pandemic of Covid 19. This kind of mistrust of the economy has been always in the first place to be accounted as one of the crucial problems for developing countries. The reason for that is coming due to the structural weakness of the developing countries. As we have already mentioned, most of the developing countries' institutions have not been mature enough in order to have a safe image in the world as to be presumed as a stable country. In case of turmoil, the management within them is not perfect enough in order to give necessary confidence towards investors so that to keep their money within. Specifically, investors prefer to invest their money in countries that have stable

economies and are much more manage towards the risk that might come through on based of either from inner side or outside. If in case of sign of any possible turmoil that investors might seek within the country, this will lead to capital flight by affecting the country in an adverse manner leading to much more severe consequences. In case of such a kind of risk, countries need to have in their account the necessary amount of foreign currencies so that to take necessary actions in order to provide the required liquidity to make the economy get on its own pace again. But in developed countries, their economies have been matured enough in order to take necessary adjustments right in time so that to take the effect of it in their currencies. Besides that, most of the developed countries are either the countries whose currency is the one of the major currencies of the world's international reserves or consist of a common currency unified under the group of countries by monetary alliance within themselves (EU).

At the same time, the developing countries also need a stream of outside support in order to increase the welfare within the county in the form of facilitating more job opportunities so that boosting the economy with increasing the standard of living of people. In order to do this, the policy enaction that is used by them are specifically targeting to attract the flow of foreign investment toward their countries. The flow of this attraction is based on two forms: Foreign Direct Investment and Portfolio Investment. These two forms are actually the main source of flowing of money into the country. That’s why developing countries are using very loose policies in order to attract foreign investors into their own countries. Even further, by cutting taxes that are taken from foreign companies that are established within the country, they are facilitating even more flow of foreign direct investment. These types of policy implementations are very common in developing countries, particularly we can see this from Figure 1.6. Here in the graph, we can see that India has the largest amount of foreign exchange reserves in comparison to other countries. The reason for that is coming due to the policy implications that has been enacted in order to make the business within the country to be more transparent and leading to an increase of the foreign direct investment and portfolio investments in Indian stocks. Most of developing countries have passed through rough times in the period of the financial crisis. Especially through those tough experiences, some of them had passed even

developed countries with their foreign exchange reserves. That's why when we compare figures 1.5 and 1.6, we see that developing countries are more reluctant to keep foreign exchange reserves rather than developed ones.

1.3.3. SDR (Special Drawing Rights)

Special Drawing Rights are another unconditional asset that Central Banks keep as international reserves. SDRs are actually supplementary foreign exchange reserve assets defined by IMF. It is not just currency or can be used to purchase the products as an ordinary currency, which also means it is not used as a means of payment for goods and services in the hand of consumers. SDR is the unit of account of the IMF and it only provides the privilege to be used as a claim on the currencies of other members within the IMF members. In 1960 the only two main reserves were operating around the globe which was gold and dollars. That was the period as the inflation was getting high due to the expansionary policy that was enacted by the United States in order to supply the demand and because of that it leads to a huge problem on the value of the dollar and lead to the budget deficit as we mentioned in the gold section. In order to mitigate the whole world from the adverse effect of it, the new currency reserve asset has been created and the name of it was Special Drawing Rights. Initially, SDR was equal to 0.88 grams of gold, equivalently to 1 dollar.[21] But later on, as alternative currency started to gain more popularity among the system and make it more lucrative, countries started to change the pattern of reserve accumulation and started to accumulate more SDRs. This action led to a decrease in the demand for the dollar which makes SDR to gain the value more than it. Unfortunately, no matter of how much huge efforts were strived to keep the Bretton Woods system operating it has been collapsed in 1973. As a matter of fact, most of the countries shift to the floating exchange rate regime so that by minimizing the role of SDR as the global reserve asset. After the collapse of the Bretton Wood System, the value of SDR started to be calculated as a basket of currencies. This basket of currencies was based on the currencies of IMF members but later on, especially after 1981, there has been changes

[21] Source: https://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/14/51/Special-Drawing-Right-SDR

in the composition of the basket. The reason for that is coming due to the fact that in order to preserve the value of SDR as the one important reserve currency, it needs to be based on the currencies of the countries that are strong in a financial manner. In order to have a better understanding of the change of the composition of currencies in the basket of SDR, would be better to analyze it by looking at the table of the weights of currencies.

Table 1.3 SDR Basket`s Currency Percentage Weights.

Currency Unit	1981	1991	2001	2020
DEM	21%	27%		
FRF	15%	14%		
JPY	16%	23%	17%	11%
GBP	16%	15%	14%	11%
USD	54%	57%	58%	58%
EUR			38%	42%
CNY				14%

Source: IMF (https://www.imf.org/external/np/fin/data/rms_sdrv.aspx)

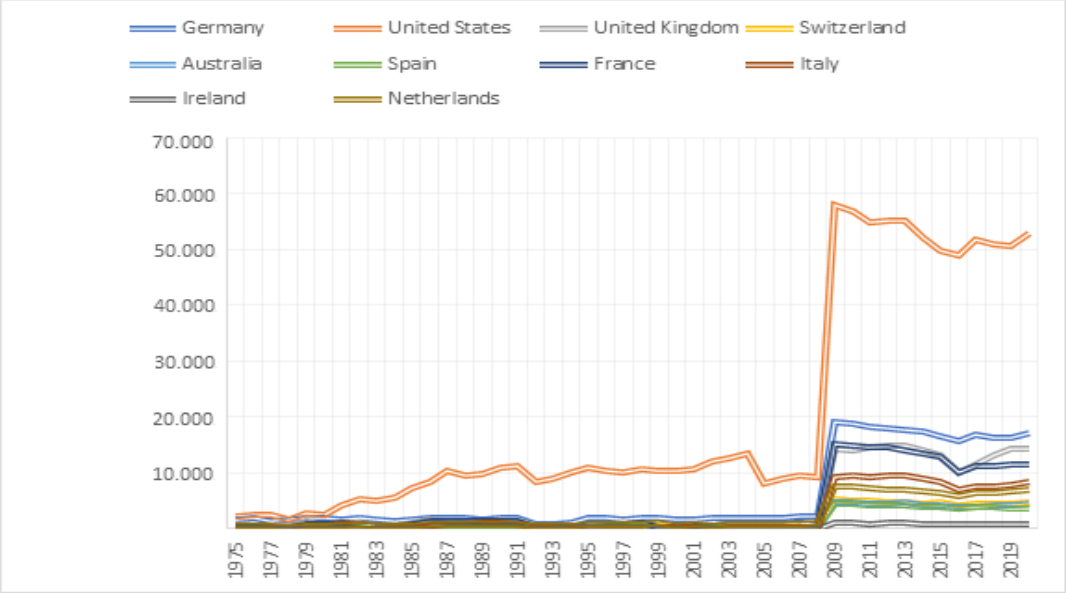
As we can see from the table above, after 1981 the basket was just composed of dollars, pounds, yen, marks, and French franc. After 2001 the mark has been exposed out of the basket because the euro became as dominant currency and it has been also included in the basket. SDR basket is reviewed every five years so that to make necessary changes in the basket if it is needed accordingly to the significance of the currencies in the financial system. In 2016 Chinese yuan has been also added to the basket due to the fact that China plays a very important role in world trade and that is why it is not surprising to see the Chinese yuan as the part of SDR basket.[22] As we can see again, that the countries from whose currencies the SDR basket is composed of, are very strong as in financial and economic manner. Besides that, countries hold SDR not just for simple matter but also for interest purposes too. The International Monetary Fund is actually paying interest to each holder of SDRs and through that the members can make interest gain through it. The only way for the interest gain incurs in case if

[22]See: IMF Annual Report (2016)

members are actually holding more than the cumulative allocation of it. In vice versa the member countries are incurring net interest obligations. But basically, the main mechanism behind the SDR is actually acting as collateral between central banks in order to get the reserves that they needed for so that making it to be one of the important reserve assets that countries keep. In simple terms we may describe this in the following manner:

Let`s assume that CBRT wants to give its Liras and purchase Dollars from Fed. Fed would not be happy with this arrangement because Liras are not accepted as a part of reserves. What would be the reasonable solution to this problem? The reasonable solution lays with the implementation of SDR instead of Lira. Since CBRT will give SDRs and receives dollars in return, the total reserves of FED won't be changed because SDR is part of reserves. When the USA gives the dollars, this also will lead to the deterioration of reserves at its disposal. By implementing like that the loss of the dollars will be compensated by acquiring the SDR and also it will receive the interest payments from CBRT through IMF. From that point of view, we can see that actually SDR is functioning as a collateral item in order to facilitate the needed amount of reserves to sustain the economy that is in desperate need of it.

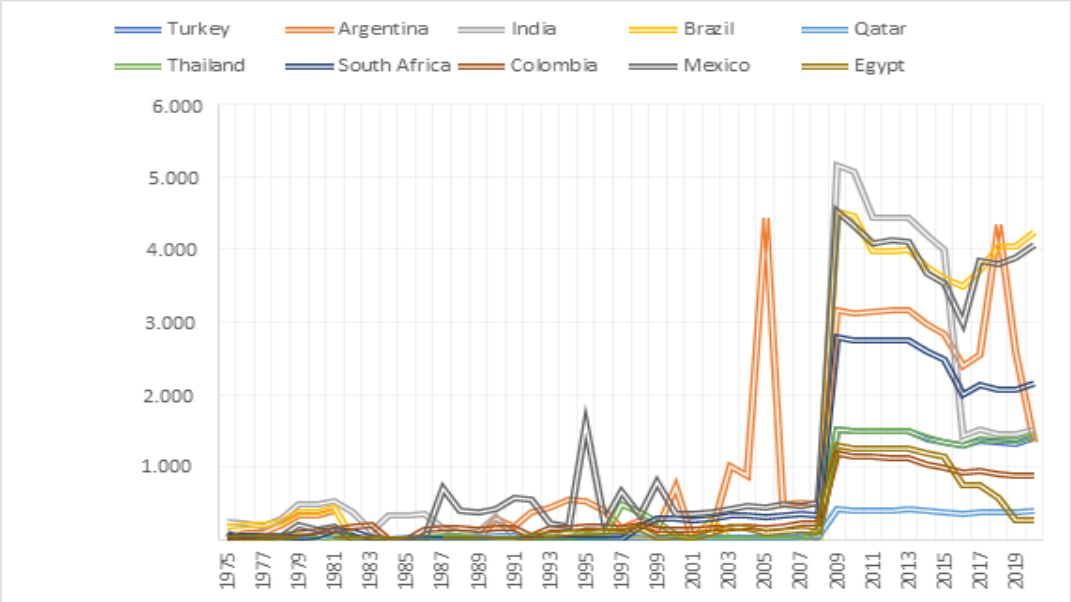
Figure 1.7 Special Drawing Rights Reserves in Developed Countries (in millions of USD).



Source: IMF Statistics

From figure 1.7 we can see how SDRs have been developing across the developed countries, especially not surprisingly to see that the United States has the largest SDRs reserves on its account.

Figure 1.8 Special Drawing Rights Reserves in Developing Countries (in millions of USD).



Source: IMF Statistics

When we look at figure 1.8 and compare it with 1.7 we can see that developing countries are less reluctant to keep SDRs in comparison to developed ones. The reason for that is coming due to the sensitivity of the developing countries to the global financial markets. As with changes that are spreading within the market, it affects the whole global system and eventually countries become more sensitive to the distortions that may presume within it. This kind of distortion leads to a negative effect on the financial system which might adversely affect developing countries' inner economies. To protect themselves from that, developing countries prefer to keep foreign exchange reserves as self-insurance. That’s why we can see such a divergence in the accumulation of SDR reserves between developed and developing countries.

1.3.4. IMF Reserve Position

IMF reserve position is one of the main sources of reserve assets. Each member needs to keep certain quotas within it. These quotas are based on the Special Drawing Rights due to the fact that the member countries have different various currencies. From that perspective, it is preferable to be kept within one currency which is SDR. In determining of how much quota each country will give to the IMF is judged based on its economic strength against the other members. The indicators of the strength of economic power are evaluated based on Gross Domestic Product, Current Account Balance, and Official International Reserves[23]. According to IMF obligations and rules, the formula for evaluating the quota is based on:

i) Weighted Average of GDP which is taken as 50 percent
ii) Openness to the Global Economy which is 30 percent
iii) Economic Variability which is 15 percent
iv) International Reserves which is 5 percent

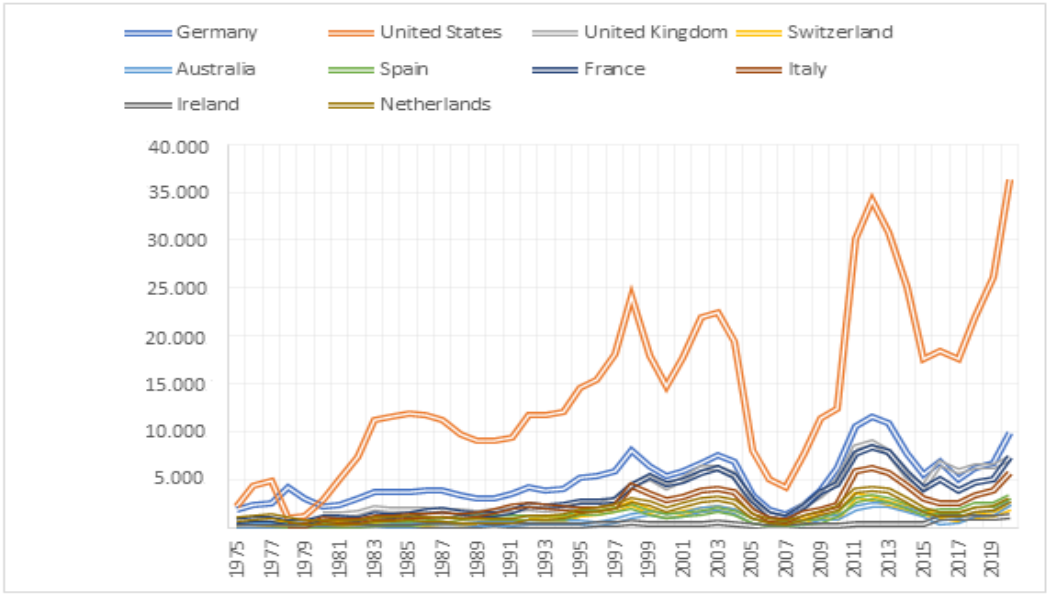
To sum up the main clarification of the IMF Reserve Position, we have to analyze it in a separate manner by looking at its very deep meaning of it. Accordingly, the Reserve Position of IMF is composed of a summation of tranche position and any indebtedness of the IMF in the General Resource Account.[24] Each member country within the IMF system as we mentioned obligated to keep certain quotas and each member accordingly is paying for that within the SDRs, also within its own currency. These quotas are created in order to use as the supplementary fund for necessary needs, by emphasizing specifically to be usable in case of turmoil as the balance of payment crises. It might be also looked as an alternative for using the necessary fund to cope with the external problem as avoiding the credit lines that might be needed for. The general idea about the tranche position is nicely summarized by IMF(2013):

[23] See: Yaman (2003)
[24] See: IMF (2013)

‘‘The reserve tranche represents the member`s unconditional drawing right on the IMF, created by the foreign exchange portion of the quota subscription, plus increase (decrease) through the IMF`s sale (repurchase)’’

From the perspectives that we saw above, it is not surprising to see how much matters reserve position quotas in central banks` accounts. Because through these quotas the countries might be able to obtain the necessary support from IMF in order to facilitate the needed aid to overcome the financial turmoils. The reason is that IMF is responsible for providing necessary support with related agreements so that in order to mitigate the balance of payments risk from member countries who are actually facing it or might be in a phase of facing it. Therefore, the main reason for these supports to related countries are reluctant in building necessary roots of economic growth by stabilizing their currencies and loosening their financial stress of them through the credit lines.

Figure 1.9 IMF Reserve Position in Developed Countries (in millions of USD).

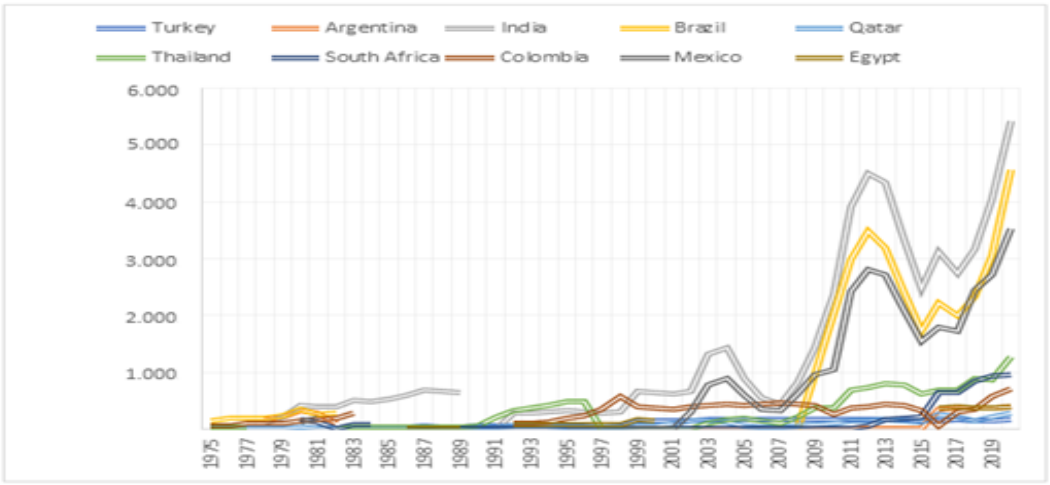


Source: IMF Statistics

In the figure above, IMF Reserve Position is presented for each country from 1975 to 2020. This graph besides just showing us the Reserve Positions within the countries, it also shows us the power of each country and how much it can have weight and influence within IMF voting decisions. Also, it shows the power of the economy of

the countries based on in case of any distortions within the economy, they can use the IMF Reserve Position on its disposal so that to take necessary help from Institution as we have already mentioned. Accordingly, the United States has the highest amount of IMF Reserves, the second is Germany, and the third is the United Kingdom.

Figure 1. 10 IMF Reserve Position in Developing Countries (in millions of USD).



Source: IMF Statistics

Here, we see that in comparison to figure 1.9, the developing countries do not have as much influential aspect in voting power as the developed countries. Their targets are way different than developed ones. As we have already mentioned the developing countries are reluctant to be affected by the balance of payment distortions and that is why they need outside financial support to overcome these distortions. This outside support can be redeemed only from a global institution which is strong enough in order to provide such an amount of financial aid towards those countries. As a matter of fact, IMF is the only institution that is responsible for bringing financial stability and prosperity around the globe. That is why developing countries are reluctant to rely more on IMF support rather than developed countries.

As we can see from all the information above, all these assets that we have mentioned are actually unconditional reserve assets that are held by Central Banks and can be found within the balance sheet of every Central Banks'. Also, there is a conditional reserves assets that are actually pre-negotiated credit arrangements with IMF or other

central banks [25]. From the definitions and information that are provided above, we can observe that what kind of crucial role international reserves play in the development of the world economy.

[25] Grubel (1984)

1.4. The Development and Composition of International Reserves in Turkey

1.4.1.The Importance of Turkey in the World

Turkey is one of the leading developing countries which actually has very huge potential phases for growth. Especially with the new targets that directed towards finding new oil and gas sources had given a very promising shape towards making the country's economy to flourish and to become one of the leading countries in the world. With the discovery of gas reserves in the Black Sea, Turkey is going to be in a league of exporters of gas, which will have a huge positive impact on the economy and specifically will take necessary steps towards prosperity. Besides that, the geographical position plays a very crucial role for Turkey's economy as a whole so that located in the heart of the center of Europe and Asia. As we can see that what kind of mandatory role Turkey has from the geopolitical point of view. Since through being at the center of Europe and Asia, Turkey is surrounded by the major political and economic powers of the global world that are circulated straight in there. Specifically, by being at the center of the continents, Turkey is granted by linking the bridge of Europe and Asia. Therefore, through that strategic mandatory position that Turkey is maintaining, makes it as one of the leading countries that have very huge influence on global politics and economics. By being at the center of the global world and influencing through it by maintaining as the strategic country, Turkey is actually showing to the world its vitality and as a role model for developing countries what kind of crucial role it has in all spheres of the international economics and politics. The best example of it is the fact that geopolitically Turkey's influence is expanding tremendously across not just its borders but even further, from the Caucasus all the way towards Central Asia. That's why it is not surprising to see that Turkey also plays a very crucial role in being the bridge of global energy resources that link the Caspian Sea with Central Asia and the West.

Specifically, prior to the technological boom, at the beginning of the 1990s, there was an increase in the capital flows towards developing countries. The reason for that

was coming due to the tremendous decrease in the global interest rates with the mixed up of recessions that were experienced by the major countries as USA and UK, made the developing countries to become more lucrative for investment purposes. As a developing country and due to the advantages that we have mentioned, Turkey was an ideal candidate for investment purposes.

1.4.2. The Economy of Turkey and Related Crises

From another side, Turkey's economy has passed through a lot of volatile periods. The political instabilities that had been going periodically through every ten years, had affected the healthiness of the economy in a very intense manner. Though bringing lots of instabilities and shocks towards the economy, it put under huge uncertainties on the prosper growth of the country by hindering the confidence of the reliability of the economy. In order to achieve stability within the economy, political stability has to be maintained and moreover, without it the economic fundamentals that needed for the country to achieve the potential growth can not be reached. The institutions that are needed for the provision and moderating economy won`t be built efficiently enough to increase the level of the country's development in a global manner and eventually increase the standard of living of people. That’s why it's very important to mitigate political instabilities within the country in order to develop and prosper. Due to abruptions in the political sphere of the country, Turkey's economic system could not be formulated as sound as it should be in order to operate in full potential so that to provide strong institutional background to facilitate the growth of the country appropriately. Furthermore, this situation had created a huge hole in the system by creating a favorable effect for crises to occur. Besides that, the ineffectiveness of fiscal and monetary policies was making the crises bring notorious effects on the country by leading to fragility of the micro and macrostate of the country. The price distortions within the economy, an overvalued exchange rate, and huge public deficits led to the merging of the foreign debt crisis in 1979. Even though the implementation of the related policies under the supervision of IMF, still was not relatively effective to diminish the effect of the vulnerabilities within the economy. Certainly, the liberalization that has been applied extensively within the plan of IMF showed

significant results in coping with the crisis. But the huge problems like unemployment and inflation had not been solved, which were still making the economy to be vulnerable to the shocks that might deteriorate the situation even worse. Indeed the effect of the Asian crisis and the Russian crisis mixed up with the earthquake that occurred in 1999 had a very deteriorating effect on the Turkish economic system. Despite implementing new switching strategies from becoming an import substitution country towards the export substitution county and changing the view of the orientation towards managing the market by bringing liberalization did not show favorable effects on the economy. The reason for that was due to the growing public deficit, which led to huge current balance deficits so that bringing a twin deficit effect to the economy. With the burst of the Asian Crisis and Russian Crisis, things got much worse and led the investors to lose their confidence in the stability of the economy, making them to take off their investments out of the country so that making the capital flows stop flowing to it. Even though with implementing related policies to overcome these unfavorable events, the result was fragile and was not showing needed outcome to bring the economy to the normal state. With the earthquake of 1999, things got much more drastic and affect the economic performance much more in a worse manner. Inflation has been reached over 70 percent and the economy has been diminished by 6.1 percent which made things much worse, leading to the depreciation of the Turkish Lira.

In addition, with a lack of meeting target inflation and eventually making the interest rates to volatile in much bigger swings, brought under the uncertainty the effectiveness of the monetary policies. At the end of the line, these overwhelming situations were creating their own effect on the currency by overvaluation, though creating more dampening effect on the inner economy and negatively affecting the agents within it, so by making imported products to be more lucrative to consume rather than inner products and also harming the export demand of the country too. This situation was leading to the growth of the current account deficit because the value of imports was increasing and overpassing the value of exports and as a result, this led to the flowing of money out of the country. Eventually, the depreciation of the currency was inevitable and foreseen by the agents of the economy due to the growing current

account deficit numbers. After all, the depreciation of the currency put pressure on the interest rates and made them go down, which in fact made the currency to be less attractive for investors. Moreover, this led to the huge rise of inflation and these rough situations affect the banking sector vitality due to the lack of liquidity that was ongoing in the economy. As a matter of fact, the deficiency of liquidity in the market and the fragile policies of the Central Bank did not show its mandatory effect as the salvation for the panic that was spreading around the economy. With all of these effects and frustrations that were surrounding the economy, it led to one of the biggest economic crises in Turkish economy history that took place in 2001. Besides just economic difficulties, political instabilities were also preserved around the country so that making the crises period to get even harsher. The situation was almost in the verge of huge turmoil that might be led to the collapse of the whole system and without taking necessary adjustments might lead to more crusade effects at the whole country. In order to cope up with the effect of the financial crisis and to terminate the effect of it, necessary bailing out policies needed to be taken into the act as immediately as possible. With designing necessary protocols and adjustment programs, in May 2001 the new act has been announced and the name of the program was `Transition to a Strong Economy Program`. In order to improve the effectiveness of the program, mandatory outsource agreements had been made in form of loans from IMF and World Bank. Taking into consideration and applying the IMF recovery acts and steps within the economy, led to positive effects on the economy.

One of the main acts that took a huge role in envisioning the economic system was giving privileges towards the Central Bank to act as independent and preserving the stability of the monetary policies which in all led to reconstructing of the macroeconomy system of the country. One of the important policies that have been implemented in order to overcome these turmoil periods of time was the implementation of the floating exchange regime. The reason for that was coming due to the fact that the 2001 financial crisis was a summon of different crises that happened at the same time. Balance of Payments crisis, bank crisis, and other crisis were gathered under the one hood which led to the splurge of the huge crisis that spoiled out on the economy. One of the ways, in order to decrease the effects of these crisis on the

economy, was the switching towards a floating exchange rate system. Before 2001 Turkey was implementing a peg exchange rate regime, which is the fixed exchange rate regime. With the implementation of liberalization acts within the economy in order to bring the integration with the globe, making the exchange rate and the banking sector collide as one. In order to bring stability within the financial system, the exchange rate needs to be functioning within the monetary system so that to be able to stabilize the banks because of the splurge of the Asian Crisis in 1997 and Russian Crisis in 1998, the capital flows started to significantly diminish towards Turkey. Eventually, the decrease in capital flows made the economy to be more vulnerable to speculative attacks. The reason for that is coming due to the two facts. The first one, the exchange rate that was used prior to 2001 was the peg exchange rate regime. The second one is the relative amount of international reserves in order to defend the currency that was not managed in an appropriate manner. When there is the expectation of turmoil that is going to be leaked towards the exchange rate system, which will lead to devaluation of the currency, it is very costly to defend the currency against speculative attacks. In order to overcome these attacks, it has to increase the interest rate and in order to stabilize the effects of the exchange rate, also Central Bank has to induce the international reserves in the foreign exchange market in order to preserve the value of the currency. With the implementation of the rising interest rates, it will lead to dampening of the output, which will lead to worse conditioning of the life state of the economy. That's why the stability of the exchange rate and policy implementations towards the decreasing of the volatility of it, plays a crucial role in the well-being of the banking system within the country. Even though with the increased flow of reserves from the 1990s, the reserve management system was not taking with necessary relevant importance for the vitality of the financial system of the economy. When the capital flows started to deteriorate due to the Asian and Russian Crises, huge volatility was presented within the exchange rate, leading to liquidity problems within the financial system, especially for well being of the banking system of the country. At the same time with the capital outflows, there was huge pressure on the stability of the Turkish Lira. With the lack of reserve management, the stability of the exchange rate could not be managed in a proper manner, and in order to prevent capital outflows, sterilization policies were implemented. Although this showed a

positive effect on the prevention of capital outflows but on the other hand, it induced more feebleness within the central bank so that leading to emerging of more serious issues in the financial system. In the end, the inability to defend the exchange rate stability and lack of adequate policies towards the reserve management of the economy was one of the main reasons for the splurging of the 2001 Financial Crisis. That's why switching to a floating exchange rate system was mandatory in order to bring stability towards the exchange rate system. Furthermore, through enacting the recommended policies of the IMF, there have been huge changes in the formulation of fiscal and monetary policies within the country. Giving strength to the banking system through adopting the new Central Bank Law and establishment of the banking regulatory and supervisory agency made the economy recover from the crisis at a faster pace. Through these reconstructions, Turkey`s social and economic development has been really improved after the 2001 crises period of time. Unemployment had been decreased significantly prior to the old days. With the necessary adjustments within the economy, by increasing the efficiency of the monetary and fiscal policies and taking necessary steps to implement the open-world policies to become more close to European Union standards, made Turkey become one of the ideal candidates in a row of European Union countries. But some macroeconomic problems were still preserved within the economy. Switching of the target of the economy from agricultural to construction-based economy led to many pitfalls, especially one of them was increasing current account deficits. Starting from the 2001 crisis, the biggest problem of Turkey`s economy was enlarging current account deficits. Even though with the stimulus programs of IMF, the current account problem was not resolved fully and it had grown since then into a huge amount and by putting Turkey into the list of one of the largest current account deficits countries in the world. The reason is that the economy was targeted only based on micro policy implications manner but been taking a macro prospect of the economy with a grain of salt. Directing the economy to be more dependent on capital inflows made the banks and private sector rely heavily on debts. Moreover that, all the crises starting with the foreign debt crisis of 1979 and all the way to the 2001 financial crises, had been always been stabilized and bailed out not by inner economy policies but under supervision of policy implication of foreign anchor. This foreign aid had been provided by only one institution which is IMF. And

with these outstanding stabilization programs and debts that have been taken for bringing adequacy towards the economy and been summon through the years to the huge pain that been burden on the shoulders of the economy. Under these circumstances, the economy was under huge pressure of increasing debt, rising inflation rate, and under the effect of increasing current account deficit.

1.4.3.Fragile Five Countries

In 2013 the report has been prepared by Morgan Stanley where it was presented by bringing a set of countries under the cluster of common features that separate them from other ones. According to the report the countries which are taken in are consisting of Turkey, Brazil, India, South Africa, and Indonesia called as Fragile Five Countries. The reason why these countries are taken into account is based due to huge reliance on outsourcing financing in order to stimulate the economy and high current account deficit level. In 2016 the list has been updated and consisted of Turkey, Colombia, Indonesia, Mexico, and South Africa. In 2017 new Fragile countries were composed but this time the report was issued by the S&P credit rating agency. The reason for choosing these countries was based on the negative impact of interest rates on their economies, Due to that, they were categorized as the group of risky countries.

As a matter of fact, Turkey as the other Fragile Five countries mainly rely on capital flows as we have already mentioned. The reason for that is coming due to the policy implications that have been based on the boldness of the liquidity that was splurging in the global economy of the 1990`s. With the rise of the global interest rates especially in developed countries, the wave of investment started to move towards developing countries. From one side the flow of capital brought with it a lot of advantages as being an intercessor for the growth aspect of the economy. Thereafter, the flow increases the standard of living within the country and facilitates to decrease in unemployment, and boosts the economy. At the same time, with the capital flow, new technological innovations come to the working practices, which increases the productivity of the labor force. By increasing the workforce within the economy, with the establishment of new factories and multinational firms within the country, the technological innovation increases the overall quality of the standard of the working places.

Moreover, bringing more flexibility for accomplishing the tasks within the companies and factories. With all these positive effects, it makes the countries to be more eligible for financial development and changing statuses of their quos. Indeed, these effects have shown a positive influence on the economy but the effect of them was not prolonged across the long term. With the expansionary policies that have been used by developed countries and accompanying with the enacting of the policies related to the allocating of capital movements of Turkey, the global macro and micro-objectives have been visioned by the boldness of this situation to be prolonged for the long term. Indeed, this boldness of the attractiveness of the developing countries has been in the center of the investors for 20 years (1990-2010). Due to this attractiveness that had been bursting in the global economy, Turkey's reliance on capital flows had been increased in a tremendous manner. But the problem is that there has been an increase in the reserves but not in an adequate manner as it should be due to mismanaging of the reserve policies in the right manner. Another big problem was the financial crisis that took place in 2001, which put huge wounds to the economy that been not fully recovered. As we have already mentioned that Turkey's economy has been always under huge stress for years. Especially with military coups that happened almost every 10 years, had a hugely adverse effect on the macro and micro stabilization of the economy. The core of the economy's healthiness had been fragile due to the instabilities within the country and could not be managed in an adequate manner. Hence, the increase of capital flows since the 1990s, led to an increase of the current account deficit that made things to get much worse. The reason for getting into the huge turmoil within the economy lays in the fact that the policies enaction were poorly managed due to the inner political issues within the country and the needed amount of the production growth had not been taken in effective manner. Even in the current state, the economy is running through a huge current account deficit that increases the vulnerability and riskiness of the financial system. The companies that are producing the related amount of products for exporting is running through huge liabilities which are based on foreign currencies and the reason for that is coming due to the intermediate products that are necessary in order to bring to the final state their own products. Eventually, with the increasing amount of the debt that comes from companies and mixed with borrowing that is targeting in order to decrease the current

account deficit, the total debt had been an increase in a tremendous manner across the years. The outstanding debt is accounted for 268.9 billion dollars. Policy implications were mostly based on the micro-objective of the economy rather than targeting macro-objectives. The probable reason for having such turmoil within the economy is laying on the fact that the integration of the economy towards the globe and taking necessary steps to adjust the market towards world financial markets, been enacted without the independent policies that needed to be taken in advance. The abolition of capital mobility restrictions put the economy into a new stage of development. With the new stage and the opportunities, lots of foreign anchor effects started to impact the inner economy. By meaning that with more integration towards the world economy, Turkey's economic policies were taken with regard towards the global economy at the expense of the policy implications that needed to bring stability within the domestic economy. Without implementing the independent monetary policies, exchange rate volatility and overall sustainability of the economic development of the country gave very bad indicators towards the reliability of the economy in the global state.

On the other hand, with the vivacity of the global economy and with the changes of the monetary policies in developed countries from 2010 to late 2015, things got harsher for developing countries. With the concern of the slowing down in the growth prospects of the developing countries and with the beginning of the implementation of the contradictory monetary policies so that giving the trends towards increasing of the interest rates, led to the deterioration of the capital flows to developing countries in significant amount. These global conditions affect the investors towards making the shift to developed countries and leading to witnessed the immersive capital flights in developing countries. Turkey had been one of the countries that had been badly affected by these capital flights which put a huge burden on the economy. The strong appetite for dollars and euros made the Turkish Lira lose value so that bringing more instabilities within the exchange system. Eventually, unresponsiveness of the policy implications that are directed towards bringing the stability and smoothness of the macroeconomic objectives accompanying the increasing debt burden led the economy to the edge of collapse. Immediate actions needed to be taken in order to facilitate stimulation of the economy and to overcome the macro-financial risks. In order to

address all these unfavorable effects upon the economy, the Central Bank of Turkey started to implement new objectives and stimulus policies in late of 2010.

One of the main concerns that have been given as priority was to achieve financial stability, through minimizing the deteriorating effect of capital flows within the economy. The only way to achieve it was based on implementing policies related to the management of the reserves ratios. Hence, this was the first-time assessment of the vitality of the international reserves as a crucial element for the well-being of the economy.

As we have already mentioned with the stop of capital flows, the economy went towards a fragile state and also being too much vulnerable to the risks that might be provoked by the global economic arena. With the increasing current account deficit and with changes of the investors' appetite that swept away from developing countries towards the developed ones, the only way how to fight against this turmoil that was taken within, through giving the priority towards the policies that are directed towards the accumulation of reserves. From that point of view, the awareness of the importance of reserves played and still plays a crucial role in bringing stability towards the economy. That is why the reserves play a very crucial role in providing the related amount of smoothness and reliance to the functioning of the financial markets and important actors within the economy. Taking all these facts into the consideration, the policies regardless towards facilitating the growth and stability had been taken with given huge privileges of the significance of reserves as the bulk against the risks and instabilities in the economy. Even though by looking at the economy in the current state the awareness of the validity of reserves as the bulk been seen but the effectiveness of the policies with facilitating of the growth of reserves still lacking as can be seen in current days too. With an increasing amount of current account deficit and outstanding debt, more divergence in the policies needed to be taken regardless of the reserves and management of it. Especially through the implication of the right models, the adequate level of reserves can facilitate the shrinking of the current account deficit and the total amount of debt in significant amounts. That is why it's very important to observe the development of the reserves and to see in which state they are and how they are managed.

1.4.4. CBRT and its Purposes

As in every country in the world, the only responsible institution that is eligible to take necessary actions and policy implications related to reserves is the Central Bank. The main institution that is responsible for reserve management in Turkey is the Central Bank of Turkey. In each country, the reserve management is changing accordingly to the circumstances that prevail around and with what targeting they are satisfying for. The main targets of the Central Bank of Turkey towards reserve management are based on the following factors:[26]

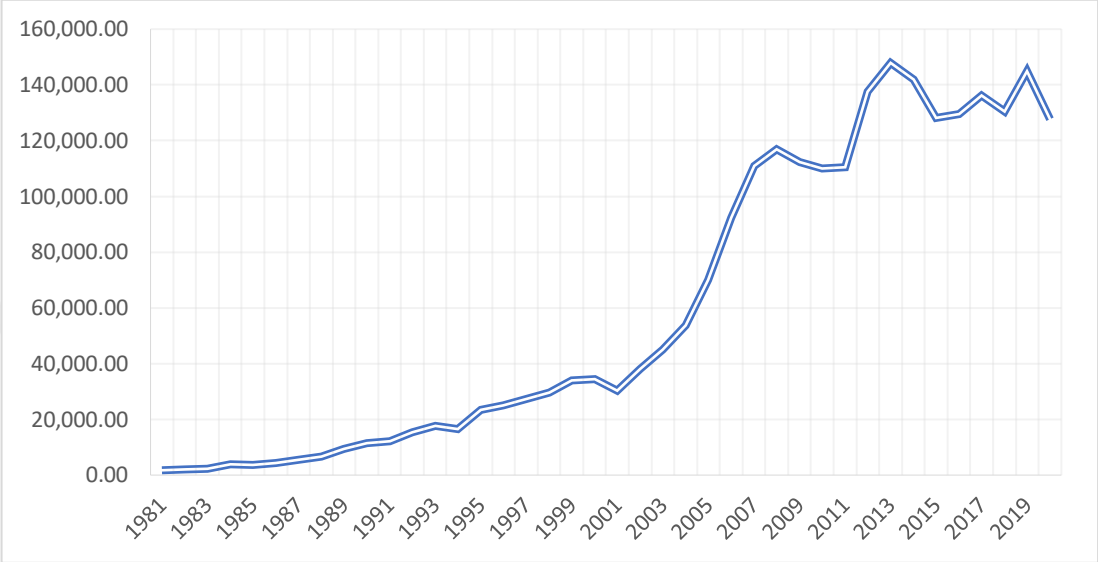
a) The current monetary and exchange rate policy
b) The liability structure of the CBRT
c) The borrowing strategy of the Treasury
d) The foreign currency debt payments are to be made on behalf of the treasury and the developments in the domestic and foreign economic conjuncture.

But the general principles of reserve management that are almost all the banks in the world assimilate as The Central Bank of Turkey are condemned by mandating the protection of the principal, liquidity, and return.[27] First of all, the protection of the principle is embodied in the fact that all the reserves are categorized as national assets and that's why the central banks are giving priorities towards securing them in the first row. The second is the liquidity principle, which is based on the fact that central banks prefer to use investment instruments in reserve management to facilitate to serve as a purpose of holding reserves and to be converted towards cash in immediate need with minimum cost. The third principle is the Return Principle, which is relied on the fact, within the scope of the reserve management, the Central Banks are targeting to increase the return of reserves in financial transactions with only visioning that the principal is secured and liquidity target is met. As we can see from principles that the Central Banks are taking necessary steps for reserve management based on the fact

[26] See: CBRT (2018)
[27] Source:https://www.tcmb.gov.tr/wps/wcm/connect/TR/TCMB+TR/Main+Menu/Banka+Hakkinda/Sikca+Sorulan+Sorular/Doviz+Kuru+Politikasi+ve+Rezerv+Yonetimi/

that in case of any turmoil that might prevail on the economy, The Central Banks will use the reserves to increase the liquidity and ease the flow of the functioning of it.

Figure 1.11 The Total Reserves of Turkey (in millions of USD).



Source: CBRT.

Figure 1.11 shows us the reserve development of Turkey across the years. As we can see from the graph above, the accumulation of the reserves started to show a significant increase from 2005. This swing-up effect on reserves has been provoked by the increase of the capital flows that have been showing significant effect starting after the 2001 crisis. As we already mentioned, with the switching to floating exchange rate system, enaction of new Central Bank law and with related policy implications and redesigning the economy to be based on more integrated monetary policies led to more favorable actions towards the flow of capital in a more tremendous manner. Through this, we see that there has been a huge increase in reserves till 2008. With the burst of the global financial crisis, there had been a decrease in reserves. Because the global financial markets were under the huge turmoil that had been led by crisis and with the huge dampening in the economy, the whole global world was under the huge effect of suffering from it. As we can see from the figure above, in order to diminish the effect of the crisis on the economy and to shield up against the adverse effects of it, there was a decrease in reserves amount so that to bring a related amount of liquidity towards the market for providing smoothness to the economy. Due to that, in 2008 there had

been a decrease in total reserves by 4 percent. In order to mitigate the effect of the crisis within the global economy, developed countries started to implement expansionary monetary policies. Eventually with the implementation of these policies, made the developing countries to become more lucrative for investment purposes and led to huge capital flows to them. Turkey`s economy was one of the economies that got the advantage of these global flows and we can see this through observing the graph. With the emerging of the 2011 Debt Crisis things got more severe for the global economy, especially for developed countries. The reason for that was coming due to the fact that the effect of 2008 had not been diminished from the globe and with the burst of the 2011 crisis, the pressure of it been more overwhelmed on the world economy. In order to get rid of these unfavorable effects, the implementation of more aggressive expansionary policies led the global capital to move even more towards developing countries. From one side it brought more reserves and boldness of liquidity but at the same time, the instability in the financial markets that have been going on in worldwide due to the crisis, made the risks to emerge that could dampen the stability of their economies. In order to defend itself against these risks, starting from 2011 Central Bank of Turkey started to implement extensively two policy instruments for using the reserves as a shield towards this turmoil that might spurge around. The first one is the Reserve Option Mechanism and the second one is the Rediscount Credit Policies. Through implementing these policies, we can see from figure 1.11 that the reserves increased in tremendous amounts and hit the highest level in 2013. After 2013 with the announcement of FED about using contradictory monetary policies led to capital outflows and uncertainties within the domestic economy made Turkey be vulnerable to the risks that might adversely affect the economy. In order to mitigate the pressure of the capital outflows on the exchange rate, the Central Bank has been using the reserves in order to stabilize the exchange rate. That’s why there has been a decrease in the amount of reserves between 2013 and 2016. In 2018 with the splurge of currency crisis, to sustain the stability in the financial system and economic system of the country, there had been deterioration in the reserves level. Despite the crises, the slight increase in the amount of the reserves in 2019 was based on revenues that were coming from export and tourism specifically prior to the second half of the year before the pandemic time. According to the Bloomberg report, an additional amount

of reserves needed to be incurred in case of a sudden stop in capital flows due to a high amount of short-term debt. In addition to the report, due to the political and economic disruptions, investors pulled out 1.6 billion USD from TL dominated bond bill market in 2019. Taking into consideration that there was high volume in TL and USD swap transactions, hence there was an acicular decline in the reserves in March. Due to that, the heavily swap activities were conducted by CBRT. The reason for conducting swap line activities is based on maintaining financial stability and reducing the tensions on the market that might affect the economy in a worse manner. Besides that, the swap line agreements are targeted in order to provide foreign currency liquidity to domestic commercial banks so that in case of any disruptions in the financial market they might use in its disposal in order to reassure their activities for mitigating the risks. By doing like that Central Bank provides additional liquidity to the commercial banks without using the reserves at its disposal. By using swap line activities, the CBRT reserves have increased in 2019, but it led to the burst of speculation which was related to the fact that the borrowed money was used by CBRT to increase reserves and strengthen the value of the Turkish Lira.

In 2020 there was a decrease in the amount of reserves and amounted to 127 billion dollars. There were a few reasons for the deterioration of the amount of reserves. One of the reasons was the military acts that had been carried in Syria at the end of 2019 and the beginning of 2020 which put high pressure on the currency and reserves. Therefore, the deterioration of the reserve level, increasing the foreign currency debt, and other exposures are creating huge concerns for Turkey's economy. Especially, wrong policy implications on the economy by inducing the effort to preserve the value of TL by selling foreign currency led to more deterioration of the reserves. Even though the policy did not reveal the expected results and the interest rates have been increased. In addition to the effect of the Corona virus on the economy, all of these made the economy to be more vulnerable to the exposures of the risks, by rising concerns for investors to invest in the country.

From one side, as we already mentioned in our previous sections that the reserves play a very crucial role in the continuity of the economy. The dynamics of it is mandatory for providing stability for the financial well-being towards the shocks that

might splurge from global imbalances. From that side, the role of international reserves is not just summoning upon just two or three notions, but it is even more than that. It`s one of the most important indicators that shows the prospect of future growth and economic development. The reason for that is coming due to the fact that with the adequate amount of reserves, countries may guarantee a moderate level of growth and development without relying on international support. Through this brings the keynote towards enacting fully independent monetary policies that would affect the micro and macro perspective of the country and would lead to an increase in the standard of living. That's why the accumulation of reserves plays a huge role in bringing the robustness of prosperity for future generations. But none of this contribution to the economy will be viable unless there is a perfect balance within the economy. By the perfect balance, we mean that the fiscal and monetary policies needed to be at the same row in order to stabilize the payment system of the country. Because without intercepting the healthiness in the balance of payment, none of the policies related to the reserve management would be adequate for the economic growth. That's why the fiscal and monetary policies needed to be carefully enacted without contradicting each other, even though if it has to be, should be exercised with the minimum cost on the balance of payments side. The reason for that is based on the fact that fiscal policies and monetary policies are interrelated and can't be achieved without each other. In order to boost the economy, fiscal policies are mandatory and monetary policies are supplementary for being as an intermediary for achieving effectiveness of the implications. For instance, if the country face with a financial crisis and in order to boost the recovery from it, the government is using active fiscal policies. One of such a kind of policy is helping employees to run their businesses in order to not a let the production deteriorate so that decreasing the probability of the emerging of recession. But the problem with that, sometimes government does not have enough funds in their disposal to aid the economy and eventually in order to fulfill its duty as an entity to promote economic stability and growth. To sustain the economy, it needs to borrow from outside sources. From one side by borrowing, it leads to positive effects on the economy through boosting it and by giving the employees the needed amount of aid in order to increase the production of their products so that to facilitate the increase in the country`s exports. In that case, if the country is in the process of a passing crisis

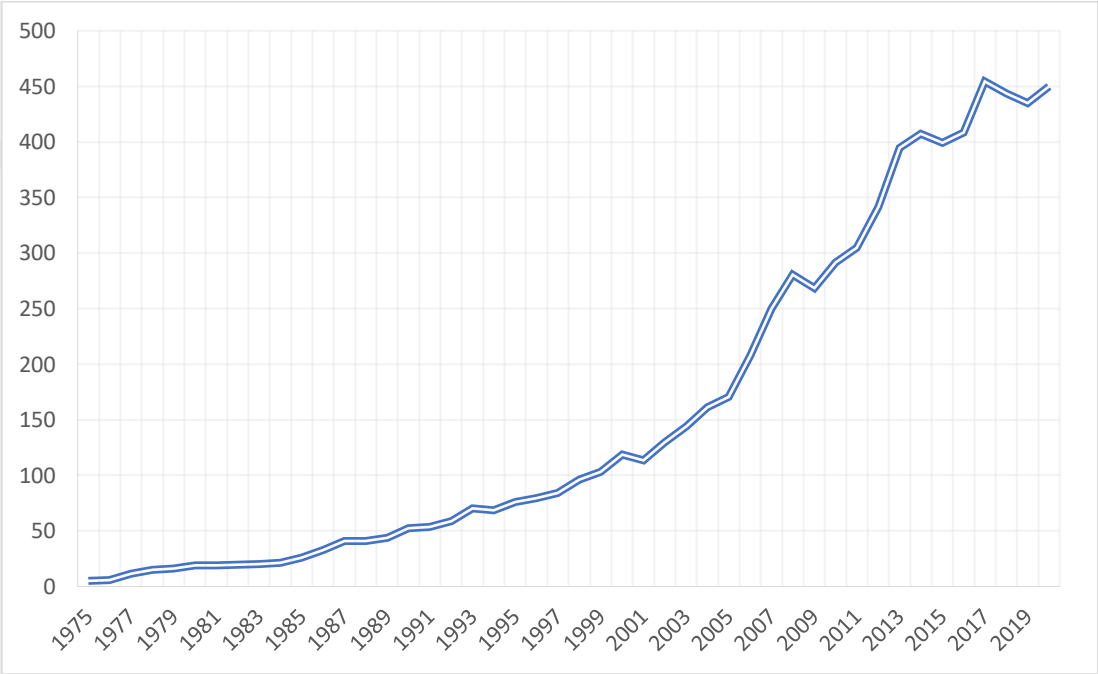
period, it will induce a much faster recovery without getting into recession. Such a kind of scenario only might be possible if the funds are used most productively through the economy, by generating income that would lead to improving the growth. In a way through that would be enough to cover the debt that has been burdened through borrowing.

All of these effects cannot be taken to effect in the case without effective monetary policies. Because only with monetary policies, the effectiveness of fiscal policies can be granted. The reason is that without managing spending flows and through excessive borrowing it will lead to a more drastic effect on the economy. When the economy is not responding towards the policies that have been implemented for the sustainability of the economy and actors within it, then the government uses more aggressive spending policies for bailing out of it. The probable reason for such a kind of unresponsiveness is coming due to the ineffective utilization of the funds that have been borrowed. By imposing more excessive borrowing, it leads to more dampening of the economy through increasing of the interest rate. Eventually, the rise of the interest rate adversely affects the private sector so that leading to have more negative effects on the economy. The ineffectiveness of the fiscal policy on the economy through excessive borrowing is called the crowding-out effect.

That's why it is mandatory for implementing fiscal and monetary policies without overlapping each other. Without the balance between each other, the economy cannot reach intrinsic value so that to be able to operate in effective way through the global financial system. And the key segment that needed to be combined with these two fractions in order to reach the long prosperity is the international reserves. Because international reserves grant a huge ability to generate not just a shield towards the shocks or vulnerabilities but also gives necessary tools to achieve a huge improvement within the economy. From that point of view, the accumulation of reserves plays a crucial role in the economy. The international reserves as we already have mentioned are tools that used by Central Bank for monitoring the economy and especially for the balance of payments. But the essential part of it is that there has to be a balance between the fiscal and monetary policies so that the effectiveness of the international reserves be preserved. Even though by observing Turkey international reserves

numbers from figure 1.11, and witnessing the fact that there is a huge increase in the reserve amount in comparison to 1981 and 2020 but the effectiveness of it is way behind what it should be. This lack of ineffectiveness comes with the crashing of the balance between fiscal and monetary policy implications. In order to have a better view of this discrepancy of the effectiveness of it let`s look closely at the graph below.

Figure 1.12 The Gross External Debt of Turkey (in billions of USD).



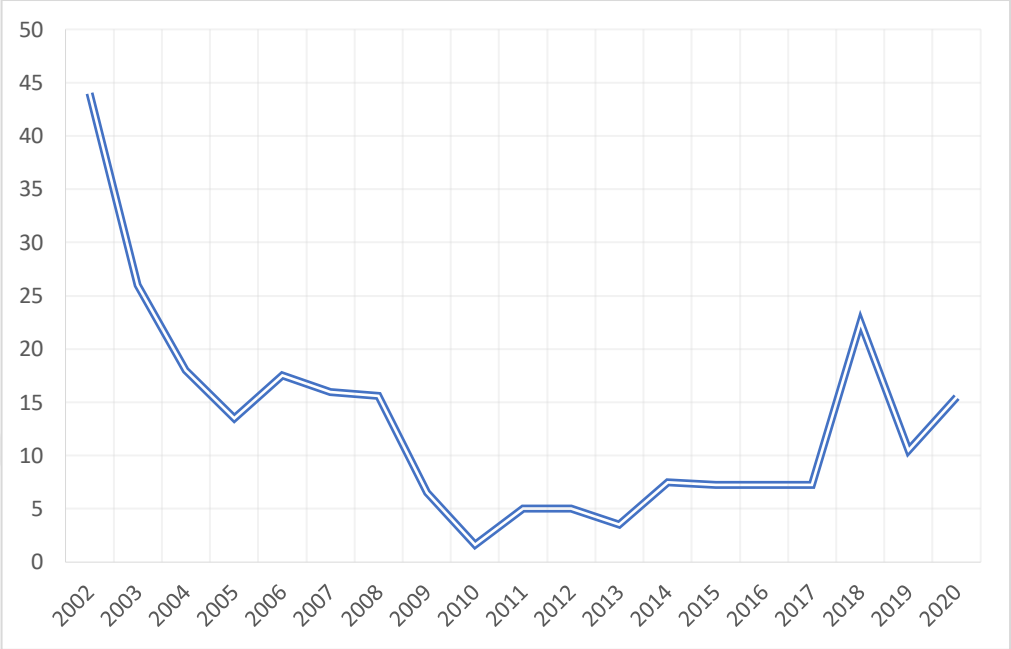
Source: Republic of Turkey Ministry of Treasury and Finance.

Fıgure 1.12 represents the total amount of debt of Turkey from 1975-2020. By observing the graph, we can see that the debts have been increased in huge amounts across the years. In 1975 the total amount of debt had been accounted for 5 billion dollars while in 2020, it had been increased to 450.1 billion dollars. The interesting part of it is encumbered in the fact that by observing figure 1.12 and figure 1.11 we can see what a huge inefficiency in the balance between the fiscal and monetary policies exist within the economy. By comparing two graphs we can see that the increase in total debt across the years has been increasing in more incremental speed rather than accumulation of reserves. In 2013 the international reserves were at the peak and accounted for 147 billion dollars while the total debt of Turkey had been 394.6 billion dollars. In 2020 the total debt had been increased by 9 percent and

reached 450 billion, while the international reserves have been decreased to 127 billion. It is obvious that there is a deficiency in the policy implementations within the monetary policies and fiscal policies. Another factor that we have to look, to have a definitive view about the effectiveness of the policy implications is the budget financing quality. The balance needed to be sustained by bringing to a common point between the ratios of tax revenues and the budget expenditures. The reason for that is stemming from the fact that tax revenues are condemned with a continuous flow of income of the budget while the non-interest expenses are actually continuous expenses of the budget. By finding the ratio between them we are actually getting the budget financing quality.

Generally, the ratio needed to be accounted of 100 percent so that to be able to meet fully the expenses of the budget with the revenues. By facilitating it, so that the borrowing won't be increasing in an unceasing manner. Taking these factors into consideration we can see that the ratio of budget financing of Turkey is accounted for 78 percent. By meaning that the expenses of the budget are not covered from revenues but are actually carried out by borrowing. Again we have witnessed that the imbalance of the policy implication between the fiscal and monetary policy is the reason for the ineffectiveness of the reserve system not functioning in the obligated as it should be. In order to increase the feasibility of the reserve within the economic system, the fiscal and monetary policies need to act as supplementary within each other. That's why it is mandatory to facilitate the balance between them, only then the acts related to the international reserves will help to strengthen the economic growth of the country and be implemented as bulk against the instabilities that might provoke from abroad.

Figure 1.13 The Interest Rate of Turkey.



Source: IMF Data Statistics

Figures 1.12 and 1.13 show us additional information related to the interest rates of the country. The reason is based on the fact that using excessive spending policy as we have already mentioned leads to the emergence of crowding out effect within the economy. That's why the S&P credit agency has added Turkey into the group of countries which has high-interest rates. Indeed, there is a crowding-out effect exists within the economy. Besides that, Turkey has been suffered throughout the years from persistently high inflation due to high budget deficits, investment expenditures, and political turmoil which were affecting the exchange rate in a negative manner, and making the economy to be vulnerable towards shocks and instabilities. With the implementation of tightening monetary policies in order to decrease inflation, made things to get even worse. Thus, the excessive fiscal policies mixed up with contradictory monetary policy led to more dampening of the economy and ineffectiveness of the stimulating targets through rising interest rates. By implementing unbalanced policy implications on the economy led to emerging of the twin crises (currency and debt) in 2018 and prior to that in late of 2019 another crisis splurged around due to the emergence of COVID 19 which led the economy to go into more drastic situation.

By summoning up all the facts and related reasonings, we can induce that the main problem of the economy is encountered in the lack of balance of implementation between fiscal and monetary policies. Instead of using as supplementary towards each other so that to mitigate the cost that has been encumbered by one of it, they are encountered separate costs that burden on the economy and making it go into more adverse situation. That's why it's mandatory to manage the policy balance within them so that to be able a reach prospect growth. The key to bringing stability to the economy is relying on the management of international reserves. The costs that are saddled from the fiscal policy as the result of using fiscal policy can be covered by the policy implication of the Central Bank. Here the international reserves are playing a huge role as the intermediary towards loosening up of the negative effect on the economy of fiscal policy enaction. At the same time, Central Bank`s monetary policy targets related with bringing stability to the economy needs to be managed in such way so that not making an adverse effect on the micro-objectives and macro-objectives of the country, because the efficiency of the international reserves is relying on that too.

At the end of the line, the international reserves are necessary for the stability and prosperity of Turkey. Through implementing the right strategies for the management of the international reserves will lead to huge positive effects on stimulating the economy and bringing related smoothness towards moving out from current economic instabilities. Therefore, in order to sustain the continued growth within the economy, the policy implications for the effectiveness of the result of international reserves need to be cooperatively enacted in the balance of within fiscal policy and other monetary policies.

The international reserves are the pivot sources for increasing sustainability of the economy against the shocks and in case of the crisis is the relief towards out of it. That is why the management of it is very crucial for the well-being of the whole economy. Indeed, The Central Bank of Turkey had been given a huge privilege towards the accumulation of the reserves. With the increase of capital flows that had been flowing towards the country, the reserves had been increased in incremental amounts. By observing figure 1.10 we can see this incremental effect on reserves. The main problem was still preserving the reliance of the economy too much on capital flows. With the

changing global environment, the costs of it starting to increase for the developing countries as for Turkey too, due to global increase of the interest rates that led to decrease in a significant amount of capital flows. In addition to that, through taking necessary lessons from the global financial crisis of 2008, the development of the international reserves took a mandatory step towards insurance the effectiveness for the self-guard of the economy against the vulnerabilities from abroad and the adverse effects of capital flows. Due to that, the active policies for the endorsement of the international reserves are based on two instruments: Reserve Option Mechanism and Rediscount Credit Policies.

1.4.5. Reserve Option Mechanism

The global financial crisis of 2008 gave a huge lesson to the whole world that relying on just price stability through keeping a steady inflation targeting is not enough to cope with the instabilities that are provoked by global circumstances. Financial stability is something that needed to be concerned with, at the same time it's vital for the macro and micro stability of the country too. That`s why central banks needed to reconsider their policies towards targeting not just price stability but also financial stability too at the same time. In a way by adopting multiple policy objectives towards achieving a solidity with more weight on the macro side of the economy rather than on the micro. Due to that starting from 2011, Turkey started to apply new policy objectives which are targeting price stability and financial stability at the same time. In order to fulfill these objectives, the Central Bank of Turkey brought a new policy instrument which is called Reserve Options Mechanism (ROM).

ROM is the option to hold foreign exchange or gold reserves in increasing tranches in place of Turkish Lira reserves requirements of Turkish Banks.[28] Basically, the Reserve Option Mechanism is actually a system that makes the commercial banks to hold a certain amount of required reserves in the form of foreign currency and gold. For the facilitation of the process of the mechanism, there are two main supplementary tools that are using for. One of them is ROR which is Reserve Option Ratio. ROR is

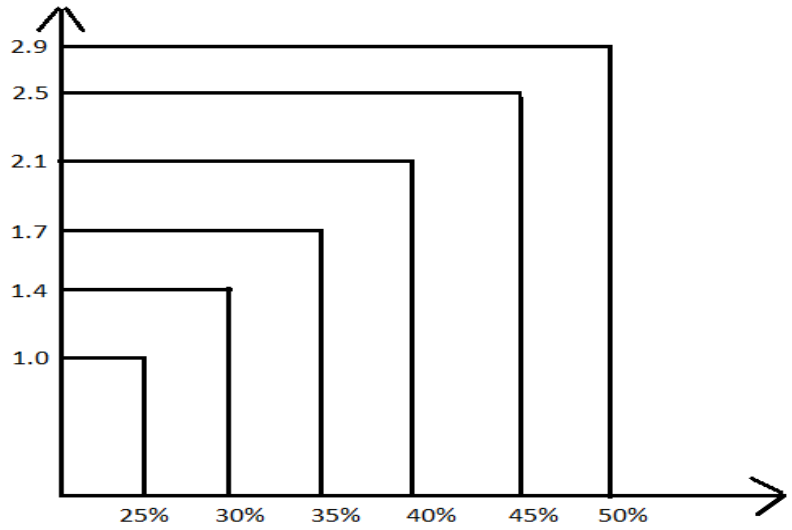
[28] See: Oduncu, Akçelik, Ermişoğlu (2013)

the amount of TL that can be held as the required reserve in gold or FX (Foreign Exchange). Another one is ROC which is the Reserve Option Coefficient, which is the vice versa of ROR where the amount of FX or gold can hold as per unit of Turkish Lira.[29] In order to have a better understanding of how the ROM works, it will be better to observe it by showing it by example:

For instance, assume that the commercial banks need to hold 500 TL as a part of the reserve requirement. Suppose that Reserve Option Ratio (ROR) is 50 percent and ROC (Reserve Option Coefficient) is 1. The exchange rate for USD/TL is 8.0000. In order for the bank to exercise position, it needs to hold 50*1=50 TL equivalent of USD, which is 50/8.0000=6.25 USD. In that case, the bank will keep 6.25 USD as equivalent to 50 TL in addition to it 450 TL as, to sum up to a total of 500 TL as a reserve requirement. As we can see the ROC has a constant distribution of up to 50 percent from the example above. But this case is simplified form in order to understand how the mechanism within it works. In Central Bank, it works a little bit more mixed and Reserve Option Coefficient is not constant, it actually embraces with Reserve Option Ratio. In order to observe that let's bring another example to see how it actually works in reality.

[29] See: CBRT (2013)

Figure 1.14 ROM Mechanism.



From the figure above, we have presented the ROM Mechanism which is in real terms is implementing by Central Bank. To give a more precise example of how the system works, let us assume that, there is Bank X and it is obligated by The Central Bank of Turkey to keep 3000 TL as required reserve ratio within the Central Bank. In order to cease the more transparent option for Bank X, the Central Bank of Turkey via ROM offers to deposit a predetermined slice of this required reserve ratio in a form of foreign exchange currency or gold. Furthermore, let assume that the banks are able to keep just 50 percent of required reserves in the form of FX. The Reserve Option Coefficient is 1. If Bank X wants to exercise this option, it might be able to do so in the following manner:

(3000) * (0.25*1.0+0.05*1.4+0.05*1.7+0.05*2.1+0.05*2.5+0.05*2.9) = 2085 TL

To recap the process, Bank X wants to keep 1500 TL of 3000 TL of required reserves in the form of foreign currency, in order to do that, it has to keep 2085 TL in the Central Bank. As we can see from the example, the ROM is not just a useful system but it's more than that. It actually reshapes the understanding of the importance of international reserves within the economy and acts as a stabilizer for the effectiveness of the financial system. In order to ensure liquidity within the financial system, Central Bank is engaging in open market operations but bringing the ROM, which actually facilitates to more smoothness of the banking operations. The reason for that is

encompassed in the fact that by using this mechanism commercial banks are actually generating foreign exchange and gold reserves within themselves. So that besides just Central Bank, commercial banks are also accumulation international reserves. In case of any shocks or possible turmoil that might be provoked by negative effects of capital flows or other instabilities on their balance sheets, the reserves that the commercial banks have at their disposal can be used as a shield to protect themselves against these adverse effects. That`s why the ROM plays a crucial role in ensuring the effectiveness of the financial system. From that perspective, it actually led to an increase of the international reserves within the economy. Besides that, by making commercial banks to keep foreign exchange or gold reserves as required reserves within the Central Bank facilitates to increase the total amount of international reserves of the Central Bank. In total if we summon the importance of the ROM as the policy instrument, we can deduce its functions in the following manner:

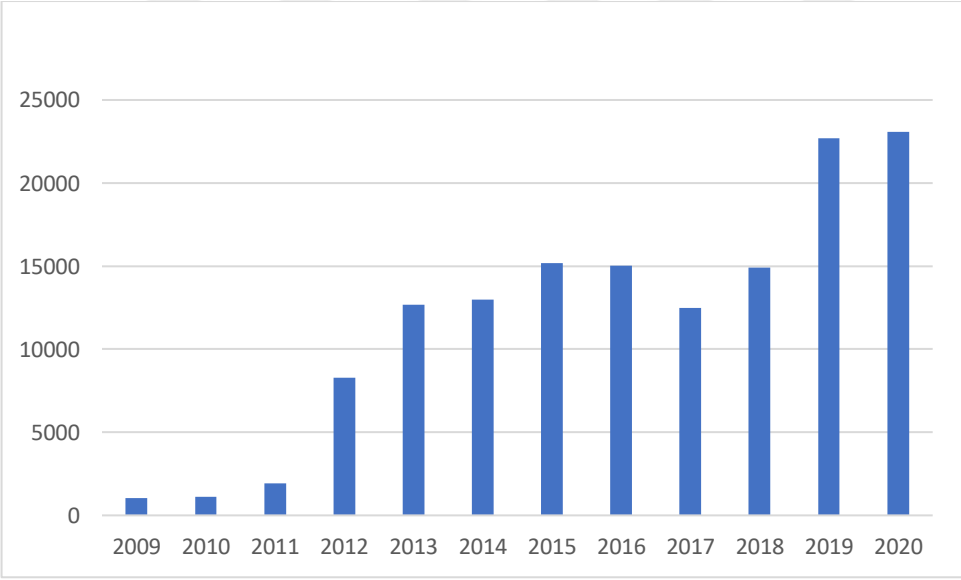
1) Facilitating the importance of international reserves and supporting it via policy implications in an effective manner.
2) Bringing the liquidity towards the financial system in case of turmoil that might happen by triggering the healthiness of the commercial banks
3) Depriving the adverse effects of capital flows on the financial and economic system of the country and ensuring the stability of macro and micro-objectives
4) Leading to an increase in the gold reserves within the economy by bringing the shred of gold under the pillow.[30]

[30] See: CBRT (2012)

1.4.6. Rediscount Credit Policies

Rediscount Credit Policies are one of the major tools of Central Bank that has been used in order to facilitate the increase of the reserves and at the same time to boost up the smooth functioning of the export companies. For that Central Bank was issuing the loans in Turkish Lira towards the exporting companies with the foreign exchange income and at the time of maturity were exercised in the foreign currency to the Central Bank (Yaman, 2017, p. 70-71). Especially this tool facilitates the optimal efficient financing for exporting companies. As a matter of fact, the implementation of these policies has a hugely positive effect on the international reserves of the Central Bank. Without performing necessary adjustments within the market, the overall level of international reserves has been increased in a significant amounts.

Figure 1.15 Rediscount Credit Contribution to FX Reserves (in billions of USD).



Source: CBRT Data Statistics

From figure 1.15 we can deduct the fact that the contribution of Redicount Credits to international reserves has been in huge amount and accounted for 23 billion dollars.

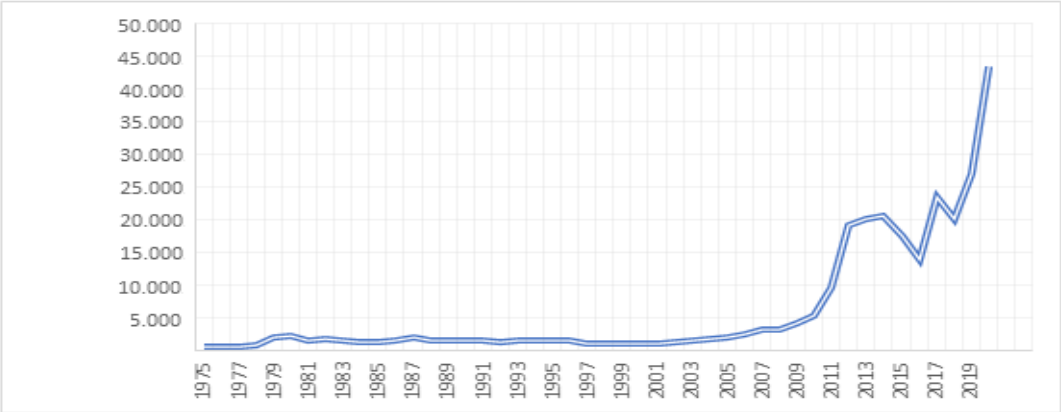
As we can see from the sections above what kind of crucial role for increasing the international reserves within the economy are played by two policy instruments. By taking in overall these two policies are actually justifying the pivot role of the reserves

as playing buffer stock against the possible turmoils that might splured around from global activities.

1.4.7. Reserve Composition of CBRT

Through the changes that spread around the global economy and the switching towards more different ratios within the central banks' reserves had an influence on the Central Bank of Turkey too. Especially by the changes what we mean is that in the past gold reserves were more taking huge percentage in the international reserves account in comparison to other types of international reserves. But with time things are changing and new developments in the global economy, make the switch towards keeping more of other reserve types that were not accounted in significant amount as right now. In order to better analyze these changes, let's have a look at each of them.

Figure 1.16 The Gold Reserves of Turkey (in millions of USD).

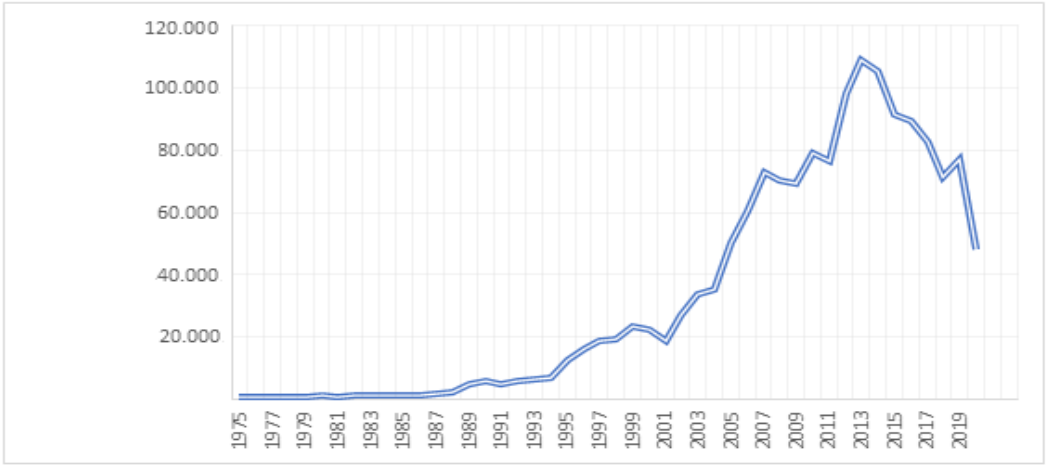


Source: IMF Statistics

By observing the development of gold reserves, we can see that the gold had been increased in a significant amount. By implementing active policies towards bringing the gold to the economy and implementing related policy instruments as ROM were the main source of giving boosting effect on the accumulation of gold reserves within the Central Bank. Besides that in 2017, the Ministry of Treasury and Finance has introduced a new type of bond which is based on gold, by encouraging to bring more gold towards the economy. The effect of these policies we can see from the graph by observing the increase of gold after 2016. Besides that in 2020 by discovering the new

gold reserves in Agri contributed to a huge increase of gold within the economy. On another side, such an increase in the gold reserves cannot be taken into account without putting into the side the fact that gold is the safest bulk against turmoils that might splurge from outside sources. From that point of view, the gold plays a very crucial role as the best actor towards mitigating any instability, especially in the form of crisis.

Figure 1.17 The Foreign Currency Reserves of Turkey (in millions of USD).

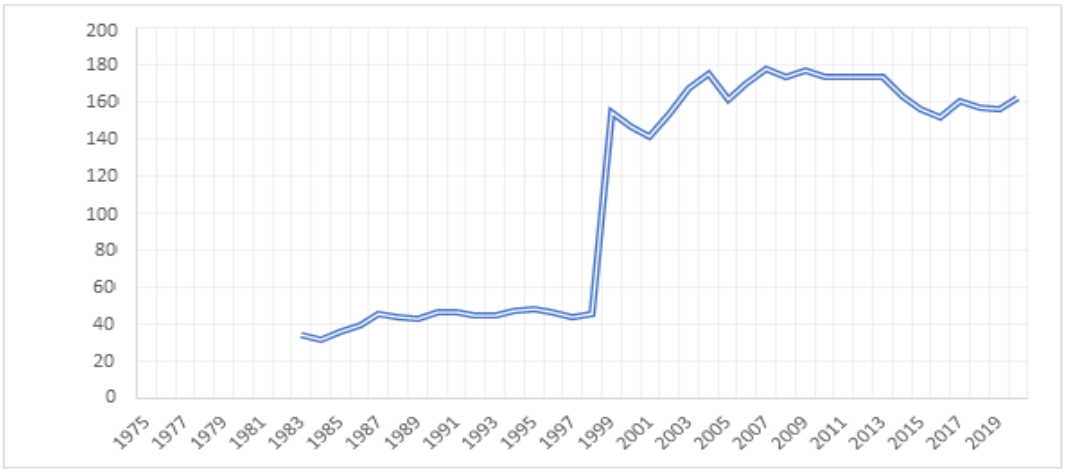


Source: IMF statistics

If we will look very closely at the figure above, we can see a lot of information related to monetary policies that have been implemented by the Central Bank. As we already mentioned in previous sections that one of the main duties of the Central Bank is to ensure price stability. One of the main problems of Turkey's economy is encompassed by the instability of currency in the foreign market. This issue had been going on in the economy for long years and has been always a frontier for economic salvation against instabilities that were coming in a different part of times especially in form of currency crisis so that we are witnessing the effect of it even now. With the implementation of active policies towards supporting the international reserves within the economy, there has been an increase in the amount of FX and reached the pick value of 109 billion dollars in 2013. After the changing in the economy of the global world, implementing contradictory monetary policies by developed countries, affecting the capital flows in a negative manner leading to decreasing in the amount of reserves. At the same time with decrease of capital flows it put huge pressure on the value of TL and in order to decrease the volatility of the currency, FX reserves had

been used in order to deprive that. Starting from 2018, FX reserves had been decreased even further due to stimulus policies of the central bank in order to preserve the value of the currency.

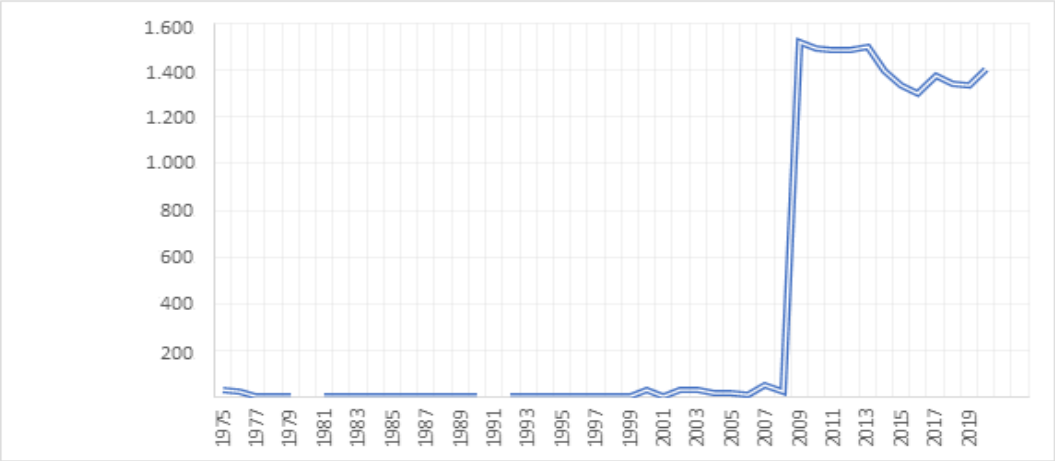
Figure 1.18 IMF Reserve Position of Turkey (in millions of USD).



Source: IMF statistics

IMF Reserve Position is the reserve asset that is provided to IMF as a subscription in order to claim the needed amount of cash in case of any turmoil that the economy might fall upon. Shortly, it is the emergency account, where countries might dispose it in case of any need that they might decide on. As we can see from figure 1.18, the reserve assets have been fluctuating across the years and been accounted for 162 million dollars in 2020.

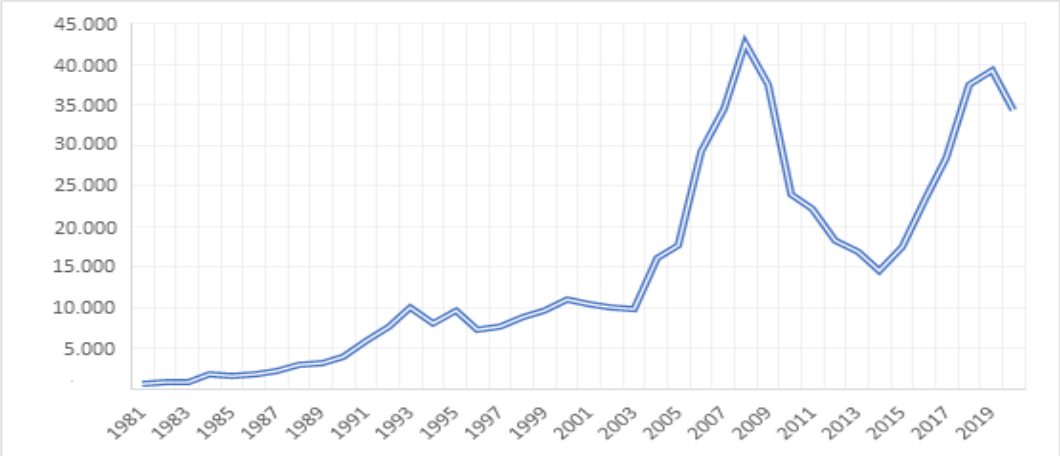
Figure 1. 19 SDR of Turkey (in millions of USD).



Source: IMF statistics

SDR reserves in comparison to other reserve assets have been in a lower level across the years. In order to sustain the global economy after the 2008 financial crisis, IMF allocated SDR to countries and Turkey was also one of them who took the advantage of it. With the reserve support policies of CBRT in 2013 SDR has reached the peak value of 1 billion 514 million dollars and with the emergence of 2018 economic crisis had been decreased in a moderate manner and reached 1 billion 407 million by 2020.

Figure 1. 20 Other Foreign Currency Assets (in millions of USD).



Source: CBRT

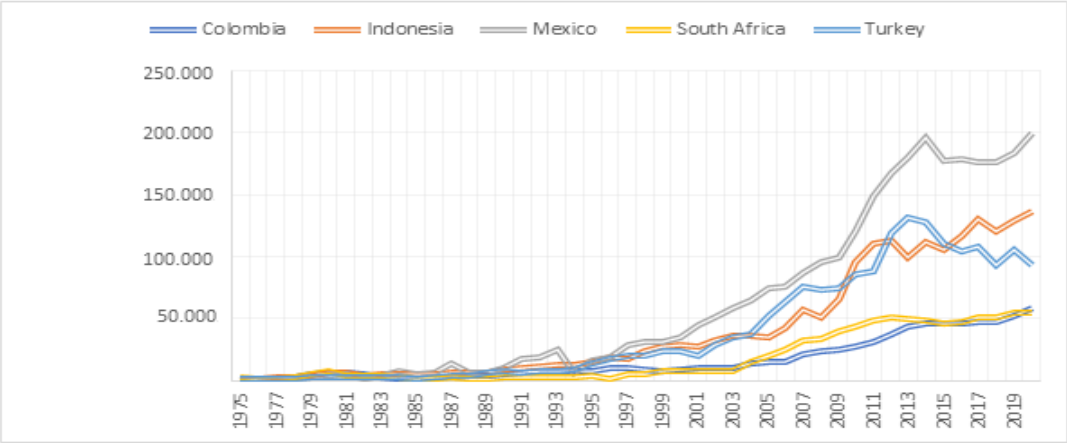
As we can see from figure 1.20, there has been a gradual increase in the other foreign currency reserves and in 2008 it had a peak of 42 billion dollars and then there was a decrease in the amount in 2014 where it hit 14 billion dollars but in 2019 it increased again and hit 39 billion dollars. Again we would like to emphasize that other foreign currency assets are conditional reserve assets that are mainly composed of pre-negotiated credit arrangements with IMF or other central banks. One of such kind of agreement can be emphasized as a swap arrangement between CBRT and other Central Banks. From that side this figure actually entails the borrowing amount of reserves that CBRT borrowed from other Central Banks or Financial Institutions as like IMF. In case for instance there is an effective demand for foreign currency arises within the domestic markets, then in that case in order to fulfill its role, CBRT uses reserves in its disposal that it manage to get it from swap arrangements with related institutions.[31] Through it actually entails to keep the liquidity in the currency available for central bank to facilitate to its private banks by lending to them so that to keep their reserve requirements, which also justifies as the role of it as lender of the last resort.

Also, Turkey has been included in the list of countries as a Fragile Five by Morgan Stanley, which are heavily dependent on external financing and have a high current

[31] Source: https://www.mahfiegilmez.com/2017/04/merkez-bankas-rezervleri.html

account deficit. From that perspective, it will be better for us to compare the reserve development across those countries too.

Figure 1. 21 The Fragile Five Countries International Reserve (in millions of USD).[32]



Source: IMF Statistics

By observing figure 1.21 very closely, we can see that Mexico has the highest amount of reserves across the countries amounted to 199 billion dollars. The reason for that is coming due to the fact that the policy implications that have targeted towards bringing macroeconomic stability show huge positive results upon the economy. Due to high per capita income have a positive effect on the standard of living of the country. Taking into consideration the fact that the petroleum refineries made Mexico as the eleventh largest oil producer in the world. Although it's on the risk of its reserve coverage ratio and with the stimulating of the economy by imposing almost near-zero interest rates makes it be a very risky country in case of shock or outside vulnerabilities.

The second country with the highest amount of reserves in the group is Indonesia, which is accounted for 135 billion dollars. Mostly the part of such increase in the amount of reserves of Indonesia is based on a new strategic asset allocating approach that has been designed to increase the effectiveness of the macro objectives. This policy design has a positive effect on the international reserves. But mostly the increase

[32] The Reserves that are presented in the related figure are composed of Official Reserve Assets.

of the international reserves has been based on government bond issuance and loans which made it to be dependent on external financing for stimulating the economy. Turkey is taking third place in the lists of these countries by accounting for 93 billion dollars in the total amount of official reserves. After that Colombia is taking fourth place by accounting for 58 billion and the last one is South Africa with 93 billion dollars of total reserves. Although the international reserves as we can see might improved across the years but the excessive dependence on foreign financial aid to stimulate the economy, makes these countries to be on the list of risky countries to invest in. The reason for that is embodied in the fact that with reliance too much on capital flows, in case of any disturbances that might be provoked by global economy making these countries to be vulnerable to shocks and affecting their economies in adverse manner. If we will sum up the main reasons of these countries to be named as a group of Fragile Five, we might list them as follows:

1) High amount of current account deficit
2) High Inflation
3) Unemployment
4) Weak Economic Growth
5) Dependance on external financing

Chapter 2

The Review of the Literature on International Reserves

This chapter provides a review of the theoretical and empirical literature on international reserves. A brief overview of the empirical literature on the subject

indicates that following an internationally widespread crisis affected the role and importance of international reserves in the economy. The content and focus of the empirical studies also changed in line with the change in the economic environment following the widespread international and global financial crises. In this sense, we can use two important crises, the Asian crisis, and the global financial crisis. The empirical studies before and after these crises seem to reflect the characteristics of reserve adequacy during these periods. The generally accepted approaches that had been used in order to evaluate the adequacy would be based on different time periods according to spurts of crises. By approaching the literature in such a way we will discover each crisis's nature and the reason of the outburst of them through which we will get a much better vision of the detailed analyses of the works that have been done with a related subject. The initial chapters of relevant review of the literature would be divided accordingly: (I)Initial studies that have been taken before Asian Crisis; (ii) 1997 Asian Crisis and studies have been taken afterward; (iii) 2008 financial crisis and afterward related studies.

In the light of the discussions given above, the rest of this chapter is organized as follows. Section 2.1 reviews the early studies undertaken before the Asian crisis. Section 2.2 provides an overview of the studies after the Asian Crisis. Section 2.3 introduces the studies done following the global financial crisis. Section 2.3 provides general discussions about this chapter.

2.1. The Initial Studies that have been taken Before the Asian crisis

There is a vast literature on reserve adequacy. The crucial role of reserves in an economy has always been the focus of economic debates. The studies related to the integration of the reserves to be as the main tool for stabilization of the economy against the outsource risks and inner side risks did not take mandatory view till 90s. But if we will summon up all the studies in the literature that has been done related to the international reserves level adequacy, we can trace it to the three stages of the development. The first one was related to a money-based approach towards evaluating the adequacy level of reserves, which was extensively applied preliminary to World War II. In the period of World War II, the second approach that has been used to

evaluate the adequacy was based on trade variabilities. And the last phase of the studies is taken after World War 2, which is related to the differences between exchange rate regimes and developments of country levels as the main indicator for adequacy.

2.1.1. Initial Empiric Studies

The first study on the adequacy of reserves was conducted by IMF in 1953 at the request of the United Nations. But the analysis could not be conducted because it is not simple as it seems. The reason for that is coming due to the constraints that have been faced in conducting it and these constraints are based on the following manner:

1) The efficiency of the international credit system
2) The existing pattern of the exchange rates
3) The appropriateness of the monetary and fiscal policies.
4) Policy objectives and the stage of the development of the countries.

A more or less viable approach has been conducted five years later again by IMF (1958). According to the statement that has been made by IMF is that when observing the balance of payments, we can see that most portion of it consists of foreign trade. For the sake of simplicity, the best optimal solution for the assessment of adequacy would be preferable to compare the reserves to trade figures of the countries. Moreover that, from the analysis it has been observed that countries are actually achieving the reserve to import ratio between 30 to 50 percent. And the ratio that needed to be used as reserve adequacy should be validated by being across that ratio. Of course, this ratio as the reserve adequacy was not giving all the privileges to be accounted for but could be accepted as the proxy for estimating as the exploratory character or to be more precise to be described as the minimum benchmark. On the other hand, there was a lot of criticism related to this approach, especially Triffin (1960) criticized the ratio and led his own opinion based on increasing the ratio to 35 percent rather to 30 due to economic circumstances of the countries at that level.

The pioneering work in the study of reserves was conducted by Heller in 1966. The main aim of the Heller (1966)'s work was to develop an index that represents the adequacy of the reserves with a single indicator by combining factors that influence

the amount of international reserve a country should hold. According to Heller`s view, each country has its own reason for accumulating reserves. Most of the countries are acting in a risk-averse manner towards the shocks that might be provoked by financial instability, which might lead to disastrous effects such as a balance of payment deficit. In order to stabilize the production and consumption in the case of a balance of payment deficit, countries hold reserves in a precautionary manner rather than in a speculative manner. As a matter of fact, the precautionary motive is the key idea in determining the optimality of international reserves, based on analyzing three crucial elements:

1) The cost of adjusting to an external imbalance
2) The cost of holding liquid international reserves
3) The possibility of the requirement for reserves of a given extent would emerge.

The cost of adjusting to an external imbalance is actually a Marginal Cost of Adjustment that shows the net loss of income due to refinement imbalance, which means the cost of running out of reserves. The cost of holding liquid international reserves is based on the notion that the liquid reserves are actually disposable capital of the monetary authorities that can be used to mitigate in a case of some disturbance in the outer state of the country that might lead to a negative effect on over state of the country. Accordingly, these assets might be invested in a more productive manner so that the opportunity cost will be based on the rate of return on it in comparison to the social rate of return of capital. The net result of this notion is stemming from the formula: $TC=r*R$ where *TC i*s the opportunity cost of holding the reserves, r is the measure of the difference between the social rate of return on capital and the return on reserves, R is the volume of the liquid international reserves. Hence, the marginal cost of financing is given by $MCf=r$ which actually is Marginal Utility, thus the optimal level of reserves is defined at the point where $MC=MU$ which implies that in order to define the optimality we need to minimize the cost of running out of reserves. Therefore, the cost of running out of reserves might happen in case of occurring some sort of balance of payment deficit. In simple context, the model of optimal reserves is mathematically formulated as:

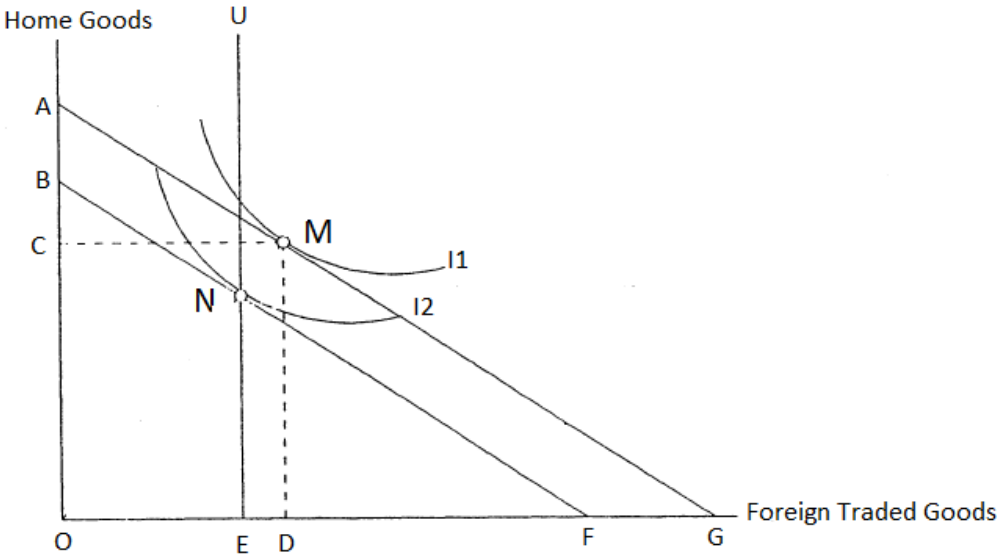
$$R_{opt}=h\ \frac{\log(r*m)}{\log 0.5}$$

As we can see more clearly Heller`s model emphasizes on four major variables. The first is *h* variable which shows the average yearly change in international reserves. This indicator is changing across countries based on the stability of the international accounts that they hold in their possession so that the countries that have unstable international accounts have more variation in their international accounts rather than countries with stable international accounts. The second variable is the *m* which indicates the propensity to import and *r* is the opportunity cost of holding the reserves as we mentioned before and the last variable is the defining measure in comparison of opportunity cost where the rate of return on reserves had to be compared to social return on capital, which actually indicates it by proxy on average about 0.5 of long-term government bond yields based on the range of different countries. Therefore, the demand for reserves is determined by the cost of adjusting to an external imbalance, the cost of holding reserves, and the probability that the magnitude of needed reserves would arise.

In order to correct itself towards the external imbalances that are ongoing through the economy, each country is enacting its own policies. These policies consist of two forms: expenditure changing and expenditure switching policies. Heller moved to design his model by using expenditure changing policies rather than switching policies. The reason for that is coming due to the fact that observing expenditure switching policies, leads to more costs for the community and more difficult to observe in arithmetic form. Accordingly, the expenditure switching policy is the policy that is changing the expenditure of the country on foreign goods and domestic goods. Basically, this policy is directed towards stabilizing the current account by affecting the changes in the expenditure of consumers through making them switch from consuming foreign goods to domestic goods. The most common expenditure policies that are enacted within the countries are related to domestic price changes, exchange level changes. These policies implementations most of the time can lead to negative

effects on the economy as like a crowding-out effect. As we mentioned, the expenditure switching policies are targeted towards stabilizing the current account balance. In case of running the deficit in the current account, to run out of it, the devaluation is needed to be applied in order to increase the exports so that to stabilize the economy. But the problem is that due to the stickiness of the prices, they cannot adjust fast enough to policy implications in the short run. Because of that, it leads to the emergence of the crowding-out effect. There are also other costs are occurring related to the expenditure switching policies but most of them are taken to be judged in a subjective manner. That`s why Heller prefers to approach his model from the expenditure changing policies side. Even the following studies that had been conducted were concentrated on expenditure changing policies rather than switching policies. In order to have a better understanding of Heller`s idea about the cruciality of the international reserves for the countries' economies, we will observe the graphical representation of it.

Figure 2. 1 The Adjustment Process to an External Disequilibrium.[33]

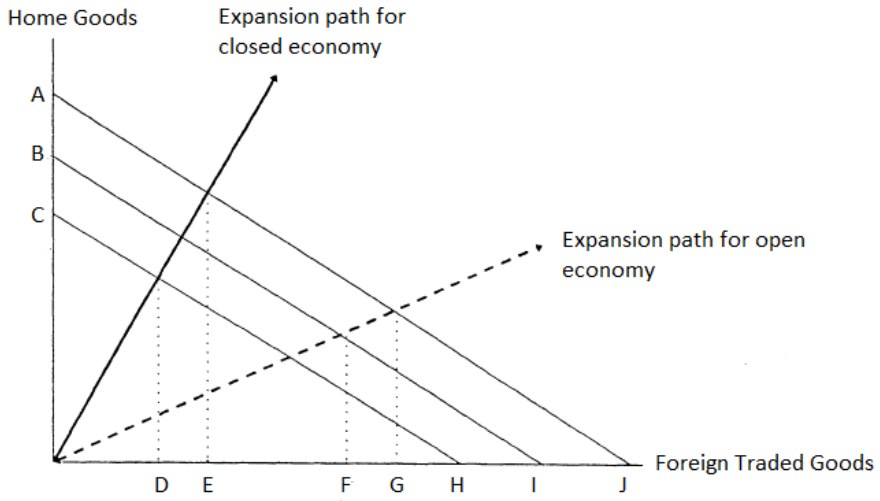


In Figure 2.1, we are observing the effect of adjustment of a country to an external disequilibrium through dampening of the economy. For the sake of simplicity, the country that we are analyzing is so small that cannot affect global prices. The vertical axes line represents foreign traded goods which consist of goods that are exportable and importable that are eligible to be consumed by residents of the country. The horizontal axes line represents the goods that are only available to be consumed within the country so that not eligible for export. Point M on the graph is representing the equilibrium point where the economy is at full potential and with the intersection of indifference curves at point M represents the highest satisfaction point of the consumers. The country produces and consumes OD and OC amounts of international and domestic goods. Let us assume that there was turmoil in the economy by creating the balance of payments deficit through a reduction in exports which is depicted by ED. In order to adjust to this new circumstance, the country`s economy needs to be diminished towards point N and the new equilibrium has been established at that point. From another side, if we will closely observe the figure, we might see that the effect

[33] Heller (1966), p.298

of balance of payment deficit brings the cost to the economy. This cost is emphasized by the price line of BF. In a way by making the country to be placed in a much lower wealth position relative to the previous point. Basically the propensity to import plays a vital role in here. By meaning that the contradiction within the economy that needed to be established in order to achieve the external balance is in a negative relationship with the propensity to import. In order to better observe this effect let's look at the figure below.

Figure 2. 2 The Open Economy and Closed Economy Scenarios.[34]



In the figure above, we have designed two scenarios that are based on two countries. One of them is the country with the open economy and the other one is with the closed economy so that order understand the relationship between import and external imbalance in a more detailed manner. By observing the amount of total cost of the effect of contradiction that is needed to maintain external balance due to the balance of payment deficits for a closed economy is AC and for the open economy is AB. So that the diminishing effect that needed to be adjusted in order to attain external balance is more costly for a closed economy rather than for an open economy and has a

[34] Heller (1966), p.298.

negative relationship with the propensity to import. By meaning that the country which does not have a connection with abroad so that it does not trade with the rest of the world, the diminishing effect on it will be larger in comparison to an open economy country. That's why the cost of adjustment has a negative relationship with the propensity to import. But in both scenarios, there is a cost that prevails for both countries. No matter on what scale is this cost for each economy still it prevails within them. That's why there is another scenario that is the most actual and preliminary one is the international reserves. Heller (1966) emphasized that if the monetary authorities have enough resources at their disposal, they can avoid all the costs related to the adjustment process towards this external unpleasant effect. By meaning that the international reserves are actually very crucial in order to ensure stability within the country's economies. Besides that, he showed not just the vitality of the international reserves as a stabilizer to bring the balance towards the economy but also show with this example the precautionary motive of holding it.

Eventually with the first step of Heller`s study gives new notions in investigating core reasoning behind the demand of reserves of countries. Heller state that his model of optimal reserves was giving much better reliable results for adequacy of reserves in comparison to the reserve/import approach.

With the studies that have come after Heller`s work was based mostly on the empirical side of the story and went beyond just a simple reserve to import approach. The main factors of research that they were focused on as determining factors affecting the demand for reserves were based on external payments variability, marginal propensity to import, opportunity cost, and measurable values as an import.

By analyzing the behavior in the balance of payments account of countries, the relationship between reserves and volatilities in the balance of payments were moving in the same direction. By meaning that external payments variability has a positive relationship between international reserves and are moving in the same direction. But the marginal propensity to import was the most debatable and questionable subject of that should be the marginal propensity to import included as the driver for the demand of reserves. The reason is that theoretically, there was doubt about whether marginal

propensity to import has a positive or negative effect. Heller also argued that the countries that accumulate reserves and if they have large imports, there is a contradiction between them. Therefore, concluding there is a negative relationship exists between international reserves and imports, and the reason for that is based on the fact that as imports increase countries need to pay for those transactions with the reserves that they have in their accounts.

But Cooper (1968) and Iyoha (1976) criticized Heller`s argument and claimed that everything depends on the degree of reserves, not on absolute terms. If the ratio of imports to GDP (imports/GDP) is high, then it leads to more openness and therefore economy becomes more vulnerable, this will then cause and will lead to a positive relationship between reserves and imports. The proof of this positive effect has been exercised by experiments that Frenkel (1978) conducted. He showed that indeed more openness is associated with higher demand for reserves.

Kim (1989) had derived the empirical model for the optimal demand of reserves. But in comparison to other studies, they used the aggregated decline of economic welfare rather than using propensity import as the cost of adjustment.

$$\begin{aligned} R^* &= R^*\left(\mu,\ \sigma^2,\ \theta,\ i,\ r,\ \rho\right), \\ &\frac{\partial R^*}{\partial \mu} > 0,\ \frac{\partial R^*}{\partial \sigma^2} > 0,\ \frac{\partial R^*}{\partial \theta} < 0,\ \frac{\partial R^*}{\partial i} > 0,\ \frac{\partial R^*}{\partial r} < 0,\ \frac{\partial R^*}{\partial \rho} < 0. \end{aligned}$$

The basic idea behind the model is based on finding the speed of adjustment that will keep the balance of payments variability as small as possible due to the adjustment process. Through that, they found out that there is positive relationship exists between the optimal demand for international reserves and fundamental disequilibrium, the cost of external borrowing. But there is also a negative relationship exist within the social discount rate, the opportunity cost of reserves, the output effect of adjustment, and the optimal level of demand for reserves. The outcome of the model in a way is similar to the previous findings but the emphasis of it is a little bit different than previous studies. The reason for that is coming due to the fact that the external adjustment has been included as the endogenous variable rather than exogenous and that`s why the impact of it has been taken with embedded effect on the demand for reserves.

Clark(1970) did the empirical study of Heller`s work related to the optimum level of reserves and went further by bringing the speed of adjustment concept. The basic idea of the adjustment concept is based on the fact that the reliance on external imbalances increases the depletion of income that comes with the greater level of reserves. From one side it actually portrays the cost for the country. With more reserves on disposal, it actually creates more costs for the country. By minimizing these costs, he derived the optimal level of reserves and related speed of adjustment. The optimal level of reserves had the same outcomes which are similar to Heller. It has a positive relationship with the changes in the balance of payments variability and a negative effect with the marginal propensity to import and the interest level. On the other hand, the optimal speed of adjustment has contrary signs for the same variables. On the empirical side, Clark found out that only the volatility of the balance of payments was significant for the level of reserves. For the speed of adjustment, all three variables were significant. By meaning that if the country relies on having a high speed of adjustment due to love level of reserves then it will lead to high oscillations in the income. Consequently, the optimal reserves of the country can be induced based on the interaction between the speed of adjustment and the level of reserves.

The most difficult subject in the reserve adequacy literature is related to finding the measurement of opportunity cost of it. There have been used a lot of proxies in order to outline the opportunity cost of the reserves but could not be granted in the appropriate manner. In order to approximate the measurement of it, a couple of different variables have been used in the literature. These variables are consisted of:

i) The government bond yield
ii) Per Capital Income
iii) Net Foreign Indebtedness

Taking all these measurements into account still there was not a precise way to measure the opportunity cost of reserves. One of the main reasons why there is no unified approach towards measuring it is related to the risk appetite of the banking sector. Due to the precautionary motive of holding reserves, banks are acting more

precautious towards loosening them, that`s why they are acting more in a risk-averse manner. Because of that, there could not find a unified approach towards measuring it (Grimes, 1993). Even though one of the important empirical studies in the literature for the optimal level of reserves have been taken by Frenkel and Jovanovic (1981) where they derive the optimal level of international reserves through dwelling on the cost of adjustment and opportunity cost which is based on foregone earnings[35]. Accordingly, the initial step towards determining the optimal level of reserves is determined by the stochastic equation:

$$dR(t) = -\mu dt + \sigma dW(t); \quad R(0) = R_0, \quad \mu \geqslant 0,$$

The basic idea of it is very similar to Heller by inducing the economy to be in a state of disequilibrium. *W(t)* is the Weiner process with the zero mean and the variance *t*. When the economy is in equilibrium μ would be zero, which implies that there is no drift in the stochastic process. By diminishing the cost of adjustment and opportunity cost, they derived the optimal reserves as:[36]

$$R_0 = \sqrt{\frac{2C\sigma^2}{(\mu^2 + 2r\sigma^2)^{\frac{1}{2}} - \mu}}$$

C - Fixed Cost of Adjustment

σ - Multiplier of the variance of holding reserves

μ - Drift Variable

r – The cost of holding the reserves.

Although the model that had been presented by Frenkel and Jovanovic (1981) had some its own pros and cos. But in comparison to Heller study, it better catches up the motives relying behind holding of reserves.

[35] Frenkel and Jovanovic (1981).
[36] Frenkel and Jovanovic (1981), p.510.

In addition, towards these variables, the foreign exchange has been playing also a crucial role in determining another reason for increasing the demand for reserves. June Flanders (1971) argues that the countries' demand for reserves comes first due to volatility in trade imbalances. Besides that to precautionary motives, as an accumulation of reserves in order to deprive themselves towards risks coming from war or changes in capital movements, likewise due to changes in the demand, leading to fluctuations in earnings.

Overall, the studies before the crisis period of time, show that there are differences in behavior between developing and developed countries, especially in terms of the effects of policies. The reason for that is related to the fact that the developing countries are more vulnerable to external disruptions rather than developed ones. The main policy enaction related to the demand for reserves in developing countries is due to the effects of the external disruptions. But developed countries have more loose policies towards the reserve demand and level of it to be steadier in comparison to developing ones. Lizondo and Mathieson (1987) made a study and found that the debt crisis of the 1980s made developing countries raise their demand for reserves due to increased sensitivity arising from the balance of payments imbalances and openness. However, the demand for reserves was declining for industrial countries due to different degrees of market financing. As a matter of fact, the more developed countries had more credits rather than developing ones, without sacrificing their reserves. Heller and Khan (1978) made several studies and found that the advent of capital mobility raises or lowers the demand for reserves, the reason is that it leads to some sort of variability depending on the degree of it. Generally, it assumes that it does not lead to any variability but in most cases, it leads to exchange rate variability. Edwards (1985) found out that there is strong relationship exists between the optimal level of reserves and net debt though by finding out the negative relationship between the interest on external debt and the demand for reserves.

Bessat and Gottlieb (1992) made the empirical study which is very similar to the work of Kim(1989) but increase the validity of their model and made it have more reliable results in comparison to Heller (1966). They have emphasized more on the opportunity cost of holding reserves so that minimize the expected costs of it.

$$EC = \pi C_0 + (1 - \pi) C_1$$

These costs as we can see consist of forgone earnings which is C_1, it is earnings that could be better managed if the countries would rather invest in a more productive manner rather than keeping it and C_0 is the cost of reserve depletion, which actually means the actual cost of default. It actually comes from the fact that as reserves started to deplete in order to restore back the balance, GNP and imports needed to be cut. Therefore, the model says that the rise of the optimal level of reserves is based on an increase in the cost of default which will lead to a decrease in capital productivity or an increase in the yield of reserves. In the empirical part of the study, they found out that there is a positive relationship exists between the optimal level of reserves and the cost of the default, the yield of reserves. Also, there is negative relationship exists between the optimal level of reserves and the capital productivity.

As we can see that most of the initial studies related to reserve adequacy have been taken in form of finding reliable proxies in order to measure it. One of them is stemming from the notion when the balance of payments instability emanates from the current account. We can judge the adequacy of the reserves based on proxies against the trade flow, which is in some sort can be measurable as the value of imports. Therefore, the ratio of reserves to imports became the formula for measuring reserve adequacy. On another side, the lack of finding unified concluding remarks related to finding definite approaches to the adequacy level of reserves made things get more in frustrating manner. That's why the approaches that have been used in order to assess the adequacy of reserves were not giving reliable results so that to be applicable in practice all the time. But the importance of devotion to analyses the international reserves still was very crucial and the interest in it started to get even more as with the switch of developed countries to floating exchange rate regime. As the IMF is the leading international financial institution in the world, the approach that has been presented towards assessing the reserve adequacy based on the ratio of reserves to imports, been used as the pivot rule in the global sphere. But as time progresses, the world is changing and the global economy is also changing in order to keep pace with it. The financial shocks and upcoming turmoil with them were no longer scattered

down to possess as in terms of trade and due to that, the old rule of thumb where the reserves needed to be equal to at least three months of imports lost its priority.

2.2. 1997 Asian Crisis and Studies have been taken Afterward

2.2.1.The Cause and Reasons of Evaporation of Asian Crisis

With the splurging of the Asian Crisis in 1997, the whole understanding of reserve adequacy has been changed completely. A huge part of the initial studies that have been devoted to giving the appropriate measurement in order to get the best preliminary results lost their validity. Because the Asian Crisis taught a huge lesson for the global world that how much important the reserves play in the economy as the safeguard towards the shocks and the management of it is another crucial part to be a concern with. These new developments led to renew the interest to develop new benchmarks for assessment of the reserve adequacy. Before observing the literature related to new benchmarks, the understanding of the process of the splurging of the Asian Crisis is mandatory for us to have a better vision of acknowledgment of the analyses.

In 1997 one of the biggest crises in the world was splurge the first roots in Thailand. Eventually, the effect of it started to sweep towards the other Asian countries too and leading to the collapse of the stock markets and other assets across East and South Asia. Due to globalization affect the crisis splurge to the whole world and started to affect the global economy starting from 1998.

But the main reason for splurging the crisis is embodied not in just one culprit but has a more divergent cause of it. One of the major reasons for it is specified that the collapse of it is the consequence of the hot money bubble. At the beginning of the 1980s and '90s, there was a significant achievement in the growth rate of the many Southern Asian Countries especially Singapore, Thailand, South Korea, Malaysia and Indonesia achieved huge economic growth. Due to their spectacular growth were called as ``Asian economic miracle``. But on another side, the achievement of these performances did not come at free. There were costs that were encumbered in it and those costs embodied as the wrong policy implications towards the development of

each economy that has been enacted by their governments. The reason for that is that the policy implications were mainly export targeted and dependent on foreign investment. In order to boost the economy, Asian countries were keeping interest rates high because increasing interest rates, was leading to boosting the exports by depreciating the currency and making goods to be more attractive for other countries to purchase. At the same time, they were pegging the exchange rate to US dollars so that in order to keep the currency value as low as possible. These policies were leading to the attraction of hot money. But the capital market and domestic businesses were under the huge pressure of foreign exchange risk due to the fixed currency exchange rate policy. The economies were more and more dependent on capital flows and more dependence on it made the economies to be vulnerable to any shocks that might be provoked by any instability. As the USA recovered from recession, in the middle of the 1990`s it increased the interest rates in order to cope with the effect of inflation. This hike in interest rate made the USA be more lucrative for investors and led to an increase of capital flows towards it. As a matter of fact, due to that effect, the dollar become in high demand and led to the depreciation of it so as to the currencies which are in peg with it. The effect of currency appreciation of the Thai baht and other Asian currencies which were pegged to the USA affected the export growth rates in a very negative manner. Also, the significant amount of decrease in capital flows made things to get worse. The major strike that has been decisive to led to catastrophe was the asset prices and were bumped up with the huge amount of credits started to crash. By witnessing that foreign investors in panic started to withdraw their investments. Hence, leading to massive capital outflows from Asian countries which put further huge pressure on the value of currencies and led to more depreciation of them. The primary effect of the collapse has been hit by the Thai government. In order to cope with the effect of it, the government switched to a floating regime and immediately the value of baht collapsed and went into the crisis. Soon other Asian countries witnessed the same thing in their economies too.

The Asian countries could be better managed to cope with the financial crises if they have reliable monetary policies to fight against them. And this reliable monetary policy

is the using of the reserves in its disposable to smooth the pressure of the crises on the economy.

2.2.2.The Lessons that had been induced from Asian Crisis

The lesson that has been taken from Asian Financial Crises is that the international reserves and management of it play a very crucial role in the well being of the whole economy and it is the only way to fight against any vulnerabilities that might be provoked upon on the economy of any countries, especially emerging countries or developing ones. These were the major reasons that made the literature of the reserves change completely and switch to new benchmarks towards assessing the reserve ratios. The first reasoning related to the reserve adequacy had been proposed by Greenspan (1999) where he states that it is important to give the value to two things for emerging market economies, firstly to capital flows and the second is the reserves to country`s short term external debt, in order to find the best optimality between the cost of a sudden stop and opportunity costs. Based on this Bussiere and Mulder (1999) made the study about emerging countries and found out that, even though with the weak domestic fundamentals as the more liquidity they are possessing on their accounts, the better they will cope against the vulnerabilities that are coming from the exogenous side and more stable their economies will be. According to the model that they have constructed, the ratio of the reserves to short-term debts will be an eligible measure for emerging countries to strive for. But with the option that the current account deficit will be in balance and the exchange rate should not be too much overvalued. If there will be violations of the options then more reserves are needed to preserve the stability.

2.2.3. The Effect of Asian Crisis on the Reserve Literature

The Asian Crises have changed the approaches that were made towards the assessment of reserve adequacy. The old rule of thumb has lost its primary effect to serve as the main benchmark for reserve adequacy. Feldstein (1999) criticized the approach of imports to be validated as the ratio for adequacy of reserves and adds that the crises that happened in nearby time (Asian Crises) is about capital flows, not about trade. Also, he supports the same as Greenspan that the international reserves are the

only way in order to reduce the vulnerabilities towards financial shocks. At the same time, he supported the findings of Bussiere and Mulder (1999) that countries whose currencies are overvalued need to have more reserves in order to stabilize their economies towards any shocks that might emerge upon them. But Fischer (2001), states that the reserves are inadequate if they covered less than about three to four months worth of imports. There were a lot of debates concerning this but the most uncertain part was related to the optimality of it, by meaning that what should be the optimal level of reserves to import ratio. Besides that, there is a linear relationship between the incidence of deficit growth and the value of imports, which means that as trade grows, we can not assume that any specific value of the ratio will remain constant over time so that leaving this measure as imperfect.

In overall, the main two proposals have been put as a new benchmark in order to assess the adequacy of the reserves. One of them is the suggestion that is provoked by Pablo Guidotti who is the Former Deputy Minister of Finance of Argentina. He stated that countries should manage their external assets and liabilities in such a way so as to be able to live without borrowing up to one year. The second suggestion has been put forward by Alan Greenspan who is the Chairman of the Federal Reserves Board of the United States. His suggestion is more or less similar to Guidotti`s but with few additions that external liabilities maturity to exceed three years. Another thing that he added is the liquidity at risk standard.

Onno de Beaufort Wijnholds and Arend Kapteyn (2001) criticized the approaches that had been proposed by Pablo Guidotti and Alan Greenspan in a way that besides external drain that affects the country`s reserves, there is also an inner effect that exists in terms of the internal drain. One of the internal drain examples is in the case of upcoming turmoil within the economy in form of shocks that may lead to capital flights by residents of the country which will put more pressure on the reliability of the country`s economy to cope with the crises. They also show the vital approach towards the assessment of the reserves in emerging countries. They found out that emerging market countries that had more severe risks in their history were accumulating reserves more in compared to others and performed much better during the other crises period. Specifically holding more reserves in compared to short-term obligations and the

degree of adequacy plays a crucial role here. For assessment of reserves in emerging countries, they proposed the best indicator could be used the level of reserves to the size of short-term external debt. By testing especially Asian Countries and looking at the way that they were performing, they conclude that the most convenient benchmark to use is the level of reserves to the size of the short term external debt. Still, there is the probability of not capturing the total effect against the crises due to risks that are coming from internal sources, which is the lack of confidence in domestic currency, leading to capital flights. However, the main fact of this could be seen in the comparison between fixed exchange rate regime countries and floating exchange regime countries, where it is more severe for fixed exchange rate regime countries rather than for floating exchange rate regime countries.

Graham Bird and Ramkishen Rajan (2002) claimed that there is a big difference in optimality standards that have been used before currency crises. The rule of thumb, the reserve to import ratios are too old in order to apply to after the crisis period, especially for the assessment of the needed amount of reserves towards hedging against crises that might come in the future. They found out that the precautional motives that had been implemented by countries as the accuracy of reserves over short-term external debt. It guides to more accumulation than needed, which also increases the costs associated with it, especially in terms of the way that they accumulate it, which is mostly in case of short-term borrowing. The reason behind it, is coming due to constraint that`s coming from conversion of the theoretical background to operational.

Joshua Aizenman and Nancy Marion (2004) emphasized that countries, especially which have a fiscal deficit by enacting harsh tax policies and facing sovereign risk lead to accumulate more reserves. Due to these facts, even the countries, which are more loss averse prefer to hold more reserves as precautionary against risks coming from limited integration of capital markets. In some sort, it depends on countries' inner structural base, whereas countries with severe political risks and high discount rates found it better to hold fewer reserves. The reason is that it acts as a tax on return on reserves due to institutional weaknesses and due to not efficiently allocating the right proportion of external borrowing and opportunity costs that are coming from holding

reserves. An empirical study that has been made by Ferhan Salman and Aslıhan Selman (1999) shows that emerging countries are more vulnerable to the shocks that come externally, especially the most important comes from exchange rate volatility, where countries take precautionary actions towards that in compared to developed countries. For the measurement of reserves in emerging countries, they have used the GARCH model as a better measurement for volatility specifically on the short-run basis. Specifically, as the case study, they analyzed Turkey where results showed that exchange rate volatility leads to depletion of reserves so in the same manner as overnight interest rates. The reason for that is coming from instability in a foreign market which makes it difficult for Central Bank to enact needed policy.

David Hauner (2005) assumed that there is also the financial cost associated with holding reserves. The reason for that comes from not efficiently utilization of costs measurements in the appropriate manner. His research results revealed that reserves can be used in a more efficient manner as the forgone savings from payment for external debts or can be used for public investments projects. Similar to Hauner`s work, Dani Rodrik (2006) evaluates the social cost that is coming from holding more international reserves, which is roughly around one percentage point of GDP annually. His research shows that countries that want to secure themselves against uncertainties that are coming in the future, hold as much liquidity as possible by accumulating reserves. By any means without precisely measuring costs associated with it, which are coming from short-term liabilities. Despite the fact that they are accumulating a lot of reserves, they did not decrease their sensitivity towards the short-term debt. From another perspective, Reddy (2006) claimed that the massive accumulation of reserves is necessary as a precaution towards liquidity risks that countries can face due to more instability and volatility. However, the main fact should be coming from investing these reserves in a productive manner, so as to enlarge liquidity but the problem is coming due to lack of instruments which is compressed by some countries cannot be taken necessary actions towards that. At the moment of financial instability and volatilities in interest rates can lead to depletion of more liquidity than expected.

Gosselin and Parent (2005) tested the hypothesis of the accumulation of reserves by Asian Countries. By using Pedroni's cointegration panel test they found out that there

is a limit to the accumulation of reserves due to the fact that after a certain point it leads to inflationary pressures which could end up in bad results domestically and externally. The findings show that the acquiring specifically of large accumulation United States dollars, which in case of stop can lead to devaluation of dollar and increase in interest rates, whereas going to reflect negatively on other countries. An interesting result has been found by Donghyun Pank and Gemma B.Estrada (2009) applying the tests of Guidotti and Greenspan, the results revealed that Asian countries have bypassed the norms of the adequacy of acquiring the reserves. They have more than needed, the reason for that can be stemming from as the main act as precautionary motives against crisis, but the problem is that they do not invest in a more productive manner to maximize profits due to the fear of uncertainty, by acting in a more adverse manner rather than aggressive. Therefore the history of the bad results that ended from crisis still keep chasing them to act like that. In contrary to studies of Donghyun Pank and Gemma B.Estrada (2009), the approach that has been used by Jung Sık Kım, Ramkishen S. Rajan, Ozan Sula, Thomas D. Willet (2007) enlightens more about the effect of the capital account in the effect of accumulation excessive reserves by Asian Countries, rather than the reasons that have encountered from previous studies that had been analyzed. Their study shows that the main reason Asian Countries accumulate a high amount of reserves comes from variations in capital accounts. The benchmarks in order to assess this dilemma come from portfolio investment, variations in the flow of short-term external debt, which is pretty significant in comparison to other studies that had been provided.

Olivier Jeanne and Romain Ranciere (2006) constructed the model where it targets the relationship between sudden stops and reserves. What makes this study to be different than other studies that have been done is that they integrate the capital flows argument which was basically judged on the theoretical background, integrated into the equation in order to find the relationship between it and the reserves. That's why this work is one of the main propositions to be used as the new benchmark for reserve adequacy. The formula for optimal reserves is following as:

$$\rho \approx \lambda + \gamma - (1 - p^{-1/\sigma}).$$

From the equation above we can see that ρ is the actually optimal level of reserves, λ is the level of coverage of deficit of external financing in case of a sudden stop, γ is the loss of output, $p^{-1/\sigma}$ is the cost of holding reserves. The empirical analysis of the model revealed interesting results especially contradicting to Greenspan-Guidotti rule. They found out that the optimal level of reserves is way more sensitive towards the probability of sudden stop, the premium term, and risk aversion. The formula is very interestingly referred to Greenspan-Guidotti rule. Accordingly, the Greenspan-Guidotti rule depicts that the ratio of reserves to short-term debt should be equal to 1, which is $\rho = \lambda$. This rule is very eligible to be concerned with in case of a sudden stop in order to facilitate the consumption but only in case if there is no output cost. From the formula above we can observe that the optimal level of reserves could be higher or lower than the rule. So that in case of the output loss, the optimal level of reserves would be higher because in order minimize the cost of the output loss but at the time it could be lower in order decrease the cost of holding reserves. Also, one of the main interesting facts that this model revealed was that the divergence of the optimal reserves to short-term debt is quite different from results that had been provided from previous studies.

If we will recap this chapter in more detail, we can see that the literature related to the financial crises of 1997 brought new sights to the analyses of the reserves. Especially by breaking most of the early studies related to reserve adequacy and mainly changing the focus and putting the trade variability factors behind. The reason for that is that as the world changes, the structure of economic variables is also changing too and at the same time the vulnerabilities and shocks are also getting severe and might affect the economies of the world in a devastating manner. That's why in order to mitigate these effects and be ready for upcoming havocs on the economy, the subject of reserve and management of it became one of the pivot topics to be analyzed for. Especially the new benchmarks accounted not just for external factors but also for internal factors too in order to have a more vivid description of the importance of the reserves as a shield against any turmoil. That's why the 1997 Asian Financial Crises play very enormous lesson for the whole world by showing how much reserves are mandatory for the well-being of the economies.

But before analyzing in more detail the 2008 financial crisis period of time, let`s have a look at the all benchmarks that have been used so far in the literature. Some of them we had already mentioned but in order to recap the vivid description of each benchmark in the literature of reserve adequacy, it will be better to analyze each approach one by one.

2.2.3.1.Reserve to Import Ratio Approach

The Reserve to Import Ratio had been widely used prior to the 1995 Mexican Peso Crisis. As we had already mentioned in the literature this ratio was the first benchmark that has been used in order to evaluate the adequacy. The first study related to this approach had been taken in 1958 by IMF and was chosen as a preliminary indicator for evaluating reserve adequacy. Especially in that period of time, the global countries were more concerned with trade variables, and the risks that had been threatening the balance of payments stability were more based on it. The reason for that is coming because foreign trade constitutes a large part of the balance of payment account. That's why the vulnerabilities related to the trade variable could bring havoc to the economy by exposing the instability in the balance of payment account. The ideal level of reserves needed to be at the level where the reserve to import ratio is between 30 and 50 percent. Even though the reliability of this interval had not been justified as perfect by IMF but rather as an approximate measure for adequacy. The validity of the ratio lost its primary reasoning after the burst of the Mexican and Asian crises in 1995 and 1997 subsequently. Although this criterion is still valid for those countries that have limited access to international markets or facing a lack of capital flows (Kapteyn and Wijnholds, 2001). But taking into consideration the stage of development of countries, very quiet few countries are preserving on that group, because of that the implementation of the benchmark is almost very limited. If we will summarize shortly the literature on the adequacy of the reserves based on the import approach, there are three criteria that exist for evaluating it:

i) The reserve level needed to cover 35 percent of annual imports. In this criteria, the reserve level needed to be at such amount, to be able to cover 4.2 months of imports (Triffin, 1960).

ii) The reserves level needs to meet between 30-50 percent of imports cover (Williamson 1973).

iii) Comparison of the reserves with the 3 months of import level. This approach is still actively implemented in IMF. This approach implies that the reserve level needed to be at the level so that to be able to cover 25 percent of the annual imports (Wijnholds and Kapteyn, 2001).

2.2.3.2.Reserve to M2 Ratio Approach

The benchmark of Reserve to M2 in literature is taken as the Broad Money approach towards reserve adequacy. By implementing this approach, we are actually comparing the reserves to the money supply, and based on that we are inducing whether the reserves are at the needed level or not. This approach had been used especially in the studies prior to the 2008 financial crisis. According to Sachs, Tornell, and Velasco's study in 1996, the ratio of reserves to M2 shows that it is an adequate indicator in order to predict crises. Especially taking into the effect of the Mexican Crisis that happened in 1995, the ratio outlined how important it is as a gauge against the turmoil that hit the Mexican economy. The reason for that is coming due to the fact in the face of the crisis that is coming upon, the domestic actors within the economy are always acting in a risk-averse manner towards it. Especially the consumers who do not want to lose the value of their wealth, they are going to convert all the assets that they have in their disposable towards the foreign currencies. By doing that is leading to capital flights which had a more adverse effect on the economy and even made the effect of the financial crisis to be more severe and to emerge faster. The same reason was the cause of the evaporation of the Mexican Peso Crisis in 1995. From that perspective, the ratio of reserves to money supply could help to provide a better way to manage the effect of reserves in order to mitigate the effect of capital flight. In order to accomplish that, the level of reserves needed to be in a certain amount so that to be eligible in order to meet the

demand of residents for foreign currencies. Basically, this ratio is showing us the level of reserves needed to be emphasized in order to create a baffle against the split of the capital towards the foreign assets by domestic residents in case of a financial crisis. The validity of the ratio as the reserve adequacy was studied also by Calvo, Leiderman and Reinhart in 1996. They concluded that the ratio of the reserves to the money supply is the adequate level for those countries who have pegged exchange rate systems, especially this conclusion is coming after the Mexican peso crisis. The reason for that is coming since Mexico was using pegged exchange rate system in 1995. That's why most of the studies like Frenkel and Rose (1996), Kaminsky, Lizondo, and Reinhart (1998) were specifically referring to crisis and examining the reliability of the ratio for countries that have the same exchange rate system as Mexico. But De Beaufort Wijnholds and Kapteyn (2001) in their study found that the ratio did not give quite reasonable results for crisis prediction especially for Asian Crisis in 1997 and the metric is better applicable for capturing the risk of capital flights. Hence, the main reason for it comes due to the fact that the ratio does not take into consideration the risks that might come from outsource. Its effective measure towards taking risks coming from inner sources(within the country) but the exposure that is coming from external sources are lacking to be considered. That's why the reserve to M2 ratio is lacking be the reliable measurement of the reserve adequacy because it does not account for all the exposures to be taken to consider for the well-being of the countries.

2.2.3.3.Reserve to Short Term Debt Approach

In the literature, this approach had been widely used especially after the Asian Crises in 1997. The reason for that was maintained in the fact that the Asian crisis was not just caused by trade variables but rather that it was caused by the currency crisis, which was burst out by the effect of capital flows. That's why the short-term approach had been taken the lead in the literature as a better indicator for evaluating reserve adequacy in comparison to the old rules of thumb. The beginning point of this approach was first time proposed by Pablo Guidotti in march of 1999. According to him, the countries should be able to live without the need for foreign debt for up to

one year. One month later, additional requirements related to the benchmark were proposed by Alan Greenspan as like countries liabilities should not exceed three years and the liquidity at risk standard needed to be maintained[37]. After these statements, the ratio started to be very popular and immediately was analyzed in the academic literature as the main approach for reserve adequacy and was named as Greenspan-Guidotti rule. Basically, the rule says that foreign exchange reserves needed to cover 100 percent of short-term debt. Conferring to the studies of Rodrik and Velasco (1999) the higher the ratio, the better it is towards the vulnerabilities that might negatively affect countries. Kapteyn and Wijnholds (2001) also justified in their study that for the countries that had a low ratio of reserves to short-term debt, the probability to fall under the crisis was much more. This was also one of the main reasons for the bursting of the Asian Crisis in 1997. The countries especially emerging ones who have the international reserves relatively high to their short-term obligations were better protected towards financial crises in comparison to the ones who had lower. But with the 2008 financial crisis, the ratio did not show up to be a good indicator for crisis prediction as it was in the 1997 crisis and made the relevance of the benchmark to lose its validity (IMF 2011). The reason for that is stemming from the fact that by observing the countries where the decrease in the level of reserves should be associated with the high percentage of short-term debt, were not actually justified. Another way around the main cause of the depletion of the reserves was related with the other sources rather than with the short-term debt. At the same time, the countries that had high percentages of the short-term debt level were witnessing the reserve losses amounted on average less than 10 percent. These outcomes are actually made to question the relevance of the ratio to be fully vindicated as the proper measure for the evaluation of reserve adequacy. On the other hand, according to the study that had been made by Matthieu Bussière, Gong Cheng, Menzie Chinn and Noemie Lisack in 2015, the reserve to short term debt was one of the very useful indicators to explain the deterioration in GDP growth rates during the 2008 financial crisis. Furthermore, by indicating the emergence of the link between the reserves and capital controls in impact on the growth rate throughout the crisis

[37] Greenspan (1999).

period of time. In a way facilitating the reserves to act as a supplementary role in order to smooth the economy within and the capital controls to act as a vessel in order to accomplish the effectiveness of the reserves. By meaning that the countries that had more reserves as a percentage of the short-term debt performed much better during the crisis than others. But also, the degree of its effect depends on the level of openness of the capital account. On another side, as time is changing and progressing, the risks of the exposures that affect the economy is also changing at the same time. To some degree, external financial outsource aid needed to be taken in order to sustain the economy against these exposures and through that leading to an increase of the short-term debt. The reason for that is coming because the credit lines that have been taken from abroad in order to bring stability to the economy are not being always perfectly managed. Because of that, the level of short-term debt is always increasing at the same time. If the borrowed funds could be managed in an efficient manner through facilitating the growth of the economy or to the strategies related to increasing the level of reserves in disposal, then it will be helpful for the country to be able to repay back the debts. But the mismanagement of the debt led to the evaporation of more risks associated with high short-term debt leading to high rollover risks. From that point, the level of reserves that needed to be cover the growing short-term debt needed to be increased in the same proportion or even more. The policy implication in order to facilitate that level of increase in the reserves is very complicated to be achieved within a short period of time. That's why the Greenspan-Guidotti rule has its own controversy regarded to efficiency as being the reliable approach for reserve adequacy.

2.2.3.4.Combination Approach

The combination approach was designed to target more risks that might affect the balance of payments account in a negative manner. One of the approaches that had been used in the literature widely in order to possess this, was Kapteyn and Wijnhold approach in 2001. Their model is based on the combination of aspects that might trigger the reliability of the economy against the turmoil that might be possibly created through the outsource effects. The model consists of a combination of ratios

which are short-term debt and money supply (M2) with taking into consideration the effect of the exchange rate and country risk. Therefore, the reasons for including these ratios are based on several factors. Firstly, the reserve level needed to be at an adequate level to be able to meet the short-term debt. The reason for including this ratio is related to the exposures that are coming from capital account sides. As we have already mentioned in the previous section, one of the pitfalls of the emergence of the financial crisis in 1997 was related to capital flows. From that perspective, the exposures related to the capital account became one of the important segments that needed to be taken care of. On another side, the exposures should not be only judged based on outsources but also internal exposures within the country are needed to be considered too. Therefore, the money supply needed to be taken into consideration to emphasize the internal risks that might burst around. Especially as we mentioned in previous sections, capital flight is one of the important concerns that might trigger the effect of the crisis to be more severe. The level of that effect is changing according to the exchange rate regime that countries are using. The appetite for foreign assets in times of instabilities by domestic residents is much higher for countries specifically that are using fixed exchange rate regimes rather than the floating exchange rate. From that side, the money supply is one of the superior indicators that had been integrated into the model by defining in form of M2. The portion of M2 that's integrated into the model is changing according to the exchange rate regime. Between 10-20 percent is accounted for fixed exchange rate regime countries and between 5-10 percent for floating exchange regime countries. Another factor that had been included in the model is the country risk. The country risk measurement was based on the magazine of the Economist`s country risk index which is based on different factors as through political instabilities towards the economic policies. Another widely used approach that had been implemented was the modified approach of the Greenspan-Guidotti rule by adding the current account deficit ratio. The reason for including the current account deficit ratio was to justify 1-year financing need.

2.2.3.5.Optimum Level Approach

In comparison to other approaches that has been used in order to derive the adequacy of reserves, there are also different suggestions had been proposed to address the problem of adequacy through an optimization point of view. As we had already mentioned in previous sections, in comparison to the benchmarks that have been used so far, all of them were targeted towards evaluating the reserves as in the form of precautionary motive against the exposures that might trigger the balance of payment account. Especially in case of external or internal risks that might affect the economy in a severe manner in case of the probability of emergence of the crisis. But the metrics that have been used in order to evaluate the adequacy, do not have a definitive approach to be accounted as a primary rule for the exact level of reserves. As we have already seen in previous chapters, each of the metrics had its own limitations towards the area of applicability. These constraints are changing from country to country based either on their exchange rate regimes or on the level of liberalization of their financial markets and on the level of openness of their economies. But to what extent the level of reserves needed to be maintained within the economy is still one of the main questions that needed to be referred to. Because there are the costs exist associated with the keeping of the reserves. These costs are defined in terms of opportunity costs so that measured in terms of foregone earnings. Approaching the reserve adequacy level through finding the optimal level of reserves is actually given us the level where the costs and the benefits associated with the reserves make the holder in a better position. The benefits associated with keeping reserves are based on downgrading the probability of the occurrence of financial crises and facilitating the smoothness in the economy during the crisis period of time. The first time the model related to observing the adequacy level of reserves through using optimum approach was proposed by Heller in 1966. Afterward, the studies as we have already mentioned in the previous sections had been modified and developed further by Cooper (1968), Iyoha (1976), Ben Bessat and Gotlieb (1991). Especially as with the progression of the time through changes of the countries developments levels and associated with crises that hit the global world in different periods of time, the approaches related towards optimality level have also changed

accordingly. With the capital flows as being one of the culprits of its own for increasing the vulnerability towards the risks that expose around in form of the financial crisis in 1997 and had influenced to the literature related with approaching to reserve adequacy from optimum point of view. From that point of view, the risks associated with the capital flows had been also added in order to take into consideration the costs associated with it too. Taking into consideration the fact that one of the main reasons for the emergence of the Asian Crisis was related to running excessive current account deficits which were depending on loosening up by extensive capital inflows. The dependence on capital flows had been increased more prior to1997 crisis, which made the developing countries to be more vulnerable on their own and in case of the stop of it had led to a burst of the Asian Crisis. Even though in or days, the level of dependence had been increased even more due to more liberalization and rapid growth of integration of the countries within. That`s why capital flows are still one of the important subjects that literature is still a concern of. The widest and most common approach that has been used, was the model developed by Jeanne and Ranciere in 2006. The reason for the popularity of this approach relied on the fact that they tried to measure the optimal level of reserves under the consideration of the sustainability of the consumption level by emphasizing the costs and benefits of holding reserves under the risk of sudden stops in capital flows. Because as we mentioned the vulnerabilities especially of the developing countries with the risks that are coming from capital flows were more granted heavily in the literature. That's why the model that had been presented by Jeanne and Ranciere was more popular to the approach to reserve adequacy from an optimization point of view.

But in comparison to other approaches that have been used in order to identify the adequate level of reserves, the optimal level approach had been used less. The reason for that stemmed that the results of the model are very sensitive to the factors that had been made about the costs and benefits of holding the reserves and the parameters within are very difficult to calibrate (IMF 2011).

Also Silva (2011) emphasized that it is very difficult to measure the adequacy level of reserves by emphasizing the optimality level models. Especially he implied that in a

world with higher liquidity and free capital flows, it's very difficult to construct an adequate level of reserves. Further in his analysis, he did the cost and benefit of holding reserves and analyzed about 71 countries. He found that the countries that hold more reserves were experiencing fewer adjustment costs during the global financial crisis and afterward.

Although there are some applications of the models that might be modified in order to evaluate the adequacy of the reserves through using the related approaches. In addition, approaching reserve adequacy through using an optimization view is still one of the crucial methods that needed to be applied in order to define the costs related to keeping the reserves. Hence in the literature, studies related to the optimal level of reserves are mainly focused on costs of holding reserves, the privileges of the holding reserves in case of crises period times also the costs that arise in case of capital outflows.

As we can see from the above, these are the approaches that had been used intensively in the literature in order to evaluate reserve adequacy prior to the 2008 financial crisis. Each of these approaches has its own advantages and disadvantages. To have a decisive one-time approach that could be applicable to all the countries is not viable because the financial and economic structure of the countries are different and the levels of development are also different too. Things have changed drastically in the literature with the emergence of the 2008 financial crisis.

2.3. 2008 Financial Crisis and Afterward Related Studies

2.3.1. The Causes and the Reasons of 2008 Financial Crisis

2008 Financial Global Crises have been the biggest financial crisis in the history of the world since the Great Depression of 1929. The main cause of the crisis was based on the wrong policy implications of the government to boost the economy. The government, in order to boost the economy, was using expansionary monetary policies and from one side it is good for the economy because the interest rates are low and it increases the investment and makes consumers increase the consumption and overall makes the economy to growth. But the problem is that when the expansionary policy

is used for a longer period besides just the inflation factor, it also induces to change in people's expectations about their behavior of purchasing. Especially the housing market bubble was one of the culprits of the emergence of financial crises. The reason is that the interest rate was low and people were expecting to be in that way so that making consumers who want to own a house get one. The favorable interest rates make the people take the mortgage loan from banks and lending institutions, through that making people take out the loans that they could not afford to payout. But the condition of favorable interest rates was expected to prevail and was making the concerns related to paying out the loans to be less relevant. Even the lenders were not concerned with the credit rating consumers were giving them because they were assuming that liquidity that has been created by the stimulation policies will be available. So that by making lenders take more risks than they have to. After that these mortgages were repacked as mortgage back securities and sold to investors to get regular income as normal bonds. But the consumers' demand for the houses led to the emergence of the housing bubble which made the house owners not to be eligible to pay for the mortgage payments and this is where the crises started to move on. Because the house owners could not pay for the mortgages and defaulted, this also affected the mortgage-backed security market and led to the collapse of it so that affecting banks and other lending institutions and the panic started to move around the whole economy and led to the financial crises to splurge up. Even though the effect of crises had been so huge that major world institutions like Lehman Brothers and Freddie Mae and Freddie Mac were so affected by crises, they went to bankruptcy.

2.3.2.The Lesson that had been induced from 2008 Financial Crisis

The lesson that has been taken from the 2008 financial crisis was embodied in a phrase: ``Too big to fail is no longer viable.`` Meaning that no matter how strong the economy is, how the institutions within are developed, having loose policy implications could lead to huge consequences for the well-being of the economy. The management and vitality of the reserve showed again how important the role reserve plays as the source of mitigation against turmoils. Before the 2008 financial crisis, the most of studies were concerned with the developing countries and were not given too

much attention towards analyzing developed countries' reserve management. But after the outbreak of the crisis in 2008, things have been changed and the lesson had been taken very seriously and was based that developed countries need to manage their reserves too in order to cope with instabilities that might be provoked on them.

2.3.3.The Effect of 2008 Financial Crisis on the Reserve Literature

At the same time, traditional approaches that have been used in order to evaluate the reserve adequacy were still applying but the core of it as the crisis predictor lost its validity. Because the 2008 financial crises show that with increasing of the globalization in a more rapid manner and more integration of the countries within the each other and with a tremendous increase of trade around the world and more financial liberalization, the approaches that needed to be taken in order to sustain against the risks, are needed to be redesign as well. As time is progressing and everything is changing within it so the making financial system and economy to change too. At the same time, the risks that threaten the economic stability of the countries are changing and progressing too. As they are progressing, the more severe they become and that's why approaching to the risks from one channel is not enough for shielding against them. That's why new approaches needed to be taken in order to assess reserve adequacy. In spite of that in 2011, IMF proposed a new benchmark that needed to be used in order to measure the adequacy of reserves. Basically, the approach that has been implemented by IMF relies on finding how many reserves needed to be taken into account in precautionary form towards the risks that are challenging the balance of payments account. The name of the metric that IMF proposed for reserve adequacy is called the ARA (Assessing Reserve Adequacy). As we already mentioned the ARA metric approach is actually based on previous crises that the countries experienced and especially the 2008 financial crisis was not just a crisis that burst from one factor but it was the combination of different factors that led to the evaporation of it. That's why the past experience crises especially the balance of payments crises was taking as an important role in suggesting how cumulatively needed to be approached in order to create the metric that takes into the consideration majority of risks that might put pressure on the balance account. Through this, it is trying to find out how

many reserves the countries needed to keep against these risks. These risks are composed of different criteria:

The first one is the export earnings. This criterion reflects that in case of a decrease in foreign demand for the products of the domestic country, the losses would lead to a burst of trade deficit which will put pressure on the balance of the payment account. Another criterion is the risks that are coming from short-term debt that are taken into the consideration, are actually the risks related to the capital flows. And the other criteria of the risks that challenge the balance of payment account is the risks related to an internal drain in form of capital flights which is encumbered in form of broad money. Particularly the money supply is used in order to capture the capital flight risks. The last criterion is the other liabilities risks that are challenging the robustness of the balance of payment account too. Other liabilities can be deduced from subtracting short-term debt from total investments in the balance of payments. As we can see from above, the IMF metric approach actually consists of three indicators. Reserves to short-term debt, reserves to export, and reserves to broad money. Some of these ratios as we have already discussed in previous sections had been widely used in literature as reserve adequacy level benchmarks in different period of times according to the structure and causes of the crises that hit the globe. Each of them has its own benefits and disadvantages. Although there have been some other approaches that have been used in the literature for reserve adequacy as like the combination approach as we have already discussed by Greenspan-Guidotti rule and Kapteyn- Wijnhold approaches but most widely used approaches were based on these ratios. But with the emerging of the 2008 financial crisis, things have changed completely and most of these ratios lost their vitality points to be able to be used. On the other side, some of them are still valid even though for those countries that have some constraints in access to financial markets or capital markets, which are having economic structures that are underdeveloped in comparison to the rest of the world. But the amount of such countries is limited and taking into consideration the fact of the spread of integration around the globe and the number of countries that almost have limited integration to financial markets is very finite. Based on the severe financial risks that the global countries might face subject to the different levels of their developments, IMF in 2011

proposed a new approach to cope with such distortions. The proposed approach is based on the process of the estimation of the model, which is based on the initial stage of finding the risks that trigger the balance of payments. These risks are based on four channels. The first channel is the short-term debt, the second is the M2, the third is the export earnings and the last one is the other foreign liabilities. As the main channels or the criteria of the risks had been defined, the weight of the channels is measured by scenario analysis with the help of probability distributions in order to identify related reserve requirements, and accordingly, the metric is formalized. After that with the processing regression analysis, the rates that affect the precautionary reasons of holding reserves are determined and through that, the reserve adequacy is estimated based on coefficients of the variables reflecting the risk channels. Basically, the approach that had been proposed by IMF is called as ARA(Assessing Reserve Adequacy) metric approach. ARA metric is the risk-weighted metric approach to the adequate level of reserves in terms of the weighted average of four risks criteria. These weights are changing according to the exchange rate regime of the countries.

Table 2.1 The weights of the risk channels (in percentages).

	Exports	Short Term Debt	M2	Other Liabilities
Fixed	10	30	10	15
Floating	5	30	5	10

After evaluating the weights of the countries according to the exchange rate regime, in the second phase, the required amount of reserves is calculated formed on the metric. Relying on factors such as deterioration of reserves in times of crises, prevailing tensions on the exchange rates, and decline in consumption expenditure, the ideal amount of reserves should be based on a range between 100-150 value. If it is in that range, then indicating that the number of reserves is adequate. However, with the progression of time, there were some changes made to the metric. These changes were based on revealing new potential risks that were added to the metric and the revision of it has been considered again in the following periods. Specifically, in 2013, the

central bank`s swap transactions and the financing that are coming from institutions such as IMF and sovereign funds also were considered in ARA. In addition, foreign currency deposits of institutions and the banking sectors were also added as one of the factors that needed to be considered for the evaluation of reserve adequacy in terms of compensation for the country`s external liabilities. In the 2015`s report of IMF, new measurements had been taken into account for the metric and further changes had been made. Distinctly the weight of the other liabilities had been adjusted by a 5 percent increase for the fixed and floating exchange regime. Besides that, in 2015 there was a commodity price crash, and the countries that were heavily dependent on commodity trade were affected by it in a bad manner and a new adjustment had been made in metric in order to take into account these effects too. Hence the implementation of the metric is changing from county to country relying on specific factors. More precisely, the weights of the metric are one of the pivot indicators that is taking the lead in countries' specification factors and changes according to their risks. For instance, in the countries that are vulnerable to risks that are coming from high debt ratios, the weight of the metric related to short-term debt might be given extra weight. As well as for the countries which have high exports but fewer capital controls, the weights of exports might be decreased and the weight of M2 might be increased.

Overall, as we can see that ARA approach brought a significant contribution to the literature of reserve adequacy. Instead of bringing as the one universal rule to be applied towards all the countries, IMF narrowed down that based on countries developments. As the country developments level is changing, the weights are changing accordingly, giving the preliminary results to assess the adequacy of each country. This approach had been widely popular in the literature due to showing more reliable results and embodied the effect of countries' responses towards the crises. Although the applicability of the metric had been criticized heavily due to IMF report related to the balance of payments in the summer of 2020[38]. The reason is embodied in the incapability of defining the differentiation of the countries' structures within

[38] Source: https://www.cfr.org/blog/it-time-scrap-imfs-reserve-adequacy-metric

themselves and the culprit of it relies on systematic problems related to the design of it.

On the other side, we should not forget one thing, all of these approaches related to reserve adequacy are needed to be applied very cautiously. As the time period is changing and evaporation of different types of new risks are threatening the globe with the speed of expansion of the financial markets. It becomes more difficult to condemn all these risks into the parameters and make a necessary adjustment in order to bring the necessary model to evaluate a definite amount of reserves for a group of countries that are alike. That's why the reserve adequacy models are needed to be analyzed in a single manner and be judged within one country, not in a group.

2.4. New Approaches after 2008 Financial Crisis Related to Motives Behind the Accumulation of Reserves

After the ARA metric approach, subsequent studies in the literature of the reserves were more diverse and related with the understanding of the psychological reasoning behind the accumulation of the reserves, and implementation of it was more observed from the empirical point of view. Especially in a way that, emphasizes the necessity of the demand of the reserves from different aspects rather than from the traditional way of approaching it. In the literature, the main reasoning behind the reserve accumulation is laying based on precautionary motives. From the beginning of the first study, the main reason for the accumulation of the reserves was related to mitigation of the inner side risks within the country and from outside risks that might threaten the sustainability of the economy. From that perspective, the forms of acquisition of reserves were based on precautionary motives and related studies were more approached and studied in that direction. But, as the global world is changing, the structures of the economies had also started to change accordingly. Through that, the motives of the demand for reserves also started to show a different pattern and as traditional approaches started to change, which also made the reasonings of reserve accumulation change as well. The view of reserve demand started to emerge from mandatory towards the necessity approach. One of these approaches prior to precautionary motive is the mercantilist approach. The mercantilist approach can be

traced as the non-precautionary motive of holding the reserves. Based on that, the reasoning of some countries acting as accumulating reserves in form of a mercantilist way is related to stimulating by taking growth strategies. Specifically, the growth strategies related to the target of export efficiency and keeping the value of the exchange rate low. Whereas the reserves play as a supplementary role in order to maintain the undervalue of the exchange rate. The literature related to the mercantilist purpose of hoarding reserves was not too much actual subject up to recent years. Even though the studies that related towards it been promoted faintly. The reason for that is in a subjective manner, there was a dispute related to the understanding of the motive of the countries. Either some of them are accumulating reserves in a precautionary manner or by mercantilist way of thinking. Because the accumulation of the reserves with the deprecation targeting of the exchange rate can be conducted with precautionary interests too. That`s why the gap between the motives has always been a debatable subject and the link of association of the difference between these two approaches was very limited to be explained. Due to the discrepancy, the empirical studies also have limited success to be applied for.

Aizenman and Lee (2005) did a study related to bringing light to this discrepancy. They found that indeed the increasing amount of reserves that are accumulating by the developing countries are related due to the past experiences that they have had in difficult times. Through the experiences that the countries passed through the reserve level have shown an increasing trend which shows that there is a precautionary motive lays behind it rather than a mercantilist motive.

Prabheesh, Malathy and Madhumanti (2007) did a study related towards the demand for international reserves by India where they found that the demand for reserves by the Central Bank of India is more concerned with a precautionary motive behind it. The reason for that is coming due to the current account vulnerability and capital account vulnerability. At the same time, the result of the speed of adjustment induced the fact that to finance the balance of payment a higher level of reserves is needed to.

In a similar fashion towards Aizenman and Lee's study, Ghosh, Ostry, and Tsangarides in 2012 conducted the study in order to reveal the reasoning behind the accumulation

of reserves by emerging countries. As we know from previous sections, across the global financial crises that happened in different periods of time, most of the devastating effects had been experienced by emerging countries. To protect themselves against these effects, the emerging countries were accumulating reserves as much as they can. The main concern here is whether the reasoning behind the accumulation of the reserves has been really conducted in a protective motive or across the time has it been changed? This is the main question that Ghosh, Ostry, and Tsangarides tried to answer, and in order to recap that they have constructed a model, where they combine both motives of acquisition of reserves and exchange rate regime and also applied quantile regression method to recap the effect of motives with the change in the reserves across the time, specifically for the period between 1980 and 2010. The genuineness of the study relies on the fact that the model depicts a very vast variation in the reasonings behind the accumulation of reserves within the emerging countries. At the beginning of the 1980s, the main motive of accumulating reserves by emerging countries was mostly based on a precautionary view. This act of acquisition was still even higher across the period 1990s, especially due to the occurrence of the global financial crises but through time there was discrepancy within emerging countries in a way of changing in the level of demand of reserves. These changes attribute to the emersion of different reasoning behind the accumulation of the reserves. Specifically, after the 2000s, the mercantilist motive was more pivot reasoning behind the demand for reserves. Also, another reasonings relies on the fact that some of the countries are more intuitively risk-averse and accumulate reserves in order to secure themselves against the risks that might come upon them, either from the inner side or outside source manner. On another side, some of them might gather reserves due to the bad experiences that they have had in the past crises. That's why they are willingly acquiring the reserves because they might think the crises that they may face in the future might be more devastating that's why it is better to hoard right now.

Schröder in 2015, did the study where he quantified the amount of precautionary level and mercantilist level on reserves accumulation of China between 1998 and 2011. According to the study, the mercantilist motive had a 10 percent effect on China`s

demand for foreign exchange reserves, and the rest of the demand is coming from precautionary motives and other reasons. Specifically, after the Asian Crisis that happened in 1997, China started to accumulate reserves in an unprecedented manner and this finding actually shows similar behavior to the emerging countries according to the previous study done by Ghosh, Ostry, and Tsangarides in 2012. Hence, another major reasoning behind the accumulation of the reserves relies on the fact that China in 2002 had become a member of WTO(World Trade Organization). Because of that, foreign direct investment towards the country has been increased in a tremendous manner and this effect has also led to the accumulation of the reserves.

Manja in 2018 did the study related to determining the reasons behind the demand for reserves by the countries which are located in the Southern African Development Community Region (SADCR)[39] for the period between 1980 and 2015. The study revealed that the risks that are coming from capital flight, exchange rate volatility, and sudden stops are the primary reasons that these countries are concerned with due to different reasons. First of all, during the middle of the 90s till the beginning of the 2000s, there were major civil wars and other distortions within the region that devastated the economy very badly. Accordingly, based on that experience and the global financial crisis of 2007, these countries were hugely accumulating reserves. In comparison to emerging countries the divergence between the motives is not severe and even its targeting only one reasoning based on the risks that they are concerned with, which is precautionary motive.

Also, there is another motive that exists within the literature, which is the transaction motive. The transaction motive actually consists of the ratio of reserves to imports. This motive is related with the square root law of reserve demand. The reliability of this ratio has been a debatable subject in the literature, but Frenkel in 1974 established the probability of the existence of such a kind of motive by implying the fact that, if the import elasticity demand of reserves is less than one, then there might be the reasoning for the occurrence of square root law.

[39] Madagascar, Namibia, South Africa, Comoros, Democratic Republic of Congo (DRC), Seychelles, Botswana, Lesotho, Tanzania, Zimbabwe, Swaziland, Malawi, Zambia, Angola, Mozambique, Mauritius.

In addition to other motives related to the demand for reserves within the countries, Cheung and Ito in 2009, studied the institutional motive for the demand of reserves. They found that the countries with a lower level of corruption eventually hold lower reserves. The reason for that is stemming from the fact that for the country in order to show itself as a reliable economy for investment, the dependence level of it on the reserve level needed to be less.

When we are observing the studies that are specifically targeting the behavior of the countries when it comes to reserve accumulation, we see different trends. Some of them as we already have discussed are based on the experiences that they have encountered in the past or by being more risk-averse, not to mention that there are also precautionary and mercantilist reasonings too. Prior to these reasonings, one of the common reasons that exist within the literature for accumulating the reserves is called as Joneses effect. The Joneses effect is the sort of behavior that emerges through the competitive rivalry between the group of countries that leads to the accumulation of the reserves that is not rational to be explained by economic terms. One of the main concerns in the reserve literature is related to the cost of bearing excessive reserves. This cost is observed in the form of the forgone interest rates that might be used more in a productive manner. But in some cases, we might see that some countries are not taking into consideration the cost side of the reserves and accumulating the reserves in an unprecedented manner. The main reason for that stems from the competition between the countries which are in similar economic positions so that to be able to become more reliable country among its neighbor competitive countries so that to get more frontier position in the global world market. This kind of behavior has been seen within Latin American countries. Cheung and Sengupta in 2010 did a study about the reasoning for the huge stock increase of reserves in the Latin American countries[40] between 1980 and 2007. They found that the reasoning behind it relies on the fact that most of these countries have a similar pattern of economic productivity that makes them be rivals within each other. For instance, most of the Latin American countries like Venezuela, Mexico, Chile, etc. are rich oil countries and due to that, they are competing with each other to attract as many investors as they can so that to be the

[40] Brazil, Argentina, Chile, Bolivia, Colombia, Ecuador, Peru, Mexico, Uruguay, Venezuela and Mexico.

reliable country in the global arena. In order to accomplish that, they are accumulating as much as possible reserves, so that to give the effect of stability and financial soundness to investors to be an eligible country for investment opportunities. This result coincides with the presence of the Joneses effect on Latin American Countries' behavior.

In a similar manner, Kristin Bernard in 2011 did a study related to the motive of increasing the demand for reserves within the small economies of Central America[41]. The study showed that by applying the traditional benchmarks to assess the reserve adequacy level, the appropriate level of the reserve was low than what should be accounted for as the proper one. But there was a trend in the behavior of the countries which is similar to Cheung and Sengupta's (2010) study and provoking evidence of the Joneses effect. Although this is not just a simple Joneses effect but much more like keeping a pace with it. Because these small countries are strategizing their economies according to big Latin America`s countries and based on that they are trying to keep up with their strategies for the economic development through attracting the investors in the form of accumulating the reserves. That's why from that point of view, this kind of action leads to an effect called as keeping with Joneses effect.

2.5. The Studies Related with the Demand for Reserves

Mwase in 2012 did a very interesting study related to the demand for reserves within emerging and small island countries[42]. In comparison to other studies that have been used in order to emphasize the motives of holding the reserves, he approached it from a different angle. By underlying whether the effect of the exposures from the inner side and outer side of the economy and institutional motive is the main

[41] Costa Rica, Guatemala, Costa Rica, Nicaragua, Honduras and Dominican Republic.

[42] Small Island Countries: Antiqua and Barbuda, Bahamas, Barbados, Belize, Cape Verde, Comoros, Dominica, Dominican Republic, Fiji, Grenada, Jordan, Maldives, Mauritius, Samoa, Sao Tome and Principe, Seychelles, Solomon Islands, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and Grens.,Tonga, Vanuata.

Emerging countries: Argentina, Albania, Belarus, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Croatia, Egypt, El Savador, Estonia, Guatemala, Hungary, India, Indonesia, Jamaica, Latvia, Lebanon, Lithuania, Macedonia, Malaysia, Mexico, Morocco, Namibia, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Romania, Serbia, South Africa, Suriname, Swaziland, Syria, Turkey, Thailand, Tunisia, Ukraine, Uruguay.

reasonings behind the demand for it. Hence, the effect of the exposures from the inner side and outer side is actually condemned in the form of current account and capital account disposition.

Interesting facts had come up from the analysis, especially by considering the reason for the demand of the reserves in these two separate categories of the countries are relying upon different aspects. The study revealed that the risks from the inner side of the economy, which is based in the form of capital account vulnerability are the main reasons intended for the demand of reserves for Emerging and Small Island countries. But when it comes to the capital account effect on the reserve holdings, things are very different between these two groups of countries. Mwase found that in comparison to other studies, where most of the countries obtained the reserves to secure themselves towards the risks that might emerge from the short-term debt, did not show the relevant result in small island behaviors. The probable reason for that is occupied in the fact that the conditions towards the acquiring of the debts are more loosed in comparison to emerging countries. It is not too harsh in comparison to the terms that emerging countries are owing so that's why the accumulation of the debt is not the main concern for them. Consequently, the risks of the exposures that might be threatening the economy from the capital account are not the main reasoning of the demand for reserves by small islands. The opposite holds for emerging countries. But taking into consideration the effect of imports on the reserve holding is affirmative for both of the categories. Meaning that import is one of the main factors that small islands and emerging countries are also concerned with and due to that are holding the reserves. The reason for that is summoned on the effect of current account shock to the economies that made countries with a higher share of imports hold more reserves. In addition, he found that the exchange rate volatility also plays a crucial role as the reserve demand for small islands in comparison to emerging countries. Also, Mwase found that when it comes to institutional motives behind the reasoning of demand for reserves, it coincides with the finding of Cheung and Ito (2009).

In a very similar manner, Eren(2017) tried to find the reasons for the demand for international reserves by developing countries[43] for the period between 2001 and 2015. At the same time, his study targeted to find besides just the reasons for holding the reserves, also the adequacy level of them. In comparison to other approaches, he sophisticated a new approach by using a panel data method with pooled ordinary least square and fixed effects estimators.

The model that he postiluted is based on:

$$\frac{Reserve}{GDP} = \beta_0 + \beta_1 * (\frac{Portfolio\ Investment}{GDP})_{i,t} + \beta_2 * \left(\frac{Other\ Liabilities}{GDP}\right)_{i,t} +$$

$$\beta_3 * \left(\frac{M2}{GDP}\right)_{i,t} + \beta_4 * (USA\ interest\ rate\ difference)_{i,t} + \beta_5 *$$

$$(Export\ Variability)_{i,t} + \beta_6 * (Nominal\ Exchange\ Rate\ Volatility)_{i,t} +$$

$$\beta_7 * (\frac{Import}{GDP})_{i,t} + \beta_8 * (Crisis\ Dummy)_{i,t} + \beta_9 * (Fragile\ Five\ Dummy) +$$

$$\beta_{10} * (Government\ Factor)_{i,t} + \beta_{11} * (Political\ Stability\ and\ Violence)_{i,t} +$$

$$\varepsilon_{i,t}$$

The basic model that had been constructed is a very similar model to the parameters that IMF used in its metric approach. But in comparison to IMF, he also added additional parameters in order to possess the risks that are coming from other parameters like Government and Political Instability and Violence. The parameters that are implemented in the model, are actually showing the exposures that affect the countries` well-being to operate in a normal manner. Based on the model, by implementing in a very similar fashion to the IMF approach without taking into consideration time fixed effect estimators, the model revealed very interesting results related to the reserve adequacy levels. Based on that, from all the 17 countries, only Thailand, Peru, Croatia, Romania, Philippines, Croatia, and Hungary were at an adequate level across the 2001 and 2015 periods. In addition to observing separately

[43] Colombia, India, S. Africa, Brazil, Turkey, Indonesia, Chile, Poland, Mexico, S .Korea, Romania, Philippines, Croatia, Peru, Uruguay, Thailand, Hungary.

the adequacy level of reserves in Fragile Five Countries[44]. It has been found that Brazil was the one who had the relatively to others in inadequate position. Even though by taking the time fixed effect estimators into account, the model predicts very similar results. Except for the fact that when observing the Fragile Five Countries Group, in comparison to the previous results, this time Turkey's reserves were in an adequate manner. Based on these results, Eren constructed an alternative metric in order to capture the effects of the observed risks that might postulate the threat for the balance of payments and better results for the motivation of holding the reserves than IMF approach. The reason is that in IMF metric, they did not take into account the time fixed effect, that`s why the result of the adequacy level is not reliable. That`s why a new metric needed to be applied in order to address this shortcoming by taking the time fixed effect estimators into account. Unfortunately, by taking into consideration the yearly fixed effects, is not possible to bring the new metric in order to possess the adequacy level across the 17 countries. The reason for that is coming due to the fact that the results of the panel data show that the parameters are not significant. But without taking into consideration the yearly fixed effect, based on panel data results, the new metric might be suggested. The new metric for developing countries is based on :

(15 percent of short term debt) +(20 percent of M2) +(5 percent of Export)+ (5 percent of Other Liabilities)

For Fragile Five Countries:

(15 percent of short term debt)+(15 percent of M2)+ (5 percent of Exports)+ (5 percent other Liabilities)

Although, these metrics as we have already mentioned are not reliable ones because they are not based on yearly fixed effects. That's why it puts under the huge question the applicability of these metrics. In comparison to the panel results for developing countries, adding the year fixed effect to the panel data analysis, gave pretty

[44] Turkey, Brazil, India, Indonesia, S. Africa.

appropriate results. Based on the results, the new metric had been suggested for Fragile Five Countries:

(25 percent of Other Liabilities)+ (5 percent of Short Term Debt)+ (5 percent of M2)+(5 percent of Exports).

Based on the new metric approach, there are some differences that exist in comparison to the IMF approach, especially when it comes to eligibility for being adequate or not. According to 2015, Turkey and Brazil were the countries who were having an inadequate amount of reserves but according to the new metric approach, Turkey's reserve level is on an adequate level. Also, Brazil was the country who were possessing an excessive amount of reserves than needed to.

In comparison to other studies, Bianchi, Hatchondo, and Martinez (2018) approach reserve adequacy from a different angle for emerging countries. The particularity of the study is embodied in the fact that instead of finding the reasons for the demand of reserves, Bianchi, Hatchondo, and Martinez were trying to analyze the optimal level of reserves for particular emerging countries that might face the risk of default. By applying the indirect cost and benefits approach, they found that it is better to acquire the reserves in the period of high income, where the country is the most productive. Because the hoarding of the reserves is very costly and the reason for that is that the resources that are using in order to get the reserves might be used in a more productive manner. But instead of that, they are getting the foreign exchange or other types of reserves through incurring debt from other outside institutions or other countries. From that perspective, the accumulation of the reserve brings the cost and based on that Bianchi, Hatchondo, and Martinez implies that it is preferable to occur the reserves when the country is in a period of high income so that they might deprive themselves from these costs that might affect themselves in a very bad manner in the future time period.

2.6. Recent Developments in the Reserve Literature Through Integrating New Approaches to Define the Determinants of the Adequacy Level

As we can see from the literature, most of the modern studies have been divergent from the initial studies and explained more about the behavior of the countries for the reserve accumulation. Prior to that, some recent studies have applied intriguing approaches to understand the relationship between the determinants of the adequacy level.

One of such a kind of approaches had been applied in a study by Shijaku and Gerti in 2012. They have studied the optimal level of reserves of Albania for the period between 1996 and 2010 by using the Buffer Stock Model which had been developed by Frenkel and Jovanovich in 1981. The model is depicted in the following manner:

$$log(IR_t) = \beta_0 + \beta_1\, log(\sigma_t) + \beta_2 log(r_t) + \beta_3\, log(IM_t) + \mu_t$$

here, r is the opportunity cost of reserves

σ is the adjustment cost

IM is the imports

By using the ARDL (Autoregressive Distributed Lag) technique in the model, they found that there is a relationship exist between the variables in the long run. In addition to that, the result of the analysis revealed that actually, the reserve level in Albania is in pretty good shape. The alteration between the actual and optimum level holding is very limited and pretty close, which implies that the management of the reserves across the presenting period is on balance.

Kashif, Thiyagarajan, and Sridharan in 2017 did a study about the determinants of international reserves in Algeria for the period between the first quarter of 1985 and the forth quarter of 2014. Algeria is an oil-exporting country and based on that, the main flow of international reserves flows through that part of the activity. From that perspective, the main root of the analysis that had been conducted on understanding, what kind of effect do the exchange rate and economic growth have on the reserve level in the long run? In order to establish the reasoning of the effect, the

Autoregressive Distributed Lag Method had been applied to the analysis. Based on that, they found out that there is indeed a significant effect that coexists within the variables in the long run. As a matter of fact, Algeria is competing within the world oil-exporting countries and the main target as like any other oil-based country is to promote its oil export at such a level so that to be eligible for being the primary country among its competitors. Due to this rivalry, the policy implications related to the enlargement of the export of oil are more primary enacting, and based on that the demand for reserves is caused by such behavior.

By applying the similar method to Shijaku and Gerti (2012), Nayak and Baig in 2019, measured the short-run and long-run demand functions for India and China to be able to clarify the determinants of demand for international reserves in the long run and short run for the periods between the first quarter of 1993 and the fourth quarter of 2015. The study revealed interesting facts related to the reasoning behind the demand for the reserves of these countries. In comparison to the previous studies, they found out that the main reason for the increase in the demand for reserves for both countries is related partially with a precautionary motive but mainly with the transaction motive. This also implies the existence of the tendency of the square root law of reserve demand.

Oyeniran and Alamu in 2020, analyzed the optimal level of reserves for Nigeria for the period between 2002 and 2016 by using the buffer stock model of Frenkel and Jovanovic (1981). By using the ARDL method, they derive the function of the model. The model is depicted in the following manner:

$$ln(R_t) = \beta_0 + \beta_1\, ln(\sigma_t) + \beta_2 ln(r_t) + \beta_3\, ln(IM_t) + \beta_4 ln(VOL) + \mu_t$$

here, R_t stands for the optimal level of reserves holding, σ_t stands for adjustment cost, r_t for opportunity costs of holding reserves, IM_t represents the import variable, *VOL* stands for real exchange rate volatility. By applying the ARDL approach, the result of the analysis is divided into two groups. One is the short-run relationship between the variables and the other one is the long run.

Table 2.2 Long-Run Relationship

Variable	Coefficient	t-Stat.	Prob.
lnR(-1)	0,9994	132,351	0,0000
lnσ(-1)	0,0035	4,2243	0,0000
lnr(-1)	-0,0050	-1,0698	0,2860
lnIM(-1)	-0,0049	-0,9471	0,3448
lnVOL(-1)	-0,2744	-2,2345	0,0266
Constant	0,0591		
R-Squared	0,9945		
F-Statistic	7096,0750		
Prob.(F-statistic)	0,0000		
Dep. Variable: lnR			

As we can see from the table above, based on regression results, there is a long-run relationship exist between the adjustment cost and reserves. The main reason for that is actually condemned that in case of any vagueness that might prevail especially the exposures that might burst due to low amount of reserves, the Central Bank of Nigeria is targeted to keep more reserves on its disposal. Besides that as we can see from the results of the analysis that except for the adjustment cost, also exchange rate volatility is significant and has a negative effect on the reserve level. The probable reason for that relies on the fact that in case of any instabilities that might trigger the reliability of the exchange rate, the Central Bank is using the reserves in order to stabilize the currency.

Table 2.3 Short-Run Relationship

Variable	Coefficient	t-Stat.	Prob.
dlnR(-1)	1,179848	6,012	0,0000
dlnσ(-1)	0,026341	3,6908	0,0000
dlnr(-1)	-0,0008	-0,1502	0,8808
dlnIM(-1)	0,013	1,1557	0,2492
dlnVOL(-1)	-0,1711	-1,9612	0,0851
ECM(-1)	-0,964741	-4,50501	0.0000
Constant	-0,001423	-0,43543	0,6637
F-Statistic	8,9823		
Prob.(F-statistic)	0,0000		

Dep.Variable: dlnR			

By observing the short-term relationship between the reserves and the parameters, we see the same scenario as with the long-term. Adjustment cost and exchange rate volatility are the only significant variables in the model, which implies that these variables explain the variation of the foreign reserves. From these results, Oyeniran and Alamu found that the main reasoning behind the demand for reserves by the Central Bank of Nigeria is related to the exchange rate stabilization policy. In addition to it, the study revealed that the reserve level is way below the optimal level.

On the other side, when we are observing the studies of the similar structure we might see some similarities between the reasons for the demand for reserves. The finding of Oyeniran and Alamu is very similar to the finding of Kashif, Thiyagarajan, and Sridharan (2017) about the demand for reserves in Algeria. Both countries are export-oriented countries in the oil industry and the exchange rate plays a crucial role for these countries due to different reasons, one of them is that because they are exporting oil, the money that flows is coming in different currencies which also leads to an increase of the reserve level. In addition to it, the stabilization of the currency is also one of the important parts of the policy tool for economic growth for them. This tendency also we might see in the following study too, which had been conducted by Jena and Sethi in 2020 to determine the foreign exchange reserves of Brazil for the period between 1960 and 2008, by using the same technique. The model that they depicted is based on the following manner:

$$FORE_t = \beta_1 + \beta_2 CAB_t + \beta_3 DEBT_t + \beta_4 DCPS_t + \beta_5 ER_t + \beta_6 INF_t + \beta_7 PGDP_t + \beta_8 RI_t + \varepsilon_t$$

Here, *FORE*: Foreign Exchange Reserves

CAB: Current Account Balance

DEBT: External Debt Stocks

DCPS: Domestic Credit to Private Sector

ER: Exchange Rate

INF: Inflation

PGDP: GDP per Capita

Rl: Benchmark real interest rate

Jean and Sethi found that is long-run relationship exists between the variables and foreign exchange reserves in Brazil. But when it is observed the short-run relationship between the variables, a very different result is revealed. In the short run that foreign exchange reserves cause current account balance as the percentage of GDP while not vice versa, even though when we are looking at the other parameters in the model, we see the same effect and this shows that there is only one direct relationship exists between them in the short run.

As we can see from this study too, again the result of the analysis also depicts the fact that in the long run there is a relationship exist between the exchange rate and the reserves which is also similar to the findings of Kashif, Thiyagarajan, Sridharan (2017), Oyeniran and Alamu (2020) about their countries. These findings show that the exchange rate is one of the important causes of the demand for reserves for export-oriented countries.

2.7. The Studies that had been Enacted to Define the Reserve Adequacy of Turkey

When we are observing the literature related to the assessment of the adequacy of reserves in Turkey, there had been limited studies related to the significance of it.

The initial study related to the reserve level of Turkey that had been done in this field is Yaman`s study in 2003. The study revealed very interesting facts related to the reserve level of Turkey for the period between 1988 and 2002. Firstly, Turkey besides its own internal economic instabilities also passed through different economic reforms like the change of the exchange rate system. Prior to 2001, Turkey's exchange rate system was using a fixed exchange rate but after 2001, the floating exchange rate system started to be implemented, this fact also affected the reserve level system too.

Therefore, Yaman used two analyses in order to test the assessment of the reserve adequacy of Turkey between 1988 and 2002. One of them is the variety of common benchmarks that had been wıdely applied in the literature for the reserve adequacy measurement. These benchmarks are composed of short-term debt, M2, import, and combination approaches. According to the study, based on the country level, the short-term debt approach showed that starting from 1996 and onward, the reserve level of Turkey was on an adequate level. By using the M2(Broad money) approach, from 1994 and onwards, the reserve level was on an adequate level. Import approach showed that from 1988 and onward the reserve level was eligible to be accounted as adequate. The combination approach which had been implied by the Winjhold and Kapteyn (2001) method showed that the reserve level is adequate after 2001. In addition to that, to have a broader context of the assessment of the adequacy level, Yaman did the comparison of the related benchmarks on the international level by comparing Turkey with other countries based on the period 2001. But in order to do that, Yaman divides these countries based on the policy targeting system in the following manner:

Table 2.4 The Ratio of Reserves by Country.

Target	Country	R/Imports (monthly)	R/STD (percentage)	R/M2 (percentage)
Monetary	Turkey	6	114.61	25.32
	Yemen	13	703.03	111
	Sierra Leone	2	230.32	37.82
	Philippines	5	220.18	32.01
	Peru	11	285.42	48.83
	Malawi	3	439.50	69.87
	Gambia	5	403.60	74.48
	Average	**6**	**342.38**	**57.05**
Inflation	South Africa	3	69	12.01
	Poland	5	361.20	29.60
	Mexico	3	246.58	31.41
	Korea	7	291.86	28.79
	Czech Republic	4	158.43	32.01
	Colombia	7	258.39	42.79
	Chile	8	549.13	47.01
	Brazil	6	126.35	23.54

	Average	**5**	**257.62**	**30.90**
IMF Support	Haiti	2	77.18	11.07
	Uganda	8	646.57	102.87
	Tanzania	6	206.54	64.02
	Tajikistan	1	110.17	112.17
	Mozambique	6	143.53	72.70
	Moldova	3	1061.86	61.61
	Madagaskar	3	166.47	39.09
	Georgia	2	259	43.38
	Armenia	4	739.48	110.33
	Albania	4	2137.81	22.71
	Average	**4**	**554.86**	**63.99**

Based on this table, by comparing Turkey to the floating exchange rate regime countries with monetary target purposes, the analysis shows that only the import benchmark is on the average level but other benchmarks are way below the average, which implies that the reserves level are very low than to be eligible to be adequate. By observing the inflation-targeting countries, again the results show that based on short-term and monetary approaches, the reserves are below the average. Only based on the import approach, the reserves are higher than average. Also, the same result is valid for IMF support targeted countries.

The second analysis that had been used by Yaman for evaluating the adequacy of the reserves was based on approaching it from an optimization point of view. Based on that, Yaman implemented Bassat and Gotlieb model (1992) to test for the optimality level of reserves. Even though in that case, across the period of the study, the reserve level of Turkey was less than the optimal level in relative terms. The reason of why in relative terms is because, after the occurrence of the 1994 currency crisis, there was a tendency for hoarding the reserves which in some sort were more or less optimal for the period of 2001. Although the effect of the twin crises that happened in that period of time which affected the economy in a bad manner led to misleading results in the reserve level. Meaning that the actual reserve level was below the optimality standards.

In comparison to Yaman`s study, Kasman and Ayhan in 2007 conducted a different study in order to find out the effect of the nominal and real exchange rate on the

accumulation of reserves of Turkey for the period between 1981 and 2005 by using ADF, Gregory and Hansen cointegration tests.

They found that in the long run there is a persistent relationship exists within the variables. In addition to that, they have applied Granger Causality for testing of causation. But the causality of the relationship between the direction to the foreign exchange reserves is different within the exchange rates. According to the analysis, in the short run and long run, the foreign exchange rate causes the real effective change, which means that there is a special relationship exists within them. This relationship is constructed in the way that the foreign exchange reserves determine the real effective exchange rate while not the other way around, which also implies there is evidence of one-way direction within them. The change in the foreign exchange reserves has an effect on the real effective exchange rate while causing it to change but this effect does not occur in vice versa order. But when it comes to the relationship between the nominal exchange rate and the foreign exchange reserves, Kasman and Ayhan found that in the short run the foreign exchange rate determines the nominal exchange rate, while in the long run, the effect of the determination is in opposite direction.

In comparison to Kasman and Ayhan`s work, Güriş in 2012 found that there is long-run relationship exists between the reserves and exchange rates. By using the threshold error correction model and the threshold granger causality test reserves for the period between the first month of 1982 and the eleventh month of 2005, he revealed that in the long run, there is a mutual relationship exists within the international reserves and exchange rate. By implying that the reserves determine the exchange rate and vice versa. So that the change in the reserves has an effect on the exchange rate, whereas the same outcome is evident in the vice versa manner.

Memiş, Paksoy, and Yöntem (2014) studied the relationship between Central Bank Reserves and Macroeconomic Variables for the period between the first quarter of 1989 and the fourth quarter of 2013. In comparison to the previous studies, they were trying to understand the relationship between the reserves of the Central Bank of Turkey, inflation, external debt, GDP, and real exchange rate across the first quarter

of 1989 and the fourth quarter of 2013. According to the analysis, they found that in the short run the international reserves determine the exchange rate and vice versa. While there is a unified relationship persistent within the reserves and GDP. In the long run, the exchange rate affects the output and the output affects the external debt level. In addition to that, they found that in the long run indeed there is a relationship exist between the exchange rate and reserves, which is similar to the findings of Guriş (2012).

In comparison to the other studies, by implementing Hansen- Seo (2002) and causality test by Diks and Panchenko (2006), Bayat, Senturk and Kayhan in 2014 found that there is a nonlinear relationship exist between the exchange rate and foreign exchange reserves for the period between 2003 and 2014. Meaning that there is no relationship from foreign exchange reserves to nominal and real exchange rate, but there is a causation relationship exists between the variables, which is also approving the previous studies' reasonings as well.

Yüksel and Ozsarı (2017) examined the factors that affect the foreign exchange reserve of CBRT for the period of 1988-2015 by using the MARS method. The model that they have implemented in their study is based on the following equation:

$$LnDR_t = a + \beta EC_t + \gamma CAB_t + \delta lnSTD_t + \theta DF_t + pDK_t + \mu TF_t + \omega IR_t + \varepsilon_t$$

The parameters that are taken into consideration in the model are economic growth, current account balance, short-term debt, USD interest rate, USD/TL exchange rate, TL interest rate, and Inflation Rate. The analysis showed that the current account balance is one of the main factors that affect the foreign exchange reserves. The reason for that is due to the presence of the current account deficit. Also, there has been found a relationship between the USD interest rate and the reserves. According to the analysis, if the USD interest rate is below 5.02 points, it has a positive effect on the CBRT reserves. But if the interest rate will be higher than this level, it will have a negative effect on the reserve levels. The reason for that is that when the United States is applying the tightening monetary policies it leads to an increase of the interest rates and puts pressure on TL and in order to decrease that effect, the Central Bank prefers to keep more foreign exchange reserves. On another side in comparison to the other

two factors, TL interest rate and CBRT`s foreign exchange reserve have a negative relationship within themselves. As the TL interest rate increases lead to the rise of the cost of foreign exchange rate reserves, in that case, CBRT prefers to keep fewer reserves at its disposal.

Ersoy (2011) did an empirical study related to the motives behind the increasing demand for reserves by Turkey for the period between 1974- 2019 by using the ARDL approach. Her model was based on the following manner:

$$RES = \beta_1 CAV + \beta_2 IR + \beta_3 FO + \beta_4 FDP + \beta_5 FXV + \beta_6 EXPV + \beta_7 TO + \beta_8 FXA + \beta_9 PUBD + \beta_{10} DFDP + \beta_{11} FL + \beta_{12} STD$$

The Parameters are based on:

RES- Reserves to GDP

CAV- Current Account Volatility

FXV- Exchange Rate Volatility

EXPV- Export Volatility

FXA- Exchange Rate Appreciation

IR- Opportunity Cost of Reserves

DFDP- Domestic Financial Development

FL- Foreign Liabilities

FDP- Financial Development

FO- Financial Openness

TO- Trade Openness

PUBD- Public Debt

STD- Short Term Debt

According to the analysis, there is a long-run relationship exist between the reserves and current account volatility, export volatility, opportunity costs of reserves, financial

openness, financial depth, trade openness, exchange rate appreciation, public debt, exchange rate volatility, domestic financial development, foreign liabilities, and short-term debt. Although. these factors that have been taken for the analysis are the main factors that provide the main motive for the accumulation of the reserves in the literature. From another side, the empirical analysis of the study implies that short-term debt, financial openness, exchange rate volatility, and domestic financial development are the main reasons for the increase in the amount of reserves during the presented period of time. The reasons for that are coming due to the risks that these factors are possessing in the economy, which makes the accumulation of the reserve to increase more. This kind of behavior is emphasized as the precautionary motive to accumulation the reserves.

In comparison to Ersoy`s (2011) and Bayat, Senturk and Kayhan`s (2014) studies, Çeştepe and Gündenoğlu (2020) tried to emphasize the asymmetric relationship between the exchange rate and foreign exchange rate of Turkey for the period between 2002- 2019. But in comparison to them, Çeştepe and Gündenoğlu applied the NARDL approach in order to investigate that effect. The result of the NARDL technique showed that there is a cointegration relationship exist between the foreign exchange reserves and exchange rates. At the same time according to asymmetry tests, it showed a similar finding to Bayat, Senturk and Kayhan`s (2014) so that there is an asymmetric relationship exists between the reserves and the exchange rate in the short run and the long run. The core part of the study suggests that the reason for the accumulation of reserves in a such high manner in Turkey during the period of observation is related to the tendency of precautionary motive from the exchange rate side which brings a similar result to Ersoy`s (2011) study. Meaning that in case of any exposures that might threaten the stability of the exchange rate, CBRT is collecting reserves to be used as a source to deprive that effect.

As we have already mentioned in the literature, Eren(2017) did the study with the year fixed effect by adding to the panel data analysis for Fragile Five Countries. In that analysis as we have already observed the new metric approach has been proposed based on the result of the panel data for the periods between 2000 and 2015. Turkey is

also been mentioned in the group of Fragile Five Countries. According to that, the new metric is based on the following way:

(25 percent of Other Liabilities)+ (5 percent of Short Term Debt)+ (5 percent of M2)+(5 percent of Exports).

Based on the new metric approach, Turkey`s reserve levels are in adequate level. Besides that to have a better view of the adequacy level, Eren compares the reserve levels with the other adequacy benchmarks in the literature. These benchmarks are IMF reserve adequacy, Short term debt, Broad Money (M2), and Import approaches. When comparing the results of the first three criteria, interesting results were inducing from it. By taking into consideration the results of three approaches, there had been improvements in the reserve adequacy of Turkey after the 2001 economic crisis. Hence, according to the new approach, there was a decrease in the amount of reserves across 2007-2010 due to global financial crises and afterward effect but with the necessary implementation of policies, the Central Bank of Turkey stemmed to increase the amount of reserves to the levels beyond necessary amounts. Whereas the IMF metric approach shows that the reserves remained close to the limit value, only in 2013 the limit value of 100 percent could be overcome. Short term debt approach depicts that Turkey is inefficient to meet the foreign obligation of up to one year. Therefore, according to the depiction of three criteria, there was a fall in the amount of reserves in very small amount after 2014. In totally manner, the study revealed that the reserves level is insufficient according to the IMF metric. According to the import and broad money approaches the reserve level across the period was adequate, even though there was a fall in reserves to M2 in 2008 because of the global financial crisis but afterward there was an increase in the ratio after 2010.

Özdemir and Karabulut (2015) did a study related to evaluating the optimal level of reserves for the period between 2001 and 2012. The model that had been used in order to assess the optimal level of reserves was based on Ceh and Krznar model. Based on the probability of the risks that might emerge in case of capital flows and on country risk and currency depreciation that might be threatening the economy, it has been

found that the optimal level of reserves between 2001-2011 was not adequate but in 2012 the optimal level of reserves was preserved.

In a similar manner, Demir (2020) evaluated the optimal level of reserves of Turkey for the period of 2003-2018. In order to determine the optimal level, he used the combined approaches of the common benchmarks related to the reserve adequacy literature. According to reserves to the short-term debt across the given periods of time show that on average the performance of the ratio was 1.20 points for those periods of time. But starting from 2013 and onwards, the ratio showed that the reserve levels were not optimal because it was below the threshold. In the second approach for the test of optimality, the reserves to import ratio showed that on average between that period, it scored 1.87 points. This value is bigger than the threshold value so that meaning according to the second approach the reserve level is optimal for that period of time. And the last approach reserve to M2, showed that the level of reserves of Turkey is optimal too.

Kılıcı (2019) examined the international reserve adequacy level of Turkey based on two stage approach that had been proposed by IMF. This two stage approach is based on a comparison of 25 percent of annual imports with the reserve level and a comparison of the international reserves with the short-term debt. By implementing the Fourier Granger Causality test, she did the study of reserve adequacy based on two stages for the period of the third quarter of 2011 to the fourth quarter of 2018. The result of the analysis discovers the fact that, according to the first approach which is based on a comparison of 25 percent of annual imports with the reserve level, validate that the level of reserves of Turkey is adequate but according to the second approach there is no relationship exist between the short-term debt and international reserves across the relevant period which indicated that the level of reserves is not adequate.

Furthermore, in 2021, Kılıcı investigated the international reserves and CBRT`s official reserves for Turkey based on the period between 2005-2019 by implementing IMF`s ARA metric approach. According to the study, the weights of the exposures of the risk criteria of Turkey are defined in the following manner:

30% of short term debt + 10% of other liabilities+ 5% of M2+ 5% of export

Based on these weights of the exposures, the adequacy level of reserves was analyzed in the following manner. The weights described above is also ARA metric.

In order to further investigate the subject: ARA 1 and ARA 2 approaches were composed. Basically, ARA 1 is composed of international reserves over the ARA metric and ARA 2 is composed of CBRT`s reserves over the ARA metric. The level of adequacy according to IMF should be within the range of 100 and 150. By meaning that if the level of reserves is within that range then, the reserve level of the country is eligible to be adequate.

According to the analysis, ARA 1 was showing reliable results to be considered as an adequate level based on the values that it takes which were between 100 and 150, while ARA 2 metric showed more inconsistent behavior but mostly the values were on that range. Based on these techniques, the study revealed that based on the relevant period of time, the reserve level of Turkey was adequate although the applied tests showed there was unsteadiness in the trend of indicators determining the reserve adequacy.

To sum up the main concluding remarks of the chapter, we might see that the literature on the relevant subject, had been taken the majority of differences in a way of changing across each time. Each shock in form of a crisis that the world had been witnessing was having an effect on the understanding of reserves and related measurement of it. The initial studies were more targeted towards approaching them from a more simplistic point of and taking the effect of vulnerabilities that might break upon the trade variables. But with the emergence of the 1997 Asian Financial Crisis, things completely changed and the effects of vulnerabilities that might be provoked were more condemned in capital flows rather than exposures from trade. This brought other approaches towards assessment of it. 2008 Global Financial Crises brought another lesson that even the advanced countries needed to manage their reserve and take necessary measures towards allocating policies in order to acquire an adequate amount of reserves so that to protect themselves against the vulnerabilities that might come. As the global world changes and develops, so as the financial market with it by bringing new innovations in the instruments. At the same time, the shocks on the

economies are also developing and becoming more severe so that no matter how big or small countries are, all of them needed to manage their reserves in such a manner to be able to protect themselves against any kind of shocks that might be provoked by. That's why we witnessed the fact that, across time as the literature is progressing, the techniques that composed in order to understand the driving motives for the demand of reserves by countries started to get more vivid in comparison to the initial studies.

CHAPTER 3

An Empirical Analysis of the Determinants of Reserve Level of Turkey

Having reviewed both the theoretical and empirical literature on the determinants of international reserves in the previous chapters, this chapter introduces the empirical model of international reserves and the econometric methodology employed in econometric analysis of the subject. As mentioned before, the validity of the international reserves is very important for the macroeconomic and microeconomic sustainability of the economies as a shield that helps to overcome the exposures that might create a huge turmoil for the economy. That's why it is important to determine empirically the level of reserves.

The determinants of international reserves is modelled by using the modified Frenkel and Jovanovic (1981)'s reserve model. In estimating the empirical model, this study will make use of the Autoregressive Distributed and Nonlinear Autoregressive Distributed Lag methods in estimating and calculating the optimal foreign reserve function. By estimating the model parameters, we will thoroughly explain the reasons for choosing the variables and will justify the importance of each of them. Based on the model, we will generate the results and apply the related techniques to define the optimal level of reserves, and in addition to it, we will look for the reasoning of the long-run and the short-run relationships between the variables. Through analyzing the behavior of the Central Bank of Turkey and giving a vivid description of its demand for reserves by understanding the motives behind it. Moreover, based on the analysis we will compare the actual level of reserves with the optimal level of reserves to see if they are on the ideal level or not. The observation period of our analysis is following the timeline between 1990:Q1 and 2020:Q4.

The chapter is organized as follows. Section 3.1. provides an information on the model specification and the definitions of variables subject to empirical analysis. Section 3.2. introduces the econometric methodology that will be used in estimating

the empirical reserve's model and the sources data. Section 3.3. presents estimation results and provides interpretatin of the results.

3.1. The Model Specification and the Definition of Variables

Reviewing the literature related to the international reserve models that are emphasized for the measure of the reserve adequacy level indicates that different models and methods have been used in the empirical literature. These models are based on the approaches that had been signified in different ways as through elaborating the benchmarks to the assessment of it or through approaching it from an optimization point of view (IMF,2011). But if we categorize them according to the relevance in the literature, we might see that there are three main approaches used in the measurement of reserve adequacy from the optimization side.

The first one is the general rule of thumb, the most common approach employed in the empirical literature to determine the adequacy level of reserves. The main proposition of this approach is based on judging the reserve as the precautionary motive of holding it against the turmoil that might be induced by imbalances in the balance of payments. As we have already discussed in the chapter three, the most well-known rule of thumb approach in the literature involves Short term Debt rule, the Imports rule, the M2 (Broad Money) rule, and combination approaches such as Winjhold and Kapteyn (2003) and ARA metric (2011).

Another approach is the Frenkel and Jovanovic (1981)'s approach where the optimal level of reserves is given primary priority as the main source of mitigation against the imbalances that might trigger the international payments. The other one is the Jeanne and Ranciere (2006)'s model which targeted to evaluate the reserves in the phrase of insurance against the balance of payment and banking crises. Each of these methods has its own pros and cons but the main target of these methods is targeted towards evaluating the adequacy of the reserves in an appropriate manner.

But the problem is that some of these methods have a limitation when it comes to being applicable in the practice. The implication of the methods as like the rule of thumb is easier to induce within the analysis rather than the models. The reason is that,

if we will look at the literature, we will observe that the rule of thumb is actually a set of benchmarks that targeted towards giving the idea about the subject of adequacy more simplistically by emphasizing the ratios based on the reasons for holding reserves to the experiences of the countries that had in a crises period of time. Meaning that it actually gives us a subjective view of the reasoning behind the accumulation of reserves.

But in order to have a more compulsory view about the main driven forces of the countries that induce them to accumulate the reserves are need to be taken in a more complex manner. By complexity, we mean here is that approaching towards our subject in a broader context through observing all needs of accumulation of it and related costs associated with them. From that point of view approaches that had been proposed by building the model as like Heller(1966), Frenkel and Jovanovic(1981), Ben Bessat and Gotlieb(1992), etc. are more relevant approaches to measure the adequacy of the reserves. But as IMF(2011) stated that, most of them have a lack of implications when it comes to being the primary source of finding the relevant adequacy level of reserves.

That's why most of the models related to the optimality level are based on building scenario analysis by collaborating the parameters in order to better quantify the costs and benefits of estimating the demand for reserves. Because of that, the scenario analysis is too difficult to apply in real terms due to the proxies of the parameters that are applied within. From that side, these types of models are giving just explicit guidance towards finding the ideal amount of reserves.

In our analysis, we have applied the buffer stock model that had been modified by Frenkel and Jovanovic(1981). The main reason for using this model is based on the fact that it is more easily to be applicable in real terms and instead of relying on scenario analysis, it is more eligible to be applied in the practice due to the fact that it might easily be modified to capture the different motives of holding reserves (Oyeniran and Alamu, 2020; Shijaku, 2012). Another reason for choosing this model in comparison to other models related to the optimality level of reserves, it gives the opportunity to depict how much reserve level of the country is different from the

optimal reserve of it. Because the crucial part of the study relies on the intentions of the policy implications that the Central Bank is using in order to define what is the real motive relying on behind the demand for reserves.

Accordingly, this study had adopted the advanced buffer stock model which had been implemented by Frenkel and Jovanovic in 1981. The main idea of the model is based on the fact that, prior to the reasoning that the central banks keep reserves in order to use them in case of any turmoil that might be provoked by the shocks in the economy. In a way that the monetary authorities are accumulating the reserves, they are making the economy to be more efficient towards these shocks but the problem is that accumulation of the reserves is also brings with itself the costs. One of these costs is the adjustment cost, which is a policy-related cost with taking necessary measurements to obtain the additional amount of reserves if the reserve level is at a low level. The other one is the opportunity cost which is the foregone earnings that might be better evaluated if instead of keeping the reserves, could be invested and bring related interest earning on them. Based on that, the buffer stock model emphasizes that the reserve level needed to be at such a level that could minimize these costs.

3.1.1.Empirical Model of International Reserves

According to the model of Frenkel and Jovanovic (1981), the reserves are being described as the function of the continuous exogeneous Wiener Process, which might be constructed in the following manner:

$$d(R_t) = -\mu dt + \sigma dW(t)$$

$$R(0) = R_0, \mu \geq 0$$

In where R_t stands for the level of reserves at time t and *W(t)* stands as an acronym ``for the standard Wiener process possessing the properties of simple random walk, with mean μ and with standard deviation σ ``(Frenkel and Jovanovic,1981). Also here, $d(R_t)$ show us the change in the level of reserves for a small time interval and can be written as:

$$R_t = R_0 - \mu_t + \sigma dW(t)$$

Here R_0 stands for optimal reserve holdings,`` $\mu_t$ means the deterministic part of of the instantaneous change in reserves, and σ articulates the standard Weiner process processing the properties of simple random walk`` (Frenkel and Jovanovic, 1981). Basically, the equation might be interpreted that the reserve level at time t is equal to optimum reserves minus μ which is the displacement at time t plus the adjustment cost due to the variation in the reserves σ. On the other hand, Frenken and Jovanovic (1981) described that if the reserve level is at the optimum level, then displacement constant μ is zero. Meaning that the stochastic process which shows the changes in reserves is without a drift. Intrinsically this equation justifies the fact that the optimal level reserves needed to be at such a level that minimizes the adjustment and opportunity costs.

Based on Shijaku (2012) and Oyeniran, Alamu (2020), applying the second-order approximation method of Taylor, the optimal demand for reserves is identified in the following way:

$$lnRt = \beta_0 + \beta_1 ln\sigma_t + \beta_2 lnr_t + \varepsilon_t$$

This is the main proposition of the buffer stock model and based on that, our model is generated in the following manner:

$$lnR_t = \beta_0 + \beta_1 ln\sigma_t + \beta_2 lnr_t + \beta_3 lnSTD_t + \beta_4 lnEXC_t + \beta_5 lnCAB_t + \varepsilon_t \quad (1)$$

As we can see our model is specified according to the parameters above and we are going to estimate the parameters of the model using the Nonlinear Autoregressive Distributed Lag approach. The empirical model given in Equation (1) includes the variables based on the literature in order to capture the variation in the regression so that to emphasize the strong reliability of our results. The main proposition of the empirical model given in Equation (1) is entailed in the fact that besides just the effect of costs of incurring the reserves, we are also measuring all the possible exposures too. In order to be precise, we approached to reserve adequacy through an optimization point of view, in a way by using the parameters that take into consideration, not just the costs related by keeping the reserves but also the risks from the inner side and outer

side that might trigger the reserve level and which can affect the stability of the economy in a negative way. That's why we are trying to approach the reserve adequacy subject in a broader context.

3.1.2.Definitions of Variables of Empirical Model of Reserves

Before proceeding to the next step of the analysis let's introduce the variables of empirical model subject to econometric analysis and the relationship between the independent variables and dependent variable. The variables are defined as follows:

$\boldsymbol{R_t}$: is the dependent variable of the model in Equation (1) and stands for International Reserves variable. It has been calculated as a ratio of total international reserves to gross domestic product (Total International Reserves/GDP) measured in thousands of US dollars.

$\boldsymbol{r_t}$: represent the opportunity cost variable. The opportunity cost of reserves had been always one of the critical subjects that had been discussed in the literature. Especially it is one of the important factors that lead to the emergence of the complications to analyse the level of reserves from an optimization point of view. As we have already mentioned at the beginning of the chapter, the main limitation of the models related to the measurement of reserve adequacy is based on finding reliable parameters in order to define the costs of the reserves. From that point of view, the sensitivity analyses that had been implemented by the models were given limited applicability across each country's implementation. The costs that needed to be measured were difficult to quantify due to the difficulties related to either finding the related proxies or the availability of the data was one of the main concerns of limitation of it. But through recent studies, a new proxy had been proposed in order to capture the effect of opportunity cost which is the call money rate (Oyeniran and Amaru 2020). Based on that, we have taken as a proxy for the opportunity cost of reserves in terms of call money rate, and respectively the coefficient of it is β_2. The expected sign of it is negative.

$\boldsymbol{\sigma}$: represents the adjustment cost variable. In a similar manner, the adjustment cost was also one of the subjects that had been criticized towards the problems with the

estimating of it. According to the new studies related to the measurement of the adjustment cost, the proxy for this parameter had been taken as the change in the stock of reserve holding (Silva and Silva, (2004), Shijaku (2012), Oyeniran and Alamu (2020)). The relevant coefficient of it is β_2 and expected sign of it is positive.

$\boldsymbol{STD}$: stands for the Short Term Debt and has been measured as a ratio of short-term debt stock to gross domestic product (STD/GDP) in thousands of US dollars. From the literature, we know that one of the important factors that needed to be taken into the consideration is the short-term debt variable. The reason is that short-term debt is one of the main pitfalls that without being taken into control can lead to huge costs for the economy. Rodrik and Velasco(1999) specified the costs in such a manner: `` Countries with the short-term liabilities that exceed the level of their reserves are three times more reluctant to suffer reversal in the capital flows. Furthermore, greater short-term exposure is associated with more severe crises when capital flows reverse.`` Even though by observing 1997`s financial crisis, when the crisis started to burst around Taiwan and started to spread to other countries along. Korea which was one of the strong countries across the Asian countries, went into default during just one night when investors saw that it has a lot of short-term debt prior to reserves and made the creditors demand their money back. From that point of view, as we can see the short-term debt is a very important variable that we need to consider in our analysis. Because it has a strong incentive to be the main actor that can increase the possibility for the emergence of the risks that might threaten the stability of the economy. In our model we have estimated the short-term debt as the short-term external debt stock and its coefficient is β_3 and the expected sign of it is positive.

$\boldsymbol{EXC}$: stands for real effective exchange rate variable. As we have already mentioned in the previous sections, the exchange rate is also one of the important indicators that influence the reserve level of the countries. The reason is that in order to provide price stability, the intervention to stabilize the exchange rate needed to be enacted. To decrease the fluctuation in the exchange rate, Central Banks are needed to use the reserves at their disposal so that to be able to provide stability to it. Due to that, we

have added the exchange rate to our analysis as well and the relevant coefficient is β_4 and the expected sign of it is negative.

$\boldsymbol{CAB}$: represents the Current Account Balance variable and it has been measured as the ratio of Current Account Balance to Gross Domestic Product (CAB/GDP) in thousands of US dollars. CAB is also one of the important factors that we want to add to our analysis and the reason is that it has a very huge influence on the reserve level of countries and especially for Turkey. It is linked to the export and import of goods and services. If there is a surplus in the account then the flow of foreign reserves is coming to the country, the reserve level is increasing. But if there is a deficit, then the country becomes a net borrower from the rest of the world which leads to the outflow of the reserves which is not a favourable outcome for the country. That's why CAB is also one of the important parameters that needed to be analyzed due to its effect on the reserve level. The relevant coefficient of it, is β_5 and the expected sign of it is positive.

As we can see from the above, these are the parameters that we have included in our model. By doing that, we want to integrate all the risks in our model in a broader manner, so that with the emphasizing on the each of the effects of the parameter as in outsource or inner source way that might trigger the stability of Turkish economy. In addition, we want to find out, what is the main reasons behind the accumulation of the reserves by CBRT so that to be able to see what kind of policy implications is applying for reserve management. Based on that we will evaluate the optimal or adequate level of reserves, so that to able to find if the reserve level of Turkey is at the ideal level or not.

3.2. The Data and the Methodology of the Empirical Analysis

The Data used in this study had been taken from the Central Bank of Turkey and The Federal Reserve Economic Data (FRED). The period of observation of analysis is conducted in quarterly time series from 1990:1-2020:4. In addition, all the variables are taken in the form of USD in thousands. In order to decrease the variation in the model, we have integrated our model into logarithmic form and we have adjusted our variables for the seasonality effect and made our related estimations based on that.

In estimating the empirical reserve model given in Equation (1), we are going to make use of the Linear and the Nonlinear Autoregressive Distributed Lag Approach. ARDL is the form of cointegration test analysis, and the first time it was proposed by Pesaran, Shin, and Smith in 2001.

In comparison to the other cointegration test analysis, it features the bound test approach which makes it to be more supreme because it evaporates the condition that all the variables subject to the analysis are stationary at the first level. The reason is that the traditional approaches that had been used for cointegration analysis as like Engle and Granger (1987) or Johansen (1988) have their limitations when it comes to performing the analysis. If the variables that are going to be analysed have the mixed order of cointegration or all of them are not non-stationary, then we can not apply traditional approaches of the cointegration analysis. These unfavourable outcomes of the methods put a huge obstacle for proceeding analyses.

In contrast to them, the ARDL method brings more priorities and flexibility within the applicability in the practice. First of all, this approach is better applicable for testing in small samples. Besides that, it performs much better in comparison to other approaches in explaining the relationship between the variables because it relies on producing more reliable results by using the short-run and long-run dynamics of the series so that facilitates more information about the variables of the analysis. Also from another side, ARDL does not have any restrictions in the conducting of analysis as in comparison to other techniques as if the series has different stationary levels or even the combination, it does not deprive from performing the analyses. But with the exception of the fact that the series should not be integrated of the order of 2. In order to have a much better understanding of the method let's integrate our model into it and emphasize it through the ARDL approach.

Based on the ARDL approach, the long-run relationship between the international reserves and the related parameters of our model is generated in the following manner:

$$\Delta R_t=\theta_0 + \theta_1 \sum_{i=1}^{p} \Delta R_{t-i} + \theta_2 \sum_{i=1}^{p} \Delta\sigma_{t-i} + \theta_3 \sum_{i=1}^{p} \Delta r_{t-i} + \theta_4 \sum_{i=1}^{p} \Delta STD_{t-i} + \theta_5 \sum_{i=1}^{p} EXC_{t-i} + \theta_6 \sum_{i=1}^{p} CAB_{t-i} + v_1 R_{t-1} + v_2\sigma_{t-1} + v_3 r_{t-1} + v_4 STD_{t-1} + v_5 EXC_{t-1} + v_6 CAB_{t-1} + y_t$$

In here y_t is the white noise error term and the summation sign is the indicator of the error correction dynamics. The second part of the equation shows the long-run relationship between the variables and based on the method, the null hypothesis of cointegration depicts that: $H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = 0$ which means that the series are not cointegrated. Based on the obtained F statistics the result is evaluated, whether there is a cointegration relationship exist between the variables or not. In the bound test, if the obtained F statistics exceeds the upper limit at a certain significant point, then there is cointegration exist within the series, which means that we can reject the null hypothesis. But if the obtained value does not exceed the lower limit and eventually below it then we accept the null hypothesis, which means that there is no cointegration exist between the series. In addition to it, if the F statistical value is between the two bounds then we can not depict anything related to the cointegration within. From another side, if there is the existence of cointegration within the series, then we can estimate the long-run coefficients of our model in the following manner:

$$\Delta R_t = \rho_0 + \rho_1 \sum_{i=1}^{p} \Delta R_{t-1} + \rho_2 \sum_{i=1}^{p} \Delta\sigma_{t-1} + \rho_3 \sum_{i=1}^{p} \Delta r_{t-1} + \rho_4 \sum_{i=1}^{p} \Delta STD_{t-1} + \rho_5 \sum_{i=1}^{p} \Delta EXC_{t-1} + p_6 \sum_{i=1}^{p} \Delta CAB_{t-1} + y_t$$

The short-run estimates of the model will be estimated in the following way:

$$\Delta R_t = \psi_0 + \psi_1 \sum_{i=1}^{p} R_{t-i} + \psi_2 \sum_{i=1}^{p} \sigma_{t-i} + \psi_3 \sum_{i=1}^{p} r_{t-i} + \psi_4 \sum_{i=1}^{p} STD_{t-i} + \psi_5 \sum_{i=1}^{p} EXC_{t-i} + \psi_6 \sum_{i=1}^{p} CAB_{t-i} + \eta ECM_{t-1} + y_t$$

Here we have included in the short run the ECM parameter which is the error correction model. It actually shows the speed of adjustment that needed to be maintained in order to restore the long-run equilibrium after the short-run shock. As we can see that ARDL is a very helpful approach in order to indicate the relationship between the variables based on short term or long term within themselves. Also as we can see it shows a linear relationship between the variables. But there is also an

asymmetric relationship that could also exist within the variables in the long run and in the short run. There might be a relationship between the variables that are hard to detect through ARDL due to the fact that, this relationship might be in a non-linear manner, and based on that the information related to cointegration might be missing, based on that NARDL approach had been proposed by Shin et al. (2014). This is the main approach that we are going to integrate into our analysis in order to depict the parameters of our model through the Non-Linear Autoregressive Distributed Lag Approach. According to the structure of the method, the independent variables of our model are divided to the partial sum of positive and negative changes within. We can write them in the following manner:

$$\sigma_t^+ = \sum_{i=1}^{t} \Delta\sigma_i^+ = \sum_{i=1}^{t} \max(\Delta\sigma_i\,; 0)$$

$$\sigma_t^- = \sum_{i=1}^{t} \Delta\sigma_i^- = \sum_{i=1}^{t} \min(\Delta\sigma_i\,; 0)$$

$$r_t^+ = \sum_{i=1}^{t} \Delta r_t^+ = \sum_{i=1}^{t} \max(\Delta r_i\,; 0)$$

$$r_t^- = \sum_{i=1}^{t} \Delta r_t^- = \sum_{i=1}^{t} \min(\Delta r_i\,; 0)$$

$$STD_t^+ = \sum_{i=1}^{t} \Delta STD_i^+ = \sum_{i=1}^{t} \max(\Delta STD_i\,; 0)$$

$$STD_t^- = \sum_{i=1}^{t} \Delta STD_i^- = \sum_{i=1}^{t} \min(\Delta STD_i\,; 0)$$

$$EXC_t^+ = \sum_{i=1}^{t} \Delta EXC_i^+ = \sum_{i=1}^{t} \max(\Delta EXC_i\,; 0)$$

$$EXC_t^- = \sum_{i=1}^{t} \Delta EXC_i^- = \sum_{i=1}^{t} \min(\Delta EXC_i\,; 0)$$

$$CAB_t^+ = \sum_{i=1}^{t} \Delta CAB_i^+ = \sum_{i=1}^{t} \max(\Delta CAB_i\,; 0)$$

$$CAB_t^- = \sum_{i=1}^{t} \Delta CAB_i^- = \sum_{i=1}^{t} \min(\Delta CAB_i\,; 0)$$

By emphasizing the relevant parameters in the related forms, now we can integrate the NARDL approach to our model:

$$\Delta \mathrm{R}_t = \alpha + \sum_{i=1}^{p_0} \beta_{0,i} \Delta R_{t-i} + \sum_{j=0}^{p_1^+} \beta_{1,j}^+ \Delta \sigma_{t-j}^+ + \sum_{j=0}^{p_1^-} \beta_{1,j}^- \Delta \sigma_{t-j}^- + \sum_{k=0}^{p_2^+} \beta_{2,k}^+ \Delta r_{t-k}^+ +$$

$$\sum_{k=0}^{p_2^-} \beta_{2,k}^- \Delta r_{t-k}^- + \sum_{l=0}^{p_3^+} \beta_{3,l}^+ \Delta STD_{t-l}^+ + \sum_{l=0}^{p_3^-} \beta_{3,l}^- \Delta STD_{t-l}^- + \sum_{m=0}^{p_4^+} \beta_{4,m}^+ \Delta EXC_{t-m}^+ +$$

$$\sum_{m=0}^{p_4^-} \beta_{4,m}^- \Delta EXC_{t-m}^- + \sum_{n=0}^{p_5^+} \beta_{5,n}^+ \Delta CAB_{t-n}^+ + \sum_{n=0}^{p_5^-} \beta_{5,n}^- \Delta CAB_{t-n}^- + \theta_0 R_{t-1} + \theta_1^+ \sigma_{t-1}^+$$

$$+\theta_1^- \sigma_{t-1}^- + \theta_2^+ r_{t-1}^+ + \theta_2^- r_{t-1}^- + \theta_3^+ STD_{t-1}^+ + \theta_3^- STD_{t-1}^- + \theta_4^+ EXC_{t-1}^+ + \theta_4^- EXC_{t-1}^-$$

$$\theta_5^+ CAB_{t-1}^+ + \theta_5^- CAB_{t-1}^- + \varepsilon_t$$

This is the formal NARDL technique which we have implemented into our model. In order to give a more clear statement for the sake of analysis, let's have a look at the expression above. In here, β_i^+ and β_i^- are evaluating the long-run effect of the parameters of the model. Correspondingly, $\theta_j^+$and θ_j^- are evaluating the short-run effect of the parameters of the model. After defining the structure of the method that

we are going to implement in order to estimate the parameters of our model, we can now perform related tests to estimate the results of our analysis.

3.3. The Estimation Results of the Empirical Reserve Model

The first step that we are going to implement in our analysis is to observe the descriptive statistics of our variables. The reason is that descriptive statistics is providing a piece of very crucial information about the structure of each variable`s data and that`s why it is important to obtain and observe it in our analysis.

Table 3.1 Descriptive Statistics

	R	σ	r	STD	CAB	EXC
Mean	-0.715187	0.001156	37.89070	17.45670	-1.594969	4.496928
Median	-0.611176	0.000554	22.09600	17.54163	-1.577576	4.512766
Maximum	-0.197709	0.017934	206.0257	18.76684	-0.100251	4.777456
Minimum	-1.646843	-0.000415	-3.937668	15.74046	-3.348254	4.050623
Std. Dev.	0.348210	0.002129	37.28557	0.906570	0.815938	0.164449
Skewness	-1.169444	4.587655	1.715996	-0.075619	-0.163809	-0.433999
Kurtosis	3.521262	33.13816	7.559792	1.615150	1.629922	2.418847
Observations	124	124	124	124	124	124

Examining Table 3.1 above we can deduct the valuable information related to our analysis. First of all, here we have mean and median which both measure central tendency. In this specific result, we can see that the mean of international reserves is -0.7151 and the median is -0.6111. From these indicators, we can deduce that the data of the international reserves appeared to be skewed to the left, which explains why the mean is less than the median. By looking at our second variable which is the adjustment cost, we see here that the mean is higher than the median (0.0011 is higher than 0.0005), which is the opposite to the situation that we observed in the reserve`s data.

This outcome reveals that the data of adjustment cost variable is skewed to the right. The justification of these appearances of the data also can be observed by looking at the skewness indicators. The opportunity cost variable (*r*) also appears to be skewed to the right. But the rest of the variables, which are Short Term Debt, CBA, and

Exchange Rate appear to be skewed to the left, which can be deducted based on their skewness being negative on all of them. The distribution of the data between all six variables has a higher variation for the Opportunity cost of reserves (r) in comparison to other variables. At the same time, we can see that all the variables except the opportunity cost (r) and adjustment cost (σ) are concentrated far away from the mean on average, which shows that there is a large variation in the data of the variables. The effect of this might be seen by observing the discrepancy between the mean and standard deviation of the variables.

Also, the kurtosis of the variables also shows the additional information related to the data located around the mean or far away from it. The costs variables have the kurtosis which is higher than a prerequired measure of 3, meaning these variables are leptokurtic. The adjustment cost variable (σ) has the extreme kurtosis value, which means that most of the numbers are located in the tails of the distribution, rather than close to the mean. The international reserve variable has a kurtosis of a little bit higher than 3 as prerequired which can be deduced also as leptokurtic. But the remaining variables` kurtosis is less than prerequired measure of 3 and means that they have a platykurtic design.

Unit root test results

After analysing the descriptive statistics of our data, as the second step of our analysis, we can determine the level of integration of our series. This is a pivot analysis that we need to conduct in order to show the stationarity of our series so that to be able to avoid any problems within the regression. Based on that we have implemented three different unit root tests. These are the Augmented Dickey-Fuller Test(ADF), Phillips-Perron Test(PP), and Kwiatkowski-Phillips-Schmidt-Shin(KPSS) test. In addition, the unit root test is important for the sake of the implementation of the ARDL approach, that's why we have to check for the stationarity of the series.

Table 3.2 Unit Root Tests.[45]

	R	σ	r	STD	CAB	EXC
ADF	-14.484 (0)*	-9.520 (4)*	-8.887 (3)*	-11.508 (0)*	-6.682 (4)*	-10.068 (0)*
PP	-15.401 (7)*	-70.785 (32)*	-23.597 (68)*	-11.508 (3)*	-9.9294 (3)*	-10.155 (36)*
KPSS	0.230 (9)*	0.313 (82)*	0.495 (121)*	0.074 (4)*	0.07401 (4)*	0.314 (27)*

Note: * denotes 1 % significance level. Figures in the paranthesis implies the number of lags chosen by SIC (Schwart Information Criterion).

All the series had been tested based on all three unit root tests. All of them are stationary at the first difference and are significant at the 1% level. In addition, KPSS is insignificant and this is the result that should be because the null hypothesis of the KPSS claim that the variable is stationary, meaning that if the test statistics can not be rejected at the 1%, 5%, or 10%, then we need to accept the null hypothesis, which claims that the series is stationary. In addition, to be assured of the relevancy of our analysis, we have to perform diagnostic test analyses for that. Based on that we have applied three tests for the reliability of our analysis.

Table 3.3 Diagnostic Tests.

	F-statistic (p value)	Obs*R-squared Chi-Square
Heteroskedasticity Test	1. 469346 (0.1352)	19.67254 (0.1408)
Serial Correlation Test	1.651966 (0.1966)	3.721745 (0.1555)
Normality Test		
Jarque Bera	3.196704 (0.202229)	

[45] In these tests the acronym for (*) means stationary.

Ramsey Reset	Value	df	Probability
t-statistic	1.768782	106	0.0798
F-statistic	3.128590	(1, 106)	0.0798

Table 3.3 presents the diagnostic tests in order to observe if there is a presence of autocorrelation or heteroskedasticity exist within the model. As we can see that there is no heteroskedasticity or autocorrelation exists within the model. We can deduce that, based on the null hypothesis of the tests. According to the Breusch-Pagan-Godfrey test of heteroskedasticity and correlation test, our results are greater than 5 %, which means that there is no heteroskedasticity or autocorrelation within the variables. Also, we can see from the Jargue Bera test that our model has a normal distribution because the p-value is more than 5% which implies that the data is normally distributed. At the same time, we have applied the Ramsey Reset Test for the existence of misspecification error in our model, and the null hypothesis of the test claims there is no persistence of the specification error. As we can see our result is bigger than 5%, which means that we can not reject the null hypothesis and claim that we have not any misspecification error in our model. From all of these tests, we can conclude that our model is correctly specified.

As we have already mentioned, the procedure of adopting the ARDL technique is to apply the bound test. The main reason for applying the bound test is to evaluate the existence of the long-run relationship between the variables of the analysis. Because we want to see, which independent variables explain the long-run relationship within the dependent variable. In order to be precise, we want to know which independent variable affects the international reserves in the long run. Based on that our bound test results are presented in the following manner:

Table 3.4 Results of Cointegration Test of ARDL method.

Test Statistic	Value	k
F-Statistic	1.317243	5
Critical Value Bonds		
Significance	I0 Bound	I1 Bound
10%	2.08	3
5%	2.39	3.38
2.5%	2.7	3.73
1%	3.06	4.15

As we can see from the table above our F statistic is 1.3172 and when we compare it to the bounds, we see that it is below any criteria bound limits. The null hypothesis of the analysis claims that there is no long-run relationship exists between the variables. By checking the F statistics we can see that it is lower than the upper bound levels of all significant values, so we accept the null hypothesis, by meaning that there is no long-run relationship exist within the dependent and independent variables. In order to reassure the bound test results, we might take a look at long-run and short-run estimates of the symmetrical method of analysis.

Table 3.5 Short-run and Long-run Estimates of ARDL Analysis.

a) Short-run Estimates of ARDL Analysis.

Dependent variable R			
Variable	Coefficient	Std. Error	t-Stat.
D(STD)	0.498*	0.080	6.199
D(STD(-1))	-0.198*	0.074	-2.666
D(VSQ)	4.929	2.971	1.658
D(VSQ(-1))	5.166	3.133	1.648
D(EXR)	-0.253**	0.099	-2.555
D(CMR)	-0.001*	0.0003	-4.170
D(CAB)	0.101*	0.033	3.053
D(CAB(-1))	0.090*	0.034	2.634
CointEq(-1)	-0.049*	0.015	-3.120

Note: *,**,*** denotes the significance level at 1%, 5% and 10% respectively.

b) Long-run Estimates of ARDL Analysis.

Dependent variable R			
Variable	Coefficient	Standard Error	t-Stat.
STD	1.030	0.604	1.703
VSQ	151.992	163.0005	0.932
EXR	0.808	1.033	0.782
CMR	-0.003	0.007	-0.397
CAB	0.315	0.415	0.758

Note: *,**,*** denotes the significance level at 1%, 5% and 10% respectively.

By observing the short-run and long-run estimates of the model, we might see that in the short run there is a relationship exist within the independent and dependent variables while the same outcome is not valid for the long-run relationship. If we will analyze each independent variable, by looking at the variables, we might see that D(STD) which is the short-term debt is significant at the 1% level. This means that in the short run there is a relationship exists within the short-term debt and international reserves.

The same outcome we can deduct for the exchange rate variable as well. By rejecting the null hypothesis of no relationship between the independent and dependent variable, at a 5% significant level there is a relationship exist within the exchange rate and dependent variable. Also, Current Account Balance and Opportunity Cost variables are significant at a 1% significant level so that proves there is an existence of the short-term relationship. But by observing the VSQ variable which stands for adjustment cost, the same outcomes may not be deducted for it. The reason is that its p-value is really high and because of that we can not reject the null hypothesis of the analysis.

As we know, the null hypothesis of the analysis claims that there is no existence of a significant relationship between the related independent variable and dependent variable. If generated p-value of the independent variable is lower than 1%, 5%, or 10% then we can reject the null hypothesis but we can not reject the null hypothesis for the adjustment cost variable, which proves that in the short run there is no relationship exist between itself and dependent variable.

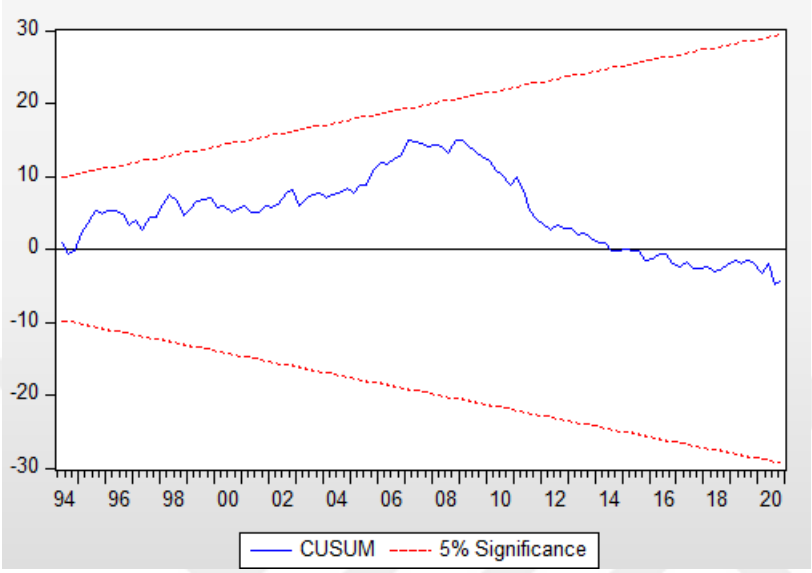
On the other hand, we also deduce a very important component related to the time relevance of the analysis which is the error correction form of our model and it is negative and statistically significant which shows the speed of adjustment per period of time. By meaning that if any shocks happen in the independent variable, it will be corrected based on the rate of 4.9% percent per period for the model to move back to the long run.

The long-run estimates of the analysis or in other words the long-run relationship estimates of the analysis from the table 3.5b show that none of the independent variables has a long-run relationship within themselves and dependent variable. Particularly, none of the independent variables could pass the null hypothesis which claims that there is no significant relationship exists between themselves and the dependent variable. Based on that it means that in the long run, there is no association exists between the STD (Short term Debt) and dependent variable which is R(International Reserves), between VSQ(Adjustment Cost) and R, between EXR(Exchange Rate) and R, between CMR (Opportunity Cost) and R, and between CAB(Current Account Balance) and R.

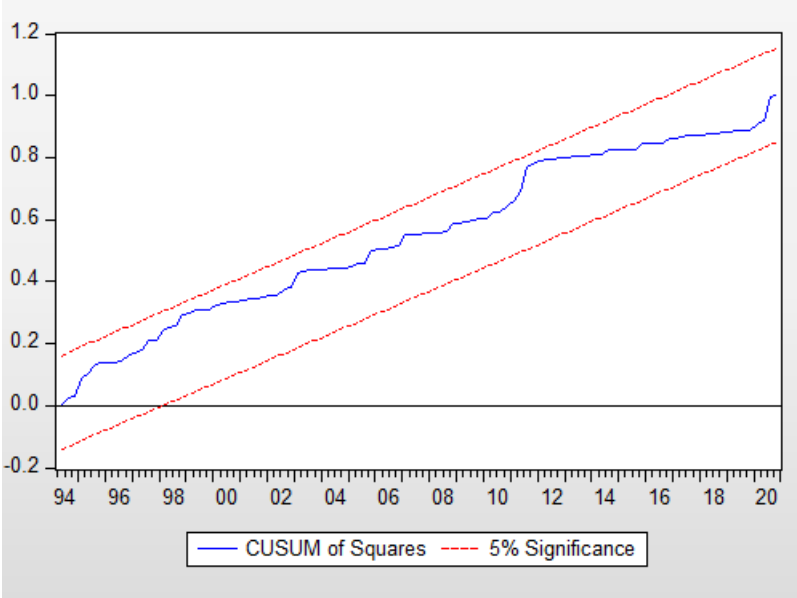
The last step that we are going to implement in our analysis in order to induce the reliability of our analysis by deducting it through the CUSUM graph. The CUSUM graph is a very important analysis as the other diagnostics analysis for the reassurance that if the model is correctly specified or not. By meaning that if the model fits the data or not.

Figure 3.1 CUSUM Graphs of ARDL method.

a)



b)



From the figures above, we might observe that our model fits the data and the model is correctly specified. Again by imposing the symmetric ARDL method into our analysis, we are actually trying to emphasize the degree of the relationship between the variables. So that this degree is decomposed in the form of the linear relationship between the variables. By expounding the possibility of the linear relationship between

the dependent and independent variables in the short run and long run. In other words, by applying this technique, we are trying to observe if there is any linear relationship we might see between the independent and dependent variables in the short run and the long run.

Now, after conducting the Symmetric ARDL method into our analysis, we can move to the analysis of the Asymmetric ARDL method(NARDL). But before proceeding with the main analysis, we need to conduct diagnostics tests as we did with the ARDL method. The reason for doing this, based on to be assured that the tests that we are doing are correct and the result of the tests are correctly specified.

Table 3.6 Diagnostic Tests of NARDL Method.

	F-statistic (p value)	Obs*R-squared Chi-Square
Heteroskedasticity Test	1. 091613 (0.3662)	31.22209 (0.3550)
Serial Correlation Test	0.466739 (0.6286)	1.263271 (0.5317)
Normality Test		
Jarque Bera	1.016693 (0.601489)	

Ramsey Reset	Value	df	Probability
t-statistic	0.759421	88	0.4496
F-statistic	0.576720	(1, 88)	0.4496

Based on our diagnostic results we might say that no serious correlation or heteroskedasticity problem is existing within the data and the value of the Jargue Bera Test also signifies that our data is normally distributed. By observing the Ramsey Reset Test for the existence of misspecification error in our model, by checking the p-value, we can be assured that we don't have any specification error in our analysis. The diagnostic tests of the NARDL method showed that our model is correctly specified. By determining the diagnostic analysis, now we can perform the cointegration test by implementing the bounds testing method.

Table 3.7 Results of Cointegration test of NARDL Method.

Test Statistic	Value	k
F-Statistic	3.130871	10
Critical Value Bonds		
Significance	I0 Bound	I1 Bound
10%	1.76	2.77
5%	1.98	3.04
2.5%	2.18	3.28
1%	2.41	3.61

According to the Cointegration test analysis, the null hypothesis claims that there is no presence of cointegration exist within the model. By meaning that if we can not reject any of the critical levels then we accept the null hypothesis. As we can see from the table above our F statistic is 3.13, by observing the lower bound and upper bound levels we can see that our F statistic value is above the lower bound and upper bound at 5% and 10%. This implies that we can reject the null hypothesis of no cointegration between the values so that meaning that there is a long-run relationship persists in the model. Based on this result, we might analyze the long-run and short-run estimates of NARDL results.

Table 3.8 Short-Run and Long-Run Estimates of NARDL Analysis.

a) The Short-Run Estimates of NARDL Analysis.

Dependent variable R			
A. Conditional Error Correction Model			
Variable	Coefficient	Std. Error	t-Stat.
D(STD_POS)	0.624*	0.106	5.850
D(STD_POS(-1)))	-0.314*	0.117	-2.689
D(VSQ_POS)	4.249	3.511	1.210
D(VSQ_POS(-1))	-1.761	3.316	-0.531
D(VSQ_POS(-2))	-4.719	3.091	-1.526
D(VSQ_POS(-3))	6.218**	3.066	2.028
D(EXR_POS)	-0.384**	0.161	-2.380
D(EXR_NEG)	-0.297***	0.154	-1918
D(EXR_NEG(-1))	-0.296**	0.142	-2.074
D(EXR_NEG(-2))	0.475*	0.146	3.244

D(CMR_POS)	-0.001*	0.00004	-3.210
D(CAB_POS)	0.119**	0.053	2.243
D(CAB_POS(-1))	0.089***	0.052	1.696
D(CAB_POS(-2))	0.144*	0.050	2.876
D(CAB_NEG)	0.120*	0.056	2.137
D(CAB_NEG(-1))	0.083	0.056	1.477
D(CAB_NEG(-2))	-0.0019	0.055	-0.034
D(CAB_NEG(-3))	0.194*	0.053	3.636
CointEq(-1)	-0.252*	0.038	-6.497

Note: *,**,*** denotes the significance level at 1%, 5% and 10% respectively.

b) The Long Run Estimates of NARDL Analysis.

Dependent variable R			
Variable	Coefficient	Std. Error	t-Stat.
STD_POS	0.433	0.468	0.924
STD_NEG	0.167	0.300	0.558
VSQ_POS	110.388*	1033	0.782
VSQ_NEG	95.34***	51.73	1842
EXR_POS	-0.204	0.380	-0.537
EXR_NEG	-0.376	0.477	-0.788
CMR_POS	0.0008	0.002	0.374
CMR_NEG	0.001	0.002	0.565
CAB_POS	-0.168	0.129	-1303
CAB_NEG	0.065	0.134	0.489

Note: *,**,*** denotes the significance level at 1%, 5% and 10% respectively.

In table 3.8, we have presented the outcomes of the short-run and long-run estimates of our independent variables. First of all, by observing the error correction form of the short-term estimates, we can depict the fact that it takes roughly 25% per period for the model to move back to the long run. By looking at the significance level of the independent variables, we can see that occurrence of the shock in the short-term debt has a significant effect on the reserves in the short run. By observing the adjustment cost variables we might say the positive shocks of the adjustment cost do not have an effect on the international reserves in the short run because the t statistic is more than 5% and 10% which implies that. The exchange rate variable shows that there is a relationship exists within the negative and positive shocks of it on the dependent

variable in the short run. At the same time, the opportunity cost(CMR) also affects international reserves in the short run. The same outcome we can depict for the rest of the independent variables and claim that there is a short-run relationship exist between independent and dependent variables, except for adjustment cost(VSQ) which shows that there is no short-term relationship persists within it towards the dependent variable.

By looking at the long-run estimates we see the different scenario, from all the variables only one variable show the presence of the long-run relationship. This variable is the adjustment cost variable (VSQ) that affects the dependent variable in the long run. By meaning that the positive changes and negative changes that are coming from adjustment cost have a significant effect on the dependent variable. But the same outcome we can not say for other independent variables because all of them could not reject the null hypothesis, which means none of the independent variables except VSQ affect the dependent variable in the long run.

On the other side, by observing the short-run and long-run effects on the dependent variable, we need to perform the Wald test in order to be reassured that the presence of the asymmetry exists within the variables.

Table 3.9 Long-Run and Short-Run Symmetry Tests .

Long Run (W_{LR})				Short Run (W_{SR})		
Variable	t-statistic	F-statistic	Chi-square	t-statistic	F-statistic	Chi-square
STD	0.421	0.177	0.177	1.556	2.423	2.423
VSQ	1.775***	3.152***	3.152***	0.467	0.218	0.218
EXR	0.280	0.078	0.078	-0.637	0.405	0.405
CMR	-0.274	0.075	0.075	-2.752*	7.575*	7.575*
CAB	-1.430	2.047	2.047	-0.208	0.04	0.04

Note: *,**,*** denotes the significance level at 1%, 5% and 10% respectively.

By observing the table above, we can see the results for the short-run and long-run asymmetry analysis conducted by using Wald Test. By observing the STD, we can deduct the fact that in the long run there is no asymmetric relationship coexisting within the dependent variable and the related variable. The reason for that is based on

the fact that in the long run, STD can not reject the null hypothesis at any significant levels, which indicates that we accept the null hypothesis of no asymmetry in the long run. This indicates that there is a linear relationship that coexists within the independent and dependent variables in the long run. The same outcome we might depict about the short-run result. The second variable which is the VSQ shows that there is a long-run asymmetric relationship exists between itself and the dependent variable. By meaning that we can reject the null hypothesis of equality and claim that there is an asymmetry in the long run. But when it comes to the short-run pace, we can see that VSQ does not have any asymmetrical effect on the independent variable. When we are observing EXR in the long run, we can see that, there is no existence of the long-run asymmetric relationship between itself and the dependent variable. Because we can not reject the null hypothesis at any levels and due to that there is no presence of the long-run relationship within the variables. A similar outcome we might conclude about the short-run result because it is insignificant at all levels.

By observing our fourth variable which is CMR, we can deduce that there is no long-run asymmetric relationship exists between the dependent variable and itself. Because we can not reject the null hypothesis and the reason for that its p-value is over the threshold and meaning that there is a presence of a symmetric relationship. When we look at the short-run relationship of it with the dependent variable, we see that it's significant at the 1% level, which indicates that there is a presence of the asymmetric relationship in the short run.

The fifth variable of our analysis is the CAB variable and it shows that in the long run and the short run there is no asymmetrical impact of it on the dependent variable. This result implies that there is linear interaction exists between the related variable and dependent variable in the short run and the long run.

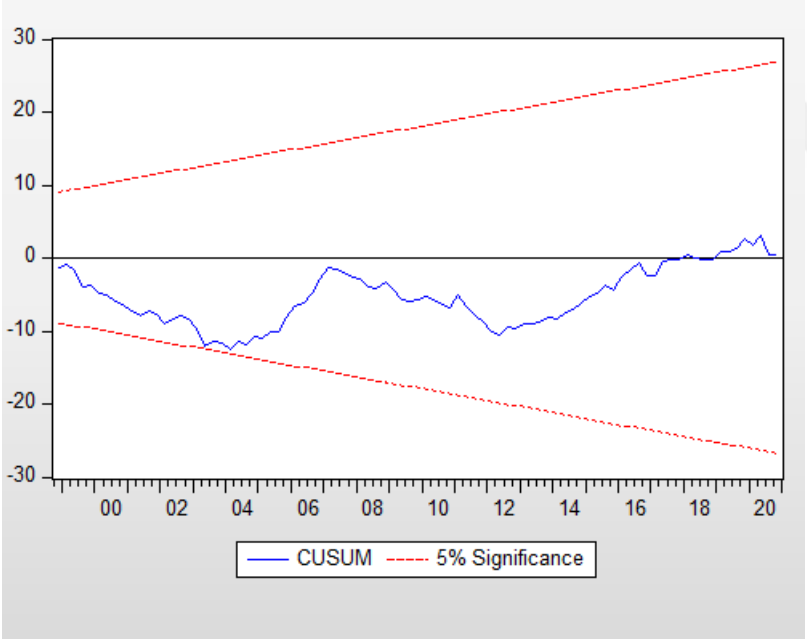
If we will shortly summarize the results of the Wald Test analysis, we can deduce that the short-run results of the analysis show that there is positive and negative effect exists between the related parameters and dependent variable. But this relationship except for opportunity cost is not in asymmetric form. By meaning that there is symmetrical effect exists in the short run between short-term debt, exchange rate, adjustment cost

and current account balance on the international reserves. Similar results we can depict for all variables in a long-run except for the adjustment cost. Due to the presence of a linear relationship, the interpretation of the long run and short-run effect of the related parameters are needed to be based on the results of the ARDL method. Because methodologically, it more appropriately explains the dynamic interaction between the independent variables and dependent variable.

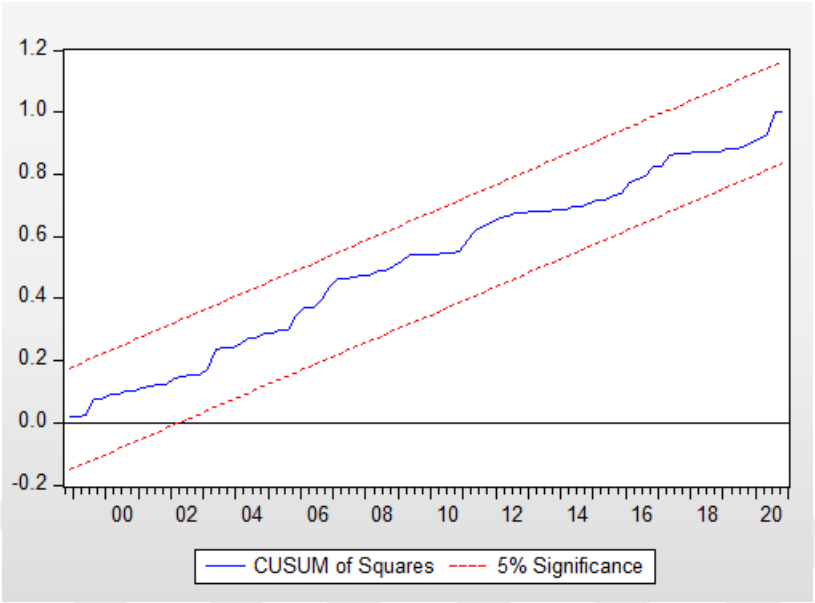
The last analysis that we are going to perform in order to be reassured of the relevancy of our results is to implement CUSUM analysis.

Figure 3.2 CUSUM Graphs of NARDL method.

a)



b)



As we can see from the figures above, the results from the CUSUM analysis show that the model is correctly specified and stable.

3.4. The Result of Empirical Analysis

Before interpreting the results of the empirical analysis, we have to devote attention to one of the important factors that we have deducted from our analysis is that international reserves prior for being as an indicator for acting as a shield against the risks that are affecting the economy, it also shows the economic performance of the country. First of all, the international reserves are the instruments that the central banks use in order to secure the economy against any turmoils that might happen through the emergence of disturbances that are coming from the inner side of the economy or from outside. Because of that, the international reserves are actually the policy implications of the central banks that are used in order to minimize the effects of potential risks that might possess on the economy. That's why in order to find the optimality level of international reserves or to see whether the reserves are on an adequate level or not, we need to find the reasons behind the demand for international reserves by Central Bank. Based on that reasons, we can analyze whether the CBRT reserves are at the optimal level or not so that to guard against the risks that might affect the economy.

Therefore the reasonings behind the demand for reserves is changing from country to country based on their economic structure and the different risks that affect each of them.

That's why when we are observing the results that are represented in table 3.5 and 3.8 we can descry the form of symmetric and asymmetric methods of analyzing our model and based on we might see very intriguing results related to the policy implication of the Central Bank of Turkey for the reasonings behind the demand for international reserves.

First of all, the exchange rate shows that it has a significant symmetrical effect on the international reserves at a 5% critical level in the short run so a 1% change in the exchange rate leads to a decrease of international reserves by 0.25%. Again, according to the result of the Wald Test that had been conducted at table 3.9, in the short run there is no asymmetric relationship exist within the exchange rate and international reserves. From that perspective, the ARDL method is appropriate for analyzing the short-run effect.

This result coincides with the statement of the main target of the CBRT which is to secure the stability of the currency and in order to do that it uses the reserves at its disposal to ensure it. By meaning that the shocks that might affect the exchange rate in the short run are under the primary concern of the CBRT so that in the presence of any instability in the exchange rate, CBRT is ready to mitigate its effect of it immediately. Also, the instability in the exchange rate plays one of the crucial roles in the demand for reserves which also corresponds with the findings of Manja (2018).

When we are looking at the long-run estimates, we see that there is an insignificant symmetric relationship exists between the exchange rate and the international reserves. This implies that in the long run, the exchange rate does not have a significant impact on the demand for reserves by CBRT.

Based on the result of the Wald Test that had been conducted at table 3.9, in the long run, shows that there is no asymmetric relationship exist within the exchange rate and international reserves. From that perspective, the ARDL method is appropriate for analyzing the long-run effect.

The outcome of the insignificancy in the long run within the exchange rate and International Reserves according to the ARDL method, can be deduced from the findings of Oyeniran and Alamu (2020), Kashif, Thiyagarajan, and Sridharan (2017), and Jena, Sethi (2020). The reason is that in these studies, the countries that had been taken as a role model to study for, are export-oriented countries. For instance, in the study of Oynerian and Alamu (2020), the country that they have studied was Nigeria. As we know Nigeria is one of the leading countries with natural resources like oil and it is exporting it abroad. The same we have seen in the study of Kashif, Thiyagarajan, and Sridharan (2017) who studied the international reserve level of Algeria. Algeria is also like Nigeria is producing oil and exporting it. Similarly, we might say about Brazil which had been studied by Jena and Sethi (2020), which is also famous for its natural resources. There is a huge demand for these countries' services and goods in abroad. The same can not be said about Turkey, because it does not export natural resources or services that have a huge demand relevant to these countries. The biggest evidence of it is the inclusion of Turkey in the group of Fragile Five Countries.

Therefore, when the country is exporting its goods and services and eventually has the foreign demand for them, in the long run, this puts pressure on the exchange rate. Because the demand for goods of these countries increases and in the long run this leads to the appreciation of the currency and in order to stabilize it, international reserves are needed to be exercised for that. That is why in these studies, it has been found that there is a long-run relationship exists between the exchange rate and international reserves. This is one of the probable reasons why the exchange rate does not have an effect on the international reserves of Turkey in the long run.

But on the other side, again we should not forget the fact that according to the reserve literature, one of the main functions of reserves is to act as the bolster mechanism against the exposures that might emerge upon the economy. The presence of the short-run relationship between the exchange rate and the international reserves indicates that the reserve policy implication which is applied by CBRT in order to preserve the value of the currency is related towards the mitigation of the risks that are possessing from the instabilities in the exchange rate on a short-run. The main reason for that is actually stemming due to the experiences that Turkey had experienced across the consecutive

shocks that had emerged back in the 90s. Specifically, the shocks that emerged in the 1990, 1994, 1997, 1999, and 2000-2001 periods led Turkey to experience major economic crises and the reasonings behind it relied on many factors as one of them was related with the shock that occurred due to Gulf Crisis in 1990 that put huge pressure on the stability of the exchange rate and affected the value of the currency in a negative manner so that eventually led to evaporation of major economic crisis in 1994. Even though the effect of the currency crisis that started in 1994 has not been fully recovered and in addition of the emergence of consecutive shocks that had been caused by the Asian Crisis in 1997 and the earthquake of 1999 led to a worsening of the economy, so that leading to the occurrence of huge pressures on the stability of the exchange rate and with the effect of persistently high inflation rate also caused the occurrence of another currency crisis that emerged in 2001[46].

Due to the experiences that it witnessed across these periods, CBRT's demand for reserves is primarily concerned with taking all necessary means in order to deprive the effect of fluctuations on the exchange rate on a short run and mitigate any effect of the occurrence of such crises again.

Because of that the insignificance of the effect of the exchange rate in the long run also shows that the risks that are coming from the exchange rate are not the primary reason for the demand of reserves by CBRT. By meaning that CBRT's demand for reserves is not concerned with the risks that might possess from the instabilities that can be caused by fluctuations in the value of the exchange rate in the long run.

The lack of consideration of the effect of the exchange rate on international reserves in the long run, is the primary factor in the emergence of the recent economic crisis in 2018. From that perspective, the insignificance of the exchange rate on international reserves in the long run, indicates the vulnerability of the economy against the risks that the exchange rate possesses on.

[46] See: Engin (2007); Durgun (2018).

The short-term debt also has a significant symmetrical effect on the international reserves in the short run so that 1% increase in the short-term debt leads to an increase of the international reserves by 0.30%.

By observing the long-run estimates, we see that the short-term debt has an insignificant symmetrical effect on the international reserve level of Turkey.

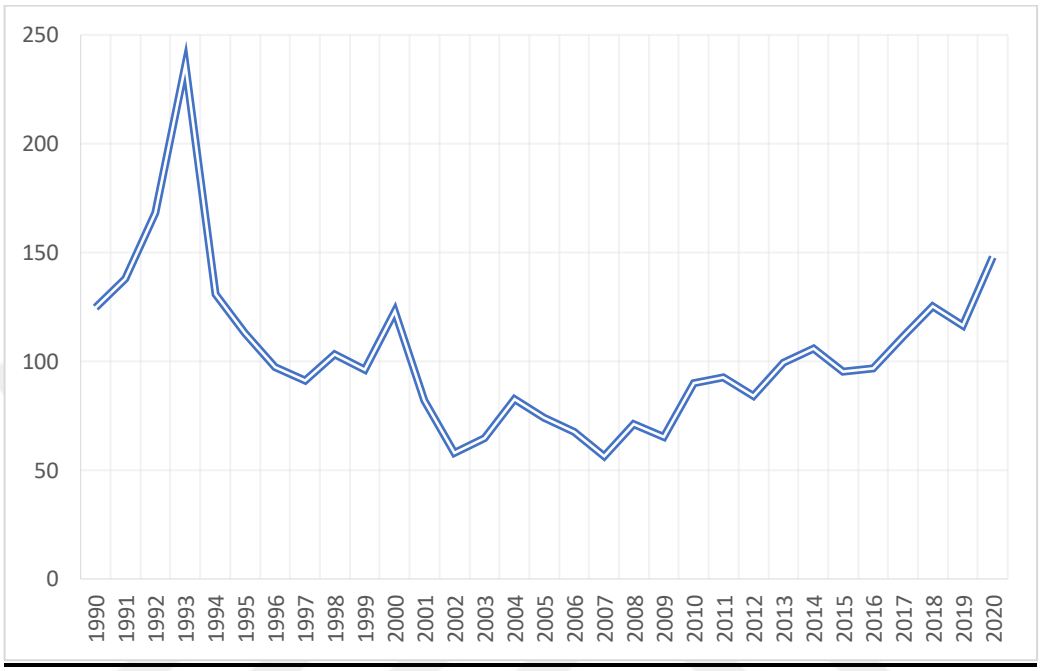
The impact of the short-term debt has a huge effect on the literature especially the main culprit of the Asian Crisis in 1997 was coming from mismanagement of short-term debts which led to huge costs for the global economy. (Rodrick and Velasco (1999), Kapteyn and Wijnholds (2001), Pablo and Guidotti (1999)). Accordingly to the relevant studies, the increase in short-term debt also increases the probability of the emergence of a crisis.

Correspondingly, the occurrence of the consecutive economic shocks in the 90s proves the best example of the importance of the effect of short-term debt on the stability of Turkey`s economy. The emergence of the 1994 crisis in Turkey had been based on many reasonings behind it, and it was not just the one reason behind it but a couple of reasonings that led to the evaporation of it. One of these reasons was also the presence of a high level of short-term debt, which also counted as one of the culprits of the emergence of the economic crisis[47].

The gradual increase in short-term debt across these periods led to the occurrence of another crisis in 2001. The best proof of it is the IMF support program that had been induced during 2000-2001 in order to cease the effect of the crisis on the economy and one of its main targets was to reduce short-term debt[48]. The vivid description of the effect of short-term debt can be better emphasized by a graphical representation of it across the period.

[47] See: Gümüş (2001).
[48] See: Yeldan (2004/1).

Figure 3.3 Short Term External Debt as a percent of international reserves



Source: The World Bank.

As we can see from the figure, short-term debt has been rising at the beginning of the 90s and eventually, it led to the emergence of the 1994 economic crisis. Because during that period in 1990 the short term debt accounted for 124 percent of international reserves whereas in 1993 this amount raised to 236 percent. Eventually, in 1994 the economic crisis evaporated, although after that there has been a gradual decrease in the short term debt but the emergence of the shock of the Asian Crisis and with the effect of the 1999 earthquake led to more deterioration in the economic growth and the short term debt has been raised and in 2000 it was nearly 122,95 percent of the international reserves and led to the emergence of another crisis in 2001. With the IMF program that had been induced in 2000-2001 in order to decrease the amount of the short-term debt, there has been a decrease in the amount of short-term debt and ended up with 57.94 percent in 2002. One of the biggest risks that short-term debt possess on

the economy is the fact that it can lead to evaporation of the currency crises[49]. This is exactly what happens in the 1994 and 2001 economic crises.

Based on the experiences that Turkey had passed through the consecutive shocks which occurred in the short run through periods of 1990,1994,1997,1999, and 2000-2001, the vulnerability that short-term debt possessed on the economy in the short run has been taken into the consideration. By meaning that the risks that are coming from a high amount of short-term debt in the short run have been the primary reason for the demand of reserves by CBRT.

Although the symmetric results of the analysis show that the insignificancy of short-term debt in the long run can be deduced from the fact that the risks that short-term debt possesses on the economy in the long run are not taken as a potential threat to the economy by the Central Bank of Turkey. Because the experiences that had been experienced based on the past crises show that the risk that might be possessed from the short-term debt is prudent based on the short-run basis rather than the long run.

But if we will look at the period of analysis, the risks that short-term debt possesses on the economy in the long run eventually emerged and became also one of the causes of occurrence of the 2018 economic crisis. As we can see from figure 3.3 in 2017 the ratio of the short-term debt to international reserves was 111.34 percent and in 2018 it raised to 125.57 percent, which also proves the fact of the presence of the crisis.

By observing the CAB(Current Account Balance) variable based on table 3.4 we might say that in the short run according to symmetrical analysis, there is significant existence of the relationship between CAB and international reserves. So that 1% percent increase in CAB leads to a 0.19% increase in the international reserves. But by judging the long-term effect of CAB on international reserves, we see that it is insignificant in explaining its impact on reserves.

Correspondingly, the result of the short-term effect emphasizes that the expected sign of the relationship between CAB and international reserves is correctly specified. Hence the presence of the positive effect between the CAB and international reserves

[49] See: Dadush, Dasgupta, Ratha (2000).

shows the fact that in case the country runs a current account deficit then there is going to be a decrease in the amount of international reserves. The common reason behind it lays on the fact that in case if the country runs a current account deficit then there is a rise in the demand for foreign currency arises and in order to suppress that need CBRT uses international reserves at its disposal. The result of the short-term effect correspondence with the finding of Yüksel and Özsari(2017).

In addition, the current account deficit is also one of the indicators that shows the presence of the upcoming crisis. Stanley Fisher nicely summarizes the effect of the current account deficit on the economy in the following manner:

'If the expected and realized current account deficit is high then it means that the country invites the devaluation.'[50]

One of the important factors that we induce from the results of the analysis is that the occurrence of the turmoil that happens in one indicator spread to another one as a chain of reasonings. Based on that, the occurrence of the major consecutive shocks that emerged in 90s where one of the main factors that led to the evaporation of the crises of 1994 and 2001 was also related due to a large amount of current account deficit[51]. The increasing current account deficit actually triggers the devaluation of the currency which also leads to the emergence of the currency crisis. This is what exactly had been witnessed during that period. The increasing amount of current account deficit and the effect of increasing inflation at the beginning of the 90s led to the depreciation of the currency even more causing the emergence of the economic crisis in 1994. The shocks that had been occurred during 1997, and 1999 led to a more deteriorating effect on the current account balance so that leading to the emergence of another crisis in 2001.

Because of that CBRT managed the reserve policy in such a way so that to deprive the effect of the Current Account Deficit on the economy in the short run so that to deprive the emergence of similar crises again.

[50] See: Fisher(1988:115)
[51] See: Enç (2001/2, 31-38).

From another side, by observing the policy of CBRT related to the reserve management and the reasons behind the demand for it, the presence of the insignificant effect of CAB in the long run, can be traced that the risks that are possessed by CAB are not a primary factor that affects the demand for international reserves of CBRT. The presence of the effect of the Current Account Deficit over a long period of time can lead to the emergence of severe consequences on the economy. One of such consequences is the emergence of the currency crisis of 2018 where one of the main culprits of it, is the increasing current account deficit. The lack of taking into account the negative effects that emerge from the current account deficit in the long run led to the emergence of the economic crisis in 2018.

If we will observe cautiously the effects of the three parameters that we have analyzed so far, we can see that there is actually a paradigm exist within it. The disturbances that had been caused by the shocks that had occurred during the 90s show how the short-term debt, exchange rate, and current account balance parameters affected simultaneously the economy. As we can see that the chain of the effects that occur in one of the parameters are actually affecting the other ones so that leading to have a total effect on the economy. Hence, it shows what crucial role reserves play in order to mitigate the effect of instabilities caused by these parameters.

By observing table 3.4, we can see that in the short run there is a significant symmetrical effect of opportunity cost on international reserves. By meaning that a 1% increase in the opportunity costs leads to a 0.001% decrease in reserves. Also by observing the asymmetric table of 4.7, we can deduce that there is a significant asymmetric effect of opportunity cost on the international reserves so that every 1% increase in the opportunity cost leads to a decrease in the international reserves by 0.001%. The effects of the symmetrical and asymmetrical results are similar.

The expected sign and statistical significance of the result show that the calculation of the opportunity cost had been correctly specified and corresponds to the finding of Ben Bessat and Gottlieb (1992). As a matter of fact, the effect of the magnitude of the opportunity cost on international reserves is very low. This also implies that the foreign currency reserves or other forms of components that CBRT obtains are not utilized for

investment purposes but rather are used as a precautionary demand for reserves in the short run. This outcome corresponds to the findings of Shijaku (2012), Aizenman and Lee (2005). At the same when we are observing the long-run relationship between the opportunity cost and international reserves, we see the insignificant symmetrical effect between them.

By looking at the results of the analysis in symmetric table 3.4, we can depict that in the short run there is no significant relationship exists between adjustment cost and international reserves either. At the same time, the result of the ARDL shows the absence of a long-run relationship between the reserves and adjustment cost.

But when we look at the long run of NARDL results, we see that indeed there is a long-run relationship exist between the adjustment cost and international reserves. By meaning that in the long run, the adjustment cost has a significant asymmetric effect on the reserves, which can be deduced from the effect of positive and negative changes of it on the level of reserves. The negative change of the adjustment cost on the reserve level has a positive coefficient, which means that the response of the international reserves to the negative changes in the adjustment cost is positive. By meaning that whenever the adjustment cost is decreasing, it will have a diminishing effect on the reserve level. For every 1% decrease in the adjustment cost, international reserves will decrease by 95%. On the other hand, if the adjustment cost increases by 1% then the reserves will increase by 110%. As we can see that in the long run there is an asymmetric relationship exist between international reserves and adjustment costs. The results imply that CBRT is striving to accumulate reserves as much as it can due to the uncertainties and vulnerabilities that might arise upon of having a low reserve level. This effect showed what crucial role, in the long run, the reserves play for CBRT as a policy tool for safeguarding the economy against the exposures that might affect it in a negative manner. This also proves that CBRT's main policy for reserve accumulation is based on the precautionary motive which confirms accordingly by the analyses of Aizenman and Lee (2005) and Oyeniran and Alamu (2020), Shijaku (2012).

Besides that, the results of the error correction mechanism from both analyses which are respectively -0.04 and -0.25 induce a low speed of adjustment indicating less active reserve management. The main reasoning behind that might be related to floating the exchange rate mechanism and the availability of data on real-time (Shijaku (2012)). Although the combination of the increasing trend in the reserve level with the low adjustment coefficients indicated the fact that in order to finance the balance of payments needs, the return to equilibrium will induce a huge amount of reserves[52].

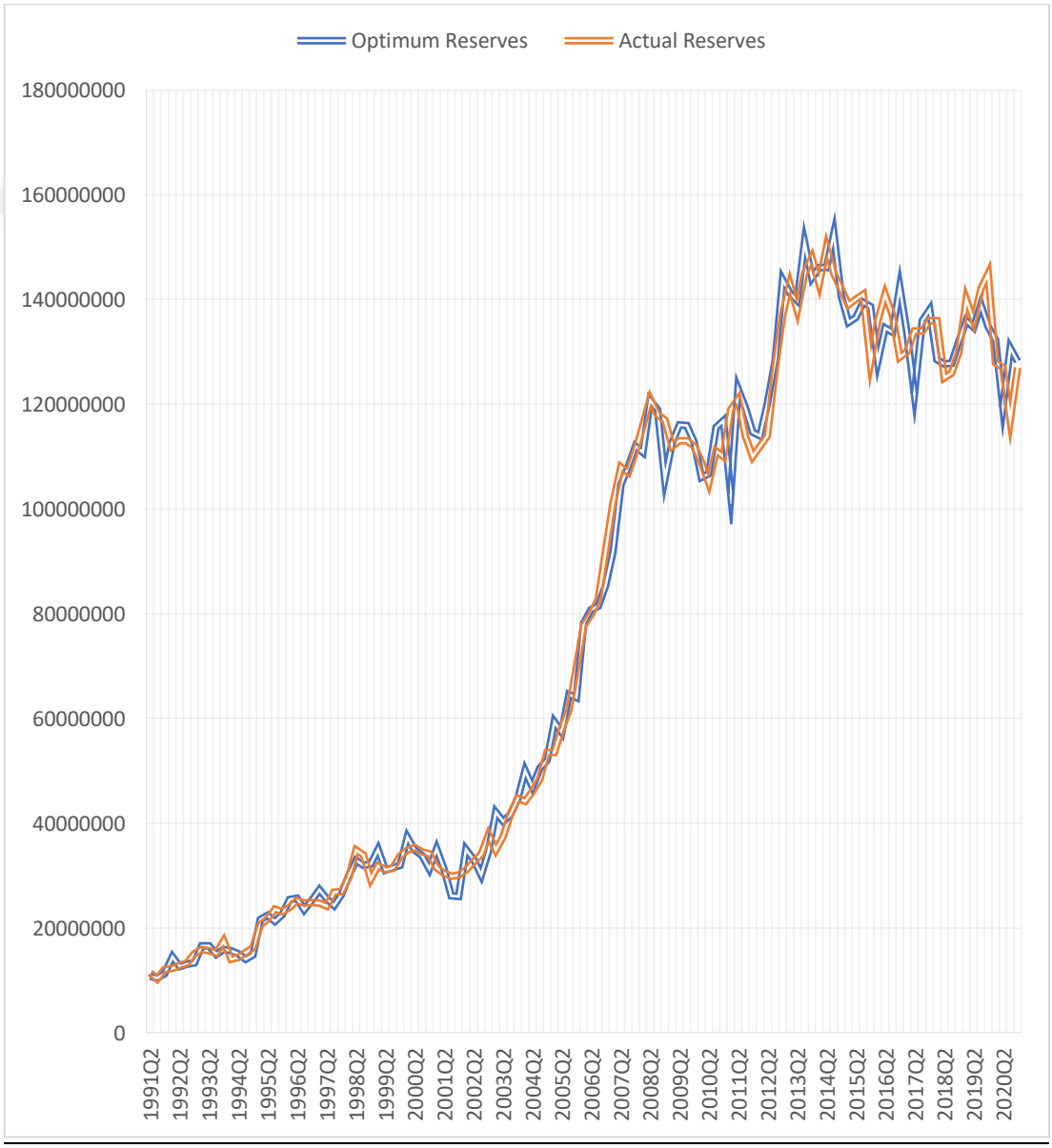
Furthermore, the effect of the precautionary motive behind the accumulation of the reserves can be vividly anticipated from the results of the short-run and long-run estimates of the analysis. By observing the description of the results that we have obtained from the analysis, we might see that the short-run and long-run reasonings are actually imitating the economic situation of Turkey in a very vivid manner. The risks that are possessed by the exchange rate, short-term debt, and current account balance led to the emergence of the biggest economic crises in history that took a place in 1994, and 2001 crises. Although one of the main contributions of the emergence of 1994 was coming from the Gulf Crisis in 1990 and the 2001 economic crisis was provoked by the shocks that had taken place in 1997 and 1999.

Based on that experiences, CBRT is more concerned with the risks that are coming from these parameters in the short run rather than in the long run. This can be also induced by the short-run effect of the opportunity cost on the reserve level. Because the timeline between the evaporation of the next shock was on a short-run basis, in order to deprive the effect of occurring the consecutive shocks that occurred in 1994,1997,1999 and 2001, CBRT prefers to keep reserves against the evaporation of such a kind of disturbances. That's why we might see more clearly the reasoning behind the demand for reserves against the risks that these parameters possess on the short run rather than a long run. On the other hand, the long-run effect of adjustment cost proves the fact that indeed CBRT acknowledged the importance of the reserves and the related costs that occur with the depletion of them.

[52] See: Prabheesh (2007).

But again the lack of taking into consideration the long-run effect of the risks that related parameters are possessing, led to the emergence of the 2018 economic crisis. The graphical representation of the comparison of the actual reserves with the optimal level that is represented below is the best vivid description that proves this aspect.

Figure 3.4 The tendency of Optimum and Actual Reserve Level of CBRT.

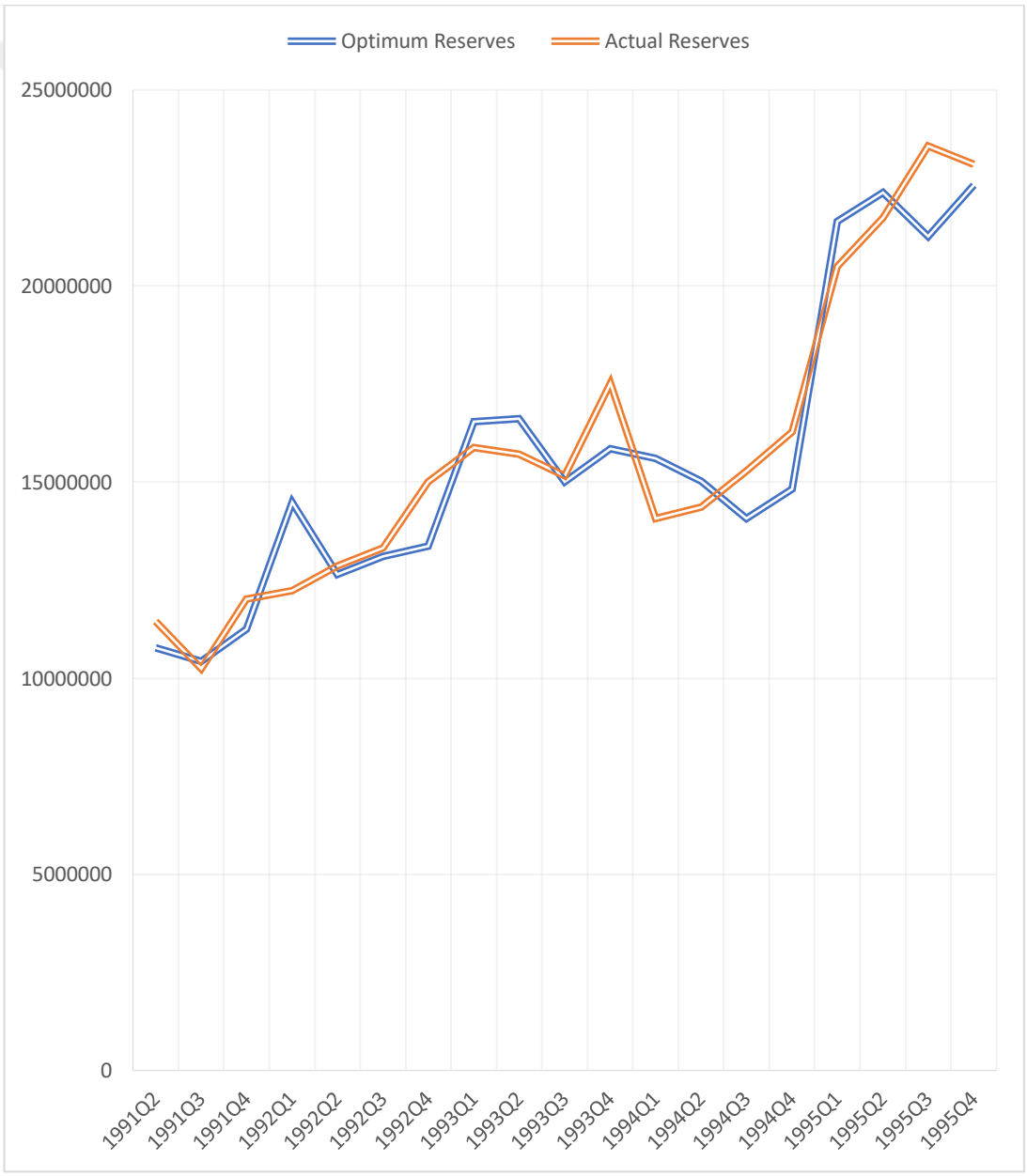


The figure above gives us a vivid description of how the economy of Turkey had been performing over time. The main important part of this graph shows us how the shocks

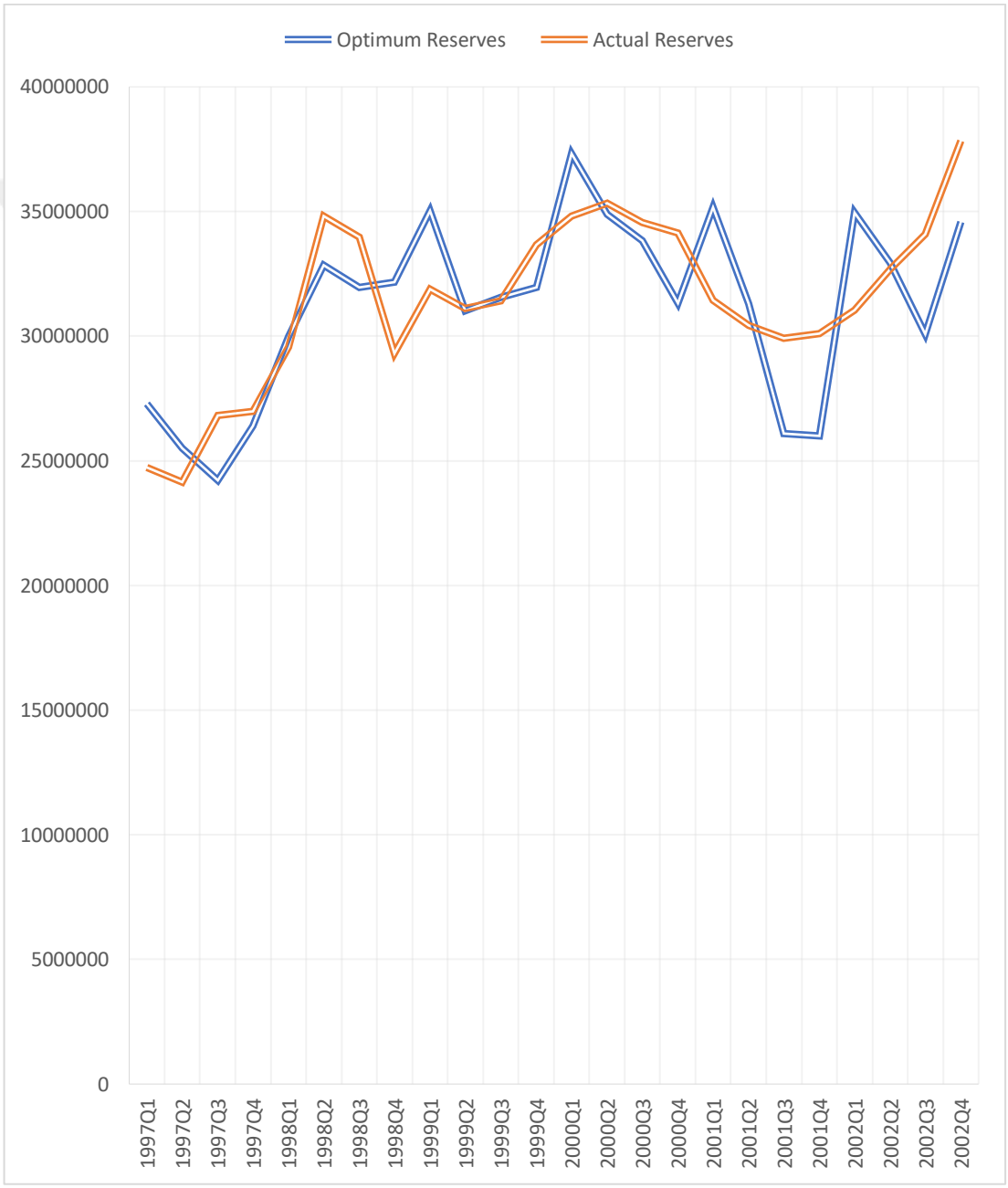
have been affecting the economy and how CBRT has been reacting towards these vulnerabilities. In order to better see the effects, we have divided the graph into segments so that to be able to better observe the effect of shocks that had affected the economy.

Figure 3.5 The segments of Optimum and Actual Reserve Level of CBRT.

a)



b)


Optimum Reserves
Actual Reserves
40000000
35000000
30000000
25000000
20000000
15000000
10000000
5000000
0
1997Q1
1997Q2
1997Q3
1997Q4
1998Q1
1998Q2
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2001Q1
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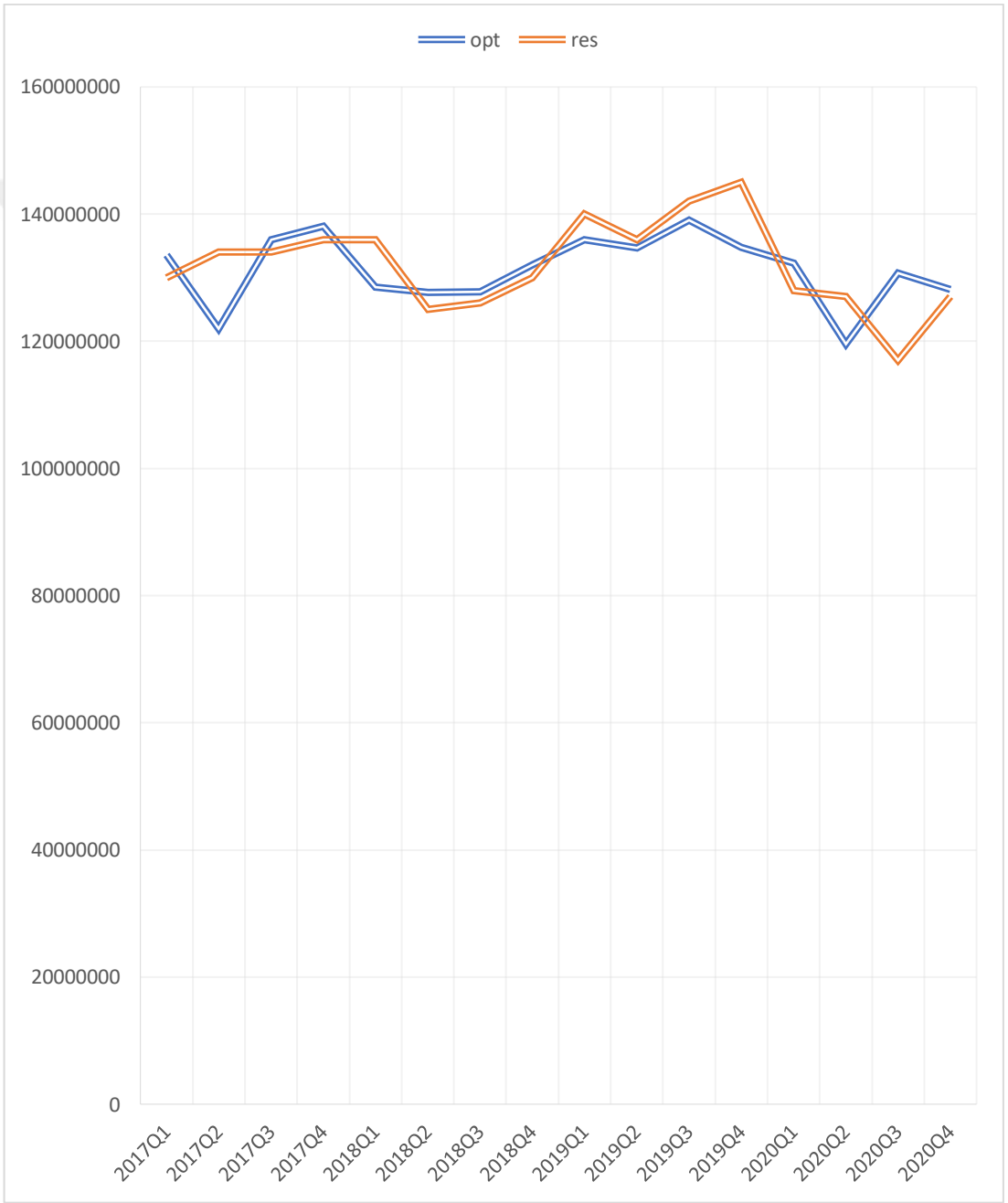
2001Q4
2002Q1
2002Q2
2002Q3
2002Q4

c)


opt
res
160000000
140000000
120000000
100000000
80000000
60000000
40000000
20000000
0
2017Q1
2017Q2
2017Q3
2017Q4
2018Q1
2018Q2
2018Q3
2018Q4
2019Q1
2019Q2
2019Q3
2019Q4
2020Q1
2020Q2
2020Q3
2020Q4

By observing figures of 3.5 we can see how the reserve level was performing at the beginning of the 90s. As we can see from the graphs the reserve level experienced a lot of fluctuations which also shows that most of the time it was below the consistency level so that it did not catch up with the optimality level so that proving how severely the economic shocks have actually affected the economy. But based on the experiences that Turkey endured each time with the emergence of new shocks upon, we see from figure 3.4 how in time the reserve level has been increased. The emergence of the consecutive shocks that took place in 1990, 1994, 1997, 1999, and 2000-2001 gave a good lesson of facilitating the importance of the reserves as a bolster against the risks possessed by the shocks that had been experienced across the years. The short-run impact of opportunity cost justify the fact in order to decrease the effect of the vulnerabilities that might emerge upon on the short run, instead of investing in high yield assets, CBRT keeps the reserves for precautionary purposes. Correspondingly, the long-run effect of adjustment cost proves that the risks that might happen due to insufficient amount of reserves in the long run can lead to more severe consequences prior to crises experienced before. This kind of behavior approves the presence of precautionary reasoning behind the accumulation of reserves. An increasing effect of the reserve level can be also induced from the low-speed adjustment of both ARDL and NARDL results[53].

Therefore, the amount of reserves as we see from figure 3.4 has been exhibiting an increasing trend. Imposing new active policies by CBRT for increasing the reserve level such as ROM led to an increase in the amount of reserves after 2011. Although the actual reserve level has been increased hence it was not still performing at the same rate as the optimal level which still proves that the economy is vulnerable to the risks that might emerge upon, such as the 2018 economic crisis.

The burst of the 2018 economic crisis that emerged in the second quarter led to a decrease in the amount of reserves so that to deprive the effect of it on the economy. Although the effect of the crisis has not been felt at the same level in comparison to the previous crises. Specifically, in 1994 and 2001 the economic crises were more

[53] See: Clark (1970).

severely affected the economy rather than in 2018. The reason of this actually entails in the fact that the reserve level has been higher in comparison to the period of the previous crises and because it was high, the effect of the crisis has not been felt too much on the economy. Because during the occurrences of the crises 1994 and 2001, the reserve level was low and because of that the effect of the crises were more severe. But in 2018 the level of reserves was much higher and because of that, the effect of the 2018 economic crisis did not have the same effect on the economy as the previous ones. Due to the turmoils that had been experienced back in the 90s prove the fact how crucial role the reserves play for the economy based on the result of the long-run effect of adjustment cost.

Also, another reason is that the discrepancy between the actual reserves and optimal reserves as we can see from figure 3.5.c has not been too much profound in comparison to the previous crises(3.5.a; 3.5.b), which also additionally proves the fact that the effect of the recent crisis has not have a devastating effect on the economy as like previous crises.

But at the same time, the discrepancy was not perfect, because in that position it should be showing a very similar trend to the optimality level. If that will be the case then the 2018 crisis should not have emerged but it did which proves that although its effect of it was not as rigid in comparison to the previous crises but the lack of trend of optimality proves the fact that the crisis affected the economy. The same outcome we might say about the shock that had emerged from the global financial crisis of 2008. Even though as we can see from the figure of 3.4, there was a lot of fluctuations and oscillations between the actual reserves and optimal reserves but the effect of that shock had not been too much severe in comparison to the 1997 shock so that to induce of emerging economic crisis as like 2001. But although the effect of 2008 might not be too much severe hence the effect of it still affected the economy.

If we will generally look at the period of analysis we will see that the fluctuations and oscillations within the optimal level and actual reserves show the fact that in comparison to the beginning of the 90s, the reserve level had been increased but even though there is an increasing trend in the reserve level, still Turkey economy is

vulnerable to the shocks. These shocks are not just limited prior to the vulnerabilities that emerge from the parameters of the analysis but also to other risks as like the occurrence of the Pandemic at the end of 2019, which proves again the fact that Turkey's economy is still very vulnerable to the risks that might emerge on the economy. In order to facilitate a strong background against such a kind of exposure, CBRT needs to use more effective policies in order to manage the reserve level so that to be able to show a similar trend with optimality level.

Although another probable reason of why the reserve level of Turkey is not at an adequate level can be deduced based on the institutional motive behind it. Turkey is one of the emerging countries which is trying to overpass its competitors for being the leading country for investment by foreign investors. In order to show that, CBRT might intentionally hold fewer reserves than required so that to give the message as a country that has a low level of corruption. This is one of the strategies that CBRT can adopt in order to show its image in the global world in order to attract investors. But the effect of such a kind of reasoning or others is needed to be further investigated in order to see the presence of them in the motives of CBRT prior to precautionary motive.

Conclusion and Policy Recommendation

The international reserves have been playing an important role in the global economy. The reason for that stems from the fact that with the progression of time, world economic and financial systems become more divergent and in accordance with it brings more opportunities for the countries to grow but at the same time, it brings a lot of distortions within it. Especially with the burst of globalization after the breakdown of the Bretton Woods System in 1973, countries become more interdependent within each other so that leading to countries that never had a chance to be able to access the financial markets and to be able to progress and develop.

But this interdependence also becomes one of the reasons for splurging the risks that it brought with itself in the form of financial and economic crises. Because the interdependence that globalization led to the dependence of the countries within each other and eventually the disturbance that emerges in one country led to passing it to other countries and through that facilitating to the emergence of the crises in the whole world. From that perspective, the international reserves play a crucial role as a relief to mitigate the effect of these disturbances and constraint the evaporation of future crises. Even though in case that if the country is already experiencing the effect of the crisis, the international reserves provide the necessary adjustments to minimize the effect of that crisis and provide smoothness to the economy. That's why from that perspective, the international reserves play as a shield against any distortions that might lead to distortions in the economies of the countries so that leading to a contraction in the growth.

Because of these positive effects that international reserves have on the economy, there has been done a lot of studies in order to find out what is the adequate level of reserves needed to have in order to decrease the effect of the vulnerabilities that might emerge upon the economy from the inner side or outer side. There have been proposed a lot of benchmarks to find the adequacy level of reserves. But all of these benchmarks have their own limitations and because of that, there is no perfect benchmark that might be used in order to assess the adequacy. The reason is that the international reserves are the main instruments that are actively exercised by the Central Banks in

order to stabilize the economy against the risks that might splurge upon. From one side the demand for reserves by Central Banks is changing from country to country and the risks that they are targeting with their demand is changing too. So that with the development of the countries at the same time the risks that are threatening the economy also changed and become more severe. With the evaporation of each new risk, the traditional approaches lost their validity points in order to capture the risks as the crises predictors. Prior to that, the approaches that had been implemented in practice are taken in linear form and do not take into account a lot of explanations coming from nonlinear effects within the variables. That's why new approaches needed to develop in order to assess the adequacy of the reserves.

When we are observing the studies that have been done to assess the adequacy level of international reserves of Turkey, we see very limited in comparison to the studies that had been done abroad. In addition, most of the studies that have been conducted were based on evaluating the international reserve in the form of foreign exchange reserves but not as the total reserves. Based on that we have evaluated the adequacy level of reserves from an optimization point of view. The basic reason for evaluating the adequacy level of reserves from an optimization point of view is due to the fact that implementing the metrics that have been possessed by methodologies is not taking into consideration the costs associated with keeping the reserves. One of these costs is the adjustment cost, which is a policy-related cost with taking necessary measurements to obtain the additional amount of reserves if the reserve level is at a low level. Another one is the opportunity cost associated in the form of forgone interests earnings which can be better be evaluated as investing in more higher-yield assets in international markets. That's why evaluating the adequacy of reserves from an optimization point of view is not just taking into consideration the risks that might evaporate from the inner side or outer side but also taking into consideration the costs associated with reserves. So that evaluating the adequacy of reserves by using an optimization approach is very important for giving us an idea about how the reserves are actually managed and at what levels they are, by judging it based on the cost and benefits approach. Based on that, we have evaluated the determinants of the Central Bank of the Republic of Turkey's international reserves, and we have also assessed the reserve

adequacy from an optimization point of view for the period between 1990:1-2020:2. In order to do that we have adopted the buffer stock model advanced by Frenkel and Jovanovic (1981) and integrated the ARDL and NARDL methods into the model. According to the result of the empirical analyses, we found that short-term debt, opportunity cost, exchange rate, and current account balance have a significant symmetrical impact on the demand for reserves by CBRT in the short run. Also, according to NARDL results, there is a significant asymmetrical impact of opportunity cost in the short run and adjustment cost in the long run existing on the demand for reserves by CBRT.

The effect of the shocks that had occurred specifically in 1990, 1994,1997,1999, and 2000-2001 led to the experience of major economic crises that had been caused by distortions that have been affected by the exchange rate, short-term debt, and current account balance due to the low amount of reserves. Based on the experiences that had been experienced across that period, CBRT demand for reserves was mainly targeted to decrease the distortions that might emerge from these parameters in the short run. But the insignificancy of short-term debt, current account balance, and exchange rate, in the long run, show that the risks that they possess in the long run are not taken as a primary concern in the demand for reserves. The lack of concern brought to the emergence of the recent economic crisis in 2018.

Although the level of actual reserves was not as low as in comparison to the previous periods so that implying the effect of the 2018 economic crisis on Turkey`s economy was not as severe in comparison to the timeline of the crises that had been evaporated back in 1994 and 2001. By indicating the fact that with each occurrence of the shocks across the analyzed period of time, some of them showed a more severe effect on the Turkey economy through emerging of economic crises which led to taking lessons accordingly and through that facilitating to take actions so that not to allow to have occurred alike disturbances anymore. The related actions for that can be deduced from the presence of the short-term effect of opportunity cost and the long-run impact of the adjustment cost on the demand for reserves by CBRT. By indicating that the main intention of accumulating the reserves is concerned with precautionary motives rather than mercantilist motives. This aspect also shows what crucial role ARDL and

NARDL methods play within the analysis so that be able to reveal these dynamic interactions. Although, despite the increasing trend in the reserve level of Turkey for most of the time it could not catch the trend of optimality level which indicates that despite the increase in the amount of reserves in comparison to the initial years, the economy of Turkey is still vulnerable to the other shocks that are coming apart from the parameters of the analysis. The best example of such kind of shocks is the pandemic of Covid 19 that burst in 2020.

Thus, CBRT should be more cautious with the policies related to the reserve's management. Because the insignificancy of the parameters in the long run, shows that CBRT does not take fully into account the risks that these parameters possess to the economy. Prior to that, the level of reserves is needed to be managed in such a way so that to be able to catch the optimality level in order to deprive other types of shocks that might lead to the emergence of more severe types of crises. That’s why CBRT needs to manage its own reserve policies more effectively so that to take more operative steps in order to deprive the effect of vulnerabilities that might splurge on the economy.

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